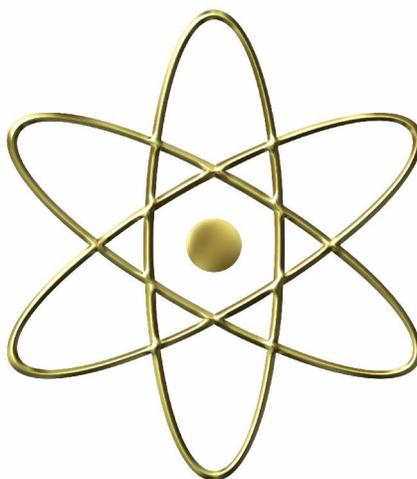


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The Journal of American Science

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¹ Ali Badragheh, ² Mohammad Abedi

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Abstract: Importance of women issue at Iran especially rural area, at one side face with fast population growth and mass of unemployed at process of access to rural growth and development, and at other side with limitation of facilities and productive resources. Rural women at all production level of agriculture products and livestock productions work alongside men and generally, development is multidimensional process and contains different economic, social, cultural and political dimensions. Women's participation at this process is active and affective participation, and main aspect of this participation was its economic dimension for rural women. Rural women have key role as a producer at agriculture activities, rural sources and services at rural area. rural women most efficient women of society and among people who are active at productive occupations, so it is obvious that attention to rural women as a strong arm at rural development can follow positive and undeniable affects, in this purpose.

[Ali Badragheh and Mohammad Abedi. **Importance of rural women as effective factor in rural households**. Journal of American Science 2011;7(6):1-6]. (ISSN: 1545-1003). <http://www.americanscience.org>

Keywords: rural women, rural households

[Full Text](#)

Climate change caused by dust and its effects on the characteristics of Morphophysiology, quantitative and qualitative yield of plants in Khuzestan province

2

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Abstract: Human in the last 20 years climate change has faced a lot of his works on display touches gradually. Dust (size 4 microns) resulting from natural phenomena in which these changes occur, the mitigation of harmful effects is very difficult and almost "out of control And why is Iran being on the belt of this phenomenon (geographical location and latitude 24 40 °) regions of the country constantly, especially "the South have faced with this phenomenon but in recent years the amount, concentration of suspended solids, number, time stability and the establishment, expansion and influence of this phenomenon has increased. Spread and persistence of dust caused climate change in terms of amount of These changes on plant metabolism and .light received, changes in air temperature and relative humidity changes in the amounts directly and carbon dioxide and oxygen is indirectly Dust particles are no moisture absorption and potential abundance of .affects the performance characteristics of qualitative and quantitative Morphophysiology and affect the plants Dusts on plant surfaces are green and the moisture levels, reduced water .water that attracts humidity and dry air over the process of expanding leaf surfaces and limit plant growth On the other hand placing the green plants on the surface, disrupting the process of receiving light and can reduce plant .pressure are limited turgid growth will intensify With low growth, reduced plant height and dry matter .photosynthesis and are dark spots on plants and garden products to create a market-friendly to reduce the intensity accumulation, especially "in plants such as sorghum and alfalfa hay spatial and reduced product sweep sorghum south province reduced panicle length, have a severe drop Radasith According to estimates made phenomenon to about 40 to 50 percent crop damage are: for example, "reduce product pomegranates from 6 tons to two tons and reduce .product product from 50 to 60 pounds below the five kilogram PJ per tree in 2009 resulting this is a phenomenon. Because of the dust early harvested crops such as pomegranates reduce Dust phenomena addition to reducing the impact of harvesting dates is .serious product and its quality is low. The amount of the paste processing and production quality is very low seriously diminish the quality of this product is too. At present rates of harvest dates in Khorramshahr is faced with a significant decrease. In 2009 only six thousand and 500 tons of palm groves of palm harvest and harvest dates grade level to zero level and harvest dates Palm owners only grade 2 and below have hope. Dust phenomena in addition to increasing .sequence s pests, reducing rates of photosynthesis and quality Field dates will be

[Tayeb Saki Nejad, Climate change caused by dust and its effects on the characteristics of Morphophysiology, quantitative and qualitative yield of plants in Khuzestan province. Journal of American Science 2011;7(6):7-9]. (ISSN: 1545-1003). <http://www.americanscience.org>

Keywords: climate change, dust, crops, Khuzestan (IRAN)

[Full Text](#)

3 Calculate changes of bean germination process in the presence of various compounds of biological fertilizer Humic acid mixed with micro and macro elements

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Result of the student research team

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Abstract: Biological products that are organic fertilizers include different types of microorganisms have the ability to convert the elements of the form unavailable to available form through biological processes have them. Biological fertilizers increased microbial activity of microorganisms and intensify them to make food available in forms which are easily absorbed by the plant are. Huomic acid as an organic acid from humus and other natural resources through the hormonal effects of improved nutrient absorption and increased root and shoot biomass is. Therefore, it seems, especially biological fertilizers Huomic acid increased root biomass, increased solubility of nutrients in the soil and can increase the absorption is increased yield. Germination of seeds is a complex physiological process triggered by imbibitions of water after possible dormancy mechanisms have been released by

appropriate triggers. Organic matter due to the beneficial effects on physical properties, chemical and biological soil has an important role in soil fertility, plant nutrition and crop yield have increased. Humic acid humus material that is part of the property due to the complex hormonal and audience an important influence in increasing crop production and supply is balanced. Effect of micro-fertilizers in the new debate is the speed and germination. Humic micro elements like iron and acid compounds or elements Clat Humic complete micro or treatment Humic Clat, complete micro and macro elements on the speed of germination and affect. These substances cause a change in speed and percentage germination for causing water absorption and osmotic regulation are. The purpose of this experiment was how to effect of micro fertilizers on germination. After three days of testing, counting and investigation was initiated seeds results indicate that the five treatments applied after the third day: 10 numbers in the control of the number 5 seed was germinated but in treatment Humic Clat magnesium and calcium from number 10 seed did not do any germination.

[Tayeb Saki Nejad, S, M, Hossaini, Mahdi Hyvari. Calculate changes of bean germination process in the presence of various compounds of biological fertilizer Humic acid mixed with micro and macro elements. Journal of American Science 2011;7(6):10-14]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Humic Acid, micro & macro elements, Seed

[Full Text](#)

4

Calculate dynamic changes in bean yield in different plant densities

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Abstract : General purpose of testing conditions to get the best crop production figures for comments in order to get maximum yield is. Appropriate distribution of plants per unit area in one of the most consistent factor is to increase yield. In order to study the effect of different densities on bean cultivars, experimental farm in 2008 Farm Research, Islamic Azad University of Ahvaz was executed. Factorial experiment in randomized complete block design with three replications was formed. The first factor consists of three densities (45, 55, 65) plants m and the second factor consists of three digits (ZOHREH, SHAME and JAZAYERI) were. The results showed that between different varieties of grain yield and all yield components (seed number per pod and NO. pod) statistically significant difference in the level of 5 percent there. ZOHREH figure was superior to other cultivars and varieties having SHAME with little JAZAYERI showed no statistical difference. Grain yield in different cultivars ZOHREH, SHAME and JAZAYERI, respectively 1523.33, 1372.67, 1352 kg ha was. Most biological functions in the plant density of 55 3042.89 kg/ha obtained the density of levels with other significant difference at 5 percent showed. Highest harvest index and density of about 55 plant varieties ZOHREH m according to the results the best varieties for planting varieties bless and best density, density of 55 plants per square meter is.

[Somaye Ghadaksaz, Tayeb Saki Nejad, Alireza Shokohfar. Calculate dynamic changes in bean yield in different plant densities. Journal of American Science 2011;7(6):15-18]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: bean, density, variety, yield

[Full Text](#)

Calculate the growth dynamics of root and shoot of bean plants

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Abstract: Dry matter accumulation patterns in most grains are sigmoid-type curve. In the first stage of this model is that if growth is slow, then there is a rapid phase after the flowering stage is followed by growth that is in pod formation stage. Studies have shown that leaf area development and dry matter accumulation in most cereal grains, especially cold for a long period after transplantation is very slow. Accordingly, in order to effect the kinds humic acid plant growth and bean seeds under climatic conditions of Ahvaz in the form of a split-plot experimental design with randomized complete block design based on years of farming 2010 was designed and executed. Factor with three bean varieties ($V_1 =$ Barekat, $V_2 =$ Jazayeri, $V_3 =$ Shame) in the main plot factor with four types humic acid ($F_0 =$ control, $F_1 =$ humic acid, $F_2 =$ full macro humic acid, $F_3 =$ acid Micro humic full) rate of 2 ppm in the sub-plots were placed. The results showed that the use of acid in all varieties humic increased plant growth parameters such as crop growth rate (CGR), plant height, grain yield, harvest index and biological function has been compared to the control. the highest total dry weight of the acid treatment Humic full macro level was 5909 kg per hectare and the lowest rate to the control was 4332 kg per hectare Effective grain filling period (*EFPP*) The increase in the treatment process itself revealed. Varieties planted in the province and the third type humic acid with a control rate at 2 ppm was placed in sub-plots. The highest and lowest average number of lateral roots in this experiment in order Humic acid treatments and control macro level 241.7 and 136 numbers were obtained. Note that between the number of acid root treatment and between macro and micro humic acid and acid micro Humic significant difference was found. the highest root dry weight to macro Humic acid treatment with a mean 4.22 grams of control treatment and lowest with mean 2.63 has been hot Total root number from 592 to 899 in number in the control humic full macro will increase the number of roots, a positive regression ($r^2 = 0.89$) with the amount of biological fixation (percentage of nitrogen nodules) showed. [Simin Haghghi, Tayeb Saki Nejad, Shahram Lack. Calculate the growth dynamics of root and shoot of bean plants. Journal of American Science 2011;7(6):19-26]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: growth dynamics, root, shoot, bean plants

[Full Text](#)

Effect of drought stress on stomata resistance changes in corn

6

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Abstract: To evaluate the effects of drought stress in different periods growth stomata behavior, research using factorial experiment design, randomized complete block with four replications and two factors with four levels of water stress as the first factor and three levels of growth periods As the second factor in the three crop years (1999-2000 & 2000-2001 and 2001-2002) the Islamic Azad University Research Station at 3 km south of Ahwaz, Ahwaz city was designed and executed. Analysis of variance at 1% showed in all three years of water stress treatment, periods of growth and interaction of these two stomata resistance and lower leaf surface supernatant separately showed significant effect. by applying different levels of water stress, stomata resistance and lower leaf surface increased supernatant Duncan test was at 5% level in three years of the three groups presented mean that

treatment (severe water stress treatment) and the highest treatment (control, no water stress) the lowest stomata resistance showed. Duncan test at 5% level one to two average growth for the period presented the highest stomata resistance in all three years and the treatments were obtained and lowest stomata resistance was observed in treatment. Duncan test at 5% level interactions show treatments with treatments that apply the lowest stomata resistance values were the other words in the early stages of plant growth when water is enough to provide resistance, stomata express that little but more severe stress in the course of Growth stomata resistance was increased considerably, the underside of leaf stomata resistance levels much higher than the leaf supernatant

[Tayeb Saki Nejad, Effect of drought stress on stomata resistance changes in corn. Journal of American Science 2011;7(6):27-31]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: corn, stomata resistance, drought stress

[Full Text](#)

7 Effect of GA₃ hormones on growth dynamics of Bean

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Abstract: In order to effect hormone gibberellins acid on properties such as bean plants Morphophysiology: internodes' length and stem number, plant height, leaf growth dynamics and crop growth rate research as a factorial experiment in randomized complete block design with three replications in crop year 2010 Farm Research HASHEMI located in the city HAMIDIEH province was conducted, first factor hormone gibberellins acid on four levels, respectively, treated (d0) control (no hormone gibberellins acid) treatments and d₃, d₂, d₁, respectively, 5, 50 and 250 ppm and the second factor included three plant growth periods: (vegetative phase= s₀, Flowering phase = s₁ and pod set phase = s₂) for the hormone gibberellins spray on beans were considered. Dose 50ppm hormone gibberellins acid, more leaf area index (*LAI*) with 1.98 in comparison with other surfaces have been in the treatment group a was used Hormone gibberellins acid applied best courses in the vegetative period before flowering leaf dry weight, 752.2 kg/ha been in a treatment group were. And the flowering period to Pod set treated with 678.3 kg/ha-level statistical treatment Pod set b to aggregation with 666.6 kg/ha c level was statistically. Dose of the hormone gibberellins acid maximum height of internodes 4.07 inches compared to other hormone levels have been in statistical was. Other doses differ quite significantly with this level did not have the lower levels were. The results showed that the hormone gibberellins acid increased crop growth rate to 35 percent in d₃ = 20.15 g/m²/day treatment than control treatment was d₀ = 14.5 g/m²/day. Hormone gibberellins acid effects on bean plant stem internodes' distances showed that on average 2.2 inches were added to the internodes' length. Especially the increase in the lower internodes bean plant stems were most evident in the treated internodes' d₂S₀ height d₀S₀ than the control treatment was significant. [◊Somaye ghalandari, Tayeb Saki Nejad, Shahram Lack. Effect of GA₃ hormones on growth dynamics of Bean. Journal of American Science 2011;7(6):32-39]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: GA₃, Growth dynamics, Bean

[Full Text](#)

8 Personal Empowerment among Al-Anon/Nar-Anon Members in Iran

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Abstract: As addiction affects not only on addict person but also on family members, so relationship behaviors is an important part of codependents' life which needs to recover in order to achieve health promotion. This study investigates to find whether the "12-Step Program" empowers families of addicts/alcoholic in term of relationship with others or not. In other words, this study aims to find differences of relationship behaviors by comparing families of addicts/alcoholics who practice the "12-Step Program" and who do not. Theory of empowerment is the key theory to conduct this study. The findings of this study indicate that the "12-step program" is an effective program to enables codependents to improve their relationship with others in comparison with those who do not practice this program (control group). In other words, independent samples t-test reveals that codependents' relationship behaviors are recovered duo to practicing the "12-Step Program" in Al-Anon/Nar-Anon groups in Iran.

[Zahra Ajri , Mohammad Shatar Sabran. **Personal Empowerment among Al-Anon/Nar-Anon Members in Iran**. Journal of American Science 2011;7(6):40-44]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: 12-Step program, Addiction, Al-Anon & Nar-Anon, Codependency, Families of Addict, personal empowerment.

[Full Text](#)

Effect of different doses of the hormone gibberellins acid on the process of protein changes in bean plants

9

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Abstract Due to poor land of Khuzestan and land pollution due to application of chemical fertilizers, use of materials that can no harmful effects on the environment, planting with very low doses, had positive effects on plants have quality performance, it seems necessary. Why research in this area in order to affect hormone levels and time use gibberellins acid (GA₃) on the process of change and increasing amounts of protein bean seeds, bean seeds to increase the quality performance (Vicia FabaL.) were performed. The research farm located in the city Hamidieh hashemi research during the season and in 2010 was done, figure used in this experiment using BARAKAT variety. Use design was factorial experiments in randomized complete block design with three replications. Factors tested included four concentrations of the hormone gibberellins acid: (no hormones = d₀, d₁ = 5 ppm, d₂ = 50 ppm and d₃ = 250 ppm) and the second factor the third period, hormone sprayed: (phase of eruption = s₀, Flowering = s₁ and phase pod set = s₂), respectively. Measuring grain protein levels indicated that the hormone gibberellins acid spray treatment growth period increased grain protein and the greatest amount of protein in the amount of treatments d₂S₀ d₁S₀ and 29.28 percent, respectively. . [◊Somaye ghalandari, Tayeb Saki Nejad, Shahram Lack. Effect of different doses of the hormone gibberellins acid on the process of protein changes in bean plants. Journal of American Science 2011;7(6):45-49]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Bean, the hormone gibberellins acid, proteins

[Full Text](#)

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Enhanced Production of Biosurfactant from Isolated Pseudomonas Sp Growing On Used Edible Oil

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Abstract: The production of surface active compounds or biosurfactants by microorganisms has been a subject of increasing interest in recent years especially due to the potential applications in enhanced oil recovery. A number of studies have indicated that the type of medium and growth conditions can influence the type and yield of biosurfactants. The present work demonstrated that the isolated bacteria, *Pseudomonas sp* from used edible oil was able to utilize the used edible oil as carbon and energy source to produce rhamnolipid at a concentration of 7.6 g/L. The temperature, incubation period, and nitrogen source optima of biosurfactant production was found at 36 °C, 72 hr and sodium nitrate respectively. [Soniyaamy A.R., Praveesh B.V., Vimalin Hena J., Kavithakumari P., Lalitha S and M Palaniswamy. Enhanced Production of Biosurfactant from Isolated Pseudomonas Sp Growing On Used Edible Oil. Journal of American Science 2011;7(6):50-53]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Rhamnolipid. *Pseudomonas sp*. Used edible oil. Biosurfactant

[Full Text](#)

11

Effect of Nursing Management Protocol on Selected Side Effects of Interferon and Ribavirin among Hepatitis C Patients

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Abstract: Interferon related side effects need extensive researches especially the management strategies of these side effects are available. This study was carried out to assess the effect of nursing management protocol on selected side effects of Interferon and Ribavirin among hepatitis C patients. A convenience sample of 60 hepatitis C patients of both sexes in liver out patient clinic at Shebin El- Kom teaching hospital was selected for data collection. Tools for data collection included Tool 1: Structured interview questionnaire. It includes 3 parts to assess medical data and knowledge of patients. Tool 2 : Fatigue severity scale to measure fatigue severity among studied sample. Tool 3: Anxiety scale to assess the anxiety level of studied sample. All studied sample had several complains related to Interferon before giving the nursing management. Also there were statistical significance differences in all laboratory findings and body temperature before and after the study by 8 weeks. There were statistical significant improvement of these knowledge after 4 and 8 weeks from beginning of the study. Also, there was significant improvement in anxiety and fatigue level after 8 weeks from beginning of the study. It is concluded that: nursing intervention and knowledge about chronic hepatitis C, its treatment and management of Interferon related side effects seemed to have positive effects on improving patients knowledge about diseases and managing side effects of treatment and self care modalities that reflected by improvement in laboratory findings, vital signs, patients complains, anxiety level and fatigue level. It is recommended that: Promotion & enhancement of the self care modalities to the patient; a strict written instruction with pictures about disease process, prohibited and allowed foods, rest and physical activities and follow up should be continued after termination of the treatment through a rehabilitation program.

[Magda M. Mohsen, Manal E. Fareed, Amal A. El-Sheikh and Sabry M. Abbas. Effect of Nursing Management Protocol on Selected Side Effects of Interferon and Ribavirin among Hepatitis C Patients. Journal of American Science 2011;7(6):54-63]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Nursing management protocol, selected side effects, Interferon and Ribavirin, Hepatitis C

[Full Text](#)

12 Principles and methods of Adult education

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Abstract: Any activity that gets your students involved makes the learning experiential. This includes small group discussions, experiments, role playing, skits, building something at their table or desk, writing or drawing something specific – activity of any kind. Activities also keep people energized, especially activities that involve getting up and moving about. Most adult students are in your classroom because they want to be. Some of them are there because they have Continuing Education requirements to keep a certificate current, but most are there because they've chosen to learn something new. This principle is not about why your students are in your classroom, but about why each thing you teach them is an important part of the learning. I'll use my own pickle-making lesson as an example.

[Mojtaba Sadighi and Mehran Bozorgmanesh. Principles and methods of Adult education. Journal of American Science. 2011;7(6):64-68]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult education, adult learning

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13 Assessing Lesson Plans for Adults

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Abstract: adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Though rarer today than in the past, some teachers discount the importance of learning styles. They continue to teach in their one major method without trying to vary instructional methods. This is a mistake that will lead to less learning in the classroom. On the other hand, many students and to a lesser degree some teachers make the mistake of thinking that they cannot learn using methods that are not focused on their learning style. This is also a huge mistake that in the end will result in less learning. If teachers do not help their students find ways to be successful learning information presented in any style, they are not helping them succeed in the future. The fact is that students will be faced with many different styles of teaching during the educational career. Only by finding ways to adapt and learn using other styles, will students end up succeeding.

[Mehran Bozorgmanesh and Mojtaba Sadighi. **Assessing Lesson Plans for Adults**. Journal of American Science. 2011;7(6):69-72]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult learning, Lesson Plans

[Full Text](#)

14 **Rural people participation in Participatory Rural Appraisal (PRA)**

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Abstract: There exist different methods of data collection and analysis, each with its own strengths and weaknesses. Through time, more appropriate and refined methods have been developed. In the context of rural development, information regarding the communities, their livelihoods, their beliefs, the physical environment in which they live, and their resource endowments need to be gathered and interpreted in a manner that identifies their priorities with a view of developing better understanding of their status and designing appropriate intervention projects directed at resolving their problems. The different ways of data collection and interpretation can be seen under two perspectives (IUCN, 2001): qualitative versus quantitative, and participatory versus top down. While the quantitative methods generate information that can be captured numerically, the qualitative methods generally do not generate specific numbers. Qualitative methods are concerned with exploring meanings, processes, reasons, and explanations.

[Mina Abarashi and Maryam Nikmanesh. **Rural people participation in Participatory Rural Appraisal (PRA)**. Journal of American Science 2011;7(6):73-77]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Participatory Rural Appraisal (PRA), participation

[Full Text](#)

15 **Energy Coefficient for Irrigated Wheat Production in Western Provinces in Iran**

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ABSTRACT: The data for diesel fuel energy consumption on tillage, planting, cultivation, irrigation, harvesting and grain hauling as well as electricity for pumping water from wells obtained by questioners for four western provinces of Iran. The data was analyzed by SPSS software and then compared with the calculation results for the similar activities. Calculations were run for the worst case situation that is the hardest soil type for tillage, lowest forward speed and field efficiency for all. The results showed that the least energy consumption for every one of the practices was higher than the calculated figures; in some cases more than triple. The energy used for irrigation was the dominating. More energy was put into the water wells than for the hardest soil tillage. Statistics showed that the farmers in these provinces used 24.10-38.98 GJha⁻¹ to produce one hectare of irrigated wheat compared to 23.67 GJha⁻¹ calculated for the worst case. International data for semi tropical area in India for the drought years was cited as 15.289 GJha⁻¹. Experimental data for energy consumption for every practice was separately analyzed and compared with the calculated figures. Tillage with an average coefficient of 57.38 lha⁻¹ and planting with an average 34.16 lha⁻¹ showed no significant differences between the provinces at 5% probability level. Energy coefficient for the other activities that is cultivation, irrigation, harvesting and grain hauling did show significant differences between some of the provinces. The average energy consumption for these activities was 1.045, 21.268, 1.406 and 2.99 GJha⁻¹ respectively. The worst case calculated values were 0.232, 18.813, 0.680 and 1.748 GJha⁻¹ respectively. The energy coefficient per ton of produced wheat was also obtained.

[Mansoor Behroozi Lar and Zahra Khodarahm Pour. **Energy Coefficient for Irrigated Wheat Production Western Provinces in Iran**. Journal of American Science 2011;7(6):78-83]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Energy consumption, Irrigated wheat, Energy coefficient, Western provinces, Iran

[Full Text](#)

16 **A method for detection and extraction of circular shapes from noisy images using median filter and CHT**

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Abstract: One of the challenging topics in image processing is extracting the shapes from noisy backgrounds. There are some methods for doing it from different kinds of noisy backgrounds. In this paper, we are going to introduce another method by using 4 steps to extract circular shapes from impulse noisy backgrounds. First step is applying median filter to disappear "salt and pepper" noise. This step causes edge smoothing. So, as the second step, a laplacian sharpening spatial filter should be applied. It highlights fine details and enhances the blurred edges. Using these two steps sequentially causes noise reduction in an impressive way. Third step is using Canny edge detection for segmenting the image. Its algorithm is talked during the paper. Finally, forth step is applying Circular Hough Transform (CHT) for detecting the circles in image. At the end of paper different use cases of this method is investigated.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. **A method for detection and extraction of circular shapes from noisy images using median filter and CHT**. Journal of American Science 2011;7(6):84-88]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Extracting circular shape; median filter; laplacian filter; Canny edge detection; Circular Hough Transform (CHT).

[Full Text](#)

17 **A short paper on steps of designing an appropriate website**

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Abstract: In the modern world that the lives are going to have an online aspect in addition to traditional life, having suitable websites for different purposes plays a big role in social communications. High quality communication is the product of good interaction, and a good online interaction is the product of a good website.

In this paper, we want to introduce some basic steps that can help to provide a guideline for designing a suitable website. We have tried to cover both technical and psychological

aspects of a website. These steps are divided into 3 parts: pre-design, design, and post-design steps. Each one of them is consist of some steps that are described in details through the paper.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. A short paper on steps of designing an appropriate website. Journal of American Science 2011;7(6):89-91]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Website design; information systems; modeling website; publishing website.

[Full Text](#)

18 **An algorithm for minimizing of Boolean functions based on graph data structure**

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Abstract: In this paper, we intend to introduce a new heuristic algorithm to apply maximum minimization to Boolean functions with normal SOP form. To implement the proposed algorithm, we use the graph data structure and define the adjacencies. Also, we demonstrate some conditions to achieve the maximum minimization. Through this paper, the problem of shared vertices in more than one adjacency is talked, and the solution is presented. Karnaugh map is used to clarify the matter.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. An algorithm for minimizing of Boolean functions based on graph data structure. Journal of American Science 2011;7(6):92-96]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Minimization of Boolean functions; Graph data structure; SOP functions; discrete mathematics.

[Full Text](#)

19 **Embedding stego-text in cover images using linked list concepts and LSB technique**

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Abstract: In this paper, we intend to introduce a steganography algorithm for embedding a message into a RGB 24-bit color image. It will be done by using the concepts of linked list data structure. It will help us to achieve some important advantages. First, we can create a “stego-key” by the address of message blocks. Second, it makes the detection of message harder. Also, there will be other benefits that are mentioned during the paper.

Another point about the presented algorithm is the flexibility. For example, it could be written in recursive way. To prove it, we wrote a recursive function called “Read()” for extracting the message from the cover image. At the end of paper, characteristics of this algorithm will be talked.

For embedding data, LSB (Least Significant Bit) technique is been used.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. Embedding stego-text in cover images using linked list concepts and LSB technique. Journal of American Science 2011;7(6):97-100]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Steganography; secure communication; data covering; carrier image; linked list; LSB

[Full Text](#)

20 **Investigating the basic principles for proper GUI design**

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Abstract: User interface is a general connection tool for getting the request of user and give back the responses. A special type of user interface is GUI (Graphical User Interface), which is very important in computer world, and you can't find any application without it. Designing a suitable GUI is definitely an important part of designing any application. Due to this, there are some principles that help to create an appropriate GUI. In this paper, we are going to talk about the necessity of a suitable GUI for an information system. So, the goals of GUI will be investigated. Then we will get into common characteristics of a proper GUI.

[Masoud Nosrati, Ronak Karimi, Rahin Karimi, Hamed Nosrati. Investigating the basic principles for proper GUI design. Journal of American Science 2011;7(6):101-105]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: User interface; Graphical User Interface; GUI; GUI Purpose; information system; information display.

[Full Text](#)

21 **Taking a Brief look at steganography: Methods and Approaches**

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Abstract: In this paper, we are going to introduce different types of steganography considering the cover data. As the first step, we will talk about text steganography and investigate its details. Then, image steganography and its techniques will be investigated. Some techniques including Least Significant Bits, Masking and filtering and Transformations will be subjected during image steganography. Finally, audio steganography which contains LSB Coding, Phase Coding, Spread Spectrum and Echo Hiding techniques will be described.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. Taking a Brief look at steganography: Methods and Approaches. Journal of American Science 2011;7(6):106-109]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Steganography; text steganography; image steganography; audio steganography.

[Full Text](#)

22 **Non-steroidal anti-inflammatory phonophoresis versus topical application in improvement of hand grip strength in psoriatic arthritic patients**

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Abstract: The purpose of this study was to compare the efficacy of ibuprofen phonophoresis versus topical application of ibuprofen in improvement of hand grip strength in psoriatic arthritic patients. Methods: Forty patients who had asymmetrical psoriatic arthritis in hand participated in this study. Their ages ranged from 30 to 50 years. Patients were classified randomly into two groups of equal numbers; group (1) (control group) received routine physical therapy (hot therapy, stretching and strengthening exercises), in addition to sham ibuprofen phonophoresis, while group (2) (studied group): received routine physical therapy, in addition to ibuprofen phonophoresis. Each patient was evaluated for grip strength, tender and swollen joint count before and after one month of treatment. The results revealed that there was a significant difference between both groups regarding to grip strength, tender and swollen joint count, with the percentage of improvement in group 1 were 56%, 54%, and 55% ,while in group 2 were 82%, 80% and 76% respectively. It is concluded that the results of the current study confirms the effectiveness of phonophoresis as a therapeutic modality enhancing the delivery of ibuprofen so increasing the percentage of improvement of grip strength in the studied group .

[Amal M. Abd El Baky and Intsar S. Waked. Non-steroidal anti-inflammatory phonophoresis versus topical application in improvement of hand grip strength in psoriatic arthritic patients. Journal of American Science 2011;7(6):110-114]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Ultrasound, phonophoresis, ibuprofen, grip strength, psoriatic arthritic

[Full Text](#)

23 **Biodegradation of PAH Compounds in the Rhizosphere of *Tamarix nilotica*: A Salt tolerant wild plant**

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Abstract: During a scientific visit to a coastal area at Suez, Egypt, it was observed that *Tamarix nilotica* plant naturally dominated on oil polluted site in this area, indicating that this plant is a tolerant of the combined adverse effects of salinity and petroleum pollutants. This observation stimulated a study to investigate the rhizosphere effect of this plant on the degradation and removal of petroleum aromatic hydrocarbons (PAH) compounds from this coastal saline soil. Accordingly, samples were collected from the rhizosphere and from the non-rhizosphere soil and studied. The results show that the rhizosphere soil of *Tamarix nilotica* was rich in total heterotrophic bacteria and oil-degraders. In the rhizosphere soil oil-degraders were of higher percentage (30.7%) compared to the non-rhizosphere soil (4.6%). Residual total petroleum hydrocarbons (TPH) in the non-rhizosphere soil was 2.25% (w/w), while in the rhizosphere soil the percentage was 0.9% (w/w). This indicate a reduction of 60% of the TPHs. The saturates fraction in the rhizosphere as compared to the non-rhizosphere soil was reduced by 87.5%, while the aromatics were reduced by 60.7%. It is of interest to find that the non-degradable asphaltenes and resins were reduced in the rhizosphere by 1.1% and 2.5% respectively. As a total the amount of PAHs (mgkg⁻¹ soil) were 1073.5 and 541.94 in the non-rhizosphere and rhizosphere soil respectively, i.e. with a loss of 49.5% in the rhizosphere. Chrysene and dibenzo(ah)anthracene as compared to the other PAHs were more frequent in the non-rhizosphere soil. These two compounds were reduced by 55.7% and 24.3% respectively in the rhizosphere. As a total the four-ringed PAHs as compared to other PAH groups were highly reduced (60.3%) in the rhizosphere, this was followed by the three-ringed PAH group (52.5%). The five-ringed and the six-ringed groups were weakly reduced (37.8% and 33.8% respectively). The 8 carcinogenic PAH group were collectively reduced in the rhizosphere by 49.1%. A particular notable distinction of the rhizosphere of *Tamarix nilotica* is the greater efficiency to degrade the carcinogenic PAH compounds especially flouranthene (75.4%), benzo(a)anthracene (63.4%) and pyrene (60.2%). Results of Gas Chromatography (GC) analysis for the detection of the accumulated PAHs in the shoot tissue of *Tamarix nilotica* plant growing in the polluted area as compared to that growing in non-polluted area show that the identified peaks in the tissue of both plants were 15 and 14 peaks respectively. The sum of the 15 PAHs was 528 mgkg⁻¹ dried tissue, whereas the sum of the 14 PAHs was 769 mgkg⁻¹ dried soil. This result indicate an accumulation value of 1.46.

[Eman A. Diab and Reham K.A. Badry. Biodegradation of PAH Compounds in the Rhizosphere of *Tamarix nilotica*: A Salt tolerant wild plant. Journal of American Science 2011;7(6):115-124]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Biodegradation , salt-tolerant plant , *Tamarix nilotica* , PAHs degradation

[Full Text](#)

24 **The Effect of Soft laser Application on Orthodontic Movement (In vitro study)**

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Abstract: The present study was designed to evaluate the effect of low level laser therapy on alveolar bone remodeling and rate of tooth movement secondary to application of orthodontic forces. 42 male Guinea pigs were used in this study. The animals were divided into two groups (each group contains 21 animals), group (1) received soft laser therapy at the treatment site and group (2) as a control group. The orthodontic device was cemented to the lower central incisors to be activated once only. Daily measurements were taken directly from the oral cavity to record the rate of tooth movement of the experimental groups. Seven animals of each group were sacrificed at 3 days, 2 weeks and one month. Radiographic assessment was carried out at these intervals using Radio-Visio-Graphy (RVG), with its personal computer (PC) based version, to monitor the changes in the bone density mesial to each lower central incisor. The lower jaws were histologically treated to obtain mesiodistal sections of the lower incisors with their supporting structures and stained by H & E. Conclusion: Soft laser can enhance the rate of orthodontic tooth movement due to stimulation of bone remodeling.

[Tarek Momhamed Ibrahim, mostafa gheith ,Mona M. Abo-Elfotouh. The Effect of Soft laser Application on Orthodontic Movement (In vitro study). Journal of American Science 2011;7(6):125-135]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Orthodontic treatment, laser therapy

[Full Text](#)

25 **Nucleotide variations of 16S rRNA gene of VacA positive *Helicobacter pylori* strains isolated from human Gastric Biopsies in Saudi Arabia**

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ABSTRACT: Three isolates of *Helicobacter pylori* (*H. pylori*) were originally isolated from gastric biopsies taken from patients complaining of gastric disorders in Makkah City, Saudi Arabia. The isolates that previously revealed to be vaculating cytotoxin A positive were identified by 16S rRNA gene as *H. pylori* using a primer pair designed from the similar sequences within consensus regions of GenBank *H. pylori* to amplify the 163 bp fragment. Sequence alignments of 16S rRNA gene were performed and total numbers of 46, 55 and 40 nucleotide positional differences with base-pair substitutions were identified for these isolates compared to GenBank strains of *H. pylori*. Phylogenetic analyses based on 16S rRNA gene sequences showed that the three *H. pylori* strains formed a phylogenetically distinct group, separate from all other species of *H. pylori*. The three isolates were hence coined as *H. pylori* Milyani-1, -2 and -3 at GenBank database under the accession numbers HQ877021, HQ877022 and HQ877023, respectively. The obtained results evidently indicated a large diversity with unique characteristics of the three Saudi Arabian *H. pylori* strains from all the other established strains.
[Milyani MR. **Nucleotide variations of 16S rRNA gene of VacA positive *Helicobacter pylori* strains isolated from human Gastric Biopsies in Saudi Arabia.** Journal of American Science 2011;7(6):136-145]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Accessions HQ877021, HQ877022 and HQ877023, *Helicobacter pylori*, isolates, 16S rRNA gene, variations.
26 **Disk-Rim flywheel of minimum weight**

[Full Text](#)

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Abstract: In this article the disk-rim flywheel is suggested for light weight. The mass of the flywheel is minimized subject to constraints of required moment of inertia and admissible stresses. The theory of the rotating disks of uniform thickness and density is applied to each the disk and the rim independently with suitable matching condition at the junction. Suitable boundary conditions on the centrifugal stresses are applied and the dimensional ratios are obtained for minimum weight. It is proved that the required design is very close to the disk with uniform thickness
[Bedier B. EL-Naggar and Ismail A. Kholeif. **Disk-Rim flywheel of minimum weight.** Journal of American Science 2011;7(6):146-149]. (ISSN: 1545-1003).
<http://www.americanscience.org>.

Keywords: Disk-Rim; flywheel; minimum angular speeds; moment of inertia; radial and tangential stresses.
27 **Genetic variability and path coefficient analysis in sweet basil for oil yield and its components under organic agriculture conditions**

[Full Text](#)

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Abstract: Data for variability, heritability, genetic advance and path coefficient analysis for oil yield and related characters were conducted on 15 genotypes of sweet basil at two seasons in complete randomized block design. The results revealed that analysis of variance showed highly significant differences among genotypes in studied characters. Ranges of herb dry yield (HDY) (68.40 – 86.30 gm.), oil content (2.30-2.90 ml.) and oil yield (1.22-2.24 ml.) were obtained. Overall, the highest values of genotypic coefficients of variation (G.C.V %), genetic advance (GA%), and broad sense heritability (h²b) were obtained for stem dry weight (SDW), linear growth (LG), herb dry weight (HDW) and leaf dry weight (LDW). Path coefficient analysis for oil yield exhibited variation from season to other and slight variation was found among cuts. The highest direct effects on oil yield were observed for herb dry yield followed by stem dry weight and essential oil content; hence, the study reflected the importance of herb dry yield and essential oil content as selection criteria for improvement of oil yield in sweet basil.
[Ibrahim, M.M., K.A. Aboud and R.M. Hussein. Genetic variability and path coefficient analysis in sweet basil for oil yield and its components under organic agriculture conditions. Journal of American Science 2011;7(6):150-157]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Genetic variability; Path coefficient; Sweet basil; Organic agriculture
28 **Antihepatotoxic Effects Of *Ficus Vogelii* Ethanol Leaf Extract On The Liver Function Indices Of Ccl₄ –Induced Hepatotoxicity In Rats.**

[Full Text](#)

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ABSTRACT: This study was conducted to evaluate the anti-hepatotoxic effect of intraperitoneal administration of ethanol extract of *Ficus vogelii* (600mg/kg) in CCl₄-induced hepatotoxicity in male albino rats. Phytochemically, the leaf extract contains tannin, alkaloid, flavonoid, carbohydrates, protein, saponin, steroids, terpenoids, fats and oil. The administration of the *Ficus vogelii* extract was at one phase of the experiment according to the body weight of the test animals. The ethanol extracts of *Ficus vogelii* significantly reduced (p<0.05) the level of activity of the hepatic enzyme markers in the serum (Alanine amino transferase (ALT), Aspartate amino transferase (AST), alkaline phosphate (ALP) and total bilirubin) which occurred due to induced oxidative stress. Relative to the control group, treatment with CCl₄ significantly raised the levels of ALT, ASP, AST and total bilirubin in the serum. The animals that received *Ficus vogelii* showed not only reduced hepatocellular degeneration but also of hepatocellular regeneration when compared to the liver of those exposed to CCl₄ alone. Thus the histopathological studies also supported the anti-hepatotoxic action of the ethanol extract of *Ficus vogelii*. The results of this study clearly indicate that *Ficus vogelii* ethanol extract has a potent anti-hepatotoxicity action against carbon tetrachloride induced liver damage in rats.
[EGBUNA, P. A. C.; JOSHUA, Parker Elijah and CHIGBO, Maureen Ujunwa. **Antihepatotoxic Effects Of *Ficus Vogelii* Ethanol Leaf Extract On The Liver Function Indices Of Ccl₄ –Induced Hepatotoxicity In Rats.** Journal of American Science 2011;7(6):158-163]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: *Ficus vogelii*; Hepatotoxicity; Carbon tetrachloride; Liver Function Tests

[Full Text](#)

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Abstract: Power Purchasing Agreements (PPAs) are the recent contracts between Generation Companies (GENCOs) and Independent System Operator (ISO). After restructuring in power system, lack of motivations for Independent Power Producers (IPPs) to partnership in power generation and long term maintaining energy have affect the long horizon expansion planning. In this area, long term contracts can help the market entities to hedging their risks in satisfying the future demands and ensuring the return of their investment cost. From an IPP point of view, clarifying the rate of return of investment has an important role in his financial decision making. In competitive power market, each GENCO would offer in the market and some of them could exercise market power in power market. One of the proposed ways to controlling the market power is PPA. In this paper the PPA and some proposed PPAs are introduced and clarifying the weak and strong point of the PPAs are presented.

[Mohammad Sadegh Javadi, Amin Javadinasab. Power Purchasing Agreements in Modern Power System, Journal of American Science 2011;7(6):164-169]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Power Purchase Agreements, Independent System Operator, Independent Power Producer, Renewable Energy

[Full Text](#)

30 **Evaluation of Some Growth Parameters and Chemical Composition of *In Vitro* Grown Seedlings of *Rumex vesicarius* L. (Polygonaceae).**

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Abstract: The aim of this research is to evaluate differences in growth and chemical composition of *in vitro* grown seedlings (10, 20 and 30 days old) of *Rumex vesicarius* L. (Polygonaceae) on either solidified MS medium or agar. Percentage of germination increased with time from 2 days till 16 days in case of seedlings grown on MS medium, and 10 days in case of seedlings grown on agar. Variations in seedlings length at 10, 20 and 30 days were non significant. Seedlings grown on agar were longer than seedlings grown on MS medium. Shoot: root ratio (%) decreased with time from 10 to 30 days, shoot: root ratio of seedlings grown on agar was less than these of seedlings grown on MS medium. Variation in shoot: root ratio of seedlings grown on either solidified MS medium or agar was highly significant. Fresh and dry weights of these seedlings increased with time in 10, 20 and 30 days old seedlings. Variations were highly significant in both fresh and dry weights. Fresh and dry weights of seedlings grown on MS medium were higher than seedlings grown on agar. Phytochemical screening of 10, 20 and 30 days old seedlings showed variations in the presence and / or amount of some biologically active constituents under investigation such as: flavonoids, saponins, alkaloids and tannins, chlorides and Sulphates, these variations indicated that, the formation of these active constituents is positively or negatively related to time. Regarding total phenolics, of seedlings grown on MS medium, 20 days old seedlings had the maximum concentration (3.833±0.334 mg GAE_g/g F.W.), followed by 10 days old seedlings (1.910±0.334 mg GAE_g/g F.W.), while 30 days old seedlings were found to contain the least amount of phenolics (1.167±0.334 mg GAE_g/g F.W.). Variations in the amount of total phenolics within different seedlings were non significant. Seedlings grown on agar contained low amount of phenolics till 30 days old, compared with seedlings grown on MS medium. Total flavonoids were determined also, highly significant variations were found between 10, 20 and 30 days old seedlings grown on either MS medium or agar. The maximum amount of total flavonoids was found to be in 10 days old seedlings grown on agar (106.350±3.849 µg/g F.W.); flavonoidal contents were negatively related to time. In wild young plantlets of *Rumex vesicarius* L. at vegetative stage, total phenolics were found to be lower than *in vitro* grown seedlings. Plantlets roots were found to be the richest organ (1.695± 0.178 mg GAE_g/g F.W.), however roots contains about less than half amounts found in *in vitro* grown seedlings on MS medium at 20 days old (3.833±0.334 mg GAE_g/g F.W.). Wild young plantlets were rich in flavonoids. There were highly significant variations between plantlets parts. Leaves were found to contain the highest amount of flavonoids (2835.000 ± 305.757 µg/g F.W.).

[El-Bakry, A.A.* , Mostafa, H.A.M. ** and Eman, A. Alam**. Evaluation of Some Growth Parameters and Chemical Composition of *In Vitro* Grown Seedlings of *Rumex vesicarius* L. (Polygonaceae). Journal of American Science 2011;7(6):170-179]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: *Rumex vesicarius* L. - total phenolics - total flavonoids - phytochemical screening - *in vitro* grown seedlings

[Full Text](#)

31 **The importance of indigenous knowledge in agricultural development**

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Abstract: Different definitions were presented about indigenous knowledge by experts that each of them present their idea about this knowledge from their viewpoint. Each of them emphasis on a special aspect of indigenous knowledge according to their viewpoint. Oxford vocabulary define the word indigenous knowledge such this" it is created naturally in a region which is related to the people of that region. Indigenous knowledge is a knowledge that has been grown in a long time and has transferred from one generation to other generation in hereditary form . Williams and Molina have defined indigenous knowledge such this: indigenous knowledge is the learning methods, understanding and attitude to the world which is the result of experience and solving problems according to test and error by the people who are active and have used their available resources on its suitable time. Chambers with emphasizing on people's role in development process, believed that the phrase rural people's knowledge is more sensible than the other phrase such ethnic ecology, ethnographic knowledge, ethnic classification. He also believed that indigenous knowledge is a knowledge that is created naturally and is emanated from geographical circle.

[Esmail Ghorbani and Fatemeh Bakhtiar. **The importance of indigenous knowledge in agricultural development.** Journal of American Science 2011;7(6):180-184]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Indigenous knowledge, rural women

[Full Text](#)

32 **Decentralization in agricultural extension: implications and priorities**

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Abstract: Over the past two decades many countries have undertaken to decentralize government functions and transfer authority and responsibilities from central to intermediate and local governments, and often to communities and the private sector. Decentralization is potentially important to agricultural knowledge and information systems, but decentralization is not an end in itself, and successful decentralization strategies must address three challenges—establishing a national framework for decentralization, developing subsector approaches, and enhancing capacities of various participants for coproduction of decentralized goods and services. Agricultural extension services are under increasing pressure to become more effective, more responsive to clients, and less costly to government. Decentralization is an increasingly common aspect of extension reforms. Field extension advisory services are well suited to decentralized approaches, but a comprehensive extension system requires a range of extension support services and programs, some of which (strategy formulation, training, monitoring and evaluation, specialized technical support) are often best carried out at the central level. The prime challenges in the traditional public extension systems enlisted as outdated, top-down, paternalistic, inflexible, subject to bureaucratic inefficiencies that results less ability to cope with the dynamic demands of modern day agriculture (World Bank, 2002; Obaa et al., 2005). In some countries the change is occurring with its natural pace but in many developing countries these have been accelerated by structural adjustment reforms.

[Abbas Emami and Esmail Ghorbani. **Decentralization in agricultural extension: implications and priorities.** Journal of American Science 2011;7(6):185-189]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Decentralization, Agricultural extension

[Full Text](#)

33 **Using of E-learning in agricultural education**

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Abstract: Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home. The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections. Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

[Esmail Ghorbani. **Using of E-learning in agricultural education.** Journal of American Science 2011;7(6):190-193]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: E-learning, distance education

[Full Text](#)

34 **Social Capital and Human Development: A Meta-Analysis in Iran**

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Abstract: This meta-analysis aims to assess the influence of social capital on the Human Development Index, Human Poverty Index, and Gender-related Development Index in Iran. The results reveal a positive and significant relationship between social capital and the human development index (HDI). The effect of social capital on the Human Poverty Index (HPI) was negative and significant. However, no significant relationship was found between social capital and the Gender-related Development Index (GDI).

[Hamidreza Babaei, Sarjit S. Gill, Amir Hossein Zomorrodian, Nobaya Ahmad, Leila Falahati. **Social Capital and Human Development: A Meta-Analysis in Iran.** Journal of American Science 2011;7(6):194-197]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Social Capital, Human Development Index, Human Poverty Index, Gender-related Development Index, Iran

[Full Text](#)

35 **The Influence of Life Skills with respect to Self-Help Approach on Relapse Prevention in Iranian Adolescents Opiate Addicts**

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Abstract: This study explores the importance of three elements of life skills, i.e. problem solving, critical thinking and ability to abstinence, on drug use and its effects on the prevention of relapse among male adolescent opiate users in Kerman, Iran. Life skills are one of the important factors that affect the recovery of addicts and presuppose relapse among adolescents. The lack of life skills is an operative factor to relapse among adolescents. The development of life skill was recognized as a factor that could help the adolescents in their efforts to avoid relapse. Iran is in the process of developing options concerning drug abuse treatment for opiate and other drug dependent patients while nearly 60% of its population is under the age of 25. Scholars emphasize the critical role of life skills to prevent relapse in adolescents and highlight the lack of life skill as a factor leading to relapse among adolescents ADDIN EN.CITE ADDIN EN.CITE.DATA (Barr & Parrett, 2001; Gorski, 2001; Gouws, Kruger, & Burger, 2000; Mc Whirter, 2004; Van Niekerk & Prins, 2001). Focusing on this issue, this research explores a new examination area and finally reinforces the result of the previous relevant studies in its own contribution. In this research 226 adolescents between the ages of 13 to 20 in ten rehabilitation centers were selected to answer the self-administered questionnaire. Benefiting from Pearson Correlation analyses, the findings represent a significant moderate negative relationship between life skills and relapse ($r = -0.453$, $p < 0.01$), i.e. the lack of life skills significantly raises the risk of relapse among adolescents. The study proposes some suggestions in order to prevent relapse after treatment in adolescents.

[Samira Golestan, Hajar Namayandeh, Ali Anjomshoa, **The Influence of Life Skills with respect to Self-Help Approach on Relapse Prevention in Iranian Adolescents Opiate**

Addicts. Journal of American Science 2011;7(6):198-202]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Life skills, Opiate Addiction, Adolescents, Recovery Process, Relapse Prevention

[Full Text](#)

36

Immediate Vascular Photochemical Reactions to Infrared Laser Irradiation in Normal Volunteers

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Abstract: Background: There are evidences that low level laser therapy (LLLT) stimulates wound healing. Objective: The study aimed at investigating the exact vascular mechanisms through which infrared (IR) laser acts to promote wound healing. Participants: Thirty normal female volunteers were selected from the female section, Faculty of Applied Medical Sciences, King Abdul-Aziz University. They were randomly divided into three equal study groups (G1, G2, and G3). Methods: Five ml. of whole blood were collected in a plane tube from all volunteers for the analysis of lipid profile including cholesterol (Chol); triglyceride (TGL); low density lipoprotein (LDL) and high density lipoprotein (HDL). Other five ml of blood were collected for the performance of glycated hemoglobin (HbA1c), hemoglobin (Hgb) and red blood cells (RBCs) count before and immediately after receiving continuous IR laser (810 nm, 100 mW). The irradiation doses were 12 J/cm² for 120 sec, 6 J/cm² for 60 sec and 1.4 J/cm² for 14 sec in groups one, two, and three respectively. Results: There was a significant increase in Chol, TGL, HbA1c%, Hgb concentration and RBCs count after irradiation. On the other hand, there was no significant difference in LDL or HDL concentration in the three groups. Conclusion: Infrared laser was effective in increasing the levels of different blood components that are important for wound healing processes with the best results obtained from laser dosage of 12 J/cm².

[Mohammed H Saïem Al-Dahr and Enas Elsayed. Immediate Vascular Photochemical Reactions to Infrared Laser Irradiation in Normal Volunteers. Journal of American Science 2011;7(6):203-208]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Vascular alterations, Wound healing, Infrared laser

[Full Text](#)

37

Contraceptive use dynamics and effect of counseling on use- continuation of contraception in Assiut Governorate, Upper Egypt

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Abstract: Background: Egypt's family planning programs have followed a similarly unsteady course. Debated by Egyptian social scientists since the 1930s, Egypt's high population growth became widely viewed as an acute problem in the 1960s, when the government acknowledged the serious economic and social problems associated with it. **Objectives:** analyzing the factors associated with contraceptive methods discontinuation among women aged 15- 49 years in study area and contraceptive use dynamics. We also examined the effect of counseling on percent of continuation. **Study design:** A cross sectional survey was carried out among the eligible women. **Study setting:** The study areas included Assiut Governorate family planning units in different places providing contraceptive methods. **Study population:** One thousand and ten women in reproductive age from 15-49 who used contraceptive methods once or more, has one child or more were included. **Study tools:** An interview questionnaire were constructed including data about used contraceptive methods, discontinuation and its causes, failure and its fate. We asked about ten steps of counseling. Data entry –after revising and editing -was done via Excel software while data analysis was carried out via SPSS program version 11. **Results:** the most commonly used modern method was IUD (43.0%). The results revealed that (69.7%) of methods had been stopped within 2 years of starting for various reasons. The percent of discontinuation decreased significantly with increasing age. Discontinuation was the lowest when there were four or more living children and increased significantly by decreasing number of living children. It decreased significantly with increasing the number of sons. As regards infant deaths, discontinuation was insignificant among those who did not experience infant deaths, and presence of one and two deaths respectively. University graduated women showed least discontinuation level. As regards causes of discontinuations, side effects and health concerns was the most common reason of discontinuation. Most of method failure as expressed by pregnancy ended in live births. The results indicated that a higher score on counseling was significantly associated with continuation. **Conclusion:** Counseling should emphasize the possibility of side effects, stressing the fact that most will be transient, and the need to identify a backup method. Follow-up visits should be scheduled for 1 to 2 months after a prescription is written.

[Etemad A.A. El- shereef, Gamal H. S., Abo Bakr A. M., and Ahmed M.A. Contraceptive use dynamics and effect of counseling on use- continuation of contraception in Assiut Governorate, Upper Egypt. Journal of American Science 2011;7(6):209-219]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Contraception, use dynamics, counseling and Upper Egypt.

[Full Text](#)

38

Rediscovering Red Blood Cells: Revealing Their Antigens Store

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Abstract: This paper describes a newly observed phenomenon related to red blood cells (RBCs). We found that plasma from a healthy individual immune-reacted with hemolysates from the same person and from other individuals. This strongly suggested presence of antigens in RBCs and corresponding antibodies in plasma. Those RBCs' antigens are different from RBCs proteome. Those antigens can be separated using plasma / serum of blood from which RBCs were taken. It is found that those antigens consist of HLA antigens, tissue specific antigens, and foreign antigens. The foreign antigens can be fetus antigens in pregnant females, microorganisms' antigens, food, insects or other antigens from environment. The collection of those transported antigens represents a dynamic store. Consequently, RBCs may play role in tolerance through transporting those antigens to central organs of the immune system. The experiments, which have been done, reveal some of the antigens of the store, and show how this phenomenon can be exploited, for instance, in diagnosis of human tuberculosis (TB). In effect, this work opens a new avenue of research and hopes.

[Mahmoud Rafea, Serhiy Souchelnysky and Saleh El-Ayouby. Rediscovering Red Blood Cells: Revealing Their Antigens Store. Journal of American Science 2011;7(6):220-226]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Red Blood Cells, Erythrocytes, Immune Tolerance, Self-Antibodies, Erythrocytes Antigen Store, Erythrocytes Functional Proteome, Protection of Fetus as Allograft

[Full Text](#)

39 The effect of vitamin E on post-thawed buffalo bull sperm parameters

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Abstract: The sperm cells protection against oxidative reactions during cryopreservation process done by antioxidant and amino acids agents. The purpose of this study was evaluation of the effects of vitamin E on Azerbaijan Buffalo bull's sperm cells after thawing. Therefore for definition the percentage of motility, acrosomal membrane integrity, and live ratio of sperm cells, ejaculations from five mature buffalo bulls after preparation in tris-yolk base medium was added with five levels of vitamin E (0.1, 0.5, 1 or 1.5 mM) separately and frozen process was performed. One month later, five piote selected randomly and after thawing in 37 °C water bath in twenty seconds, sperm cells motility evaluated with 37 °C warm plate microscope. On the other hand, the one step eosin-nigrosin staining for evaluation of live ratio percentage and formal citrate for acrosomal membrane integrity was performed, then slides evaluated with 1000x light microscope and 200 sperm per slide was counted. The result showed significant difference between blank and vitamin E groups and sperm motility was higher in vitamin E (P<0.05). On the other hand sperm motility in vitamin E 1.5 mM was higher than other vitamin E groups (P<0.05). Between vitamin E groups, the percentage of live-ratio was higher in vitamin E 1.5 mM and lower in vitamin E 0.1 mM (P<0.05) and the lowest was in control group (P<0.05).

[Rahim Beheshti, Aiden Asadi, Naser Maheri-Sis. The effect of vitamin E on post-thawed buffalo bull sperm parameters. Journal of American Science 2011; 7(6):227-231]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Buffalo bull, vitamin E, semen.

[Full Text](#)

40 Perceived autonomy support among Maternity and Psychiatric nursing students

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Abstract: Supporting students' autonomy has many outstanding benefits. It promotes self motivation and satisfaction for students in various learning settings. The aim of this study was to identify the nursing students' perception of their clinical instructors autonomy support. A convenient sample was taken from Faculty of Nursing, Alexandria University at Maternity and Psychiatric Nursing Departments. Sample of this study consisted of 250 undergraduate students attended and studied Maternity and Psychiatric Nursing courses. Data were collected in the second semester of academic year 2009/2010. Two tools were used to collect the necessary data. One questionnaire sheet to obtain demographic data including gender, age, and academic achievement. Second questionnaire sheet was Learning Climate Questionnaire, to assess the perceived autonomy support among students at different learning settings. Results of this study showed that the majority of Maternity and Psychiatric nursing students perceived either low or moderate levels of autonomy support and no statistically significant difference was found. Significant differences were only found between students' perception of clinical instructors autonomy support and gender differences among both groups. Teaching programs will be recommended to train clinical instructors in both specialties to display more autonomy-supportive behaviors.

[Fatma Hussein Ramadan and Rasha Mohamed Essa. B Perceived autonomy support among Maternity and Psychiatric nursing students. Journal of American Science 2011;7(6):232-240]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: autonomy support, self-determination theory, gender differences, maternity and psychiatric nursing students.

[Full Text](#)

41 Concurrent External Radiotherapy And Doxorubicin Based Chemotherapy In Breast Cancer Patients Any Cardiac Side Effects?

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Abstract: Doxorubicin, has for long been a major component in the combination chemotherapy for Breast Cancer. At a cumulative dose of 400 and 600mg/m² cardiomyopathies and electrocardiographic changes have been reported which may be worsen in patients who receive external beam radiation treatment to the left chest wall. This study aimed at examining presence of cardiac sequelae that may result from concurrent use of Doxorubicin based chemotherapy and external beam radiotherapy to the chest wall in our breast cancer population. Sixty-five (65) patients with cancer of the breast on combination therapy who received 50mg/m² of Doxorubicin in four divided three weekly doses and had 50Gy of external beam radiation in 25 daily fractions over 5 weeks were evaluated. The patients also had 5-florouracil 1000mg/m² and Cyclophosphamide 1000mg/m² as part of the combination chemotherapy. All patients had ECG and Echocardiography before commencement of treatment and at three and nine months post treatment. Only 55 were found evaluable at the end of the study with mean age of 48 years. Eleven patients had history of hypertension while none had any previous history of heart diseases. The pre and post-treatment ECG and Echocardiography were similar (p>0.05). The participants were also symptom free during the follow up period. Though this study suggests a safe combination of Doxorubicin-base chemotherapy and chest wall radiation within the period of evaluation, this may however, not exclude the possibility of long term complications.

[A.A. Adenipekun, O. Oladapo, T.N. Elumelu. Concurrent External Radiotherapy And Doxorubicin Based Chemotherapy In Breast Cancer Patients Any Cardiac Side Effects? Journal of American Science 2011;7(6):241-244]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Concurrent Radiotherapy; Doxorubicin Chemotherapy; Cardiac side effect

[Full Text](#)

42 Effects of administration of industrial tannins on nutrient excretion parameters during naturally acquired mixed nematode infections in Moghani sheep

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Abstract: Tannins are one of the secondary metabolites of plants that tend to combine with protein and reduce parasitic properties in livestock and veterinary industry. The aim of this study was to investigate effects of different levels of Quebracho Condensed Tannins (QCT) on Crude protein (CP) and other excretion parameters during naturally acquired mixed nematode infections in Moghani sheep. Twenty ewes (6-12 months years-old) with average body weight (26.5 ± 3.5 kg) were selected randomly and divided into four experimental groups: Control, A, B and C (were given 0, 1.5, 2 and 2.5 g/kg body weight QCT, respectively) in summer 2010. In order to reduce the undesirable effects of tannins, it was used as a single oral dose drenches. Faecal samples were taken at 24 and 48 hour after treatment. Our result showed that protein excretion has a significant difference in all treatment groups compare to control group after 24 hours from drenching ($P < 0.05$). Also, 48 hours after drenching, CP excretion was significantly decreased in treatment groups ($P < 0.05$) and the QCT has no significant effect on faecal excretion of dry matter (DM), organic matter (OM) and ash ($P > 0.05$). Our results indicate that high levels of tannins intake were decreased protein excretion and increased retention of nitrogen in animal body.

[Majid ChaichiSemsari, Naser MaheriSis, Mohammad Sadaghian, Behrad Eshratkhal, Shahin Hassanpour. Effects of administration of industrial tannins on nutrient excretion parameters during naturally acquired mixed nematode infections in Moghani sheep. Journal of American Science 2011;7(6):245-248]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Quebracho tannin, protein excretion, nematode, sheep

[Full Text](#)

43

Outcome of Mild and Moderate Preterm Newborns Admitted to NICU of Assiut University Children Hospital, Relation to Birth Weight

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Abstract: Prematurity and intrauterine growth restriction continues to be the major determinant of neonatal morbidity and mortality. The aim of this study was to assess morbidity and mortality of mild and moderate preterm newborns admitted to NICU of Assiut University Children Hospital, and to find out the effect of birth weight on these outcomes. Three hundreds and six preterm cases were included of which 194 were mild preterm (34-36 gestational weeks) and 112 were moderate preterm (32-33 gestational weeks). Cases with birth weight $< 10^{\text{th}}$ percentile on growth charts were classified as small for gestational age (SGA). Cases were followed during the admission period for neonatal mortality and/or morbidity including respiratory distress (RD), need for mechanical ventilation, sepsis/meningitis, intraventricular hemorrhage (IVH), and necrotizing enterocolitis (NEC). The length of hospital stay was also recorded. Results showed that moderate preterm group had significantly higher susceptibility to RD and IVH, and higher need to mechanical ventilation than the mild preterm group. Furthermore, they showed higher rate of death and longer hospital stay than the mild preterm. There was a significant negative correlation between gestational age and length of hospital stay. According to birth weight it was noticed that SGA moderate preterm showed higher mortality rate and higher rate of IVH and sepsis/meningitis than the corresponding AGA group, while SGA mild preterm newborns had significantly lower rate of RD and higher rate of IVH and sepsis/meningitis than the corresponding AGA group. Both SGA subgroups had significantly longer hospital stay than the corresponding AGA groups. In conclusion, preterm infants especially SGA are at greater risk of neonatal morbidity and mortality. Management strategies and guidelines should be settled to prevent spontaneous preterm deliveries and to early diagnose and manage intrauterine growth restriction.

[Hanaa Abd Ellateef Mohammad, Nafisa H R Abd ElAziz, and Randa shams Eldeen. Outcome of Mild and Moderate Preterm Newborns Admitted to NICU of Assiut University Children Hospital, Relation to Birth Weight. Journal of American Science 2011;7(6):249-253]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Preterm Newborns; respiratory distress; necrotizing enterocolitis; intraventricular hemorrhage

[Full Text](#)

44

LMI Based Switching Congestion Controller for Multiple Bottleneck Packet Switching Networks

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Abstract: In this paper a new Linear Matrix Inequality (LMI) based switching controller for multiple Bottleneck packet switching Network has been considered. The main goal is to illustrate the effects of the Switching Control methodology on the congestion control problem of the packet switching Networks with dynamically varying parameters such as Link capacity and time delays. The congestion dynamic for congested network is presented and LMI based switching controller is being discussed. Then, the proposed control method has been applied on a case study in ATM Congested Network and simulations are conducted, and simulation results will be compared with old method..

[Rouhollah Barzamini, Masoud. Shafiee. LMI Based Switching Congestion Controller for Multiple Bottleneck Packet Switching Networks. Journal of American Science 2011;7(6):254-261]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Congestion Control; Linear Matrix Inequality (LMI); Multiple Bottleneck; Packet switching Network; Switching Control Methodology

[Full Text](#)

45

Designing Affordable Solar Dryer for the Small Scale Holder

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Abstract: The local farmer preserves the farm produce either by drying over the cooking tripod flue or by the use of natural sunlight. The quantity of produce that can be accommodated over the cooking flue is limited and the traditional solar drying is inefficient because the produce is exposed to vagaries of nature, birds and occasionally to rodents. The produce is preserved for use during the lean period, sold when the price is right and stored to provide seeds for the next planting season. The cost of building the typical glass covered solar dryer is generally beyond the means of the average rural farmer. There is therefore a need to find cheaper construction materials to replace the major cost components such as glass. Two solar dryers with glass and plastic covers have been designed and constructed for the purpose of assessing the suitability of plastic sheet as a replacement for glass. The drying performance of the two dryers has been compared. The results from the plastic covered solar dryer compare favourably with those of the glass dryer. It is therefore concluded that glass can be replaced with plastic sheet without significant performance loss.

[Nnorom ACHARA. Designing Affordable Solar Dryer for the Small Scale Holder. Journal of American Science 2011;7(6):262-266]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: transparency; incident; angle of inclination; absorption coefficient; reflection coefficient; tracking; dimensionless parameters

[Full Text](#)

46 **Assessing techniques in Participatory Rural Appraisal (PRA)**

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Abstract: PRA requires researchers / field workers to act as facilitators to help local people conduct their own analysis, plan and take action accordingly. It is based on the principle that local people are creative and capable and can do their own investigations, analysis, and planning. The basic concept of PRA is to learn from rural people. Chambers (1992) has defined PRA as an approach and methods for learning about rural life and conditions from, with and by rural people. He further stated that PRA extends into analysis, planning and action. PRA closely involve villagers and local officials in the process. Similarly, Rapid Rural Appraisal (RRA) reflects the new thinking about development, needs, and people oriented responsibilities. It is a process that is highly systematic and structured, relying on interdisciplinary teamwork and special strategies for data collection and analysis such as triangulation, probing, and iteration. Some critics consider RRA to be a quick and dirty technique. There are a wide range of participatory tools and techniques available. People can use these tools and techniques according to their situation or needs. Generally, the application of different tools may vary from one situation to another. However, the process for conducting RRA/PRA remains the same.

[Zahra Kaveie and Fakhteh Ghahramani. **Assessing techniques in Participatory Rural Appraisal (PRA)**. Journal of American Science 2011;7(6):267-271]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Participatory Rural Appraisal (PRA)

[Full Text](#)

47 **Distance in Economics Education: A Study of Factors**

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Abstract: In conventional face to face education, as far as teaching approaches are concerned everything is left up to the teacher concerned. Though the infrastructure is available the problem lies in its proper communication. In order to gauge the distance perceived across various aspects in the educational system, the researcher conducted the present study. After consulting the literature, nineteen factors were identified and an opinionnaire was accordingly prepared for teachers of Economics from the conventional face to face education. The nineteen factors and the teachers' opinion show how conventional educational system has not taken into consideration the communication aspects which would hamper overall performance of teachers as well as students. It has taken for granted that no communication distance can be present because of physical proximity between teacher and students and institution. Therefore there is a need to reconstruct the conventional curriculum taking into consideration the factors and compensate for them. To compensate for this distance, one can look towards the distance education mechanisms. The face-to-face education has thus a number of lessons to learn from distance education. In distance education, distance is presumed and attempts are made to create devices to compensate for it. As this study has showed, there is no reason to believe that the face-to-face education does not have any communication distance. It is a rather serious matter that most of the teachers in the face-to-face system perceive a communication distance.

[Hadi Ghaffari, Ali Younessi. **Distance in Economics Education: A Study of Factors**. Journal of American Science 2011;7(6):272-276]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Economics, Distance Education, Conventional Education, Communication Distance

[Full Text](#)

48 **Formation of mutagenic heterocyclic amines in some cooked chickens**

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Abstract: Food mutagens one of the major factors can contribute to human cancer risk and different health adverse effects. Heterocyclic amines (HCAs) are important class of food mutagens/carcinogens that can be formed in cooked meat, chicken and fish. The quantity and types of HCAs is dependent on cooking method, heating temperatures and time of cooking. In the present study, the effect of cooking method (charbroiling, wet boiling and smoked chicken luncheon) on formation of HCAs in Egyptian cooked chicken was studied using three short-term mutagenicity assays; yeast D7, somatic mutation and recombination test in *Drosophila* and rat bone marrow chromosomal aberrations assay. Mutagenic/carcinogenic heterocyclic amines (HCAs) are formed at low levels during heat processing of protein-rich food; therefore blue rayon was used as effective extraction and purification method. The results of mutagenicity tests indicated that used cooking methods for charbroiling and smoked chicken luncheon in this study were capable of forming food mutagen(s) and gave positive significant mutagenic effects in all tested assays. No HCAs were detected in wet boiling chicken extract, where it gave negative effects in all used bioassays.

Al-Kalifah, S. M., Hoda F. Booles, R. Mahmoud, M. Farag, H. Madkour, And Kh. Fahmy. **Formation of mutagenic heterocyclic amines in some cooked chickens**. Journal of American Science 2011;7(6):277-285]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: HCAs – *Drosophila* – Yeast D7 – Chromosomal aberration

[Full Text](#)

49 **Rumen degradation of dry matter and organic matter digestibility of Cherry tree leaves in ruminant nutrition using *in vitro* gas production and *in situ* techniques**

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Abstract: This study was carried out to determine the chemical composition and estimation of nutritional value of cherry tree leaves in the ruminant nutrition. In this study *in vitro*

gas production and *in situ* techniques were used to evaluate nutritional value of cherry tree leaves. Cumulative gas production was recorded at 2, 4, 6, 8, 12, 24, 48, 72 and 96 h of incubation also, *in situ* disappear of dry mater for experimental samples was measured at 0, 4, 8, 16, 24, 36, 48, 72 and 96 h of incubation. Chemical composition including dry matter (DM), crude protein (CP), crude Ash (Ash), ether extract (EE), neutral detergent fiber (NDF), acid detergent fiber (ADF) and tannin compounds, 91.11, 2.76, 9.3, 8, 27.6, 20 and 2.185 percent, respectively measured. Gas production test and *in situ* rumen degradability with of three Taleshi native male cattle rumen fistulae were performed. Digestibility of organic matter (OMD) 65.74 percent and metabolizable energy (ME) 10.27 (MjKg⁻¹) were estimated. The Polyethylene Glycol (PEG) supplementation had also a significant (p<0.05) increase in the estimated parameters of gas production, OMD and ME of samples. Potential degradation (a+b) for dry matter and Effective rumen degradable (ED) at a rate of 0.05/h were estimated, 84.12 % and 52.20% respectively.

[Morteza Kiyani Nahand, Ramin Salamat Doust-Nobar, Naser Maheri-Sis and Abolfazl Ghorbani. **Rumen degradation of dry matter and organic matter digestibility of Cherry tree leaves in ruminant nutrition using *in vitro* gas production and *in situ* techniques.** Journal of American Science 2011;7(6):286-289]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: In situ, Cherry leaf, Gas production, Metabolizable energy and Dry matter degradability

[Full Text](#)

50 **Canola oil and its effect on the EPA and DPA content of abdominal fat of Iranian native turkey**

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Abstract:The aim of this research were to evaluated effect of canola oil on the EPA and DHA fatty acid contents in the abdominal fat of Iranian native turkeys. A total of 90 turkey chicks were randomly divided into 3 experimental treatments with 3 replicates were arranged in a completely randomized design. The experimental period lasted 20 weeks. Experimental diets consisted of: Basal diet with 0% canola oil; basal diet with 2.5% canola oil and basal diet with 5% canola oil. Results show that different level of canola oil could not affect significantly EPA and DHA content but DPA percent significantly increased in experimental treatments compare with control group.

[Ramin Salamatdoust nobar1, Abolfazl Ghorbani1, Kambiz Nazeradll, Saeid Ghaem Maghami1. **Canola oil and its effect on the EPA and DPA content of abdominal fat of Iranian native turkey.** Journal of American Science 2011;7(6):290-292]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Turkey, abdominal fat, DHA, EPA, DPA

[Full Text](#)

51 **Investigation of dip coated ZnO thin film: X-ray reflectivity and Fourier analysis**

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Abstract : In this study we fabricated Zinc Oxide thin film by sol-gel dip coating method on glass substrate. X-ray reflectivity (XRR) and its optimization have been used for characterization and extracting physical parameters of the film. Genetic Algorithm (GA) has been applied for this optimization process. Independent information was exploited from Fourier transform of Fresnel reflectivity normalized X-ray reflectivity. The Auto Correlation Function (Fourier transformation of X-ray reflectivity) yields thickness of each coated layer on substrate. This information is a starting point for constructing optimization process. Specular X-ray reflectivity optimization yields structural parameters such as thickness, roughness of surface and interface and electron density profile of the film. Acceptable agreement exists between results obtained from Fourier transformation and X-ray reflectivity fitting.

[Ghahraman Solookinejad. Investigation of dip coated ZnO thin film: X-ray reflectivity and Fourier analysis. Journal of American Science 2011;7(6):293-298]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: X-ray Reflectivity, dip coating, roughness, Fourier Transformation

[Full Text](#)

52 **New look to indigenous knowledge in developing countries**

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Abstract: in the process of agriculture renovation in the third world that is indeed unavoidable, the indigenous agriculture knowledge and local methods in management of agriculture resources is to be destroyed and simultaneity environmental regions are on the verge of destruction. Modern agriculture prefers huge profit from resources and didn't pay attention to environmental, cultural, social and economic varieties of traditional agriculture. So incongruities of agriculture development plans are not compatible with rural needs and talents and also rural conditions. By recognizing indigenous agriculture features such as traditional classification for identifying plant and animal species and using of indigenous practices like simultaneous cultivation of compatible crops, we can get useful information about suitable ways for agriculture. Surely these guidelines will be more compatible with rural needs and agriculture and environmental features of each region and won't be reckless to social, economic and environmental complex issues.

[Abbas Emami. **New look to indigenous knowledge in developing countries.** Journal of American Science 2011;7(6):299-303(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: indigenous knowledge, developing countries

[Full Text](#)

53 **The role of distance learning tools in Increase the efficiency of adult education**

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Abstract: Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult

illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out. To be successful, the Commonwealth's strategies must energize and gain the commitment of all the state's political, education, business, and civic leaders. No strategy will succeed unless it engages leaders in each community and county to identify needs and develop programs and services appropriate to the community's unique circumstances.

[Akram Ghaffari. **The role of distance learning tools in Increase the efficiency of adult education.** Journal of American Science 2011;7(6):304-308]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult education, distance learning
54

Assessing relationship between rural women empowerment and employment

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[Full Text](#)

Abstract: Rural women constitute about half of the world's population and in the world production supply they have energetic communion and constitute a great part of agriculture workforce. They constitute% 50 of the workforce and they participate in the production of half of the foods in the agriculture section. As an example the rural women constitute about 70 to% 80 of agriculture workforce in sub-Saharan Africa, %65 in Asia, %45 in Latin American & Caribbean, %80 in Nigeria & Tunisia and %80 in India, but their role in production system is the men's supplements roles and this causes a big responsibility inside their mother & wife duties and it takes a great time and energy of them. Studies in this field show that women spend about two thirds of their time for production, management & organize of their house as the men spend only one third of their time for such things. In the development countries, rural societies which are poverty for geographic reasons such as being far from urban societies or because of mountainous of zone and also as the roads are impassable and some other reason, they became deprived of many human development programs. Unfortunately these societies are suffering of mortality because of poverty but what is clear here is that we can't attribute such privation to geography and nature of the zone. Every country is trying to solve such critical conditions by applying depoverity policies.

[Akram Ghaffari. **Assessing relationship between rural women empowerment and employment.** Journal of American Science 2011;7(6):309-313]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Employment, rural women, empowerment
55

Importance of educators' knowledge about teaching methods in adult education

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[Full Text](#)

Abstract: Complex role of adult learning and training process is significant, his role gradually changed from the donor information and active for many years will assume that the principles and techniques that are used in teaching children to contribute equally in the adult learning process On the other hand is effective in children for adult education teachers were employed. Later that person was well trained (ie the experts), who could well slow or a group leader to manage the program, was selected as an adult educator. Thus learners directly in adult education programs that are based on experience were used, and adult As a mature child which has its own characteristics and is unique is that the principles and techniques of the different techniques used for the education of children is needed. As a result the role of adult educator gradually from non-skilled person without the expertise of individual specialists and trained to be changed and Instructors for training and educational opportunities were provided at all levels are therefore unable to work for educators from institutions with short-term training courses for users of the guidance program (project leaders) through summer workshops for professional leaders through programs Training of Master and PhD levels in schools of higher education courses were provided. other procedures, where the role of teacher has changed the theoretical concepts first, an understanding of adult learning was unfounded on the principle that the concept of adult education is based on transferring knowledge to them and saying what they should know or duty to interpret absorption educator their training. In recent years the practice has changed and the role of educator as a "change agent" and reform as a donor and an "auxiliary roles" or "facilitators" were raised as his understanding of adult personal and community among people.

[Fatemeh Bakhtiar. **Importance of educators' knowledge about teaching methods in adult education.** Journal of American Science 2011;7(6):314-317]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: teaching methods, educator, adult education
56

The role of information and communication technologies (ICT) in distance education

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[Full Text](#)

Abstract: Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend on matching technological capabilities to education needs. Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home.

[Fatemeh Bakhtiar. **The role of information and communication technologies (ICT) in distance education.** Journal of American Science 2011;7(6):318-322]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: ICT, distance education

[Full Text](#)

57 **Characteristics Adult and children education**

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Abstract: adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation.

[Mehran Bozorgmanesh and Mojtaba Sadighi. **Characteristics Adult and children education.** Journal of American Science 2011;7(6):323-326]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult education, children education

[Full Text](#)

58 **The role of Distance education in improving adult education**

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Abstract: Distance learning is one of the fastest-growing components of higher education. Almost 3.5 million students were enrolled in at least one distance learning course in the fall of 2006 and online enrollments are increasing every year. The convenience of taking classes at any time from any location appeals to today's adult learner, especially those who work, have families or live in rural areas. Today a growing number of paralegal and legal secretarial programs have a distance learning component (no law schools currently grant credit for distance learning studies). However, not all distance learning programs are of equal quality. Moreover, the increasing popularity of distance learning programs have led to "diploma mills" or "accreditation mills" that offer bogus degrees and certificates. Choosing a distance learning program requires careful research and evaluation. Below are several important factors to consider in choosing a distance learning program. In evaluating distance learning paralegal programs, determine if the school is accredited by one of the regional accrediting bodies and by the American Bar Association (ABA). ABA-approval signifies that the school has met certain standards in terms of academics, facilities and instruction. Graduating from an ABA-approved school may give you an advantage in the legal job market.

[Maryam Zandieh and Mona Habibi. **The role of Distance education in improving adult education.** Journal of American Science 2011;7(6):327-331]. (ISSN: 1545-1003). <http://www.americanscience.org>

59 **Rural women empowerment and rural development**

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Abstract: in the rural community of Iran, there are gaps between the ruling class (capital owners) and villagers, between literate and illiterate, and between men and women. Especially in villages women have fewer possibilities in terms of investment and less power and credit. Role of rural women, over of men, is more influenced with differer economic, social, cultural and ecologic factors. Rural women are considered as a noticeable potential in the community either directly (crops production, livestock, handicraft: cottage industries) or indirectly by helping the agricultural sector (as labor). About 5.6 million women are involved in agricultural production, and activities related to planting, harvesting, preparation of animal food, and taking care of livestock and poultry and some certain activities related to trading and marketing are all different fields of rural women' role and participation. Based on current statistics, women in rural area participate about 50% in conversion industries, 22% in producing crops and livestock, 75% in handicrafts an in areas related to planting...harvesting , respectively, 25, 24 and 4.26. And also in activities related to livestock, they handle 23% of livestock grazing, 42% of animal care and 10 percent of total poultry in the village. Therefore their role in achieving food security is undeniable. But, like most developing countries, this crucial role in society and in process c rural development, is not obvious. In Iranian rural community, about 80% of women work, but they are mostly considered as housewives, unpaid employment, domestic workers: family workers, or independent employers. The statistics often do not take into account seasonal, part-time, unpaid employment, and housekeeping activities. In economics and socia sciences, those of women's activities that have emerged out of house and affected national economy, are the ones to be noticed. In most research and statistics men are known as th heads of household and they are also the owners of lands and fields. That only 1% of the rural lands are belonging to women does confirm such matter.

[Nooshin Javadi and Mona Habibi. **Rural women empowerment and rural development.** Journal of American Science 2011;7(6):332-336]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: empowerment, rural women, rural development

[Full Text](#)

60 **Rural women participation and Employment in iran**

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Abstract: Among developing countries, millions of women always are in farms and lands, work in engaged industries, keep the cattle, store firewood and water and earn livelihood and participation in economic activities is one of their important characteristics. But Despite their widespread presence in economic activities and benefits associated with it, they always face with discrimination. The discrimination has never tired them, but as a major force in economic activities is discussed around the world. In Semi-desert areas in Africa, women traditionally are active in keeping poultry and Vegetarian animals and wild plants and trees fruit collected. In Turkey, women are employed to produce vegetables and dairy products. Among Indians, agricultural activities of women include the region around the home and caring small animal, garden products and collective activities such as spinning, weaving, wool weaving, and the cheese production. In China, when the job opportunity outside the farm is not available, the men are trying to produce crops and women are keeping

livestock, doing crafts and spending to food products. In that case, women are responsible for all the agricultural tasks and do some activities such as the poultry production. [Mona Habibi and Maryam Zandieh. **Rural women participation and Employment in iran.** Journal of American Science 2011;7(6):337-341]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Employment, rural women

[Full Text](#)

61 Adult learning principles

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Abstract: adult education in the local agricultural education program is an essential component of the "total" program. Offering adult education programs helps to keep farmers and agribusiness employees better informed of current trends and provides them with opportunities to learn new skills and improve existing ones. Teaching adults can be very challenging, but also very rewarding. Most teachers would agree that the benefits derived from a successful adult education program in agriculture far outweigh the costs. In addition to the direct benefits to adult participants, the teacher, the school, the community, and the secondary program also benefit from a quality adult education program in agriculture. Adults in agriculture use a number of sources to gain new information that can be used to help them solve problems. Persons employed in agriculture utilize newspapers, magazines, newsletters, radio, television, government publications, internet, and meetings to gather information which can be directly utilized in their business activities. In many communities, the agriculture teacher is the primary source of agricultural information.

[Nooshin Javadi and Maryam Zandieh. **Adult learning principles.** Journal of American Science 2011;7(6):342-346]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult learning, adult education

[Full Text](#)

62 Distance learning in adult education

¹ Maryam Nikmanesh and ² Mina Abarashi

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Abstract: Adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out.

[Maryam Nikmanesh and Mina Abarashi. **Distance learning in adult education.** Journal of American Science 2011;7(6):347-352]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: distance learning, adult education

[Full Text](#)

63 Assessing process of Adult Learning in agricultural education

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Abstract: Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered. Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his. Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills.

[Mona Habibi and Nooshin Javadi. **Assessing process of Adult Learning in agricultural education.** Journal of American Science 2011;7(6):353-356]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult learning, education

[Full Text](#)

64 Utilization of micro-credit for rural women and improving livelihood

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Abstract: In the countries that credits are provided in a proper financial manner, not only it has increased production and income but also it has encouraged poor to save a part of their income. These savings can be an important support for the institutes providing micro-credits and can be a financial base for more loans and all these result in institutes' finance dependence. With the new way of micro-credit payments, in addition to covering poor's financial needs, a combination of other services and facilities are available for them; such saving accounts, educational services, and cooperation possibilities. If rural women can work through receiving credits, loan and others finance facilities at favorite jobs and

through earned income (as it called “self-reliance and independence”) , so undoubtedly we would see changes in social, economic and cultural relations of village. However the actions caused that women stand in good economic condition and also gain self reliance and rely themselves with no help from husbands, but dominant cultural space on villages may create some disorders. At most of villages in Iran, patriarchal with all features dominate and women’s financial self reliance may not being pleasant for some human and rural groups.

[Fakhteh Ghahramani and Zahra Kaveie. **Utilization of micro-credit for rural women and improving livelihood.** Journal of American Science 2011;7(6):357-361]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: micro-credit, rural women

[Full Text](#)

65 **Using Participatory Rural Appraisal (PRA) in rural research**

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Abstract: Robert Chambers (2004) describes PRA as “a growing family of approaches, methods, attitudes and behaviours to enable and empower people to share, analyze and enhance their knowledge of life and conditions, and to plan, act, monitor, evaluate and reflect”. While RRA focuses on data collection or extraction, PRA focuses on empowerment. It needs to be noted that although RRA and PRA carry the term “rural”, they can both be and have been applied in urban settings. To make it more inclusive and to emphasize the empowerment aspect, the term Participatory Learning and Action (PLA) is used interchangeably with PRA. PRA has many sources. The most direct is rapid rural appraisal (RRA) from which it has evolved. RRA itself began as a response in the late 1970s and early 1980s to the biased perceptions derived from rural development tourism (the brief rural visit by the urban-based professional) and the many defects and high costs of large-scale questionnaire surveys. PRA has much in common with RRA but differs basically in the ownership of information, and the nature of the process: in RRA information is more elicited and extracted by outsiders as part of a process of data gathering; in PRA it is more generated, analyzed, owned and shared by local people as part of a process of their empowerment. The term Participatory Rural Appraisal (PRA) is being used to describe a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act.

[Fakhteh Ghahramani and Zahra Kaveie. **Using Participatory Rural Appraisal (PRA) in rural research.** Journal of American Science 2011;7(6):362-366]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Participatory Rural Appraisal (PRA), rural research.

[Full Text](#)

66 **The role of indigenous knowledge in Reaching to sustainable development**

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Abstract: Indigenous knowledge is local knowledge that is restricted to one specific culture and/or certain society. Indigenous knowledge is different with scientific knowledge that was established by universities and scientific communities. This knowledge is basis for decision making at field of agriculture, health, education, food and natural sources . Indigenous knowledge is set of all knowledge and skills that people enjoy in one geographical area (in one environmental conditions) that most of their skills and knowledge be transmitted to next generation , and new generation would be adapted with them and add to it. Since, each knowledge is consequent of individual interaction with environment, so indigenous knowledge is consequent of indigenous people interaction with their environment. Chambers with emphasis on people’s role at development process believes that “rural people’s knowledge” term is more eloquent than other terms for indigenous knowledge. Our purpose of rural people are producer farmers , input buyers , agriculture production sellers and etc. “people” in above phrase emphasis that this knowledge is more verbal and less has been written . This word also referred to whole knowledge system which contains concepts, beliefs, and attitudes and also contains gain, store and transmitting knowledge process.

[Zahra Kaveie and Fakhteh Ghahramani. **The role of indigenous knowledge in Reaching to sustainable development.** Journal of American Science 2011;7(6):367-371]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: sustainable development, indigenous knowledge

[Full Text](#)

67 **Financial self-reliance of rural women through micro-credit**

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Abstract: If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live without dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes. Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

[Maryam Nikmanesh and Mina Abarashi. **Financial self-reliance of rural women through micro-credit.** Journal of American Science 2011;7(6):372-375]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: financial self-reliance, rural women

[Full Text](#)

68 **Status of indigenous knowledge in rural (in developing countries)**

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Abstract: Indigenous agriculture is base on farmer’s cooperation with nature. Sustainable agriculture that inspired by indigenous systems would rectify most of deficiencies of

modern agriculture. Indigenous agriculture systems is production of centuries of cultural and subsistence revolution. These systems are collections of farmer's experiences that haven't enjoy sources except inputs, capital and indigenous knowledge. And consequently they accessed to such sustainable agriculture that just is dependent on using restricted local resources and existing humane and animal power. At indigenous agriculture, culture diversity and frequency would minimize possibility of loss crops in spite of simple technology. These systems despite of limitation of sources enjoy merits of sponsors traditions and intelligent methods of using animals, fields, and compatible crop species. Thus ecological agriculture scholars consider these systems as unique samples to determine sustainability standards in agricultures activities. This knowledge would rise at different fields such as language, botanical and zoology and also skills and manual and agriculture professions that all are product of human efforts in his environment. This information contain best, useful and consistent collocation of exploiting methods and living in special environment which be transmitted through verbal and empirical way from one generation to another.

[Maryam Zandieh and Nooshin Javadi. **Status of indigenous knowledge in rural (in developing countries)**. Journal of American Science 2011;7(6):376-380]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Indigenous knowledge, rural women

[Full Text](#)

69

Importance of using information and communication technologies (ICT) in education

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Abstract: ICT provides access to only a small part of the action is created equal. Equal attention should also be applied to ensure the technology really "is used by learners and ways of how well their needs will cure. An educational program that reinforced this approach shows the overall program is bilingual. The program seeks to establish technology learning centers for bilingual teachers, students, teachers, parents and community members. Technical teams from each center three students, two teachers and the director of the Center with at least one female student and a teacher are female. Another example of a general approach to the application of ICT in education, radio education project Gobi Women of Mongolia, which seeks to provide professional and educational structure of women's favorite courses around the nomads and their opportunities for income generation. It contains topics such as livestock rearing, family support (family planning, health, nutrition and health) to create income in the application of local raw materials and basic skills for the job is a new market. Policy makers and service providers have increasingly come to view information and communication technologies (ICT), and particularly the Internet, as an important tool in providing disadvantaged groups and areas with access to information, services and markets that would otherwise be inaccessible. The concept of development of the rural, today, is not just project initiatives and governance; it is much more beyond that. This paper uncovers a whole plethora of ICT emergence as a technology of the new millennium.

[Dr. Mahmoud Safari. **Importance of using information and communication technologies (ICT) in education**. Journal of American Science 2011;7(6):381-385]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: education, information and communication technologies (ICT)

[Full Text](#)

Effect of K, P, Zn, S Fertilizer on cold tolerance on rapeseed genotypes (relay Cropping) in climatic region of Varamin

70

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Abstract: In order to study of different levels of fertilizer treatment (K , Zn, S) on increase tolerance to cold on quality characteristics on genotypes of rapeseed in delayed planting , an investigation was carried out with factorial in random complete block with three replications and 36 treatment ,in Varamin - Pishva university field research (Ghaleh – sin) in 2008-2009. Factors were genotypes in three levels(Hyola -42 , SLM046 , Zarfam) and fertilizer treatment in 4 levels (1-Control , 2- C+ K, 3- C, K+Zn, 4- C, K, Zn +S). Planted seed at 10th November were delayed planting .The highest grain yield achieved from (C,K,Zn,S,SLM046)with 6564.6 Kg/ha ,That had 72 % grain yield further of (Control, Zarfam) genotype with 1807.65 Kg/ha. Also the highest number of pods per plant, number of grain per pods and biological yield with 156.97, 20.7 and 17384.9 Kg/ha respectively was obtained from Hyola-42 Hybrid and use of C, K, Zn, S. In this research the lowest these amounts were achieved for Zarfam genotype with Control fertilizer. In conclusion Slm046 genotype with C, K, Zn, S fertilizers was suitable for delayed planting (Cold Stress) for Varamin condition.

[Pourang kasraie, Mohammad Nasri, Mansoureh Khalatbari. **Effect of K, P, Zn, S Fertilizer on cold tolerance on rapeseed genotypes (relay Cropping) in climatic region of Varamin**. Journal of American Science 2011;7(6):386-390]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Rapeseed; Genotype; yield and yield components cold tolerance

[Full Text](#)

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Prevalence of Adenocortical Insufficiency in Patients with Liver Cirrhosis, Liver Cirrhosis with Septic Shock and in Patients with Hepatorenal Syndrome

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Abstract: Critical illness is accompanied by the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which is highlighted by increased serum corticotropin and cortisol levels. In patients with severe sepsis, the integrity of the HPA axis can be impaired by a variety of mechanisms. These patients typically have an exaggerated proinflammatory response and are considered to be relatively corticosteroid insufficient. This complex syndrome is referred to as critical illness-related corticosteroid insufficiency (CIRCI) which manifests with insufficient corticosteroid mediated down regulation of inflammatory transcription factors. Similar to type II diabetes (relative insulin deficiency), CIRCI arises due to corticosteroid tissue resistance together with inadequate circulating levels of free cortisol. Numerous papers have reported a high incidence of adrenal failure in critically ill patients, including those with end stage liver disease and liver transplant recipients. The term hepatoadrenal syndrome e.i, Adrenocortical insufficiency in patients with liver cirrhosis has been used to describe such an association between liver disease and adrenal failure and the definition of this term extends beyond the occurrence of sepsis, which is a frequent complication of liver failure. Aim of work to assess: The prevalence of hepatoadrenal syndrome (HAS) among the Egyptian cirrhotic patients, the prevalence of HAS among those complicated with septic shock or hepatorenal syndrome and to find significant predictors for HAS. Patients and methods: Our study was a cross sectional study, conducted on 45 patients admitted to the liver intensive care unit and hepatology ward of Theodor Bilharz Research Institute (TBRI) in the period between November 2009 and

February 2010, who were fulfilling the criteria of Child Pugh classification. Patients were divided into three groups. Group A included 15 patients with liver cirrhosis, with neither septic shock nor hepatorenal syndrome, Group B included 15 patients with liver cirrhosis and septic shock, but not associated with hepatorenal syndrome, Group C included 15 patients with hepatorenal syndrome. The adrenal function of all patients was assessed by the conventional dose, short synacthen test (250 ug.iv) which was performed within the first 24 h of admission. Blood samples to measure plasma cortisol levels were obtained before and 30 minutes after synacthen administration. Results: Our study revealed that adrenocortical insufficiency (ACI) was found in 33 patients out of the 45 patients subjected to this study (73.3%). Receiver Operating Characteristic (ROC) curve was done and showed that the MELD score may be a good predictor for ACI in liver cirrhosis patients. ROC curve showed also that the serum bilirubin may be a good predictor for ACI in liver cirrhosis patients. Conclusion: Adrenocortical insufficiency is common in patients with cirrhosis and in patients complicated with hepatorenal syndrome. According to our study MELD score and serum bilirubin level may be good predictors for Hepatoadrenal Syndrome. Recommendation: We recommend To make further studies with greater number of patients to detect hepatoadrenal syndrome and to study its effect on the prognosis, the complication of liver cirrhosis and mortality. [Mohamed Badr Mohamed, Gamal Hamed, Ayman Heikal and Hisham Darwish. Prevalence of Adrenocortical Insufficiency in Patients with Liver Cirrhosis, Liver Cirrhosis with Septic Shock and in Patients with Hepatorenal Syndrome. Journal of American Science 2011;7(6):391-400]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Liver cirrhosis, child classification, hepatoadrenal syndrome, hepatorenal syndrome, adrenal dysfunction, adrenocortical insufficiency, relative adrenal insufficiency, MELD score [Full Text](#)

72 **Design and Development of a Portable Banana Ripeness Inspection System**

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Abstract: Automatic control of environmental conditions is an important problem of banana ripening treatment. In this study, a capacitive sensing system was designed and developed. In this method banana fruit is placed in the capacitive sensor as a dielectric material and then the capacitance of sensor is measured. Experiments were carried out with 10 kHz to 10 MHz sinusoidal frequencies. A consistent decrease of ϵ_s had occurred at 100 kHz and 1 MHz frequencies when banana had been ripened. A high correlation was observed between ϵ_s and ripening period ($R^2 = 0.96$) at 100 kHz frequency. This system has the following characteristics: rapid response, simple operation, non-destructive measurement, and low cost.

[Mahmoud Soltani, Reza Alimardani and Mahmoud Omid. **Design and Development of a Portable Banana Ripeness Inspection System**. Journal of American Science 2011;7(6):401-405]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Banana fruit, Dielectric constant, Electronic circuit [Full Text](#)

73 **Effect of Chitosan on Oxidative Stress and Metabolic Disorders Induced In Rats Exposed to Radiation**

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Abstract: Radiation is one of the most widespread sources of environmental stress in living environment which cause oxidative stress and metabolic changes. Chitosan is widely distributed in nature as a component of bacterial cell walls and exoskeletons of crustaceans and insects. The present study aims to evaluate the antioxidant effect of chitosan against gamma rays induced oxidative stress and metabolic disorders in rats. The study was conducted on forty eight (48) female rats which were classified into four equal groups. Group 1: Control group, rats administrated orally 1.0 ml vehicle solution for forty days. Group 2: Chitosan group, rats administrated orally (intragastric intubation) 1.0 ml of chitosan solution (100mg/kg b.wt. / day for 40 days). Group 3: Irradiated rats, rats were subjected to whole body γ irradiation to dose 4 Gy delivered as single exposure dose. Group 4: Combined treatment: rats administrated orally 1.0 ml of chitosan solution (100mg/kg b.wt. / day) for 40 days. At day 35 of chitosan treatment the rats were irradiated at dose level of 4Gy. Rats inspected after 1st and 5th days post irradiation and liver, spleen, lung and blood samples were collected. The animals exposed to gamma radiation had significant increase in TBARS, LDH, glucose, cholesterol, triglycerides, LDL-C, copper, iron, urea, creatinine, AFP and non significant increase in Mg. Also, significant decrease in GSH, CAT, HDL-C and estradiol was recorded. Administration of chitosan to rats prior and post gamma radiation improved the tested parameters so it is a therapeutic alternative for oxidative stress, hyperlipidaemia and hormonal changes. In this way, chitosan may be contributed to the prevention of atherogenic processes and contribute as safe functional fiber food.

[N. E. Mohamed. Effect of Chitosan on Oxidative Stress and Metabolic Disorders Induced In Rats Exposed to Radiation. Journal of American Science 2011;7(6):406-417]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Chitosan, γ - irradiation, Antioxidant, Lipid profile, Kidney function, Hormones, Rats. [Full Text](#)

On Early Discovery of Mathematically Creative Children using Artificial Neural Networks Modeling (with a case study) 74

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Abstract: Learning creativity is an interesting educational phenomenon usually observed at children classrooms. Early discovery of individual children having mathematical creativity is a challenging interdisciplinary research issue. This piece of research focuses on quantitative analysis and evaluation of mathematical learning creativity on the basis of acquired "Subjective Domains of Experiences" (SDE) inside children's brain. Acquisition of (SDE) assumed to modify a children's stored experience via application of various multimedia Computer Assisted Learning (CAL) packages (modules). Accordingly, fairly assessment of mathematical learning time response has been adopted herein for analysis and evaluation of learning creativity acquired by (SDE). By some details, early discovery of creativity could be performed well in accordance with obtained learning assessment results. That is after solving correctly a suggested mathematical topic (at children classrooms). Furthermore, interactive interference between Reflective and Spontaneous Vorstellungen* during mathematical education has been simulated using supervised and autonomous Artificial Neural Network (ANN) learning paradigms. * The German word Vorstellungen is used in replacement of the vague English expression "internal representation"

[H.M. Mustafa On Early Discovery of Mathematically Creative Children using Artificial Neural Networks Modeling (with a case study). Journal of American Science 2011;7(6):418-429]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Learning Creativity Phenomenon ,Artificial Neural Network, Vorstellungen, subjective domain of experiences, Computer Assisted Learning. [Full Text](#)
75 **The study of food preference of *Sitophilus oryzae* L. on common cultivars of rice in Guilan province**

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Abstract: Rice product after wheat has special importance as the second agriculture strategic product. Rice weevil as one of the most important stored pest has the main role in losses of stored product. So in this research, the pest effects was studied on 4 common varieties of rice in Guilan province "Taroum, Hashemi, Ali kazemi and Dylamani" in two conditions of facultative and obligatory nutrition. Results showed that Taroum variety was the most sensitive variety in conditional of facultative and obligatory nutrition and after it Hashemi variety was in the second category and had significant difference with Taroum variety. Ali kazemi and Dylamani varieties didn't have significant difference with together and had the lowest sensitive.

[Seyedeh Masoomeh Hashemina. The study of food preference of *Sitophilus oryzae* L.on common cultivars of rice in Guilan province. Journal of American Science 2011;7(6):430-434]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Rice weevil, Food preference, Rice varieties [Full Text](#)
76 **Investigating the Strategies to Achieve Success in Human Resource Planning**

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Abstract: Human resource planning has traditionally been used by organizations to ensure that the right person is in the right job at the right time. Under past conditions of relative environmental certainty and stability, human resource planning focused on the short term and was dictated largely by line management concerns. Increasing environmental instability, demographic shifts, changes in technology, and heightened international competition are changing the need for and the nature of human resource planning in leading organizations. Planning is increasingly the product of the interaction between line management and planners. In addition, organizations are realizing that in order to adequately address human resource concerns, they must develop long-term as well as short term solutions. As human resource planners involve themselves in more programs to serve the needs of the business, and even influence the direction of the business, they face new and increased responsibilities and challenges.

[Masoud GhorbanHosseini. Investigating the Strategies to Achieve Success in Human Resource Planning. Journal of American Science 2011;7(6):435-439]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Human Resource, Planning, Organizations, Line Management Concerns. [Full Text](#)
77 **A Survey on the Human Resource Management Perspectives as an Emerging Managerial Function**

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Abstract: Human resource management can be defined as the process of acquiring, training, developing, motivating, and appraising a sufficient quantity of qualified employees to perform the activities necessary to accomplish organizational objectives; and developing specific activities and an overall organizational climate to generate maximum worker satisfaction and employee efficiency. While the owner-manager of a small organization is likely to assume complete responsibility for human resource management, larger organizations use company specialists called human resource managers to perform these activities in a systematic manner. The position is becoming increasingly important because of increased competition, government intrusion, emphasis on cost control, complex wage and benefit programs, and a changing work force. This article reviews the perspectives and the important considerations over the HR management and what HR managers should care about to achieve better Performance Measures.

[Masoud GhorbanHosseini. A Survey on the Human Resource Management Perspectives as an Emerging Managerial Function. Journal of American Science 2011;7(6):440-444]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Human Resource Management, Performance Measures, Maximum Satisfaction, Managerial Function. [Full Text](#)
78 **Gender and Self- Esteem as Determinants of Psychological Hardiness among University Students**

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Abstract: The study deals with the issue of investigating the relationship of psychological hardiness and self-esteem in a sample of 151 University students. Psychological Hardness Scale by Nowack (1990) and self-esteem Inventory by Coopersmith (1981) was used to assess psychological hardiness as well as global hardiness. Further, high self-esteem University students were found to possess significantly higher commitment, perceived greater sense of control on themselves, had higher challenge- accepting tendency and were harder as compared to their low self-esteem counterparts. The paper calls for the implementation of intervention strategies for development of hardy personality and self-esteem among university students.

[Armin Mahmoudi. Gender and Self- Esteem as Determinants of Psychological Hardiness among University Students. Journal of American Science 2011;7(6):445-447]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Psychological Hardiness, commitment, control, challenge and self-esteem [Full Text](#)
79 **The effect of total quality management (TQM) in education- A Comparative study in Bangalore(India) and Shiraz (Iran)**

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Abstract: This paper aims to present the perception of secondary school teachers in Bangalore city (India) and Shiraz city (Iran) regarding Total quality Management (TQM) in education. It is an attempt to understand how these perceptions vary by demographic variable such as, gender & subject specialization (Arts and sciences). Data were collected from 326 high school teachers in BANGALORE (India) and SHIRAZ (Iran) on the Bonstingles conceptualization of Deming's 14 points Total Quality Management (TQM) in Education (1992) and were analyzed using SPSS version 16.0. Multivariate Analysis of variance (MANOVA) was employed to find out the significance of difference between variables subscales. The results obtained by the researcher indicated that there is significant difference between male and female teachers in the perception of total quality management. It is further showed that, Female teachers had higher mean score than male teachers in both the countries. It is also found that, there is no significant difference between ARTS and sciences secondary school teachers from both the countries in the perception of TQM in education. [Armin Mahmoudi. The effect of total quality management (TQM) in education- A Comparative study in Bangalore (India) and Shiraz (Iran). Journal of American Science 2011;7(6):448-453]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Total Quality management, Gender, subject specialization, Education, Secondary Schools

[Full Text](#)

80 **Could Preeclampsia Affect The Maternal Serum Chorionic Gonadotrophin and Plasma Adenosine Deaminase Levels?**

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Abstract: The current work aimed to study the effect of preeclampsia on maternal serum level of beta subunit of human chorionic gonadotropin and maternal plasma level of adenosine deaminase. Ninety pregnant women with gestational age 24 - 26 weeks were selected for this study, they were classified into three groups: group 1 consists of 30 women with normal pregnancy, group 2 consists of 30 patients with mild preeclampsia and group 3 consists of 30 patients with severe preeclampsia. Maternal serum level of beta subunit of human chorionic gonadotropin, and maternal plasma adenosine deaminase level were measured. Maternal serum level of beta subunit of human chorionic gonadotropin was significantly higher in severe preeclampsia compared with the mild preeclampsia group and normal pregnancies. Maternal plasma adenosine deaminase level was significantly higher in the severe group compared with the mild preeclampsia and normal groups. Maternal serum level of beta subunit of human chorionic gonadotropin and maternal plasma level of adenosine deaminase might be useful as markers of the severity of preeclampsia.

[Mohamed A. El hadi Farag, Mohamed Abd El-Salam, Ashraf I. El Mashad, Ibrahim El-Maghawry. **Could Preeclampsia Affect The Maternal Serum Chorionic Gonadotrophin and Plasma Adenosine Deaminase Levels?** Journal of American Science 2011;7(6):454-458]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Preeclampsia, human chorionic gonadotropin, adenosine deaminase

[Full Text](#)

81 **On the Invertibility Preserving Linear Maps**

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Abstract: In this paper we show that the essentiality of the socle of an ideal B of the algebra A implies that any invertibility preserving linear map $\Phi: A \rightarrow A$ is a Jordan homomorphism. Specially if A is a preliminary algebra then any such Φ is an algebraic homomorphism.

[Mohammad Reza Farmani, Abdorreza Panahi. On the Invertibility Preserving Linear Maps. Journal of American Science 2011;7(6):459-462]. (ISSN: 1545-1003).

<http://www.americanscience.org>.

Key words: Invertibility preserving, Banach algebra, Socle, Jordan homomorphism.

[Full Text](#)

82 **Decentralization of agricultural extension**

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Abstract: Agricultural extension is one of the main institutional components of agriculture as it promotes the transfer and exchange of information that can be converted into functional knowledge. It is better to say that extension is the instrument, which is helpful in developing enterprises that promote productivity and generate income in the present climate of change, which ultimately reduce poverty in developing as well as developed countries. Un-fortunately in developing as well as low income countries agricultural extension has failed in diffusing new technology to its ultimate users and further deterioration witnessed with the passage of time. The failure of agricultural extension services for last decades is under constant pressure to be responsive to ever-growing challenges of food production. Agricultural extension is a non-formal type of education that provides advisory services by the use of educational approach in acquiring knowledge and skills to deal with the growing needs of global world. Diverse agricultural extension funding and delivery arrangements have been undertaken since the mid-1980s by governments worldwide in the name of "privatization." When agricultural extension is discussed, privatization is used in the broadest sense – of introducing or increasing private sector participation, which does not necessarily imply a transfer of designated state-owned assets to the private sector. In fact, various cost-recovery, commercialization, and other so-called privatization alternatives have been adopted to improve agricultural extension. The form and content of decentralization has dominated development discourse and public sector reform agenda in Kenya in the last two decades.

[Mina Abarashi and Maryam Nikmanesh. **Decentralization of agricultural extension.** Journal of American Science 2011;7(6):463-469]. (ISSN: 1545-1003).

<http://www.americanscience.org>.

Keywords: Decentralization, Agricultural extension

[Full Text](#)

83 **Sperm nuclear deoxyribonucleic acid denaturation in diazinon/diazoxon sprayer men**

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Abstract: Objectives: Excessive exposure of agrochemical male workers to organophosphate (OP) pesticides may induce morphofunctional changes in their sperms. The aim of this study was to explore sperm nuclear deoxyribonucleic acid (DNA) reaction to in vitro incubation with or in vivo chronic exposure to diazinon or diazoxon. **Methods:** Fixed volumes of every semen sample of ten healthy volunteers were incubated at 37°C for one hour with rising serial volumes of 60% of either diazinon (DZ) or diazoxon (DZO). Induced sperm morphological alterations were determined by microscopic examination of direct fresh, Papanicolaue stained and eosin-Y exclusion smears while sperm nuclear cytotoxicity was assessed by DNA fluorometric examination. On the other hand, sperms of 20 chronic agriculture DZ/DZO spraying workers were directly examined for their quality and DNA denaturation state. **Results:** Normal human spermatozoa showed unfavorable increasing alterations in their quality and DNA integrity after their incubation with serially rising volumes of either diazinon or its oxon. Induction of sperm nuclear DNA denaturation by DZO was more severe both qualitatively and quantitatively than after DZ treated testing. Similar alterations but to lesser extent were found in sperms' DNA of chronic DZ/DZO spraying workers without exogenous OP treatment. **Conclusion:** In vivo DZ/DZO chronic exposure induced unfavorable effects in seminal quality and sperm DNA integrity but were lesser in strength than in vitro testing.

[Sherif MH El-Kannishy, Rizk M El-Baz, Soma Sh Abd El Gawad, Hamdy F Marzook, Samia A Hassan and Abdelhamid A Metwali: Sperm nuclear deoxyribonucleic acid denaturation in diazinon/diazoxon sprayer men. Journal of American Science 2011;7(6):470-475]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: diazinon, diazoxon, DNA fragmentation index, sperm chromatin structure analysis.

[Full Text](#)

84 **Temperature distribution in porous fins in natural convection condition**

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Abstract: This paper investigates the temperature distribution in porous fins in natural convection condition and compares it with temperature distribution in conventional fins. To formulate the heat transfer equation, the energy balance and Darcy's model used. This study is based on finite-length fin with insulated tip. The porous fin allows the flow infiltrate through it. The theory section addressed the derived governing equation. The effect on porosity parameters "S" and convection parameter in porous fin "n", and convection parameter in conventional fin are discussed. The result suggests that by increasing "S" the heat transfer increase but in some cases it has exemption.

[Seyfolah saedodin, Mehdi olank. Temperature distribution in porous fins in natural convection condition. Journal of American Science 2011;7(6):476-481]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: porous fin, Darcy's model, temperature distribution, heat transfer, natural convection

[Full Text](#)

85 **Surgical management of patellar ligament rupture in dogs using a prosthetic woven fabric: Experimental study.**

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Abstract: A new synthetic fabric composed of a mixture of two biomaterials, polyamide 6.6 and polyester, was manufactured with specific tensile characters to serve in the reconstruction of the patellar ligament rupture in dogs. Twelve skeletally mature mongrel dogs with no evidence of clinical signs of lameness were used in the present study. Patellar ligament rupture was induced by severing the mid portion of the right ligament of each limb. Surgical intervention was performed by primary suturing of the severed patellar ligament ends and applying a synthetic fabric to act as a supportive internal splint. Satisfactory results were obtained concerning the tendon healing and the return to limb normal function without complications. It was found that the polyamide polyester fabric proved to be a suitable reconstructive biocompatible material that allowed primary ligament repair with adequate support by and give an excellent outcome in cases of patellar ligament ruptures in dogs.

[Inas N. El-Husseiny, Ali Marwa A., Ayman A. Mostafa¹ and Mahmoud H. Elshakankery. **Surgical management of patellar ligament rupture in dogs using a prosthetic woven fabric: Experimental study.** Journal of American Science 2011;7(6):482-490]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Antioxidative enzymes, Drought stress, Photosynthesis, Proline, Pea

[Full Text](#)

86 **Effect of Methanol intoxication on the Function of Retina of Rabbit**

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Abstract: Methanol is an ideal candidate to replace fossil fuels. However, alterations in the retinal function are primarily associated with methanol intoxication. In the present work, chronic methanol intoxication was carried out in New Zealand rabbits previously depleted of foliates with methotrexate. We analyze the effect of long-term alcohol consumption on oxidative stress parameters of the rabbit retinas and its correlation to retinal function. We show that methanol has a toxic effect on rabbit retina associated with oxidative stress. Decreases in retina glutathione concentration and increases in catalase activity in whole retina homogenate significantly correlate with ERG a- and b-wave decrease. We show also a marked change in the molecular structure and orientation of rhodopsin in cell membranes of the retina. Chronic methanol consumption induces oxidative stress in rabbit retina associated with an impairment of ERG and molecular changes of membrane proteins.

[Alaa El-Din A. Gawad and Amal E. Ibrahim. **Effect of Methanol intoxication on the Function of Retina of Rabbit.** Journal of American Science 2011;7(6):491-496]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Methanol intoxication, Retina, Rabbit, fossil fuels.

[Full Text](#)

87 **Intellectual capital and its effect on economic performance: A Case Study in Iranian Automotive Industry**

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Abstract: Studies have shown that in the contrary of loss productivity of traditional sources (money, land and ...), knowledge is really a source of increasing economic performance. Basically, managers of companies are forced to correct and improve production methods, marketing, innovations and ultimately increase productivity and economic efficiency by considering prevailing economic conditions constantly. One of the main ways to improve economic conditions and increase competition for successful factories which can reach to the potency of competition, is the use of creative thinking that without the recognition and protection of intellectual capital will not be possible. In this study, elements and components of intellectual capital are independent variables as human, Structural, and relational capitals. Economic performance indicators (dependent variables): profit and cash earnings are considered. Methods of research in doing is descriptive - correlation of covariance analysis of structural equation model. The results were analyzed with the Lisrel & SPSS software, and finally the relationship between intellectual capital were confirmed and it has been found that relational and structural capital directly and human capital, indirectly, impress economic performance by structural effects.

[Mojtab Rafiei, Tahereh Feyzi, Hossein Azimi. Intellectual capital and its effect on economic performance: A Case Study in Iranian Automotive Industry. Journal of American Science 2011;7(6):497-507]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: human capital, relational capital, structural capital, economics, Lisrel

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Effect of Length of Delay after Slaughter (LODAS) on Quality of Raw Catfish (*Clarias gariepinus*)

[Full Text](#)

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Abstract: The effect of delay after slaughter on microbial quality, proximate composition and sensory scores of raw catfish, *Clarias gariepinus* (Burchell, 1822) was evaluated. A total of 52 live catfish weighing $700.0 \pm 7.0g$ were used. Ten freshly slaughtered fish samples each were selected for organoleptic assessment at 0, 4, 8 and 12 hours post-slaughter, while three fish samples each were selected for chemical and microbial analyses. Microbial load on fish samples increased significantly ($P < 0.05$) with increase in length of delay after slaughter, LODAS. Bacteria isolated included *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Bacillus spp* and *Staphylococcus aureus*. Percent protein and ash contents of fish samples increased with increasing LODAS, while moisture content decreased and lipid was not affected. It was observed that raw *C. gariepinus* retained most of its physical attributes up to 4 hours post-slaughter. These quality attributes except colour and odour of gills, deteriorated significantly ($P < 0.05$) at every successive four-hour post-slaughter interval. Significant negative correlation existed between LODAS and sensory quality of raw fish (eyes, $r = -0.966$, $P < 0.05$; gills, $r = -0.980$, $P < 0.05$; skin, $r = -0.998$, $P < 0.01$; and odour, $r = -0.994$, $P < 0.01$). This study established that quality of raw *C. gariepinus* deteriorated with increasing LODAS and that raw *C. gariepinus* was not totally unacceptable when delayed for 12 hours after slaughter at ambient temperatures.

[Ayeloja, A. A.; George, F. O. A.; Obasa, S. O.; Sanni, L. O and Ajayi, A. A. **Effect of Length of Delay after Slaughter (LODAS) on Quality of Raw Catfish (*Clarias gariepinus*)** Journal of American Science 2011;7(6):508-512]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: *Clarias gariepinus*; microbiology; proximate composition; organoleptic assessment.

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Coping Behavior of Junior Physicians in Managing Conflict between Work and Family Roles

[Full Text](#)

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Abstract: This study examined the extent of work-family conflict experienced by married female junior physicians and the coping behavior of the physicians in managing the conflict. The sample of this study consisted of married female physicians (with at least one child) aged 40 and below working in fourteen public hospitals in Malaysia. Data were gathered from a sample of 231 female junior physicians using self-administered questionnaires through the drop and collect method. The two major strategies used by the physicians were personal role redefinition which involved changing their own attitudes and perceptions of role expectations, and reactive role behavior which involved careful planning, scheduling and organizing their role activities, and working harder to meet all their role demands. The least frequently used strategy was structural role redefinition which entails an active attempt to deal directly with role senders and lessen the conflict by mutual agreement on a new set of expectations. Implications of the findings and suggestions for future research were discussed.

[Aminah Ahmad, Department of Professional Development and Continuing Education, Faculty of Educational Studies, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia. Journal of American Science 2011;7(6):513-517]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: coping behavior; work-family conflict; junior physicians

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Is salinity tolerance of rice lines related to endogenous ABA level or to the cellular ability for ABA synthesis under stress?

[Full Text](#)

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Abstract: As the plant hormone abscisic acid (ABA) is involved in responses to salinity stress. We tested its putative relationship with the degree of tolerance to this abiotic stress. For this purpose we examined the responses of sensitive (IR29) and tolerant (IR651) varieties of indica rice (*Oryza sativa* L.) to a range of salinity (0 (control) and 100 mM NaCl).

Shoot and root dry weight was reduced and leaf Na concentration increased in response to salinity for both cultivars with a **higher** extent in sensitive. Tolerance of IR29 to saline stress was generally improved by ABA treatment and leaves Na content reduced to their respective control treatment. This ABA effect was evident in IR29 with low tolerance, as their ability to recover from stress increased up to seven fold. Independent of the saline treatment, the absolute endogenous leaf ABA content in sensitive variety was significantly more than tolerant one. However, upon stress, the increase in endogenous ABA synthesis was higher in tolerant than in sensitive varieties. These data together with those obtained by using Fluridone, an inhibitor of ABA synthesis, suggested first, there was differential sensitivity to ABA in the tolerant and sensitive leaves cultivars and enhanced concentrations at tolerant levels acted primarily to maintain root and shoot growth salt stress and second, the differences in the level of tolerance to saline stress is related to their different capacity of ABA synthesis under stress conditions.

[Saeed Saeedipour. **Is salinity tolerance of rice lines related to endogenous ABA level or to the cellular ability for ABA synthesis under stress?** Journal of American Science 2011;7(6):518-524]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords Abscisic acid; Fluridone; *Oryza sativa* L.; Salinity; Stress tolerance

[Full Text](#)

91 **First report on the Karyomorphology Of a threatened Snow barbel, *Schizothorax labiatus* (Teleostei: Cyprinidae), From the River Jhelum Kashmir.**

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Abstract: The karyotype and chromosomal characteristics of (Chush Snow barbel) *Schizothorax labiatus* from River Jhelum Kashmir were investigated. The analysis of 80 metaphase plates revealed the chromosome number of this fish $2n=98$ and a fundamental arm number (FN) =142. The diploid complement comprised 12 metacentric pairs, 10 submetacentric pairs, 1 subtelocentric pairs and 26 telocentric pairs (24m+20Sm+2St+52t). Total length of the haploid complement equalled 157.5 μ m with a range in the length of shortest and longest chromosome between 2-8 μ m. The arm ratio and the centromeric index ranged between 1- ∞ and 0-50 respectively. No heteromorphic sex chromosomes were found. The present study is the first to describe the chromosomal characteristics of *Schizothorax labiatus* from The Kashmir Valley.

[Farooq A Ganai, A. R Yousuf, N. K Tripathi. **First report on the Karyomorphology Of a threatened Snow barbel, *Schizothorax labiatus* (Teleostei: Cyprinidae), From the River Jhelum Kashmir.** Journal of American Science 2011;7(6):525-531]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Karyotype, *Schizothorax labiatus*, River Jhelum, Kashmir, Chromosome

[Full Text](#)

92 **Building Social Capital for Poverty Reduction**

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Abstract: Does social capital generate positive influences on poverty reduction? This question has important theoretical and policy implications for the contemporary world, especially for the developing countries. This study assesses social capital in poverty reduction in rural areas of Marvdasht, Iran. Data were collected using survey questionnaire. Results indicate that although there is strong communication and social cohesion for poverty reduction, but communities still face challenges and constraints which hinder their contributions in poverty reduction.

Fatemeh Allahdadi, **Building Social Capital for Poverty Reduction.** Journal of American Science 2011;7(6):532-535]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: social capital, poverty reduction, rural development

[Full Text](#)

Investigation on relation between organizational structure and entrepreneurship in physical education of Eastern Azerbaijan's Islamic Azad University 93

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Abstract: This study aims to investigate the relation between organizational structure and entrepreneurship which is of discretionary – correlational type, done by the field method among all the physical education (PE) teachers and employees of Eastern Azerbaijan's Islamic Azad Universities (n=63). Two questionnaires about organizational structure and entrepreneurship, whose reliability was achieved by the experts, and Pearson and T correlational coefficients, were used to test and analyze the data. The results showed no relation between organizational entrepreneurship and complexity but showed a negative and significant relation among entrepreneurship and formality and concentration. Eventually, no difference was observed between organizational entrepreneurship of the (male or female) teachers and employees.

[Amineh Sahranavard Gargari, Ali Ojagi, Fahimeh Sahranavard, Abedin Asadollahi, Morteza Jorkesh, Iraj Sadri, Zeynab Roostaei. **Investigation on relation between organizational structure and entrepreneurship in physical education of Eastern Azerbaijan's Islamic Azad University.** Journal of American Science 2011;7(6):536-541]. <http://www.americanscience.org> (ISSN: 1545-1003).

Key words: Organizational structure, organizational entrepreneurship, physical education

[Full Text](#)

94 **Ceramic Tile Border Defect Detection Algorithms in Automated Visual Inspection System**

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Abstract: Automated Visual Inspection Systems (AVIS) are becoming increasingly popular due to low cost maintenance and high accuracy. Ceramic tile factories, for example, are very much interested in these sorts of systems. This paper introduces a different strategy in ceramic tile inspection system to reveal four major problems, namely, edge curvature, thickness, size measuring and edge crack defects. It is believed that this method will cover edge curvature defects and thickness measuring of ceramic tiles in AVIS with recommending an individual algorithm for each defect based on line feature extraction techniques. In addition, it is assumed that our model makes size measuring and edge defects detection easier and more accurate rather than previous approaches. This proposed model will allow ceramic tile companies to perform quality control inspection without costly measuring tools or error-prone inspection by humans. Moreover, factories have to install and apply Flatness Control Machine (FCM) to measure the flatness curvature of ceramic tiles. This machine keeps the ceramic tiles in fixed position to investigate the upper surface only. But our strategy is independent of a specific position through inspection in various angles from top and side views. We hope that our model, which is prominent in low cost implementation, will enable companies to apply this method in different situations in their manufacturing production line systems. Hence, it will assist them to produce not only more accurate reports on defects but also permit improved manufacturing of quality products. [Ehsan Golkar, Ahmed Patel, Leila Yazdi, Anton Satria Prabuwo. **Ceramic Tile Border Defect Detection Algorithms in Automated Visual Inspection System**. Journal of American Science 2011;7(6):542-550]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Edge curvature; thickness measuring; edge defect; visual inspection; machine vision; ceramic tile

[Full Text](#)

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An Exploratory Study of Critical Success Factors of Brand Extension Strategies using Fuzzy Analytical Hierarchy Process

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Abstract: Nowadays, the issue of brand extension strategy has emerged as one of the most crucial topics for marketing management. Previous studies report extraordinarily high failure in brand extension strategies. Hence, this study present a practical framework for evaluation critical factors of brand extension strategy of product based on appropriate criteria and Fuzzy Analytical Hierarchy Process technique. For obtaining critical factors, the key published papers are employed to derive those initially important factors firstly, 15 factors are identified. These factors have been discussed and publicized in academic and management fields and can be summarized as three aspects and fifteen initially factors. Consequently, the proposed Fuzzy AHP approach is used to measure relative weights for evaluating these factors. The proposed methodology implemented as an actual case in the biggest automobile manufacture in Iran. Finally, the results of this study shows that “Quality”, “Services after sale”, “Determining the suitable strategies in Brand field”, “Top management commitment and support” and “Advertisement” is the top five critical factors.

[Emad Atef-Yekta, Ali Karbasi, Amirhossein Zarbini-Sydani, Sina Miri-Nargesi. An Exploratory Study of Critical Success Factors of Brand Extension Strategies using Fuzzy Analytical Hierarchy Process. Journal of American Science 2011;7(6):551-558]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Brand extension strategy, Critical success factor, AHP, Fuzzy sets

[Full Text](#)

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Fourier Transformer Infrared Spectroscopy for Quality Assurance of Tomato Products

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Abstract: FT-IR spectroscopic technique was used to evaluate the chemical composition, lycopene, β -carotene and some adulterants (starch, allura red pigment and paprika) of tomato products as a fast technique in comparison with standard methods. The results indicated that, sensory evaluation and color parameters of Hunter measurements (L^* , a^* & b^*) represent color value but the quality of tomato natural pigment (lycopene) not identified. FT-IR spectra of adulterated tomato paste with starch showed spectral peaks at (1137 cm^{-1} and 1040 cm^{-1}) while, in adulterated paste with paprika revealed some peaks at 641 for stretching (CH_2 , CH) and at 1520 cm^{-1} for vibrational stretching of ($\text{C}=\text{C}$). Ketchup was characterized with stretching ($\text{C}-\text{O}-\text{C}$) at 1279 cm^{-1} . Adulterated tomato paste with paprika characterized with total 1 phenolic compounds (42.7 ± 2.3) and high antioxidant activity ($78.3.8\%\pm 2.9$). The effect of processing on the volatile components present in tomato paste, ketchup and adulterated tomato paste with starch or paprika has been studied by gas chromatography (GC) and gas chromatography-mass spectrometry (GC/MS). The most predominant volatiles were saturated and unsaturated 6-carbon aldehydes and alcohols. Hexanal and (Z)-3-hexen-1-ol, (Z)-3-hexenol, 5-methyl-5-hexen-2-ol and 1-hexanol were present in significant concentrations in all samples. Methyl-(2-hydroxy-3-methyl)-valerate and methyl-(2-OH)-iso-methyl valerate were generated in tomato paste with high concentration (1.0 and 4.25%), respectively.

[Mohie M. Kamil, Gamal F. Mohamed and Mohamed S. Shaheen. Fourier Transformer Infrared Spectroscopy for Quality Assurance of Tomato Products. Journal of American Science 2011; 7(6):559-572]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Fourier Transformer; Infrared Spectroscopy; Quality Assurance; Tomato

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Detecting Adulteration of Durum Wheat Pasta by FT-IR Spectroscopy

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Abstract: Hard wheat flour and durum of different extraction level (whole meal, 82% and 72%) and their pasta products were evaluated by the ordinary methods in parallel with FT-IR spectroscopy. Chemically, there was considerable difference between hard wheat flour and durum in protein and crude fiber contents. Durum whole meal, hard wheat flour (72%) and durum adulterated with hard wheat flour 72% (1:1) were used to prepare high quality pasta and adulterated pasta, respectively. Color analysis showed that, addition of hard wheat to durum increased the lightness values but decreased the redness and yellowness values. Also, pasta processed from these raw materials had the same character except

lightness. Cooked pasta had no significant differences in lightness and redness values while there were significant differences in yellowness values of the cooked pasta. Sensory evaluation of pasta made from durum and hard wheat and their mixture showed that, there were significant differences between them in all sensory properties. Cooking quality of pasta revealed that, the weight of hard wheat pasta increased more than durum pasta, while, the volume of durum pasta was higher than hard wheat pasta. Cooking loss was very lower in durum pasta than hard wheat pasta. Since, wheat and their products contain different polar functional groups such as lipids, carbohydrates and proteins, FT-IR spectroscopy was used as a beneficial tool for detecting adulteration of pasta. The FT-IR results showed that hard wheat (72%) was recognized from durum (72%) by presence of three specific bands at 1420 and 1374 cm^{-1} which are nearly disappeared in durum, while durum was characterized by two absorption bands at 2860 and 1744 cm^{-1} . FT-IR spectral analysis of durum pasta and adulterated ones showed the same results of durum and wheat flour raw materials.

[Mohie M. Kamil, Ahmed M. S. Hussien, Gamal H. Ragab, and S.K.H.Khalil. **Detecting Adulteration of Durum Wheat Pasta by FT-IR Spectroscopy**. Journal of American Science 2011;7(6):573-578]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Adulteration – durum – hard wheat – pasta – FT-IR – sensory evaluation

[Full Text](#)

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Optimizing Browning Capacity of Eggplant Rings during Storage before Frying

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Abstract: Deterioration of fresh eggplant rings was demonstrated as a rapid increase of enzymatic browning and with an obvious browning. The effect of thermal and chemical pretreatments on enzymatic browning and frying quality of eggplant rings were investigated. Thermal pretreatment using water or steam blanching; and chemical pretreatment by dipping in different concentrations of SO_2 , chitosan, carboxy methylcellulose (CMC) or sodium chloride. Changes in enzymatic browning in fresh eggplant rings during storage at 25°C for 24 hrs were investigated by determining rings colour as a capacity of browning and colour parameters. Best colour values of eggplant rings were found in SO_2 and steam blanching pretreatments; hence the quality of fresh eggplant rings was able to maintain for up to 24 hours at 25°C. The inhibitory effect of various thermal and chemical pretreatments on eggplant rings was found to decrease in the following order $\text{SO}_2 > \text{steam blanching} > \text{water blanching} > \text{coated chitosan} > \text{coated CMC} > \text{sodium chloride}$. Frying eggplant rings at 180°C/4 min for SO_2 , chitosan or steam blanching was able to optimize the quality of eggplant rings regarding to L^* , a^* , C^* , BI, ΔE -values and non-enzymatic browning (A420 nm). The fried pre-treated eggplant rings with SO_2 or water blanching gave higher mean panel scores (7.8–8.6) in all sensory characteristics compared to other pre-treated samples.

[Hatem S. Ali, Mostafa T. Ramadan, Gamal H. Ragab, Mohie M. Kamil and Hesham A. Eissa. **Optimizing Browning Capacity of Eggplant Rings during Storage before Frying**. Journal of American Science 2011; 7(6):579-592]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Eggplant; rings; fruit; steam; storage; chitosan; CMC; sodium metabisulphite, colour, % inhibition, browning, frying

[Full Text](#)

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Chlamydia Pneumonia Infection and Possible Relationship to Childhood Bronchial Asthma

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Abstract: Background: Asthma is a leading cause of chronic illness in childhood. Respiratory tract infections with viruses and mycoplasma pneumonia are considered the most common triggers of asthma in all age groups. Recently Chlamydia pneumonia infection has been suggested to play a role in pathogenesis of asthma. **Objective:** The aim of this work was to evaluate the possible role of Chlamydia pneumonia in the development or aggravation of childhood bronchial asthma. **Patients and Methods:** This study included 50 asthmatic patients divided into 2 groups; group (1) composed of 20 new wheezier who denied previous wheezing and were evaluated during initial wheezing episode, group (2) composed of 30 chronic asthmatic children who had recurrent episodes of/persistent wheezing. Also 20 healthy children were included as a control group. Qualitative estimation of Chlamydia pneumonia infection in nasopharyngeal swabs using polymerase chain reaction (P.C.R) technique was done to all cases and controls. **Results:** In the new wheezier group 8 cases (40%) were Chlamydia pneumonia PCR (+ve), in the chronic asthmatic group 9 cases (30%) were PCR (+ve), while in the control group only 2 cases (10%) were PCR+ve. The infection rate of Chlamydia pneumonia among patients were 17 (89.5%) and among controls 2 (10.5%) with a statistically significant difference ($P = 0.041$) between patients and controls. There was an increase in asthma severity and severity of exacerbation in PCR+ve than in PCR-ve patients for C. pneumonia but it didn't reach statistical significance. Also there was a significant increase in PCR+ve males (58.8%) than PCR+ve females (41.2%), while there were no significant statistical difference between PCR+ve and PCR-ve patients as regards age, residence, seasonal variation, atopic manifestation and family history of atopy. **Conclusion:** The incidence of C. pneumonia infection among new wheezier and chronic asthmatics is high pointing to its possible role as a triggering factor for asthma in new wheezier and continuation of symptoms in spite of proper treatment plan in chronic asthmatic children.

[Nisreen El-Abiad, Wagdi M.Hanna, Amira Ahmed, Hisham Waheed and Olfat Shaker. **Chlamydia Pneumonia Infection and Possible Relationship to Childhood Bronchial Asthma**. Journal of American Science 2011; 7(6):593-599]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Chlamydia pneumonia, Childhood asthma, polymerase chain reaction

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Corrosion inhibition of lysine as basic amino acid on 316L stainless steel in 0.5 M H_2SO_4 solution

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Abstract: The corrosion inhibition of 316 L stainless steel in 0.5 M H_2SO_4 by lysine was investigated using open-circuit potential measurements, potentiodynamic polarization measurements and scanning electron microscopy (SEM) techniques. The open circuit potentials were measured in the absence and presence of different concentrations of lysine. It was found that the open circuit potential becomes more positive with increasing the concentration of lysine. Potentiodynamic polarization measurements showed that the presence of lysine in acidic solution effects mainly the cathodic process and decreases the corrosion current to a great extent and shifts the corrosion potential towards more negative values. Results revealed clearly that lysine is a good cathodic type inhibitor for 316L stainless steel in 0.5 M H_2SO_4 . The maximum inhibition efficiency of lysine was achieved at $(7 \times 10^{-2} \text{ M})$. Analyses of the surface by SEM confirm these results.

[Azza El-Sayed El-Shenawy,. **Corrosion inhibition of lysine as basic amino acid on 316L stainless steel in 0.5 M H_2SO_4 solutio**. Journal of American Science 2011; 7(6):600-605]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Corrosion; inhibition; lysine; amino acid; steel; M H₂SO₄

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Predictors of mortality among neonates admitted to neonatal intensive care unit in pediatric Assiut University Hospital, Egypt

[Full Text](#)

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Abstract: Neonatal period is the most hazardous period of life because of various problems/ diseases which a neonate faces. There is great overlap between the risks associated with morbidity and mortality in the perinatal and neonatal periods. The present study aimed to identify the profile and risk factors for neonatal mortality among neonates admitted to neonatal intensive care unit in pediatric Assiut University Hospital (AUH). A prospective study was conducted in NICU of pediatric AUH. Study population included all neonates admitted to NICU over a period of one year. The data collected included detailed antenatal and natal histories, details of clinical examination, primary diagnosis, progress during the hospital stay and outcome. The outcome measure was in-hospital death. Survival was defined as the discharge of a live infant from the NICU. Differences between deceased and survived neonates were estimated by the chi-square test and t-test. The association between risk factors and neonatal mortality were estimated by relative risk. The significance level used was p-value of less than 0.05. A total of 990 neonates were included in the study, of which 582 neonates (58.8%) died during their hospital stay. The mortality rate decreased with the increase in birth weight, as well as gestational age. Respiratory distress was the commonest primary diagnosis (94.5%) among all admitted neonates, followed by very low birth weight (VLBW) (36.7%), congenital malformations (8.2%), and infections (4.4%). Significant variables (P<0.05) associated with neonatal mortality were: maternal diabetes, obstructed labour, vaginal delivery, multiple births, neonatal respiratory distress, prematurity, low birth weight (LBW) and congenital malformations. It is concluded that majority of the causes of neonatal mortality are preventable. Surveillance programs for neonatal death should include preventive actions and interventions for the perinatal period. Focused initiatives for quality improvement may also be necessary.

[Eman M. Mohamed, Asmaa M. A. Soliman, Osama M. El-Asheer. Predictors of mortality among neonates admitted to neonatal intensive care unit in pediatric Assiut University Hospital, Egypt. Journal of American Science 2011; 7(6):606-611]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: mortality, neonates, admission, neonatal intensive care unit

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Spousal violence against Egyptian women and its impact on reproductive indicators

[Full Text](#)

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Abstract: Domestic violence against women is increasingly recognized as a global problem. It poses a direct threat to women's health and has serious reproductive health consequences. The study aims to identify the relationship between women exposure to spousal violence and some reproductive health indicators. Data from the 2005 Egyptian Demographic and Health Survey (EDHS) were secondary analyzed for 5,613 ever-married women aged 15-49 years. The results revealed that more than three in ten women had an experience with any form of spousal violence. Fertility was higher among women who have experienced violence than among women who have not (mean number of children ever born was 3.4±2.1 versus 2.9 ± 2.4). Total family planning need was higher among women who have experienced violence than among women who have not. Self reported prevalence of sexually transmitted infections was higher among women who have ever or recently experienced violence than women who have not (21.4%, 26.1% versus. 18.5%). It is concluded that marital violence is related to various negative reproductive health outcomes. Violence against women is a vicious circle that needs to be broken. Actions must be taken to make women and men understand that violence against women is not legitimate or acceptable and that everybody pays a high price for it.

[Eman M. M. Monazea and Ekram M. Abdel Khalek. Spousal violence against Egyptian women and its impact on reproductive indicators. Journal of American Science 2011; 7(6):612-622]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Domestic violence – intimate partner- reproductive indicators- health impact

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Physicochemical and Sensorial Quality of Semolina-Defatted Guava Seeds Flour Composite Pasta

[Full Text](#)

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Abstract: Guava seeds flour (20 mesh) characterized with its higher contents of crude fiber, fat and lowest moisture if compared with semolina flour. Farinograph parameter indicated that, water absorption, arrival time and dough weakening increased and stability decreased by increasing supplementation level of guava seeds flour compared to semolina flour. Supplemented pasta with guava seeds flour (10 & 20%) characterized with its higher volume than control pasta; and cooking loss not affected with replacement of 10% if compared with control pasta. Sensory evaluation showed that, stickiness, appearance, flavor and tenderness not affected with replacing level up to 30%, 20%, 10% and 10%, respectively, while color of different replacement level affected. Chemically, supplemented pasta with guava seeds flour caused an acceptable gradual increase in moisture, protein, fat, ash and crude fiber; and decrease in carbohydrates. Guava seeds flour characterized with its higher essential mineral if compared with semolina.

[Ahmed M.S. Hussein, Mohie M. Kamil and Gamal F. Mohamed. Physicochemical and Sensorial Quality of Semolina-Defatted Guava Seeds Flour Composite Pasta. Journal of American Science 2011; 7(6):623-629]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Guava seeds - pasta – supplemented flour – high fiber pasta - Farinograph

104

Preparation of Layer Nano-Silicate/Alumina Castable Composites

[Full Text](#)

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Abstract: The effect of adding nano scale particles on rheological and mechanical properties of ultra low cement alumina castables was investigated. After clay purification by mechanical methods and obtaining nano-silicate layers materials, the characterization was conducted by using XRD. Then, the produced nano-silicate particles were added to the ultra low cement Alumina castable containing microsilica and reactive Alumina. Mechanical and rheological properties of castable were studied before and after firing at 1500 °C. The results showed that d-spacing between nano-silicate layers was about 1.2 nm. Flow ability of the castables showed an increase of 5%, indicating decreasing the presence of some filler materials such as microsilica and reactive Alumina. Finally XRD results of fired samples indicated the existence of mulite as a desired phase in the samples. [M. Khoeni, H. Rastegar, H.R. Hafizpour. Preparation of Layer Nano-Silicate/Alumina Castable Composites. Journal of American Science 2011;7(6):630-634]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Layer nano-silicate; Alumina castable; Rheology; mulite phase

[Full Text](#)

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Effects of some parameters affecting the crystallization rate of calcium sulfate dihydrate in sodium chloride solution

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Abstract: Crystallization of calcium sulfate dihydrate (CaSO₄.2H₂O) in sodium chloride solutions at different supersaturation ($\delta = 1.2 - 2$), pH =3, ionic strength (I = 0.5 M) and at 80°C was studied. The influence of aluminum and magnesium nitrates having very low concentrations (10⁻⁷ mol dm⁻¹) on the rate of crystallization at different supersaturation was investigated. The rate of crystallization was found to be dependent of the stirring rate suggesting diffusion mechanism. The addition of Mg⁺² or Al⁺³ retarded the rate of crystallization to an extent proportional to their amounts present. Furthermore, the retardation effect was enhanced as the supersaturation decreases. The results also revealed that the increase in both pH (3 –10) and crystallization temperature (20 –80 °C) brought about an increase in calcium sulfate crystallization rate.

[N. S. Yehia, M. M. Ali, K. M. Kandil and M. M. El-Maadawy. **Effects of some parameters affecting the crystallization rate of calcium sulfate dihydrate in sodium chloride solution**. Journal of American Science. 2011;7(6):635-644]. (ISSN:1545-0740). <http://www.americanscience.org>

Keywords: Crystallization; Growth from solutions; Additives; Calcium sulfate; Inhibitors, metal ions

[Full Text](#)

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Evaluation of Antibacterial Activity of *Cynodon dactylon* on Multi-Drug Resistant Bacterial Isolates in Comparing with Ciprofloxacin

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Abstract: *Cynodon dactylon* regarded to possess various medicinal properties as an anticancer, antidiabetic, anti-inflammatory and antioxidative agent, but there are a few studies on its antibacterial effects. The aim of the present study was the evaluation of the antibacterial activity of *Cynodon dactylon* on 100 Multi Drug Resistant isolates of *S. aureus*, *A. baumannii*, *P. aeruginosa*, *Klebsiella* and *E. coli*. *Cynodon dactylon* samples were collected from the fields of North West of Iran. Plant roots were cut, and powder was prepared. Powdered roots were extracted by maceration at room temperature for 72 hours. Bacterial isolates were collected from clinical specimens from different wards of educational hospitals in Urmia, Iran during a 12 months period. The susceptibility of isolates to *Cynodon dactylon* root extracts was determined using a broth microdilution method. Considering to the wide application of ciprofloxacin in treatment of bacterial nosocomial infections, the antibacterial effects of ciprofloxacin on isolates also determined. All the multi- drug resistant bacterial isolates were sensitive to different concentrations of *Cynodon dactylon* root hydroalcoholic extract, the most sensitive bacterial isolates to *Cynodon dactylon* root extracts were *P.aeruginosa* isolates, however 69% of isolates were resistant to ciprofloxacin. Results demonstrate that this herbal drug could represent a new source of antimicrobial agents, for the control of hospital acquired infections. However, more adequate studies must be carried out to verify the possibility of using it for fighting these bacteria in human body infections.

[Nima H. Jazani, Peyman Mikaili, Jalal Shayegh, Negar Haghighi, Negar Aghamohammadi, Minoo Zartoshti. Evaluation of Antibacterial Activity of *Cynodon dactylon* on Multi-Drug Resistant Bacterial Isolates in Comparing with Ciprofloxacin. Journal of American Science 2011;7(6):645-650]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: herbal medicine, ciprofloxacin, resistant bacteria, antimicrobials, hospital acquired infections

[Full Text](#)

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Golden Words in the History of Veterinary Medicine among Azerbaijani people

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Abstract: Veterinary holds a great and long experience among the Turkish people like the other nations especially in folkloric literature and the part of literature which has prolonged among the villagers and conserved its own existence but its terms have not registered in their written forms. In a glimpse over the terms like rabies, enterotoxaemia, foot and mouth disease, contagious agalactia and lots of other disease put an apparent persistence on its long experience among native Azerbaijani people (Iran) in its veterinarian aspect. We try our best to have a good clarification over these terms.

[Jalal Shayegh, Peyman Mikaili, A. Nedaei, A. Lotfi. Golden Words in the History of Veterinary Medicine among Azerbaijani people. Journal of American Science 2011;7(6):651-653]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Ethnomedicine, veterinary, traditional remedies, ancient terminology, Azerbaijan, Iran

[Full Text](#)

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The Effects Of Long Term Physical Activity On The Changes In The Rates Of In Apo Proteins A And B In Nonathlete

Abstract: The Present study aims to evaluate the effects of a one-year-long volleyball practice on the changes in the rates of Apo proteins A and B in the blood serum of non-athlete men. In order to do so, 30 subjects were selected randomly from among non-athlete male students and then were divided into two control and experimental groups. The experimental group on average aged 23±2. Their average height was 172.2 ± 3 cm and the average weight was 69.6 ± 3.1kg. On the other hand, the control group aged on average 22 ± 2 and their average height and weight were 170.3 ± 3.8 cm and 69.3 ± 2.7 kg. The experimental group went through a one-year-long volleyball exercise program in which they had to practice for 90 minutes three times in a week. The control group did not have any special practice. The covariance analysis was used to probe the rates of Apo A and B and analyze the data. The rates of Apo proteins, measured before the test in both groups, were taken as the covariate to correct the groups' mean, increase the test's precision and lessen the error risk. The test results revealed that in the experimental group a one-year-long sport exercises has meaningfully changed the level of Apo A in the blood (P= 0.01). There was not a significant difference in the rates of Apo A in the posttest measurements in both groups (P= 0.01). The amount of Apo B was also meaningfully different in pre and posttest in the experimental groups but the changes in the rates of Apo B in both control and experimental groups did not differ meaningfully.[Karim Salehzadeh, Yousef aghdam, Morteza Jourkesh. **The Effects Of Long Term Physical Activity On The Changes In The Rates Of In Apo Proteins A And B In Nonathlete.** Journal of American Science 2011; 7(6):654-662].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Long-Term Physical Activity; Apo Protein A; Apo Protein B; Non-Athlete

[Full Text](#)

109 **Relationship Between Geopotential Height Anomalies Over North America and Europe and the USA Landfall Atlantic Hurricanes Activity**

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Abstract: The present paper investigates the relationship between geopotential height anomalies at level of 500 hpa over North America and Europe, and the USA landfall Atlantic hurricanes activity. The decadal data of the number of hurricanes by category which stroked the mainland USA for each decade through the period (1851-2006) are used through the present study. The daily NCEP/NCAR reanalysis data composites for geopotential height at 500 hpa level over North America and Europe for the period of (1949-2006) are used too. Hurricane datasets and anomalies in geopotential height are analyzed and correlated together. The results revealed that there are significant positive correlations between the anomalies in geopotential height over North America and East Europe simultaneously, and existence of Atlantic hurricanes of category 3 that strike USA. In addition to that, significant positive correlations between the anomalies in geopotential height over North America and existence of major hurricanes (category 3, 4 and 5) that landfall USA is found too. However, significant negative correlations between the anomalies in geopotential height over North Atlantic and existence of all USA Landfall Atlantic Hurricane categories are existed else category 1. In general one can conclude that anomalies in geopotential height at 500 hpa level over North America and Europe are control the USA landfall Atlantic hurricanes activity.

[Yehia Hafez. Relationship Between Geopotential Height Anomalies Over North America and Europe and The USA Landfall Atlantic Hurricanes Activity. Journal of American Science 2011;7(6):663-671]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Atlantic hurricanes; Geopotential height anomalies; North America; USA

[Full Text](#)

110 **The Effects of Micronutrient application on soybean seed yield and on seed oil and protein content**

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Abstract: In order to study the effects of applying the micronutrients zinc, manganese, and boron, and to compare the effects that incorporating them in the soil and spraying them on the crop on seed oil and protein contents and percentages, a study was conducted based on the factorial design with the two factors of incorporating these micronutrients in the soil and spraying them on the crop, in 16 treatments and four replications (a total of 64 trials), in 2009-2010 in Dasht-e-Naz in Sari of northern Iran. The treatments were as follows: T1=control, T2=Zns, T3=Mns, T4=Bs, T5=Zns, T6=Zns+Bf, T7=Zns+Mnf, T8=Zns+Znf, T9=Mns, T10=Mns+Bf, T11=Mns+Mnf, T12=Mns+zmf, T13=Bs, T14=Bs+Bf, T15=Bs+Mns, T16=Bs+Znf. Results obtained showed that the highest seed oil percentage (25.03%) was achieved by spraying zinc on the crop, and that the biggest seed oil yield (359.31 Kg.h) was obtained by applying manganese to the soil. Results of the comparison of the means indicated that the highest seed protein content (36.12%) was achieved by spraying boron on the crop, and the greatest seed protein yield (545.54 Kg.h) was obtained when manganese was added to the soil. These results also showed that the largest number of total pods per plant (71.05), and the biggest seed yield (152.9 g.m⁻²) were achieved by applying manganese to the soil. In the comparison of the interaction effects of the data, it was also shown that, although the highest seed oil percentage belonged to the spraying of zinc on the crop, yet the greatest seed yield among all the treatments (170.7 g.m⁻²) was that of the treatment of adding manganese to the soil plus spraying zinc on the crop, in which the greatest number of pods per plant (77.87) and the highest seed protein yield (631.1 Kg.h) and the highest seed oil yield (284.5 Kg.h) were obtained.

[Abed vahedi. The Effects of Micronutrient application on soybean seed yield and on seed oil and protein content. Journal of American Science 2011;7(6):672-677]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Boron, manganese, oil, protein, soybean, zinc

[Full Text](#)

111 **Effects of Water Infiltration to Soil in Increasing Yield and Water Use Efficiency in Peanut**

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Abstract: An experiment was conducted to evaluate the Effects of water infiltration to soil in increasing yield and water use efficiency in peanut in Astaneh Ashrafiyeh, North of Iran. A was studied split-plot in a complete random block plan with 3 replications in the 2009 crop year. Irrigation management included no irrigation (dryland) and irrigations with

6, results of this research indicated that average final infiltration was 9.4 (cm/day) and the highest biomass, pods and seeds values for the 6 days irrigation management were 9453, 4093 and 2345 (kg/ha), respectively. The highest water use efficiency based on biomass, pods and seeds in the 6 days irrigation treatment were 2.88, 1.24 and 0.71(kg/m³). Volumetric moisture variations in different depths indicated that the moisture content in upper soil layers such as 0-20 cm and 20-40 cm was less than those of 40-60 cm and 60-80 cm layers which was due to water absorption in the first and second layers by the plant.

[Ali Abdzad Gohari and Ebrahim Amiri. Effects of Water Infiltration to Soil in Increasing Yield and Water Use Efficiency in Peanut. Journal of American Science 2011;7(6):678-682]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Infiltration, Peanuts, Water Content, Water Use Efficiency, Yield.

[Full Text](#)

112 **Blood Utilization for Elective Surgeries at Main University Hospital in Alexandria, Egypt**

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Abstract: This study aimed to determine the efficiency of blood ordering and transfusion practices for patients undergoing elective surgical procedures and to assess the compliance with the international blood transfusion clinical practice guidelines. Auditing of blood bank registers for patients who underwent elective surgical procedures was done at the Main University hospital in Alexandria governorate. The total number of adult patients who had elective surgery for which requests for cross matching were made was 4844; of them only 1788 patients were transfused. A total of 13389 units of blood were cross-matched, but only 3373 units were transfused. Only 25.2% of total blood cross matched was utilized, leaving 74.8% unutilized. The overall C/T ratio was 3.9, the overall %T was 36.9% and the overall TI was 0.69. The overall percentage compliance with Scottish Intercollegiate Guidelines was 27.7%. Institution-specific blood ordering schedules and protocols should be formulated to reduce exposure to transfusion and to screen for high-risk patient. Ongoing audit and monitoring of blood ordering and transfusion practices in the hospital are essential for improving the ordering, distribution, handling and administration of blood components.

[Samaa Z. Ibrahim, Heba M. Mamdouh, Amal M. Ramadan . Blood Utilization for Elective Surgeries at Main University Hospital in Alexandria, Egypt. Journal of American Science 2011;7(6):683-689]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: blood ordering practices, transfusion practices, utilization indices

[Full Text](#)

113 **Sparkle of Existential Time as a Sanctuary in Marital Counselling**

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Abstract: Nowadays, Existential thought is considered to be a practical approach among psychologists and counsellors. Nevertheless, what seems to be ignored is paying thoughtful attention to all dimensions of Existential thought which is an essential matter among counsellors and psychologists. Moreover, some issues in Existential thought such as time are disregarded among marital counsellors as well as individual counsellors. The goal of this article is to allocate exhausting existential time to benefit marital counsellors. Findings show that existential time has full potential to be applied for marital counselling. Furthermore, review of the related literature demonstrates that there is not enough experimental and descriptive research to evaluate the effect of existential time on matrimony.

[Seyed Mohammad Kalantarkousheh, Siti Aishah Hassan, Rusnani Abdul. Kadir, Mansor Abu Talib. **Sparkle of Existential Time as a Sanctuary in Marital Counselling**. Journal of American Science 2011;7(6):690-694]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Existential thought; existential time; marital counselling

[Full Text](#)

114 **Discovering A Transformational Science of Marketing in Corporate, Social And Knowledge Perspectives: Is Not It About Time That A Marketing Scholar Becomes A Nobel Laureate?**

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Abstract: This paper is for marketers who strive to bring about a change in marketing to change this world. This paper aimed at fulfilling this far reaching end by configuring and devising a transformational philosophical logic. This logic is composed of transformational postulates reaching out to transformational edges of marketing as a science. Such process would be reflected within transformational domains to be magnified and streamlined by transformational edges of marketing theory and practice. Firstly, transformational postulates are illuminated by the backbone argument of pragmatic versus dogmatic marketing creeds. This gives rise to four subsequent core controversial arguments, contrasting the critical issues of empiricism, valorization, context specificity and multidisciplinary against their rival extremes of theorization, generalized universality, global transcendence, and original authenticity. Second, these heated intellectual polarizations take marketing ideologies on a journey of revisits and blurring, to reconsider transformational marketing edges consolidated in the boundaries of customer orientation, convergence marketing, value-based marketing, knowledge-based marketing, interdisciplinary marketing, and contextual marketing. Third, such revisits are expected to fulfill their full transformational potential when viewed through the lenses of transformational marketing domains including corporate, social and knowledge perspectives, which telescope (focus?) the transformational influences of marketing thought and practice. Fourth, and conclusively, the paper is a proactive endeavor to unleash the transformational leverages of marketing actions in order to perpetuate the transformational thrust of marketing research and practice through the deliberate adoption of, and capitalization on, transformational agendas, methodologies and deliverable outputs. Thus the authors propose a cohesive progressive philosophy of marketing science that optimizes its change-catalyst extremes in order to broaden the horizons of academic marketing breakthroughs and decision/policy initiatives. The aim is to justify a well-earned legitimacy for marketing scholars to be Nobel Laureates, for their contributions to transforming their economic, moral and scientific universes.

[Wael Kortam and Abeer Mahrous. Discovering A Transformational Science of Marketing in Corporate, Social And Knowledge Perspectives: Is Not It About Time That A Marketing Scholar Becomes A Nobel Laureate? Journal of American Science 2011;7(6):695-703]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Transformational Science of Marketing in Corporate; Social; Knowledge; Perspective; Nobel

[Full Text](#)

115 **Effect of canola oil on mucosal leucine aminopeptidase activity enzymes in small intestine of turkey chicks**

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Abstract: Canola is one of the rapeseed varieties and is in temperate and cold climate areas. Contains 94% unsaturated fatty acid and 6% saturated fatty acid, thus, has best fatty acid composition among other oils. Canola oil causes alteration in pancreatic enzymes such as leucine aminopeptidase activity. The aim of this study was assessment of mucosal leucine aminopeptidase activity enzymes subsequently using of canola oil on turkey chicks diet. According to this survey results revealed that using of canola oil in turkey chick's diet causes increasing of leucine aminopeptidase activity (in 5% treatment than control and 2.5% treatments). It seems that use of different amounts of canola oil in turkey chick's diet causes increasing of leucine aminopeptidase activity, because this enzyme play a important role in protein hydrolyzing and this enzyme activity be more subsequently reducing of digesta transient ratio. [Jamshid Ghiasi Ghalehkandi, Ramin Salamat Doust Nobar, Abolfazl ghorbai, Ali Asghar Gharachorlu, Rahim Behesti, Alireza Fani. Effect of canola oil on mucosal leucine aminopeptidase activity enzymes in small intestine of turkey chicks. Journal of American Science 2011;7(6):704-707]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: canola oil, leucine aminopeptidase, intestine, turkey chicks.

[Full Text](#)

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Adult education in various countries

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Abstract: in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings. In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education. The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal.

[Sharareh Khodamoradi and Bahareh Ansari . **Adult education in various countries**. Journal of American Science 2011;7(6):708-712]. (ISSN: 1545-1003).

<http://www.americanscience.org>.

Keywords: adult education; political; social; economic; cultural

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Information and communication technologies (ICT) and its effect on rural development

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Abstract: Direct or indirect application of ICT, in rural development sector has also been referred to as "Rural Informatics". Rural economies can be benefited from ICT by focusing on social production, social consumption and social services in the rural areas. The inculcation of a Citizen-to-Government (C2G) and Citizen-to-Citizen (C2C) interface would provide this link that would also lead to community participation in design and implementation of ICT interventions. This in return could promise better economic opportunities as well as social inclusion of rural people in the processes of governance. Such attributes in the social set up are essential prerequisites for good governance and rural development. Globalization and technological changes, the processes in the past fifteen years have been quickly lead to a new global economy have been driven with the reinforced technology and fuel (energy) that by providing information and knowledge. The global economy requires the kind of necessity and purpose of educational institutions. Since the current trend towards reducing incomplete information and access to accurate information is growing, other schools can not control time to transfer a set of prescribed information from teacher to student during a fixed time point are, but schools must to promote Culture of "Teaching for Learning For example, acquisition of knowledge and continuous learning skills which make possible during the individual's life.

[Mojtaba Sadighi and Mehran Bozorgmanesh. **Information and communication technologies (ICT) and its effect on rural development**. Journal of American Science. 2011;7(6):713-716]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: information and communication technologies (ICT), rural development

[Full Text](#)

118

The role of utilization Distance Education in adult education

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Abstract: Distance education dictates changes in behavior for both the teacher and the learner. The successful student develops persistence and skills in self-directing work. The successful distance education teacher becomes conversant with new technology and develops new instructional styles, moving from creating instruction to managing resources and students and disseminating views. Administrative and faculty support for distance education are critical to the success of this instructional method. Administrators should take note that the implementation of a distance education program may allow access to a greater number of students. However, the time and work associated with teaching at a distance exceeds the normal requirements of campus-based instruction. Students in distance education settings perform as well or better on assignments, class activities, and exams when compared to campus-based students . Nevertheless, students must maintain persistence and a clear focus to succeed in a distance learning situation. Self-direction, a passion for learning, and strong individual responsibility are important influences on achievement. There are indications that distance education works best for more mature, motivated, well-

organized, and already accomplished learners . Distance education courses vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn.

[Mehran Bozorgmanesh and Mojtaba Sadighi. **The role of utilization Distance Education in adult education.** Journal of American Science 2011;7(6):717-721]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Distance Education, adult education

[Full Text](#)

119 Income Bipolarization and Poverty: Evidence from Rural Nigeria
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Abstract: The disappearance of the middle class- income bipolarization could result into tension and social conflict. If such conflict starts in the rural area, the possible resulting revolts would clog the wheel of economic production and policy implementation and there is possibility of spreading to the urban area. The study therefore estimated income bipolarization in the rural area of Nigeria from 1980 to 2004 using Foster-Wolfson –FW- (1994) and Lasso de la Vega and Urrutia – LU- (2006) indices. Bipolarization linked poverty was estimated for the periods through the later and Foster-Wolfson bipolarization estimates were linked with the poverty status and other socio-economic features of the rural households by tobit regression analysis. Bipolarization was found to be on reduction from 1992 to 2004 moving in the direction of poverty level. FW Bipolarization was 0.6125, 0.4067, 0.4775, 0.4108 and 0.3529 in 1980, 1985, 1992, 1996 and 2004 while LU Bipolarization was 0.1676, 0.1430, 0.1610, 0.1460 and 0.1383 for the same years respectively. Poverty has highest significant positive effect on bipolarization with a marginal effect of 0.02520. The marginal effects of age was 0.00014, female head households was 0.00119. Household size, father’s education, mother education, married status, farming and wage employment have significant negative marginal effects of 0.00037, 0.00027, 0.00013, 0.00636, 0.000697 and 0.00105 respectively. Income bipolarization is higher among households located in the South than their base category, the north. Poverty and its covariates have higher sum total interactive positive effect on bipolarization than their base categories, the non-poor covariates. There is need to reduce poverty for bipolarization to decline. The southern part needs more attention in bipolarization reduction strategies. All variables that reduce poverty like education would have to be harnessed further to reduce bipolarization to guide against the occurrence of its consequences.

[Oluwole I. Ogunyemi & Omobowale A. Oni. Income Bipolarization and Poverty: Evidence from rural Nigeria. Journal of American Science 2011;7(6):722-731]. (ISSN: 1545-1003). <http://www.americanscience.org>

Key words: Middle Class, Disappearance, Bipolarization, Poverty, Rural

[Full Text](#)

120 **Application Of Distance Education in Agriculture**

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Abstract: Nowadays, using computers has changed man’s life at all aspects. Done researches in relation to development programs of all countries, represent central role of information technology and communication at these programs. information technology and communication can be used as a powerful tool for improving quality and efficiency of education so that change traditional practices of education and no more physical presence at classrooms . If so far, education benefited just from teachers and trainers, books were considered as major informational sources for education, nowadays education has faced with new communicational tools and environments. Recent progress at computer industry and local information networks, regional and international information (especially Internet) , multimedia, communicational technologies, have placed new tools and practices against planners , programmers , managers and executers of educational programs. Influence of new informational technologies on educational centers (schools to universities) and even houses, have changed simple relationship between students and teachers completely.

[Seyed Mehdi Mirdamadi, Sharareh khodamoradi. **Application Of Distance Education in Agriculture.** Journal of American Science 2011;7(6):732-738]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Distance Education, Agriculture

[Full Text](#)

121 **Prevalence of Depression among Elderly and Evaluation of Interventional Counseling Session in Zagazig District -Egypt**

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Abstract: P Depression is one of the most prevalent disabling and costly health problem among elderly. This work aimed to study the problem of depression among the elderly through determining the magnitude of depression among them, classifying the diseased according to the severity of depression, exploring some personal risk factors related to depression and evaluation an applied interventional counseling session for the diseased. This study is composed of two stages; the first one was a cross sectional design in which multistage random sample was applied to Zagazig District where 290 subjects were included in this study. The applied questionnaire included questions about sociodemographic status, some associated risk factors for developing depression and also Geriatric Depression Scale was applied to detect depressed patients and classify them according to the severity of the disease. The second stage was an interventional one applied to depressed elderly who were subjected to a counseling session educating them about the importance of counselling, follow up and recalling knowledge about treatment. Obtaining results revealed that the percentage of depression was 46.6 % and those with mild or moderate condition constitute 75.6%. Depression significantly increased with age, female (OR 2.56), not married (OR 4.47) and those having previous death event among the surrounding (OR 7.68). The severity increases among age group over 75 years and more (OR 4.52) and those of low socioeconomic condition (OR 8.8). The applied counseling session had a significant impact on recalling knowledge about the prescribed drugs (60.7%), how to manage the missed doses (71.4%), using drug correctly (75.0%) and recalling medication name (75.0 %) (p<0.05). In conclusion depression is an undiagnosed public health problem. It significantly increases with age, female sex, not married subjects, and those having history of death event in their relatives. Moreover the severity of depression increases with age and low socioeconomic condition. The applied intervention counseling session had a good effect on improving drug knowledge and probably the attitudes of the depressed patients. So increasing the role of geriatric medicine in primary health care system and introduction of counseling session at outpatient clinics to increase compliance to treatment are good recommendations from that work.

[Naglaa M. Abdo, Shereen Eassa and Ahmad M. Abdalla. Prevalence of Depression among Elderly and Evaluation of Interventional Counseling Session in Zagazig District –Egypt. Journal of American Science 2011;7(6):739-748]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: depression, geriatric, counseling.

[Full Text](#)

122

Perceived reproductive morbidity and treatment seeking behavior among ever married women in Siwa Oasis, Egypt.

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Abstract: Information about reproductive morbidity in developing countries is scanty and mainly based on information obtained from clinics or hospitals which are not usually reflecting the true magnitude of the disease burden. A cross-sectional study were conducted to assess the self-reported reproductive morbidity and the factors affecting it and to investigate the health seeking behavior among a sample of women in Siwa (Oasis), Egypt. A total of 340 ever-married women in the reproductive age group of 15 to 49 years were interviewed using a pre-designed questionnaire. About three quarters of women reported having any obstetric (72.6%) or any gynecological morbidity (75.6%). The most commonly reported obstetric problem was symptoms of severe anemia (43.8%), while symptoms of lower RTIs (51.2%) and UTIs (35%) were the commonest gynecological problems. Overall, 58.5% of participants had sought treatment for any morbidity with the majority had sought services of the public sector facility (80%). Regression analysis showed that education, age at first pregnancy and duration of marriage were the factors associated with women reports of any reproductive morbidity. The present results reveal a high prevalence of reported reproductive morbidity in Siwa, Egypt. Factors such as education, duration of marriage and women age at first pregnancy were associated with reported morbidity among the sampled women. This high reported rate in peripheral and remote areas needs to be explored further.

Ola A. Akl, Hala K. Ibrahim, Heba M. Mamdouh. **Perceived reproductive morbidity and treatment seeking behavior among ever married women in Siwa Oasis, Egypt.** Journal of American Science, 2011;7(6):749-756]. (ISSN:1545-0740). <http://www.americanscience.org>

Keywords: Perceived, reproductive, morbidity, Siwa, Egypt.

[Full Text](#)

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Moisture desorption isotherms of *Lavandula officinalis* L. flowers at three temperatures

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Abstract

Lavander has been used as a medicinal plant and to treat several diseases. Knowledge of moisture desorption isotherms is useful in food dehydration and drying. The equilibrium moisture content for *Lavandula officinalis* L. flowers were measured by using the gravimetric static method with water activity ranging from 11% to 85% and three temperatures of 30, 40 and 50°C. Five mathematical models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfof and GAB equations) were used to fit the experimental data of desorption. The modified Halsey model was found to be the best model for describing desorption isotherms curves.

[Hossein AhmadiChenarbon, Sara Movahed, Seyedeh Masoomeh Hashemini. Moisture desorption isotherms of *Lavandula officinalis* L. flowers at three temperatures. Journal of American Science 2011;7(6):757-761]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Lavandula officinalis; Equilibrium moisture content; Desorption

[Full Text](#)

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Information Sharing in Designing a Supply Chain Model Considering Demand Forecasting Using Markov Process

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Abstract: In this paper, we incorporate information flow in a supply chain model. Also for decreasing the risk of the supply chain system, we first predict the customers' demands and then this forecasting is used as an input to the supply chain model. In this paper a markov chain model will be used to forecast the customers' demands. A simulated annealing (SA) algorithm is developed for solving the supply chain problem. The results indicate that the SA method and proposed markov chain model are efficient for a wide variety of problem sizes.

[Nader Azad, Ardavan Mirzaie, Majid Amin Nayeri. **Information Sharing in Designing a Supply Chain Model Considering Demand Forecasting Using Markov Process.** Journal of American Science 2011;7(6):762-766]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Supply chain model; Demand forecasting; Markov chain; Simulated annealing

[Full Text](#)

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Status Inconsistency of Women: A Study in Hamadan, Iran

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Abstract: This research investigates the status inconsistency among women in Hamadan province, Iran. The study was carried out in eight cities and 32 villages. Questionnaire was applied to collect data from 767 women from urban areas and 786 women from rural area. Data analysis was done by using SPSS software and multi-variable regressions. The results show considerable status inconsistency among women in Hamadan. In addition, with decreasing social status of women here, the status inconsistency increases and the rate of status inconsistency in the rural area was higher than the urban area.

[Hamidreza Babaei, Amir Hossein Zomorrodian, Sarjit S. Gill, Leila Falahati. Social Capital and Human Development: A Meta-Analysis in Iran. Journal of American Science

Keywords: Status inconsistency, Socio-economic Status, Self-image, Expectations, Prediction, Women | [Full Text](#)
126 **Sweet ent-kaurene diterpene glycosides of *Stevia rebaudiana* Leaves Bertoni and Biological Evaluation**

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Abstract: *Stevia rebaudiana*, Bertoni, a sweet, non-caloric natural source, perennial herb native to Paraguay and Brazil. A rapid better resolved HPIC separation of sweet glycosides of *Stevia rebaudiana* leaves and different biological activities were determined. Eight sweet ent-kaurene diterpene glycosides (SEDG) were quantitatively and qualitatively fractionated by HPLC from the butanol soluble fraction. Two major sweet glycosides were chromatographically isolated. Acid hydrolysis and chemical degradation of the glycosides were performed; their aglycones were also isolated and identified. Hypoglycemic effect of the glycosides on diabetic rats was estimated. Kidney function was revealed; by creatinine and serum urea. Significant decrease in the levels of serum fasting glucose, glycohemoglobin (HbA_{1c}), urea, creatinine, total cholesterol, total lipids, alanine and aspartate aminotransferases enzyme (AST&ALT). In addition, remarkable improvement in vitamins C, and E levels and antioxidant enzymes, glutathione, glutathione oxidase, glutathione reductase and lipide peroxides levels were observed in the liver tissues compared to diabetic controls. Histopathological investigations of the control diabetic rats were characterized. The kidney of diabetic rats treated with sweet glycoside showed mild protective effects as compared to the diabetic control rats.

[El-Gengaihi, Souad, Ibrahim Nabaweya, Riad. Sahar, El-Regal, S.N. and Naglaa Sherief. Sweet ent-kaurene diterpene glycosides of *Stevia rebaudiana* Leaves Bertoni and Biological Evaluation. Journal of American Science 2011;7(6):775-782]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: *Stevia rebaudiana*, glycosides, hypoglycemic, HbA, liver, kidney function antioxidant status. | [Full Text](#)
127 **Maternal and Neonatal Toxicities induced by three Antirheumatic Drugs in Albino Rats**

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Abstract: Because of their analgesic and anti-inflammatory properties especially for patients with rheumatoid arthritis, nonsteroidal anti-inflammatory drugs (NSAIDs) are one of the most often ingested drugs during pregnancy. The aim of the present work was to evaluate and compare some of the maternal and neonatal toxicity induced by three presently marketing antirheumatic drugs namely meloxicam, celecoxib and leflunomide. The study revealed an ascendent retardation in the body weight gain of experimental dams during gestation compared to control in a drug dependent manner for meloxicam, celecoxib and leflunomide, respectively. Moreover, maternal atrophy of femur cartilage thickness associated with lacking of the integrity was observed in the treated dams. Significant retardation in weight, size and length of the maternally treated newborns was also detected compared to control. A number of congenital malformations associated with a significant decrease in ossified lengths of certain axial and appendicular bones and evident missing of ossification centers were observed in the maternal treated litters. The mentioned maternal and neonatal toxicity showed direct dependency on the applied drug. The results indicate that the tested drugs should be avoided during pregnancy and if necessary, this should be done with caution.

[Gamal M. Badawy, Hassan I. El-Sayyad and Eman E. Al-Shahari. Maternal and Neonatal Toxicities induced by three Antirheumatic Drugs in Albino Rats . Journal of American Science 2011;7(6):783-793].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Anti-inflammatory drugs; morphological and skeletal abnormalities; albino rats; Teratology | [Full Text](#)
128 **Curcumin Improves Insulin Sensitivity and Ameliorates Serum Pro-inflammatory Cytokines Levels in Diabetes Rat model Irrespective of type of Diabetes**

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Abstract: Objectives: To evaluate the impact of type of diabetes on serum levels of pro-inflammatory cytokines and the effect of chronic administration of curcumin on their levels in experimentally-induced diabetes in albino rats. The study included 60 (20 as control group) male albino rats; diabetes mellitus (DM) was induced using intraperitoneal injection of a single dose of 50 mg/kg of streptozotocin (STZ) after animals were maintained on high-fat diet for 2-weeks (20 rats) for induction of non-insulin dependent DM (NIDDM) or without dieting regimen for induction of IDDM (20 rats). One-week later, rats received oral curcumin (200 mg/kg). Homeostasis Model Assessment of Insulin Resistance (HOMA-IR) and rapid insulin sensitivity test (RIST) were used for clinical assessment. Two fasting venous blood samples were obtained after induction of diabetes and prior to initiation of therapy and at 6-wks after treatment for calorimetric estimation of fasting blood glucose (FBG) and ELISA estimation of fasting plasma insulin (FPI), serum interleukin (IL)-1 β and -6 and tumor necrosis factor- α (TNF- α). Results: Curcumin induced significant reduction of FBG levels, irrespective of type of diabetes and in NIDDM animals, post-treatment FPI levels were significantly lower compared to their pre-treatment levels. Diabetes, irrespective of its type, induced significantly higher pre-treatment serum levels of pro-inflammatory cytokines in both study groups compared to control group. However, curcumin significantly lowered serum levels of estimated cytokines at 6-weeks after treatment compared to pre-treatment levels. In group II, post-treatment RIST index was non-significantly higher compared to control index. In group III, pre-treatment HOMA-IR index was significantly higher compared to control index, while post-treatment HOMA-IR index was significantly lower compared to pre-treatment levels, despite still being significantly higher compared to control group. It is concluded that chronic administration of curcumin improves insulin sensitivity and thus imposing an anti-diabetic effect manifested as decreased FBG levels with concomitant decreased FPI and ameliorated the increased serum levels of pro-inflammatory cytokines and such effects are manifested in both types of diabetes.

[Mohamed Khaled Mohamed Mahfouz. **Curcumin Improves Insulin Sensitivity and Ameliorates Serum Pro-inflammatory Cytokines Levels in Diabetes Rat model Irrespective of type of Diabetes**. Journal of American Science 2011;7(6):794-799]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Diabetes mellitus, Curcumin, pro-inflammatory cytokines. | [Full Text](#)
129 **Biochemical Determination of Tissue Ossification Markers in Experimentally-induced Myringosclerosis**

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Abstract: Objectives: To explore myringosclerotic tissue levels of two bone modeling markers: osteopontin (OPN) and osteoprotegerin (OPG) in experimentally-induced, histologically-confirmed myringosclerosis (MS). **Materials & Methods:** The right middle ear of 24 normal healthy growing male Wister rats was inoculated, via transtympanic access, by *Streptococcus pneumoniae* type 3, after a period of 8 weeks the tympanic membrane (TM) was examined Otomicroscopically for transparency and graded as normal TM, mild or marked opacification. Then, tympanic bullae were removed and a part of myringosclerotic plaque was excised for ELISA estimation of tissue extract levels of OPN and OPG and the remainder of the TM was stained with hematoxylin-eosin for light microscopic grading of TM inflammation according to extent of calcification into 5 grades. **Results:** 20 ears developed otoscopically defined myringosclerotic changes, 14 ears showed mild and 6 had marked opacification that was localized in 4 ears and diffuse in 2 ears. Histological examination reported inflammation of grade III in 7, grade IV in 13 and grade V in 4 specimens. Mean estimated tissue extract level of OPN and OPG in studied animals were significantly higher compared to control animals with a positive significant correlation between histological grading and tissue-extract levels of both OPG and OPN and a positive significant correlation between otoscopic grading and tissue-extract levels of OPG, but the correlation was non-significant with OPN. **Conclusion:** Increased myringosclerotic tissue extract levels of both bone modeling markers indicated their possible role in initiation and/or progression of sclerotic changes in TM after chronic suppurative otitis media.

[Ahmed Al-Shal, Nahla E. El-Azab, Mohamed Khaled Mohamed Mahfouz. **Biochemical Determination of Tissue Ossification Markers in Experimentally-induced Myringosclerosis.** Journal of American Science 2011;7(6):800-807]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: suppurative otitis media, myringosclerosis, Osteoprotegerin, Osteopontin.

[Full Text](#)

130 **Micro Vascular Density MVD-CD34 and VEGF Expression in the Liver of Patients with Chronic Hepatitis, Cirrhosis and Hepatocellular Carcinoma**

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Abstract: Purpose: The aim of this work is to study angiogenesis of the liver of patients with chronic hepatitis, liver cirrhosis and hepatocellular carcinoma by assessment of microvessel density MVD-CD34 and VEGF in liver tissue. **Method:** Sixty patients with chronic liver disease and 30 patients with hepatocellular carcinoma (HCC) were subjected to clinical examination, laboratory investigations for hepatitis C, liver function tests and ultrasonography. Liver biopsy was performed for histopathological examination. They were 3 groups: chronic hepatitis [CH] (35), liver cirrhosis [LC] (25) and HCC (30) and ten healthy volunteers as controls with negative serological markers for hepatitis (C&B), HCC were 7 with grade I, 14 with grade II and 9 with grade III. Immunohistochemical staining for tissue vascular endothelial growth factor (VEGF) was done and MVD-CD34 was assessed by Image Analysis System. **Results:** In normal liver tissue specimen, both CD34 & VEGF were negative. MVD-CD34 was increased significantly from CH to LC to HCC and increased significantly in grade I to II to III HCC. VEGF showed a significant increase in LC compared to CH & insignificant in mean HCC compared to LC. With differentiation of HCC, MVD-CD34 increased for grade I, to II to GIII ($p < 0.01$). VEGF showed a higher expression in grade I and decreased in grade II & III. **Conclusion:** MVD-CD34 is more responsible of angiogenesis than VEGF with progression of chronic liver disease to HCC. Further research for other factors mediating and cells contributing to angiogenesis is needed, which may have therapeutic implications in the control of chronic liver disease and HCC.

[Olfat Ali Hammam^{*1}, Nawal El Badrawy², Maged El Ghanam², Moataz Hassan², Wael Safwat², Amgad Anas². **Micro Vascular Density MVD-CD34 and VEGF Expression in the Liver in Patients with Chronic Hepatitis, Cirrhosis and Hepatocellular Carcinoma.** Journal of American Science 2011;7(6):808-815].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Vascular endothelial growth factor (VEGF) - Immunohistochemistry (IHC)- Hepatocellular carcinoma (HCC)-Liver cirrhosis (LC)-Hepatitis C virus (HCV)-Hepatitis B virus (HBV).

[Full Text](#)

131 **The Effect of Induction Therapy with Basiliximab on the Recurrence of Hepatitis C Virus in Living Donor Liver Transplantation (Retrospective Study)**

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Abstract: Background: Hepatitis C virus (HCV) recurrence in HCV+ liver transplant recipients is almost inevitable and may be promoted by immunosuppression. Basiliximab, a high-affinity chimeric monoclonal antibody functions as an immunosuppressive agent, is effective in reducing acute rejection episodes in liver allograft recipients, but the influence on HCV recurrence might be a problem. **Objectives:** To study the effect of induction therapy with Basiliximab on HCV recurrence in adult living donor liver transplantation. **Methods:** This was a retrospective study to determine the effect of induction therapy with Basiliximab on the recurrence of HCV in the grafted liver. In this study 47 HCV patients were included who passed more than 6 month post-transplantation. All HCV recurrences were all proved histologically. All our patients received corticosteroids in addition to either tacrolimus (FK) or ciclosporine (Neoral), mycophenolate mofetil was given to all except 4 patients. **Results:** From the 47 transplanted patients 14 (29.8%) had HCV recurrence. In the group which used Basiliximab (Group I); the rate of HCV recurrence was 56.3%, while the group in which no Basiliximab was used (Group II); the rate of HCV recurrence was 16.1% ($P < 0.001$) highly significant. In patients who had HCV recurrence 64.3% of patients received induction therapy with Basiliximab, meanwhile in the non-recurrent group only 15.2% of patients received Basiliximab ($P < 0.001$) highly significant. To out rule the role of either FK or Neoral in recurrence of HCV, we found that the rate of HCV recurrence was as follows: in a group of patients who received Basiliximab and FK; HCV recurrence occurred in 54.50%, in patients who did not receive Basiliximab but received FK; HCV recurrence occurred in 21.7% ($P < 0.001$) highly significant. In patients who received Basiliximab and Neoral; HCV recurrence occurred in 60% and there was no HCV recurrence in patients who did not receive Basiliximab and received Neoral ($P < 0.001$) highly significant. We also compared two groups of patients; those who received FK and Basiliximab (54.5%) had HCV recurrence, and in those who received Neoral and Basiliximab (60 %) had HCV recurrence ($P > 0.05$) non significant. **Conclusion:** The rate of HCV recurrence in LDLT is more when Basiliximab was used as induction therapy in patients undergoing LDLT for chronic HCV related end stage liver disease.

[Wael Safwat^{*1} – Rasha Refaie² – Medhat Abdel Aal² – Ibrahim Mostafa¹ – Mahmoud and El Meteini³. **The Effect of Induction Therapy with Basiliximab on the Recurrence of Hepatitis C Virus in Living Donor Liver Transplantation (Retrospective Study).** Journal of American Science 2011;7(6):816-819].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Therapy; Basiliximab; Recurrence; Hepatitis C Virus; Living Donor; Liver Transplantation

[Full Text](#)

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Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections

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Abstract: The present study aimed to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections. Data were collected from cardiothoracic surgery department, intensive care unit, and outpatient clinic at Assiut University Hospital. The study was conducted on 60 adult patients with open heart surgery (30 - study group and 30 - control group) who have been selected randomly. Data were collected through: four tools; (cardiac surgery patient needs assessment sheet, cardiac teaching program based on individualized patient needs assessment, cardiac post operative observation checklist sheet, and cardiac post operative wound site infection evaluation sheet). Results of this study concluded that, more than half of the patients in study group 53.3 % were females, 70 % were married, and 40 % their ages ranged from 18 - 29 years. While the majority of the patients in the control group 63.3 % were male, 46.7 % were married, and 33.3 % from 30-39 years. Conclusion; Significant differences for improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. The study recommended that, pamphlets and simple illustration booklet should be available for patients illiterate to with simple explain how to safely live after open heart surgery. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.

[Sahra Z. Azer; Sanaa M. Alaa Eldeen; Mohammed Abd-Elwabb and Amal M. Ahmed. Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections. Journal of American Science 2011;7(6):820-834].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Open heart surgery, Infection, Post operative care

[Full Text](#)

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IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES OF POROSOME IN MAMMALIAN PANCREATIC ACINAR CELL

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Abstract: Pancreatic acinar cells have a particular role in the synthesis, storage and regulated secretion of the different digestive enzymes present in pancreatic juice. Recently a detailed understanding of the molecular machinery and mechanism of cell secretion has come to light. So, it is now an accepted belief, that the mechanism of cell secretion is quite different, and a highly regulated process. The secretory vesicles (zymogen granules) dock and transiently fuse at the base of specialized plasma membrane structures called porosomes or fusion pores. In the present study, TEM images and a computer-assisted morphometry approaches have been used to analyze quantitatively the shape and fine structure of porosome in pancreatic acinar cell of post-feeding rat. The electron micrographs illustrated the porosome as a distinct permanent, lipoprotein, cup-shaped structure at the cell plasma membrane of the pancreatic acinar cell, facing the lumen and varies in shape and structure according to the stage of secretion. The computer-assisted morphometry summarized the structural and morphological importance of the porosome and revealed its different shapes during the cell secretion. The coloured images have clearly shown the supramolecular tripartite lipoprotein structure of the plasma membrane and porosomes. Histogramic analysis showed the numerical values of the secreted materials and the three layers of both porosomes and plasma membrane which differed depending on the stage of cell secretion.

[Waslat W. Elshennawy. IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES OF POROSOME IN MAMMALIAN PANCREATIC ACINAR CELL. Journal of American Science 2011;7(6):835-843].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: cell secretion, image processing, histogramic analysis, porosomes, secretion machinery, ultrastructure.

[Full Text](#)

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The effect of non-linear terms on the process of computing water hammer with regard to friction coefficients for different cast iron pipe

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Abstract: Water Hammer problems are complex and time-consuming even with very simple calculation method and usual boundary conditions. The governing equations of water Hammer are partial differential equation and are expressed based on continuity and momentum equations. One of the important procedures for solving the governing equations of

$$V \frac{\partial V}{\partial x}, V \frac{\partial H}{\partial x}$$

unsteady flows is finite difference method. One procedure for simplifying the governing equations is neglecting the nonlinear terms such as $V \frac{\partial V}{\partial x}, V \frac{\partial H}{\partial x}$ without considering the amount of errors that are created with this process. Therefore in this paper, the phenomenon of water Hammer in the tank, pipe and valve system has been investigated in two manners, one with full equations and other with neglecting the nonlinear terms. For doing this, an FDM code has been written in MATLAB and the amounts of head along the pipe in sequential times and the differences between two manners have been given in diagrams. The obtained results indicate that for iron pipe with different friction coefficient (smooth, perennial and worn) by decreasing Chezy coefficient, wave damping increases and the effect of nonlinear terms decreases.

[R. Daneshfaraz, S. Sadegh-Fam, M. Majedi-Asl. **The effect of non-linear terms on the process of computing water hammer with regard to friction coefficients for different cast iron pipe.** Journal of American Science 2011;7(6):844-847].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Water Hammer; Non-linear and Linear Terms; wave damping; Chezy Coefficient; Tank and Pipe System

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Psychological reflection on anguish in players

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Abstract: A great deal of the literature on the relationship between anguish and performance has come from a cognitive-behavioral perspective. This paper examines the relationship between the two constructs from a psychodynamic perspective. Included are a discussion of winning and the anguish of separation from an object relations perspective, the dread of success, self psychology, Freudian instinct theory, and the secondary gain that is found in defeat. Suggestions for future directions in treatment of anguish within the athletic context are offered as well as a postscript.

[Ali Feiz Khademi, Saadat Hajipour. **Psychological reflection on anguish in players.** Journal of American Science 2011;7(6):848-851]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Psychological reflection; anguish; players; performance

[Full Text](#)

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The Effects of two different doses of Antioxidant Vitamin C supplementation on bioenergetics index in male college student

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Abstract: In order to study the effects of consumption of 2 regimes of vitamin C (500 and 1000 mg) on bioenergetics index (aerobic and anaerobic power) in 36 physical education college male students, were selected non – randomly procedure and they were set in 3 groups. Average of age, weight, height and Fat percentage of subjects was (22.48 ± 1.84) years, (64.93 ± 7.84) kg (175.4 ± 5.66) cm and (10.94 ± 5.29) mm respectively. The period considered for consumption of vitamin C by experimental groups, was a 3 weeks period that in this period the first group consumed dose of (500 m.g) vitamin c and second group (1000 m.g) vitamin C and third group (control group) consumed placebo. The tests which have been exerted in this research consist of: assessment of anaerobic power by RAST test. 2) Assessment of aerobic power by Cooper test. Result indicated that there was not a significant (p < 0.05) difference between 3 group in anaerobic and aerobic power. Therefore we concluded that daily consumption of 500 or 1000 m.g vitamin C for a period of 3 week does not have any effect on the basis of improvement of anaerobic and aerobic power in male college students. [Morteza Jourkesh, Iraj Sadri, amineh sahranavard, ali ojahi, mohammad Dehganpoori. The Effects of two different doses of Antioxidant Vitamin C supplementation on bioenergetics index in male college student. Journal of American Science 2011;7(6):852-858]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Aerobic power, anaerobic power, Antioxidant, performance

[Full Text](#)

137 **Removal of Cu from Aqueous Solution Using Slag**

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Abstract: This study intends to establish the usage of steel slag in absorption of Cu. Within this study the two types of blast furnace and converter slag were examined in laboratory conditions and the effects of parameters of time, concentration, solutions' pH on the amount of absorption were studied. Studying the experiments showed converter slag's absorption of Cu per gr was greater in a balance time of 15 minutes with high concentrations of metallic elements of 500 and 1000 ppm, but increase in pH did not alter the absorption. And the highest absorption of Cu was that of blast furnace slag with the same conditions. The only difference was that the more the pH increased the greater the absorption was, in a way that the greater amount of absorption occurred in a pH of 7. Considering the great volume of slag and its feature of absorbing Cu, usage of this absorbent can be taken into consideration as a method of quality treatment and complimentary filtration of effluent.

[Golshan Shirneshan, Noorallah Mirghafari. **Removal of Cu from Aqueous Solution Using Slag.** Journal of American Science 2011;7(6):859-862]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Slag, Cu, Absorption, Effluent

[Full Text](#)

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The Efficacy of Different *Bacillus Thuringiensis* Formulations for the Control of the Cotton Leafworm *Spodoptera Littoralis* (Boisd.) (Lepidoptera: Noctuidae)

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Abstract: The efficacy of three *Bacillus thuringiensis* formulations, Agerin, Dipel 2X and Dipel DF were tested against 2nd larval instar of *Spodoptera littoralis*. The three formulations were tested in the laboratory, field and semi field experiments. The 48 hour LC₅₀ for Agerin, Dipel 2X and Dipel DF were 0.18, 0.07 and 0.10 % for the three formulations, respectively. The results of the field experiment indicated that the general mean of reduction were 59.0, 55.9 and 58.6 % for the three *Bt* formulations (Agerin, Dipel 2X and Dipel DF, respectively). In addition, the general mean of mortality rate in the semi-field experiments were 60.3, 60.4 and 61.3 % for Agerin, Dipel 2X and Dipel DF, respectively. Moreover, the histopathological studies using ultrastructure microscopy were carried out on the midgut of 4th larval instar after the treatment of the second instars with LC₅₀ of the three formulations. These results therefore confirm the opinion stated that the toxicities of the different three formulations, are similar to each other. Therefore the Egyptian *Bacillus thuringiensis* strain (Agerin) can be used for control of *S. littoralis* as it is cheap and readily available.

[Mona F. Abd-El Aziz; Nehad M. El-Barkey and Hassan. F. Dahi. The Efficacy of Different *Bacillus Thuringiensis* Formulations for the Control of the Cotton Leafworm *Spodoptera Littoralis* (Boisd.) (Lepidoptera: Noctuidae). Journal of American Science 2011;7(6):863-871]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Different *Bacillus*; *Thuringiensis*; ormulations

[Full Text](#)

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Effect of soybean on fertility of male and female albino rats

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Abstract: This study aimed to investigate whether consumption of soybean is useful or harmful on reproductive hormones; ovary; uterus; mammary gland; testis and subsequent fertility. In the former experiment, male and female Wister albino rats were used in the present study. Each sex was randomly divided into 4 groups, control group fed on the basal diet (AIN93 G), three treated groups given 30, 60 and 90 gm cooked soybeans/70 kg human body weight (b.w.) for three months. Female rats showed that soybean significantly decreased free estradiol hormone (E2); progesterone hormone; follicle stimulating hormone (FSH); luteinizing hormone (LH); ovary weight and number of ovarian follicles. On the other hand soybean significantly increased total E2; sex hormone binding proteins (SHBP); uterus weight and caused uterus proliferation and cystic hyperplasia. The mammary gland showed gradual hyperplasia and mammary ducts showed proliferation. In male rats soybean significantly decreased free testosterone hormone; LH and FSH, meanwhile total testosterone hormone, SHBP, testes weight and testes diameter were significantly increased accompanied with spermatogenesis arrest. [Serag El Din, O.S.; Batta, H., Abd El Azim; Abd El Fattah, N.. Effect of soybean on fertility of male and female albino rats. Journal of American Science 2011;7(6):872-883].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Soybean; Fertility; Progesterone, Testosterone, Ovary; Testis.

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Improving Reproductive Performance by Glucose Injection in Damascus Does Goat during Early Summer

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Abstract: Goats are seasonally polyestrous having estrous activity during late summer, fall, and winter and showing no activity during summer and spring. The objective of the present study was to improve reproductive performance of Damascus doe goats in early summer including: estrous activity (EA), ovarian follicular (OF) growth, corpus luteum (CL) development, and progesterone (P₄) profile by injection of glucose (Glu). A total of twelve apparently healthy Damascus doe goats were used in this experiment and were classified randomly into two equal groups. Animals in group A were injected with Glu via the jugular vein; each animal of the treated group received 94.584 g Glu daily for nine days before the expected day of ovulation. The second group (B) was injected with saline solution and used as control. All animals in both groups were synchronized by PGF_{2α} (cloprostenol) three times (10 days between each interval and other) with notice that glucose was injected in the second interval. Blood samples were collected from each animal; the blood was then centrifuged and the serum was analyzed for progesterone. All does were subjected to ultrasonographic examination on days 5, 9, and 19 after the third injection of PGF_{2α} and post-treatment by glucose. The results revealed that glucose injection achieved estrous activity higher than in control (100% vs. 50 %, p>0.05). All animals showed the estrous activity through 24-72 hours after each dose of PGF_{2α} and post-treatment by glucose. The number of follicles (<5mm) in the treated group was higher than in control group (111 vs. 94 follicle, p>0.05), while the follicular diameter did not differ between the two groups. The ovarian activity on the left ovary was higher than on the right ovary (107 vs. 98 follicle, p>0.05). The ovulation rate as detected from the number of corpora lutea and progesterone level was higher in the treated group than control (p>0.05). Ovulation was significantly higher on the right ovary than on the left ovary (19 vs. 9 ovulation). Corpus luteum diameter in the treated group was significantly larger than in control group (1.2±0.11 cm vs. 0.97±0.13 cm, p>0.05). The average progesterone concentration increased significantly (2.36±0.84 ng/ml) in the treated animals than in the control (0.96±0.23 ng/ml). It could be concluded that glucose treatment led to improvement of number of estruses, ovarian follicles, corpora lutea and progesterone concentration in Damascus doe goats during early summer. Therefore, treatment with energy-yielding nutrient (glucose injection) on ovulation rate in goats may be recommended in periods of reproductive activity impairment.

[Anas A. Salem, Hassan A. H, Nasrat Abd El-Ati, and Gamal B. M.. Improving Reproductive Performance by Glucose Injection in Damascus Does Goat during Early Summer. Journal of American Science 2011;7(6):884-892].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Doe goat, EA, OF, CL, Glu, PGF_{2α} and P₄

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INFLUENCE OF ACUTE PANCREATITIS INDUCTION ON ZYMOGEN GRANULES OF PANCREATIC ACINAR CELLS USING IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES

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Abstract: Acute pancreatitis (AP) is a mild to severe inflammation of the pancreas with a clinical picture of a self – limited illness that sometimes progresses to a severe state leading to multiple organ failure eventually causing death. The initiating event of AP may be anything that injures the acinar cell and impairs the secretion of zymogen granules which enclose the digestive pro-enzymes. Therefore, the aim of this work was to assess the effect of acute pancreatitis on the ultrastructure of zymogen granules and to analyze this effect using image processing and numerical analysis approaches. **Material and Methods:** Ten male albino rats weighing 150-200g were divided into two groups; group [I] was treated with physiological saline injections *i.p.* as a control group. Acute pancreatitis was induced into group [II] by two injections of 250mg/100g b.w. of L-Arginine *i.p.* in an one hour interval as 20% solution in 0.15M NaCl. Electron micrographs obtained from zymogen granules were examined then were processed with CIS technique for image analysis and histographic analysis. **Results :** Ultrastructural results of zymogen granules of group [II] (rats received L-Arginine) revealed changes with different severity as; depletion, arrest towards the nucleus, dilatation or fusion together, some of them showed an atrophy in size, rupture of membranous boundary and eventually irregular in shape with loss of their rounded configuration and degraded. Obvious varieties appeared in coloured images and numerical values analysis that obtained from microphages of group [II] comparing with those of control group [I]. **Conclusions:** Influence of acute pancreatitis provoked deleterious effects in zymogen granules as consequence of intense inflammation. Despite of current knowledge, many hypothesis and questions remain unanswered concerning the effects of L-Arg. Image processing and numerical analysis which are considered to be valuable approaches in this study, may resolve some of mistiness of the impact of pancreatitis on the exocrine pancreas. Application of this technique gave more details of pathological changes which were unable to be seen by electron microscope only. So, it can be applied as good techniques for early diagnosis in the field of pathology to illustrate the fine details beyond that of electron micrographs.

[Waslat W. Elshennawy. INFLUENCE OF ACUTE PANCREATITIS INDUCTION ON ZYMOGEN GRANULES OF PANCREATIC ACINAR CELLS USING IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES. Journal of American Science 2011; 7(6):893-904].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Histographic analysis, image processing, L-Arginine, pancreatitis, rat, ultrastructure, zymogen granules.

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A New Measurable Definition of Knowledge in New Growth Theory

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Abstract: New Growth Theory helps us make sense of the ongoing shift from a resource-based economy to a knowledge-based economy. It underscores the point that the economic processes which create and diffuse new knowledge are critical to shaping the growth of nations, communities and individual firms. In all too many contributions to New (Endogenous) Growth Theory – though not in all – central reference is made to ‘a stock of knowledge’, a ‘stock of ideas’, etc., this variable featuring centre-stage in the analysis. Yet it is immediately apparent that this is far from being a crystal clear concept. The difficulty and uncertainty of being able to capture the value associated with knowledge is a real problem. The intent of this paper is introducing new thinking and theorizing about the knowledge and its measurability in new growth theory. Moreover the study aims to synthesize various strain of the literature with a practical bearing on knowledge concept. By contribution of institution framework which is found within NGT, we can indirectly measure the knowledge concept. Institutions matter because they shape the environment for production and employment of new knowledge.

[Hadi Ghaffari, Mohammad Ali Molaei. A New Measurable Definition of Knowledge in New Growth Theory. Journal of American Science 2011;7(6):905-910]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: New Growth Theory (NGT), Knowledge, Institution Framework

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Vegetative and Reproductive Characteristics of Iranian Gole-Gav-Zaban (*Echium amoenum* Fisch & C. A. Mey) Accessions Cultivated in Mazandaran Province

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Abstract: Iranian Gole-Gav-Zaban (*Echium amoenum* Fisch & C. A. Mey) belonged to Boraginaceae family and is considered as a valuable Iranian endemic medicinal plant that has been used widely as traditional medicine since long times. Because of its convenience and being acceptance as a remedy for different sort of diseases by people. Use one of these (besides) side a little research has been ever done on this valuable endemic medicinal plant. There for is drastically short amount of available information about it. hence there is need of more work. By these descriptions, in present study, measuring of vegetative and reproductive character of Iranian Gole-Gav-Zaban was aimed. For fulfilling these aims (objects), accessions were planted in a completely randomized design with three replications in June 2010. Bushes characteristics were observed and documented. In the vegetative phases there weren't considerable difference among accessions. But from the aspect of flower field character, the difference was significant.

[Elham Daneshfar, Ali kuhkheil, Reza Omidbaigi and Akhtar Zand. Vegetative and reproductive characteristics of Iranian Gole-Gav-Zaban (*Echium amoenum* Fisch & C. A. Mey) accessions cultivated in Mazandaran province. Journal of American Science 2011;7(6):911-914]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: *Echium amoenum*, Vegetative phase, Reproductive phase, Oil

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A Survey on the condition of Micro Facies, Sedimentary Environment and the Cretaceous Deposits (With Particular Reference to Central Iran)

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Abstract: Micro continent of central Iran is a part of middle Iran that is bounded with ophiolitic suture zones in Sistan, Nain, Baft, Doruneh fault and Kashmar – Sabzevar ophiolites and is classifiable into Lut block, Shotori upland, Tabas subduction, Kalmard upland, Posht Badam block, Biaze - Bardsir basin and Yazd block by means of long faults which are dextral strike – slip faults and have westwards inclination. In many regions of Iran, except to Zagros, in approximate boundary of early and late Cretaceous, it is observed evidences of tectonic events which are mainly as land generating and can be compared with worldwide Austrian event, in everywhere in Iran except to rare cases (east of Tehran and Yazd). Upper Cretaceous beds in Iran do not have identical facial characteristics and it seems that in contrast to equal sedimentary condition in early Cretaceous, sedimentary basins in upper Cretaceous have been separated from each other and special condition has been dominated in each basin. As a result of that, lithostratigraphic units except to Zagros and Kopet Dagh have not been named and or have local names in upper Cretaceous of Iran. This article is an overview of the condition of Micro-facies, sedimentary environment and the Cretaceous deposits in central Iran.

[Mehran Arian, Hamideh Noroozpour. A Survey on the condition of Micro Facies, Sedimentary Environment and the Cretaceous Deposits (With Particular Reference to Central Iran)). Journal of American Science 2011;7(6):915-924]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Cretaceous deposits, central Iran, Micro-facies, sedimentary environment

[Full Text](#)

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An investigation of alongshore sediment transport trend, using experimental relations, morphological landscapes and coastline changes in the Persian Gulf

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Abstract: Predict of sediment transport and sedimentation rates are one of the main affecting in coastal areas management. Many tries with emphasis on effective reasons in sediment movements has been done to decide the rate of sediment transport, including the CERC formula. But accurately predict sediment transport rates and trends were affiliated

of different such as accuracy and precision statistics, basic and initial data's. Since that may not be possible such information in some areas, was necessary used other techniques such as coastline changes and morphology. In this paper, alongshore sediment transport trends were considered in parts of northern coast of Persian Gulf, by local wave data's, CERC formula, morphological landscapes and coastline changes at the headlands and breakwaters. Coastal morphology and coastline changes were expounded with CORONA (1964) and SPOT (2005) satellite imageries. Alongshore sediment transport was outcome by CERC formula. Based on results, all of morphological landscapes and coastline changes in the study area were confirmed alongshore sediment transport trends got from CERC formula. In some areas that have limit data or lack of substantial document and prepare field information should used coastline changes and morphological settings with empirical relationships, were impossible to inspect the output.

[Hamidreza Masoumi–Ahmad Motamed–Hamidreza Peyrovan– Jamal Tarrah. An investigation of alongshore sediment transport trend, using experimental relations, morphological landscapes and coastline changes in the Persian Gulf. Journal of American Science 2011;7(6):925-930]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Alongshore sediment transport, morphological landscapes, Coastline changes, CERC formula, Persian Gulf coastlines
146 **3D Simulation of Flow over Flip Buckets at Dams**

[Full Text](#)

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Abstract: In the present numerical study, by using the Fluent software, the ability of it to predict the complex flow conditions is presented. In this purpose, experimental data over a flip bucket in different hydraulic conditions were selected. To simulate the turbulence phenomenon, $k-\varepsilon$ Standard turbulence model was selected. Moreover to predict jet surface the VOF free surface model was employed. Finally by comprising the numerical model and available experimental results, a good agreement was observed.

[M. Jorabloo, R. Maghsoodi, M. Elmi, H. Sarkardeh. **3D Simulation of Flow over Flip Buckets at Dams**. Journal of American Science 2011;7(6):931-936]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Flip Bucket; Fluent Software; VOF Free Surface Model; $k-\varepsilon$ Standard Turbulence Model.

[Full Text](#)

147 **Evaluating Strategy for Nongovernmental Scientific and Research Institutions Based on Balanced Score Card Model (Case Study: ACECR of Iran)**

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Abstract: What prevents the strategies from getting operational in organizations is that, strategies remain at general level or general actions and orientations. To alleviate this problem, the researchers who proposed balanced score card model presented the concept of strategy map in this model. Strategy map tries to represent the organization's strategy in the framework of cause and effect relationships and demonstrate how the organization's strategy can be transformed into measurable objectives and specific operations which should be followed by organizational units and organization's staffs. To implement its strategies, the academic center for education, culture and research (ACECR) as one of scientific and research institutes in Iran requires a strategy map to be prepared which will provide the essential framework for implementation of the designed strategic plans. In order to design the strategy map in the present study, we made use of the related literature, references, and opinions of experts, and we prepared 40 indicators for different aspects of balanced score card model. Afterwards, we put these indicators into a questionnaire and asked the ACECR managers to let us know their opinion regarding them. Analysis of filled questionnaires by Friedman test resulted in selection of 30 indicators to be put into strategy map, and the resultant ACECR strategy map was designed deductively since no similar one existed. Subsequently, quantitative measures and objectives were considered for each indicator. Ultimately the status of this institution after the first year of implementing the strategy was analyzed using the obtained indicators and we proposed several strategies for successful implementation of the strategy and reduction of exiting gaps.

[Sohail Dadkhah, Mohamad-Taghi Amini, Atefeh Khosravi, Sohaila Dadkhah. **Evaluating Strategy for Nongovernmental Scientific and Research Institutions Based on Balanced Score Card Model (Case Study: ACECR of Iran)**. Journal of American Science 2011;7(6):937-943]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Balanced score card; Strategy map; indicator; Measure

[Full Text](#)

148 **An Effective Preprocessing Methodology for Textual Data Classification**

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Abstract: In the present rapidly changing world, a massive amount of raw data is generated, collected and organized in databases. This data contains lot of useful and important information which is hidden and not directly accessible. There is vital need for in-depth data analysis tools which can turn raw data into knowledge. This situation is known as "data rich but information poor". It is very time consuming, slow and expensive to analyze and understand the huge volume of data manually specially when the data is in the form of text. Textual data need huge resources to preprocess it to make it ready for the data/text mining algorithms. In this paper we have proposed an effect preprocessing methodology for textual data which have produce quality data efficiently and reliably. [Dr. Muhammad Shahbaz, Dr. Syed Muhammad Ahsan, Maryam Shaheen, Muhammad Shaheen. An Effective Preprocessing Methodology for Textual Data Classification. Journal of American Science 2011;7(6):944-951]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Text Mining, Data Mining, Classification, Knowledge Discovery, Parsing, P-Tree

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149 **Creation of next generation of Open Source Science Databases**

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Abstract: From 1990s onwards, biological and chemical research in both the public and private sectors throughout the world has been transformed into industrial scale by the creation of databases with large amounts of high-quality, freely available DNA sequence data. These databases have not only enabled the comprehensive cataloging of human genes but have also accelerated the discovery of new forms of cellular regulation rendering biology and chemistry a discovery science thus providing the basis for novel experimental approaches. We however feel that the potential opportunities, accessibility and power of open source science and publicly available data have not transformed into gains and significant impact on scientific discovery. In this paper we have identified many issues with the existing conventional chemical biology and molecular biology databases and propose the development of ChemBank v3.

[Syed Ahsan, Muhammad Shahbaz. Creation of Next generation Open Source Science Databases. Journal of American Science 2011;7(6):952-955]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: biological research, open source science, databases

[Full Text](#)

150 **An Algorithm for the Removal of Redundant Dimensions to Find Clusters in N-Dimensional Data using Subspace Clustering**

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Abstract: The data mining has emerged as a powerful tool to extract knowledge from huge databases. Researchers have introduced several machine learning algorithms to explore the databases to discover information, hidden patterns, and rules from the data which were not known at the data recording time. Due to the remarkable developments in the storage capacities, processing and powerful algorithmic tools, practitioners are developing new and improved algorithms and techniques in several areas of data mining to discover the rules and relationship among the attributes in simple and complex higher dimensional databases. Furthermore data mining has its implementation in large variety of areas ranging from banking to marketing, engineering to bioinformatics and from investment to risk analysis and fraud detection. Practitioners are analyzing and implementing the techniques of artificial neural networks for classification and regression problems because of accuracy, efficiency. The aim of his short research project is to develop a way of identifying the clusters in high dimensional data as well as redundant dimensions which can create a noise in identifying the clusters in high dimensional data. Techniques used in this project utilizes the strength of the projections of the data points along the dimensions to identify the intensity of projection along each dimension in order to find cluster and redundant dimension in high dimensional data. [Dr. Muhammad Shahbaz, Dr Syed Ahsan, Ishtiaq Hussain, Muhammad Shaheen. An Algorithm for the Removal of Redundant Dimensions to Find Clusters in N-Dimensional Data Using Subspace Clustering. Journal of American Science 2011;7(6):956-964]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Classification, Regression, Clusters, Data mining, Algorithm

[Full Text](#)

151 **Competence of Nurses' Managers in Different Work Environment at Assiut University Hospitals**

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Abstract: Background: Healthcare providers are increasingly inclined to question the quality and efficacy of the care they provide. Nurse competence plays an important role guaranteeing the quality of nursing interventions and outcomes. It is claimed that a key responsibility of nurse administrators is to ensure staff nurse competence. Nurses should maintain and demonstrate competence throughout their professional career. Nurse Managers have to continuously assess safe patient care. Aim of the Study: to assess competence nurses' managers at different work environment at Assiut University Hospitals, and compare nurse's competence at different work environments at Assiut University Hospitals. SUBJECT AND METHODS: the present study is descriptive, was conducted in all units of Assiut University Hospitals. It included all nurses' managers who are working in different departments at the time of the study. A personal interview questionnaire sheet which consist of two parts: ¹st Personal characteristics data which include name, age, department, marital status, educational level, position, years of experience and years of experience of the present position (head nurse, supervisor, assistant director, director of nursing), ²nd Nurse Competence Scale (NCS) was consisted of seventy three items structured in seven competence categories: helping role (seven items), teaching- coaching (sixteen items), diagnosis functions (seven items), managing situations (eight items), therapeutic interventions (ten items), ensuring quality (six items) and work role competences (nineteen items). The Scoring System was four-point scale (0 = not applicable in my work, 1 = very seldom, 2 = occasionally and 3 = very often in my work). The levels of competence are measured with a Visual Analogue Scale (VAS 0-100 mm), which the total score of the VAS with 0 meaning a very low level of competence, 1-30 mild level of competence, 31-60 good level of competence, 61-99 excellent level of competence and 100 a very high level of competence. Results: the nurses' managers in main Assiut University Hospital are most competent than Pediatric and Women Health Hospital in all competence categories. The level of competence categories in emergency is highest than special & general, intensive care unit and operating room. The total VAS mean levels of competence of all categories ranged from 55.93 to 73.5. Conclusions: nurses' managers have excellent level of competence in work role category, followed by teaching coaching category, then in managing situation category. Main Assiut University Hospital nurses' managers are competent than Pediatric Hospital and Women Health Hospitals in all competence categories. The emergency units nurses' managers are competent than other different work settings following by operating rooms.

[Kawther Abd El-Motagally Fadel, Samah Mohamed Abdalah, Fatma Rushdy Mohamed and Eman kamel hossny. Competence of Nurses' Managers in Different Work Environment at Assiut University Hospitals. Journal of American Science 2011; 7(6):965-975]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Competence, nurse manager, work environment

[Full Text](#)

152 **Online Classes and Traditional Classes in adult education**

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Abstract: Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home. Distance education delivers classes (live or pre-taped) to students in their home, office, or classroom. It is used by K-12, higher education, continuing education and business. As the cost of delivering quality education increases,

institutions find that limited resources prevent them from building facilities, hiring faculty, or expanding curricula. They are using distance education to maximize resources and are combining their assets with others to produce programming. Distance education is offered internationally, nationally, regionally, and locally over all forms of conferencing technology. The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS)), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

[Mina Abarashi. **Online Classes and Traditional Classes in adult education.** Journal of American Science 2011;7(6):976-979]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Online Classes, Traditional Classes, distance education

[Full Text](#)

153 **Distance Education and e-learning: Similarities and differences**

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Abstract: Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation. Distance education can be used for some aspects of most disciplines. For example, several institutions of higher education already have developed certificate programs, undergraduate programs, and graduate programs in health and physical education that are delivered using distance education methods.

[Fatemeh Vahidi. **Distance Education and e-learning: Similarities and differences.** Journal of American Science 2011;7(6):980-984]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Distance Education, E-learning

[Full Text](#)

154 **Effect of Chlorhexidine in Prevention of Oral Lesions in Leukemic Children Receiving Chemotherapy**

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Abstract: Leukemia is the most common childhood cancer. Untreated leukemia results in death from infections or hemorrhage. The primary treatment of ALL is chemotherapy which is usually associated with a number of side effects among which is oral mucositis (stomatitis). It is one of the most debilitating complications following chemotherapy treatment administration. These lesions may produce discomfort and pain which interfere with eating, patient compliance to treatment and potential risk of oral infection. Good and consistent oral hygiene is one of the basic roles of the pediatric nurse to prevent and reduce the complication of oral infection. It includes oral assessment before the initiation of chemotherapy treatment and during its administration followed by creating an oral care plan. Chlorhexidine gluconate is effective in the prevention of oral lesion and in decreasing the severity of stomatitis. The aim of the present study is to determine the effect of using chlorhexidine gluconate in the prevention of oral lesions in leukemic children receiving chemotherapy. The study was conducted at the Haematology Unit of Alexandria University Children's Hospital at EL-Shatby and at the Oncology department at the Health Insurance Student Hospital in Alexandria. The subjects of this study comprised 50 children of both sexes with acute lymphoblastic leukemia. Children were divided into two groups: group I (study group) received 0.1 % of chlorhexidine gluconate and group II (control group) who was left to the routine hospital care. Tool consisted of three parts to collect the study data: Children's Bio socio-demographic data; Children's Medical data; Oral assessment guide (OAG) tool. The main result showed that children among the study group had healthier oral cavity and lower degree of oral mucositis no one developed severe oral mucositis compared to the children in the control group following 10 days of chemotherapy administration. The main recommendation is to create an oral care plan to each child individually involving cleaning teeth by using a mouth wash with Chlorhexidine gluconate. This is important for preventing oral complications, decreasing severity of oral mucositis and treating gingivitis (swelling, redness and bleeding of the gums).

[Azza M. Darwish; Mostafa A. S. Salama; Nehad S. Basiouny and Noha M. Arafa. Effect of Chlorhexidine in Prevention of Oral Lesions in Leukemic Children Receiving Chemotherapy. Journal of American Science 2011; 7(6):985-996].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: lymphoblastic leukemia, chemotherapy, oral mucositis, Chlorhexidine gluconate.

[Full Text](#)

155 **Posttraumatic Stress among Undergraduate Emergency Nursing Students**

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Abstract: Undergraduate emergency nursing students are often exposed to stress when helping patients in emergency situations. Emergency nursing students are vulnerable to the development of symptoms of post-traumatic stress Disorder (PTSD). Stress reactions among helpers can be regarded as a natural behavior and reaction when experiencing a traumatizing event and by the stress resulting from helping or wanting to help a traumatized or distressed person. Any trauma exposure can trigger post traumatic stress disorder. Selley reiterates that health workers as well as primary victims are at risk of developing PTSD. The aim of this study was to examine posttraumatic stress among undergraduate emergency nursing students. Methods: The sample of this study consisted of 250 undergraduate students attended and studied emergency nursing course during the period from February till May 2009. Two instruments were used to measure reactions to traumatic events, Impact of Event Scale Revised (IES-R) and the Post Traumatic Symptom Scale (PTSDS). Results: Of those who reported a traumatic situation the majority of them scored 30 or more on the IES-R subscale. Scores over 30 indicate a stress reaction with certain

likelihood of post-traumatic disorder. On the PTSDS-subscale the majority of students scored 5 or more, which indicates a relative strong reaction. Conclusion: The high prevalence of post-traumatic stress in undergraduate emergency nursing students indicates an inability to cope with stress in daily life.

[Hayam I. A. Asfour and Fatma Hussein Ramadan. Posttraumatic Stress among Undergraduate Emergency Nursing Students. Journal of American Science 2011; 7(6):997-1004]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Posttraumatic Stress; Undergraduate; Emergency; Nursing; Student

[Full Text](#)

156 **Prevalence and Outcome of Acute Kidney Injury in the intensive care unit according to RIFLE criteria: A single-center study**

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Abstract: Acute kidney injury (AKI) is common in the intensive care unit (ICU) and is associated with significant morbidity and mortality. This requires clinicians to be familiar with recent advances in definitions, diagnosis, prevention, and management of AKI in the ICU. The Acute Dialysis Quality Initiative (ADQI) represents the efforts of a workgroup seeking to develop consensus and evidence-based statements in the field of AKI. The ADQI group proposed a consensus graded definition, called the RIFLE criteria (Risk, Injury, Failure, Loss, and End stage). Objective: To estimate the prevalence of AKI in ICU and assess the ability of the RIFLE criteria to predict the outcome of AKI in ICU. Methods: We performed a retrospective cohort study in the internal medicine ICU, Zagazig University Hospital between January 2010 and December 2010. We excluded patients younger than 15 years, patients receiving chronic hemodialysis admitted to ICU, kidney transplant patients, length of hospital stay were <24 hours, or readmitted to the ICU during the study period. RIFLE criteria classified AKI patients into three stages of increasing severity Risk(R), Injury (I), and Failure (F). The outcomes of AKI patients in ICU were recovery, kidney loss, end stage renal disease (ESRD) or death. Results: The total number of ICU admissions during the study period was 8304 patients. After application of exclusion criteria, the number of the study became 5440 patients. According to RIFLE criteria 1885 (34.65%) had AKI. RIFLE criteria classified them into Risk 13.32%, Injury 11.91% and Failure 9.41%. The crude outcome of AKI patients as follows 77.24% recovered, 9% lost kidney functions and required renal replacement therapy (RRT), and 2.28% reached ESRD. The crude mortality of AKI patients was 20.47% versus 7.76% mortality in patients without AKI. The hospital recovery stratified by RIFLE criteria decreased with worsening RIFLE classes (R, I, F) 84.27%, 79.62% and 64.25% respectively. Patients' lost kidney functions and required RRT stratified by RIFLE criteria increased with worsening RIFLE classes 5.79%, 7.4% and 15.62% respectively. Patients reached ESRD stratified by RIFLE criteria increased with worsening RIFLE classes 1.2%, 2% and 4.1% respectively. The hospital mortality AKI patients stratified by RIFLE criteria increased with worsening RIFLE classes 14.48%, 18.36% and 31.64% respectively. The urinary output (UOP) criteria associated with lower mortality and higher recovery rate than creatinine criteria. Conclusion: The prevalence of AKI in the internal medicine ICU, Zagazig University Hospital according to RIFLE criteria is 34.65%. RIFLE criteria are useful in predicting the outcome of AKI patients.

[Mohamed Fouad and Mabrouk I. Ismail. Prevalence and Outcome of Acute Kidney Injury in the intensive care unit according to RIFLE criteria: A single-center study. Journal of American Science 2011; 7(6):1005-1012]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Prevalence; Acute Kidney Injury; intensive care unit; RIFLE criteria

[Full Text](#)

157 **Postural Changes during Normal Pregnancy**

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Abstract: This study was conducted to determine the postural changes during normal pregnancy. Forty normal primigravid women at first trimester of pregnancy (12 weeks' gestation) from the Out-Patient Clinic of Obstetric Department at Bab EL-Sheria Hospital, AL-Azhar University shared in this study. Their ages ranged from 20 to 30 years old and body mass index did not exceed 30 kg/m². Thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle were evaluated by the formetric II at 12, 22 and 32 weeks' gestation in Spinal Shape Analysis Laboratory at Faculty of Physical Therapy, Cairo University. The obtained results showed a statistically highly significant increase (P< 0.001) in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle between 12&22, 22&32 and 12&32 weeks' gestation. Accordingly, it could be concluded that there is a statistically highly significant increase in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle during normal pregnancy.

[Amal M. Yousef, Hala M. Hanfy, Fayiz F. Elshamy, Mohammed A. Awad and Ibrahim M. Kandil. Postural Changes during Normal Pregnancy. Journal of American Science 2011; 7(6):1013-1018]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Pregnancy, Posture, Formetric II, Thoracic kyphosis, Lumbar lordosis, Pelvic inclination

[Full Text](#)

158 **Predictors of Fertility among Egyptian Females at Reproductive Age at El-Manial Maternity Hospital**

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Abstract: Background: The most common and well documented risk factors which can contribute to female infertility include over weight or underweight; hormonal imbalances; fibroid; reduced oocyte quality; chromosomal abnormalities; sexually transmitted diseases; age older than 27; history of pelvic inflammatory diseases; smoking and alcohol intake; and immune system disorders. **Aim** of this study was to explore the predictors that might affect Egyptian female fertility. **Subject & Methods. Design:** A Descriptive design was adopted in this study to explore the predictors that might affect Egyptian female fertility. **Sample,** a total of 300 married infertile women was recruited from the outpatient gynecological clinic at El Manial Maternity Hospital, Cairo University, Egypt according to the certain criteria. **Tools** utilized for Data collection were collected by using an interviewing questionnaire schedule. **Results of the present study** revealed that age of the woman (P=0.008); age at marriage (P=0.007); BMI (P=0.010); eat snacks (P=0.043); fatty saturated diet (P=0.029); polycystic ovary (P=0.040); cervicitis (P=0.012); utilized contraceptives methods (P<0.001); frequency of sexual intercourse/week (P=0.028) were a predictors that might affect the female fertility. **The study concluded that,** the women with the following profile: older age at marriage, overweight and obese, depending on fatty saturated diet, eat snacks, had history of polycystic ovarian syndromes, had cervicitis, used contraceptive methods, might be at risk for the occurrence of infertility. **Recommendation,** based on the findings of the present research the following recommendation is suggested: Raise women's awareness regarding to adopting healthy life style as follow dietary program and practice exercising.

Key words: Predictors - Fertility –Reproductive Age

[Full Text](#)

159 **Extra Signal Fluorescence in Situ Hybridization for Detection of Typical and Atypical BCR/ABL Gene Rearrangements in Egyptian Chronic Myeloid Leukemia Patients**

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Abstract: Background: For many years, conventional karyotyping has been used as the golden diagnostic tool for t(9; 22) (BCR/ABL) in chronic myeloid leukemia (CML). Recently, there have been an emerging generation of complex translocations and submicroscopic deletions involving BCR & ABL genes in addition to the classic t(9;22), which have a prognostic impact on the course of the disease, and require sensitive and specific molecular techniques for their detection. Objective: The present study aimed to explore the utility of extra signal fluorescence in situ hybridization (ES-FISH) compared to double fusion FISH(DF-FISH) and conventional karyotyping (CK); for detecting the incidence of typical and atypical patterns of *BCR/ABL* gene rearrangements and clarify their prognostic significance in CML. Subject and Methods: A series of 64 consecutive *BCR/ABL*⁺ Egyptian CML patients (42 chronic phase, 9 accelerated phase, 13 blastic crisis), were investigated for typical and atypical BCR/ABL rearrangements using extra signal and double fusion FISH probes. Results: ES-FISH and DF-FISH showed higher sensitivity for detection of Philadelphia chromosome (Ph) as a sole anomaly when compared to karyotyping in all phases of CML. ES-FISH was the most sensitive method for detection of ABL deletion (14.2% in chronic phase, 33.3% in accelerated phase, 30.8% in blastic crisis) when compared to DF-FISH and karyotyping. Interestingly, ES-FISH, was the only method capable for detection of minor BCR/ABL rearrangement in 1 patient in blastic crisis phase. On the other hand, DF-FISH showed superiority for detection of BCR deletion. Both DF-FISH and karyotyping were capable of detection of trisomy 9 and variant translocation, while ES-FISH yielded confusing atypical signals regarding them. There was a moderate agreement between D-FISH & ES-FISH (P<0.01), a strong agreement between D-FISH and CK, while no agreement was found between the results of ES-FISH and CK and (P>0.05). In conclusion, karyotyping is mandatory to be applied at diagnosis of CML. ES-FISH is the method of choice for detection of ABL deletions, despite it cannot detect neither BCR deletions nor variant translocations. Karyotyping coupled with ES-FISH are adequate for the diagnosis and therapeutic monitoring of CML with the classical t(9;22) and for cases with ABL deletion.

[Hoda M. El Gendi, Soha E. Arab Abd El wahab, Dina A. Fouad, Hanaa R. Mohamed Deena M. Habashy, Nahed A. Al Refaey, Mona R. Al Kafoury, Ghada M. El Gohary and Mahmoud T. Mohammad. Extra Signal Fluorescence in Situ Hybridization for Detection of Typical and Atypical BCR/ABL Gene Rearrangements in Egyptian Chronic Myeloid Leukemia Patients. Journal of American Science 2011; 7(6):1030-1038]. (ISSN: 1545-1003). <http://www.americanscience.org>

Keywords: Chronic myeloid leukemia, ES-FISH, D-FISH, BCR/ABL gene.

[Full Text](#)

160 **Rural women and micro-credit programs**

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Abstract: Rural women are among those major groups at society who previously were considered less by planners, due to specific reasons in the past. And this problem is more observable at developing countries. While, by looking at women's history of economic and social life, we can find that this great group, continuously have played basic role in forming economic condition of country. This great group consistent with men have had active role at areas of social-economic activities and always have had major part on economic production of society. Nowadays, supporting family supervisor women is adopted by universal society, as politic, economic a social concern and nearly all countries applied related approaches, and however these efforts have resulted in failure, in so many cases . By accessing to wide range of financial tools, families according to their priorities, invest on cases such as costs of education, healthcare, healthy and good nutrition or housing. Applicants for Microfinance resources mostly involved family supervisor women, pensioners, homeless people, frugal workers, small farmers and micro entrepreneurs.

Journal of American Science 2011; 7(6):1039-1043]. (ISSN: 1545-1003). <http://www.americanscience.org>

Keywords: Micro-credit, rural women

[Full Text](#)

161 **Function of micro-credit in increasing rural women's participation**

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Abstract: Being high and low of each one is depended on various conditions and terms so it is varied from one society to another society. In Iranian rural societies, cultural and social context is such that, consequences of these phenomena maybe being different and sometimes contradictory. However these actions caused that women stand in good economic condition and also gain self reliance and rely themselves with no help from husbands, but dominant cultural space on villages may create some disorders. At most of villages in Iran, patriarchal with all features dominate and women's financial self reliance may not being pleasant for some human and rural groups. When women gain financial independence in villages, impacts and social and cultural consequences would emerge.

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Keywords: micro-credit, participation, rural women

[Full Text](#)

162 **Workplace Violence - A Survey of Diagnostic Radiographers in Ismailia Governorate Hospitals, Egypt**

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Abstract: Violence in hospitals is becoming more frequent and more aggressive worldwide. Radiographers, as members of the frontline hospital personnel are at increased risk of workplace violence. So, this study aimed to determine the magnitude and the nature of workplace violence towards radiographers in hospitals, to identify its risk factors, and to study its impact on victims. All diagnostic radiographers in Ismailia Governorate Hospitals (n=123), except those who were on extended leaves or who had less than one year clinical experience (n=22), were invited to complete a standardized questionnaire designed specifically to study workplace violence in the health sector. Out of 101 radiographers, 94 agreed to participate in this study (response rate = 93.1%). The majority of the participants (79.8%) had experienced workplace violence of any kind. Verbal abuse was the most common type. Patients' relatives were the main perpetrators. Most of violent incidents were not reported. Easy public access, crowding and noise, understaffing, and long waiting times, were the potential factors contributing to hospital violence. Many negative consequences on the victims' psychological status and work performance have been revealed. It could be concluded that workplace violence towards radiographers is a significant problem in hospitals. So, effective preventive strategies for hospital violence should be implemented.

[Reem A Abbas and Selim F Selim. Workplace Violence - A Survey of Diagnostic Radiographers in Ismailia Governorate Hospitals, Egypt. Journal of American Science 2011;7(6):1049-1058]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Workplace violence; diagnostic radiographers; health sector.

[Full Text](#)

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Smoking Behavior, Knowledge and attitudes among Medical Workers in the National Cancer Institute, Cairo University

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Abstract: Objective: To assess smoking behavior of medical workers in the National Cancer Institute (NCI), their knowledge and attitude towards smoking. Material and Methods: This is a cross-sectional survey with anonymous self-administered questionnaires for physicians and nurses. It included three sections; 1) demographic data, 2) questions about knowledge of smoking hazards, religious and lawful aspects and 3) questions regarding smoking status and attitude towards quitting and prohibiting smoking in work and public places. Results: Participants were 246; 185 responded (75.2%). Smokers constituted 25.4% of the sample. Responding current smokers were 37. The majority of smokers reported previous trials to quit, mainly due to health concern (73.3%). All workers know that smoking is harmful to health, the majority were positive about the hazard of passive smoking as well. Ever-smokers showed a negative attitude towards total prevention of smoking at workplace; however, current smokers react positively to smoking restriction in work and public places, about 2/3 stop immediately when confronted by a stop smoking sign. Twenty-seven workers (73%) reported less smoking in response to restriction. A large percent (73%) smoke in presence of nonsmokers, however nearly 92% respond to a colleague's demand to stop smoking. It is concluded that smoking remains a common habit among medical works in the NCI in spite of having a good knowledge about its hazards and direct contact with smoking victims. We should search for the suitable approach for this category of smokers to motivate them to quit other than talking about health hazards. [Manar M. Moneer, Nargis A. Labib and Maissa K. Noaman. **Smoking behavior, knowledge and attitudes among medical workers in the national cancer institute, cairo university**. Journal of American Science, 2011;7(6):1059-1064]. (ISSN:1545-0740).

<http://www.americanscience.org>

Keywords: Smoking, Knowledge, attitude, medical workers.

[Full Text](#)

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HYDROCORTISONE IMPACT ON THE STRUCTURAL AND ULTRASTRUCTURAL CHARACTERISTICS OF MAMMALIAN ADRENAL CORTEX

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Abstract: Hydrocortisone is a synthetic glucocorticoid utilized in the medical fields for the treatment Of Different Types Of Diseases In A Very Wide Scale. The Present Study Aimed To Investigate The Histological and ultrastructural alterations induced by administration of hydrocortisone on the testis of albino rat. Twenty adult male rats weighing 150-200g. were divided into two even groups; group I injected *i.m.* with 30mg/100g b.wt. of hydrocortisone sodium succinate dissolved in 0.6 ml of bacteriostatic water at 9am in a daily manner for 15 days. Whereas, group II were injected with 0.6ml of bacteriostatic water in the same manner. *Histologically*, adrenal cortex of treated rats displayed shrinkage in the thickness of its cortical zones, a mass of cortical cells projected out of its thickened capsule, beside zona glomerulosa, fasciculata and reticularis cells are compressed and lost their normal organization. Vacuolation and fibrotic areas are seen in the cytoplasm. The nuclei of some of these cells showing signs of pyknosis, karyorrhexis and karyolysis. *Ultrastructurally*, cortical cells are disarranged, compressed and possessed deformed mitochondria with abnormal type of cristae (i.e. lamelliform), lysosomes, in addition to numerous lipid droplets, collagen fibers and fingerprint-like configuration. Their nuclei showed clear signs of pyknosis, and engulfing blood cells were observed in blood sinusoids of the three zones. In conclusion, it seems that the destructive impacts of hydrocortisone sodium succinate on the adrenocortical cells reflected on their functions leading to much deficiency in their performance. So, it should be taken in consideration and great concern that such drug must be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

[Waslat W. Elshennawy and Hanaa R. Aboelwafa. HYDROCORTISONE IMPACT ON THE STRUCTURAL AND ULTRASTRUCTURAL CHARACTERISTICS OF MAMMALIAN ADRENAL CORTEX. Journal of American Science 2011; 7(6):1065-1076]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: adrenal cortex, glucocorticoids, histology, hydrocortisone, rat, ultrastructure.

[Full Text](#)

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STRUCTURAL AND ULTRASTRUCTURAL ALTERATIONS IN MAMMALIAN ADRENAL CORTEX UNDER INFLUENCE OF STEROIDOGENESIS INHIBITOR DRUG

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Abstract: The risk of adverse human health effects due to endocrine-disrupting chemicals is of growing concern. In recent years, ketoconazole, an imidazole derivative has been developed and currently used in the medical fields as an anti-fungal and steroidogenesis inhibitor drug. The present study aimed to investigate the influence of ketoconazole in the structural and ultrastructural characteristics of albino rat adrenal cortex. Twenty adult male rats weighing 150-200 g. were divided into two even groups; group I were *i.p.* injected

with 10mg/100g.b.wt. of ketoconazole dissolved in 1ml physiological saline solution in a daily manner at 9am for 15 days. Whereas, group II were injected with 1ml saline solution in the same manner. *Histologically*, adrenal cortex of treated rat displayed hypertrophy. Glomerulosa, fasciculata and reticularis cells were loaded with lipid droplets of variable sizes, occupying almost the cytoplasm thus displacing the nuclei eccentrically, which showed signs of pyknosis, karyorrhexis and karyolysis. *Ultrastructurally*, the three cortical zones displayed the presence of hypertrophied mitochondria filled with tightly packed tubular cristae, whereas the others having cavitation results in a complete loss of cristae, and mitochondria are identified by the remainder cristae adjacent to the inner boundaries of the limiting membrane, in addition to extensive accumulation of variable sized lipid droplets and nuclei showing pyknosis and karyolysis. In conclusion, it is noticed that the destructive impacts of ketoconazole on the adrenocortical cells reflected on their functions leading to much deficiency in their performance. So, it should be taken in consideration and great concern that this drug must be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

[Waslat W. Elshennawy and Hanaa R. Aboelwafa. **STRUCTURAL AND ULTRASTRUCTURAL ALTERATIONS IN MAMMALIAN ADRENAL CORTEX UNDER INFLUENCE OF STEROIDOGENESIS INHIBITOR DRUG.** Journal of American Science 2011; 7(6):1077-1086]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: adrenal cortex, histology, imidazole, ketoconazole, rat, steroidogenesis, ultrastructure.

[Full Text](#)

166 **Cytopathic effect of coccoid forms of *Helicobacter pylori* in Albino rats and Swiss mice**

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ABSTRACT: The effect of coccoid forms of a vaculating cytotoxin A positive *Helicobacter pylori* strain on *Mus musculus* (Swiss mice) and *Rattus norvegicus* (Albino rats) was studied. Two groups of Swiss mice and Albino rats were used. The first group of mice and rats was orally inoculated with coccoid forms of *Helicobacter pylori*, whereas, the second group of mice and rats were untreated and used as a control. The animals that had been orally inoculated with a total count of 7.0×10^5 bacterial cell / ml died after 5-7 days of inoculation (mice), whereas, rats died after 7-9 days. Symptoms of mouth ulcers, darkening of the ventral part and peripheries and loss of weight were apparent, in addition to slow movement and general weakness compared to the control group. Histological examination of the stomach of the inoculated animals showed marked degeneration of the epithelial lining membrane and dark dense bodies - most probably - coccoid forms inside gastric glands. In addition dilated blood vessel, degenerated, vacuolated fused cells with coccoid forms and intravascular haemolysis were observed. These findings may indicate the toxicity of coccoid forms of *Helicobacter pylori* and hence their possible pathogenic role in humans.

[Rajaa M. Milyani. **Cytopathic effect of coccoid forms of *Helicobacter pylori* in Albino rats and Swiss mice.** Journal of American Science 2011; 7(6):1087-1092]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: *Helicobacter pylori*, Albino rats, Swiss mice, coccoid forms, toxicity, cytopathic effect.

[Full Text](#)

167 **Protective effect of ginger (*Zingiber officinale*) against metalaxyl induced hepatotoxicity in albino mice**

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Abstract: The present work studied the effect of metalaxyl, an acylalanine fungicide, on the liver of albino mice and the possible role played by the aqueous extract of Ginger (*Zingiber officinale*) in attenuating the hepatotoxicity of metalaxyl. Metalaxyl treatment induced many histological changes in the liver including congestion of blood vessels, cytoplasmic vacuolization of the hepatocytes, necrosis and fatty degeneration. Metalaxyl caused marked elevation in serum ALT and AST. It also caused an increase in malondialdehyde and depletion of the activity of the antioxidant enzymes, catalase and superoxide dismutase in the liver. Treating animals with metalaxyl and ginger extract led to an improvement in both the histological and biochemical alterations induced by metalaxyl. Moreover, ginger reduced the level of malondialdehyde and increased the activity of antioxidant enzymes, SOD and CAT. These results indicated that ginger has protective effect against liver damage induced by metalaxyl and this may be attributed to its antioxidant and free radicals scavenging properties.

[Hawazen A. Lamfon. **Protective effect of ginger (*Zingiber officinale*) against metalaxyl induced hepatotoxicity in albino mice.** Journal of American Science, 2011;7(6):1093-1100]. (ISSN:1545-0740). <http://www.americanscience.org>

Keywords: Protective effect; ginger (*Zingiber officinale*); metalaxyl; hepatotoxicity; albino mice

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168 **Low Intensity Laser Versus Synthetic Bone Graft To Increase Bone Density After Enucleation Of Large Cystic Lesions Of Jaws**

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Abstract: Materials and Methods: This study included 27 patients of both sex (17 males & 10 females) aged 20 - 48 years. They were divided into 3 groups, each group contained 9 Patients. All patients in all groups were selected to have large cystic cavities in their dental arches of different etiological factors, ranged in diameter 1.5 - 3.5 cm, and not approaching any vital structures. They underwent surgical enucleation of these cystic lesions. Patients of group (I) have received bone substitute in form of Aligpore granules that were packed inside the bony cavities of enucleated cysts till complete filling. While Patients in group (II) have not received any grafting materials after cysts enucleation, but low intensity diode laser was applied to all of them in six sessions for each patient. Patients in group (III) ,control group, have not received any grafting materials after cysts enucleation. Radiographic evaluation of all patients was performed using digital radiography system (Digora). Radiographs were taken preoperatively and at intervals of 1 day, 6 weeks, 3 months and 6 months post surgically. The mean bone density at the same region of opposite side was also measured for comparison. **Results:** It was found that there was a significant higher bone density in Aligpore group than other two groups at 1 day and 6 weeks time intervals, while there was no significant difference between Aligpore and Laser groups at 3 months and 6 months post surgically. But both groups showed significantly higher bone density than control group at these 3 & 6 months time intervals. Furthermore, the bone density was significantly higher in Laser group than control group at 6 weeks time interval. In control group, there was no significant difference in bone density between all time intervals. In group I & II, there were significant increase in bone density in all time intervals compared with preoperative density, but, there were no significant difference in bone density between different time intervals in control group. **Conclusion:** Aligpore (CORALS) can be a dependable bone substitute material for grafting bony defects in both jaws, Low intensity laser has also the ability to significantly increase bone density of empty cavities of jaws after enucleation of large cysts, so, it is preferred than Aligpore specially with

cases having infected lesions .

[Khaled A. Elhayes. **Low Intensity Laser Versus Synthetic Bone Graft To Increase Bone Density After Enucleation Of Large Cystic Lesions Of Jaws**. Journal of American Science 2011; 7(6):1101-1108]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Bone substitute material, Diode laser

[Full Text](#)

169 **Survey of Relationship between the Capital Structure and Stocks Liquidity at the Accepted Companies in Tehran Stock Exchange Organization**

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Abstract: Taking a look at the asymmetry of the current data at the market, the present research tries to attain some conclusions regarding the stock share holders and investors' responses towards the financial leverage and issuing of audited financial reports within seven transactional days before event (issuing financial reports) Compared to seven transactional days after event. With the application of the nonparametric tests in two cross sectional and pooled method amongst the companies which are member of Tehran Stock Exchange organization from 13 industries, the reactions toward the prices was measured by making use of four liquidity Proxies within the period of 2002-2007. The results showed a weak relation between the leverage and the liquidity ranking, and other variables including the proportional spread of stock price, Stock Price Depth and number of stocks circulation times(Turnover Rate of Stock), did not demonstrate a significant relation. The results show that the capital structure is a related and dependent factor (even if the weak one) for decisions made by the investors and the shareholders. In fact, they consider the risk of cash flows resulted from debts in their decision-making process parameters. [Ali Ahmadzadeh and Ameneh Malekinejad. Survey of Relationship between the Capital Structure and Stocks Liquidity at the Accepted Companies in Tehran Stock Exchange Organization. Journal of American Science 2011;7(6):1109-1118]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Spread of stock price, Stock Price Depth, Turnover Rate of Stock, Liquidity ranking and Asymmetric information

[Full Text](#)

170 **Intervening Variables of Human Errors in Iranian Public Hospitals**

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Abstract: Patient safety and the prevention of medical errors have become the focus of most healthcare providers. This study aimed to determine intervening variables of human errors in Iranian public hospitals. The data were collected via researcher-made questionnaire with the reliability coefficient 0.98. The questionnaire was scored by five point Likert Scale. Rotation method of Varimax with Kaiser Normalization was used via Factor analysis. The results of the study showed factor of healthcare provider explained 7.81 percent of total variance. It had twelve intervening variables affect medical errors in Iranian public hospitals. The most factor loadings (0.718) was related "Inadequate ability of healthcare provider to decision making accurately and timely" and the Least factor loadings (0.53) was related "Inadequate awareness/consciousness of health care providers (consume alcohol, Drowsiness)". The findings of this study revealed the systemic approach must be replaced in hospitals setting to ensure the provision of patient safety and showed the most important causes for the avoidance of the culture of blame.

[Leila Keikavoosi-Arani, Pouran Raeissi, Seyd Jamaledin Tabibi, Amir Ashkan Nasiripour . **Intervening Variables of Human Errors in Iranian Public Hospitals**. Journal of American Science 2011;7(6):1119-1123]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Human Errors, Hospital, Intervening Variables.

[Full Text](#)

171 **Carbon sequestration potential of Eucalyptus and Acacia plantation in central areas of Iran**

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Abstract: Carbon sequestration potential of *Eucalyptus camaldulensis* Dehnh and *Acacia salicina* Lindl planted in 1980 was studied at the age of 30 years in the elevation plain areas of Iran. Two station of this plantation in province were selected the sample plots and the diameter at breast height of all trees was measured. At least, there trees from each diameter class were randomly selected and cut and different parts of the trees including, trunks, branches and leaves were separately weighed. The main roots of one tree from each diameter class were also nine collected and weighed. To estimate the man weight of litter per hectare, 40 sample plots of one square meter were randomly chosen and the amount of litter was determined. The percent of organic carbon in leaves and litter was also calculated in the laboratory. The amount of carbon sequestered in the soil of plantation area was calculated and compared with control. This study showed that the amount of carbon sequestered by *E.camaldulensis* in the productive site and poor site was about 8.2 and 1.73 ton ha⁻¹year⁻¹, respectively. On the other hand, for *Acacia salicina* in the poor site of this figure was 2.1 ton/ha in year. The highest the amount of sequestered carbon in *E.camaldulensis* was in 30 centimeter diameter class. This figure for *Acacia* was in 25 centimeter diameter class. The amount of carbon sequestered in different parts of the tree showed a significant difference at 0.01 also in *E.camaldulensis*, there was a significant difference in the amount of carbon sequestration between the suitable and poor sites. This study showed that there is a great potential of plantations in Fars province and similar areas of the country. This plantation will maintain suitable green areas and belts and produce wood materials for consumption in several ways. Forever planting trees will lead to the reduction of CO₂ in atmosphere which reduces the greenhouse effect, a program which is university promoted and partially sponsored by united nations and some industrialized countries.

[Seyed Armin Hashemi, Department of Forestry, Lahijan Branch, Islamic Azad University, Lahijan, Iran . Journal of American Science 2011;7(6):1124-1128]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Carbon sequestration, plantation, *Eucalyptus camaldulensis* Dehnh, *Acacia salicina* Lindl., Iran

[Full Text](#)

Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections

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Abstract: The present study aimed to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections. Data were collected from cardiothoracic surgery department, intensive care unit, and outpatient clinic at Assiut University Hospital. The study was conducted on 60 adult patients with open heart surgery (30 - study group and 30 - control group) who have been selected randomly. Data were collected through: four tools; (cardiac surgery patient needs assessment sheet, cardiac teaching program based on individualized patient needs assessment, cardiac post operative observation checklist sheet, and cardiac post operative wound site infection evaluation sheet). Results of this study concluded that, more than half of the patients in study group 53.3 % were females, 70 % were married, and 40 % their ages ranged from 18 - 29 years. While the majority of the patients in the control group 63.3 % were male, 46.7 % were married, and 33.3 % from 30 - 39 years. Conclusion; Significant differences for improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. The study recommended that, pamphlets and simple illustration booklet should be available for patients illiterate to with simple explain how to safely live after open heart surgery. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.

[Sahra Z. Azer; Sanaa M. Alaa Eldeen; Mohammed Abd-Elwahb; Amal M. Ahmed. **Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections.** Journal of American Science 2011;7(6):1129-1143]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Educational Program; Heart Surgery; Patient Post Operative Infection

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A comparative study in Money Attitude among University Students: A Gendered View

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Abstract: The paper aims to examine gender differences in money attitude among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences for different dimensions of money attitude, in which males were attached to money as a power/prestige tool while experiencing anxiety and having a retentive attitude toward money. Meanwhile female students were conservatively minded about money, as well as being attached to money for self-gratification purposes.

[Leila Falahati, A Comparative Study in Money Attitude among University Students: A Gendered View. Journal of American Science 2011;7(6):1144-1148]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Money Attitude, Gender, University Students, Financial Behavior,

[Full Text](#)

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Time in Mullah Sadra's and Henri Bergson's thoughts

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Abstract: "Time" is one of the existential aspects of human and, Man always finds himself bounded by the time, as if man is its captive and has no way out of such captivity. Mulla Sadra and Bergson are two philosophers from two different philosophical schools, who have opened new horizons and masterminded new patterns in their interpretation of time. Mulla Sadra and Bergson believed that the reality of time should be interpreted in relation to existence. Mulla Sadra conceives time as a reality which is abstracted from the existence quality of material being; Bergson also conceives time as being synonymous with motion and calls it a duration (duree), which can be comprehended only through consciousness and pure intuition, and forms the foundation of our existence. In this paper, after elucidating time from viewpoints of these two philosophers, we will try to create proximity between these two points of view and open up a window for conjunction and adaptation.

[Goodarz Shateri, Reza Davari Ardakani. **Time in Mullah Sadra's and Henri Bergson's thoughts.** Journal of American Science 2011;7(6):1149-1155]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Bergson; Mulla Sadra; time; duration

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Serum Levels Of Proinflammatory Cytokines (Interleukin 6 & Interleukin 15) And Adiponectin In Hashimoto's Thyroiditis With Different Thyroid Function States

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Abstract: Hashimoto's thyroiditis is a localized autoimmune disease which is characterized by an overactive immune response of the body directed against its own tissues causing prolonged inflammation. Numerous cytokines have been identified at sites of chronic inflammation such as arthritis, thyroiditis and periodontitis as interleukin 6 and interleukin 15.

Adiponectin, adipocyte-derived proteins, have immunoregulatory properties and it controls immune responses and inflammation. This study aimed to determine the levels of adiponectin, interleukin 6 and interleukin 15 in patients sera of Hashimoto's thyroiditis with different thyroid functional states (hypothyroidism, euthyroidism and subclinical hypothyroidism). Subjects and methods: Seventy patients (8 males, 62 females) of newly diagnosed Hashimoto's thyroiditis (HT) in Al-Azhar University Hospitals were selected on the basis of high serum levels of anti-thyroid peroxidase antibody (TPO Ab). The patients were divided according to the thyroid function tests into three groups: Free triiodothyronine (FT3), free tetraiodothyronine (FT4) and thyroid stimulating hormone (TSH). The first group was patients with hypothyroidism (H) (3 males, 25 females with mean age 46.5 ± 6.23) with increased TSH and decreased both FT3 and FT4; the second group was patients with euthyroidism (E) (2 males, 16 females with mean age 48.77 ± 6.56) with normal TSH, FT3 & FT4 and the third group was patients with subclinical hypothyroidism (SH) (3 males, 21 females with mean age 48.95 ± 6.61) with increased TSH and normal both FT3 and FT4. The fourth group is a healthy control group (C) (2 males, 15 females with mean age 49.52 ± 7.55) with matched age, gender and body mass index (BMI) with the patient groups. TPO Ab, FT3, FT4, TSH, adiponectin, IL-6 and IL-15 serum levels were measured in all groups. Obtained results revealed a highly significant increase in the mean serum levels of TPO Ab, IL-6 and IL-15 were detected in each of the three patient groups compared to the control group. A positive correlation between adiponectin and each of BMI and WHR in group II (E) only was detected. Also, a highly positive correlation was found between IL-6 and IL-15 in the patient groups. On conclusion, IL-6 and IL-15 may have a possible role in the pathogenesis of Hashimoto's thyroiditis irrespective to thyroid function states. In contrast, the serum level of adiponectin may have no role in Hashimoto's thyroiditis.

[Soha Z. El-Shenawy, Mahmoud H. Hemida and Hatem Attia. SERUM LEVELS OF PROINFLAMMATORY CYTOKINES (INTERLEUKIN 6 & INTERLEUKIN 15) AND ADIPONECTIN IN HASHIMOTO'S THYROIDITIS WITH DIFFERENT THYROID FUNCTION STATES. Journal of American Science 2011;7(6):1156-1162]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Hashimoto's thyroiditis (HT), interleukin 6 (IL-6), interleukin 15 (IL-15), adiponectin [Full](#)

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176 **Theoretical Study of the Tautomeric Preference and Self Association Processes of 2-Pyrrolidinone**

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Abstract: Relative tautomerization energies, dipole moments for the tautomers of 2-pyrrolidinone was studied by quantum-chemical calculations, using the B3LYP level of calculation with the 6-311G(d,p) basis set in the gas phase with full geometry optimization. Entropies, enthalpies and Gibbs free energies for the tautomerization process of 2-pyrrolidinone was obtained using the RHF/6-31G(d) level of computation. The calculations showed that, the Keto form is the most stable form in the gas phase. The entropy effect on the Gibbs free energy change of the tautomerization process 2-pyrrolidinone is found to be very small, and has practically no significance for the tautomeric equilibria of the 2-pyrrolidinone. The enthalpic term is dominant in the determination of the equilibrium constant. The ability to form dimer, trimer and tetramer was investigated concerning the energetical changes; dipole moments using the RHF/6-31G(d) level of computation. The thermodynamic parameters at different temperatures were studied using the PM3 semiempirical method. The results showed that, there is a high interconversion process between the cyclic and open dimer. Also, the probability to form higher association forms is presumably rare. At room temperature 2-pyrrolidinone only could exist in a dimer form in equilibrium with the monomer. The results are in good agreement with the available experimental data.

[Ahmed M. El Defrawy, Maii S. Mashaly, Mamdouh S. Soliman. **Theoretical Study of the Tautomeric Preference and Self Association Processes of 2-Pyrrolidinone**. Journal of American Science 2011;7(6):1163-1172]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: 2-pyrrolidinone, tautomerization, self association, thermodynamic Parameters, theoretical.

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Determination of Lead by Square Wave Adsorptive Stripping Voltammetry Using Ammonium Pyrrolidine Dithiocarbamate

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Abstract: In this work optimal working conditions were established for the determination of trace levels of lead on hanging mercury drop electrode with Ammonium pyrrolidine dithiocarbamate (APDC) as a preconcentrating agent in acetate buffer media using square wave anodic stripping voltammetry. The optimized experimental conditions include pH, APDC concentration, accumulation time, accumulation potential, scan rate, pulse amplitude and SW frequency on the voltammetric response were studied. A linear relationship between the peak current and lead concentration was obtained over the range (5-40 ppb) with correlation coefficient of 0.99911. Detection limits of 0.89 ppb was obtained with standard deviation of 0.03706. The interference by metal ions which are of great significance in real matrices have been studied. The formation of complex formed between lead and APDC was investigated using both of SWASV and cyclic voltammetry technique. The method was successfully applied for the determination of lead in tap water samples.

[M. A. Morsi, A. M. A. Hilmy, H. A. Etman, A. M. A. Ouf, and M. G. Elghalban. Determination of Lead by Square Wave Adsorptive Stripping Voltammetry Using Ammonium Pyrrolidine Dithiocarbamate. Journal of American Science 2011;7(6):1173-1179]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key Words: Lead, APDC, Square wave, Cyclic Voltammetry, tap water

[Full Text](#)

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Gender Differences in Financial Literacy among College Students

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Abstract: The paper aims to examine gender differences in financial literacy among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences in different dimensions of financial literacy, in which males were more knowledgeable in financial matters than female students. The results revealed that among the six dimensions of financial literacy, male students have more knowledge concerning credit and risk management, while females are more knowledgeable in respect of general financial literacy. [Leila Falahati, Gender Differences in Financial Literacy among College Students. Journal of American Science 2011; 7(6):1180-1183]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Gender, Financial Literacy, College Students, Financial Education,

[Full Text](#)

179 **Experimental study of the effect of polyethylene fibers with random distribution on the engineering behavior of the mixture of flimsy sand with clay soils**

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Abstract: In this research, the shear resistance parameters of mixture of reinforced sand-kaolinite were determined with random distribution of polyethylene fibers (PEF). All samples were compressed to a certain density and then the direct shear test was done. The dimensions of direct shear set were 10×10×2 cm. Different materials such as sand, Kaolinite and polyethylene were used in the experiments. In these experiments, moisture content, amount of polyethylene (PEF), fiber size and speed of shear stress were variable. Test results show that by increasing fiber ratio the shear resistance parameters of sand-kaolinite mixture increase. Also, in reinforced mixture of sand-kaolinite the shear resistance increases by increasing the speed of shear stress.

[Mahmood Ghazavi, Akbar Pashazadeh, Morteza Chekaniazar. Experimental study of the effect of polyethylene fibers with random distribution on the engineering behavior of the mixture of flimsy sand with clay soils. Journal of American Science 2011;7(6):1184-1188]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Sand-Kaolinite, Reinforced soil, Fibers, Direct shear test, shear stress speed

[Full Text](#)

180 **Ethnic and Gender Differences in Financial Management among College Students**

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Abstract: The paper aims to examine ethnic and gender differences in financial management among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences in financial management, in which female students performed greater financial management than male students. The results revealed significant ethnic differences in financial management, in which Malay students performed greater financial management than Chinese and Indian students. [Leila Falahati, Laily Hj. Paim, Ethnic and Gender Differences in Financial Management among College Students. Journal of American Science 2011;7(6):1189-1192]. (ISSN: 1545-1003).

<http://www.americanscience.org>

Keywords: Ethnic, Gender, Financial Management, College Students, Financial Education,

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181 **Histological And Ultrastructural Changes In Mammalian Testis Under The Effect Of Hydrocortisone**

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Abstract: Hydrocortisone is a synthetic glucocorticoid currently utilized in the medical fields for the treatment of various types of diseases. The present study aimed to investigate the histological and ultrastructural changes induced in mammalian testis under the effect of hydrocortisone. Twenty adult male rats weighing 150-200g were divided into two groups; group I, injected i.m. with hydrocortisone sodium succinate (30mg/100g b.wt.) , daily for 15 days. Whereas, group II were kept as control. (injected with 0.6ml of bacteriostatic water). Histologically, testes of treated rats displayed thickening of tunica albuginea, disruption of spermatogenesis evident, marked reduction in germ cells caused dilatation of intercellular spaces, detachment of Sertoli cells from the irregular basal lamina, in addition to necrotic Leydig cells with infiltration of the interstitial tissues. Ultrastructurally, treated testes showed thickening and irregularity of the surrounding basal lamina, cytoplasmic vacuolation of atrophied Sertoli cells, shrinkage and pyknotic nuclei of spermatogonia and primary spermatocytes, condensed Golgi apparatus and detachment of the acrosomal granule from the anterior hemisphere of the nucleus of rounded spermatids, and disappearance of elongated spermatids and spermatozoa. Also, necrotic Leydig cells were observed in interstitial tissue. In conclusion, hydrocortisone administration into adult male rats exerts a clear effect on testicular structure and ultrastructure, which leads to much deficiency in their performance. So, it should be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

[Anas Ezz, Eman Mohamed Zahran, and Azza Hamdi El-Soussi. Barriers and facilitators to research utilization in critical care settings. Journal of American Science 2011;7(6):1193-1203].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: glucocorticoids, histology, hydrocortisone, rat, testis, ultrastructure

[Full Text](#)

182 **Review of the effectiveness of management systems on empowerment of employees: A case study in an Iranian Power Generation Management Co.**

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Abstract: One of the most important subjects in management research is empowerment of employees. Many researchers have studied empowerment in different organizations, and presented different theories about it. In this paper in order to find relationship between management system and increasing employee's empowerment, one main and three sub-hypotheses have been posed: Main hypotheses: the existence of integrative management systems would effect on increasing the employ's empowerment system ISO14001 and occupational health management system ISO18001. The method of research is experimental and tools to gather the data is questionnaire. The statistical society of this research is the employees of Shazand Power Generation Management Co. the number of sample is that had responded to the questionnaire were 100 employees. After analysis the data by software SPSS the following results had been seen: The existence of management systems with 0.802 coefficient correlation would effectively and strongly impact the employ's empowerment increasing and also the result of this study indicated that the existence of environmental management system with 0.633 coefficient correlation, the existence of quality management system with 0.733 coefficient correlation and the existence of occupational health and Safety management system with 0.833 coefficient correlation have had the most effect on the employees' empowerment. [Mojtaba Rafiey, Hadi Ghaffari, Mahdi Bandarkhany. Review of the effectiveness of management systems on empowerment of employees: A case study in an Iranian Power Generation Management. Journal of American Science 2011;7(6):1204-1210]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Integrative management system, Quality management system ISO9001, Environment management system ISO14001. Empowerment

[Full Text](#)

183 **The Potential Health Hazard of Tartrazine and Levels of Hyperactivity, Anxiety-Like Symptoms, Depression and Anti-social behaviour in Rats**

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Abstract: The current research aimed to determine the influence of different doses of exposure to tartrazine on levels of hyperactivity, anxiety, depression and anti-social behaviours in rats. Forty five weanling male Wistar rats were randomly assigned into 3 groups of 15, divided on 2 replicates and administered our treatment daily in drinking water at different concentrations; 0, 1% and 2.5% for a 16 weeks period. Different animal models of anxiety; open field, elevated plus maze and dark-light transition tests were employed in our study. Tests for depression as well as social interaction were also used. Tartrazine-treated rats showed hyperactivity in open field test presented by increased horizontal locomotion. Anxiogenic effect of tartrazine was evidently observed during open field, elevated plus-maze and dark-light transition tests. Furthermore, tartrazine intake significantly promoted depression as expressed by prolonged immobilization during forced swim test. Impairment in social interaction test was also detected signifying the relevance of administered dose especially on numbers of bouts of social contacts. This study provides sufficient scientific evidence that a causal link truly exists between tartrazine and inflection of hyperactivity, anxiety and depression-like behaviours in rats and points to the hazardous impact of tartrazine on public health.

[Mervat M. Kamel, Heba S. El-Iethy. The Potential Health Hazard of Tartrazine and Levels of Hyperactivity, Anxiety-Like Symptoms, Depression and Anti-social behaviour in Rats. Journal of American Science 2011;7(6):1211-1218].(ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Food azo-colours tartrazine, hyperactivity, anxiety, depression, social interaction, Wistar rats.

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Importance of rural women as effective factor in rural households

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Abstract: Importance of women issue at Iran especially rural area, at one side face with fast population growth and mass of unemployed at process of access to rural growth and development, and at other side with limitation of facilities and productive resources. Rural women at all production level of agriculture products and livestock productions work alongside men and generally, development is multidimensional process and contains different economic, social, cultural and political dimensions. Women's participation at this process is active and affective participation, and main aspect of this participation was its economic dimension for rural women. Rural women have key role as a producer at agriculture activities, rural sources and services at rural area. rural women most efficient women of society and among people who are active at productive occupations, so it is obvious that attention to rural women as a strong arm at rural development can follow positive and undeniable affects, in this purpose.

[Sharareh Khodamoradi and Mohammad Abedi. **Importance of rural women as effective factor in rural households.** Journal of American Science 2011;7(6):1-6]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: rural women, rural households

Introduction:

Among developing countries, millions of women always are in farms and lands, work in engaged industries, keep the cattle, store firewood and water and earn livelihood and participation in economic activities is one of their important characteristics. But Despite their widespread presence in economic activities and benefits associated with it, they always face with discrimination. The discrimination has never tired them, but as a major force in economic activities around the world are discussed.

Therefore, their field of knowledge creation capabilities guide economic and social programs for women and their participation in various activities is essential. Role of women in rural areas higher than men on household economy and are responsible for activities within the home and community prosperity.

Women still further its position in world countries, especially developing countries as active citizens and enjoy the talent in the areas of economic participation - political - social and cultural activities and still have not lost women in economic calculation does not take into consideration And as they learn to be invisible workforce.

Very disappointing estimate the number of active women in rural and low estimation of women's participation in economic activities confirmed the lack of sufficient attention to the affairs of women and their added value.

Means participation of women in all stages of development, evaluate needs, identify problems,

planning, management, implementation and evaluation is. Equity participation in a patriarchal society was not easily achieved, such matter requires the participation of women, especially rural women in projects is the way that they are concerned. Rural population of Iran always different roles in the production and distribution have been responsible. Agricultural sector, supplier of about one third of employment, food needs of more than Chharpnjm country, half of exports, do not need the agricultural products industry and one-fifth of GDP countries.

In all communities, rural women as an important factor in achieving rural development goals were discussed and in fact, half of rural human resources development are needed, however, the rural population of Iran, the ruling class (the owners of capital) and rural people, between urban and rural, between literate and illiterate, between men and women, there is a deep cleft.

Women, especially in villages of fewer possibilities in terms of investment, credit and enjoy the power. Miran role of rural women more than men, influenced by various factors, conditions and economic, social, cultural and ecological is.

Rural women, either directly (production of crops, livestock, handicrafts and rural) or in terms of helping the agricultural sector (as labor) considerable potential in the community are considered. About 5/6 million women in the production Iran's agricultural sector involved. Activities related to planting, and harvesting, processing and preparation of animal feed, preservation and care of livestock and poultry and some related activities including marketing and

sales field role and participation of rural women to sue.

Rural women at development process:

History of development is ample and is contemporary with natural and social changes across world. From natural view, history of development is contemporary with geological changes and from social view, is equal with appearance of early human societies. First, discussion about more development was done by “development “and “progress” term. Development which mainly aimed for rural areas and it is necessary for programmers to consider follow issues (amiri, 2000):

- 1- development should “change” in order to improve conditions for majority of people
- 2- People who benefit from development should be more than loss ones.
- 3- Development should minimally ensure people to supply essential life needs or at least their minimum needs.
- 4- Development should be in harmonious and consistent with their needs.
- 5- Development should encourage self reliance.
- 6- Development should follow longstanding improvement.
- 7- Development shouldn't destruct natural environment.

While assessing historical flow of development , we find that trends to human dimensions after failure to fast industrialization , forced programmers and policy makers to revise their thoughts and consider occupation , population and adequate employing of workforce especially women who form half of population , as major goals of development(Fami, 2001).

Government and national organizations attention to this issue began from mid 1970's. After world conference in Mexico, year 1975 was named as “woman year” and after that year from 1975 until 1985 was named as “women decade”, and their certain needs were considered.

In this regard, vast studies were performed and it became clear that most of development programs including Green Revolution and high yielding varieties, as caused increasing productions, had negative affects on women's occupation and has increased their duties. At 1997, world conference on rural development (WCARRD) was held by participation of 145 representatives from different counties in Roma and identified problems which women faced with. Main goal of this conference was: to support rural women as producers and their certain preferences at access to productive sources especially technologies that be able to decrease extent and

hardship of their duties and lead to increase their efficiency (FAO, 1998).

Growing women's participation at labor market is one of development indexes of each society and represents increase of women's favorites to different aspect of participation at economic-social activities. Women's activities at its different dimensions at developed countries which rapidly changing by modern technology and difference at role and their functions is obvious even among poor countries. Attending to this point that women are at basic center of development, is very important. Because they control most of non-monetary economy by rearing generation, providing workforce and managing and performing family affaires and also subsistence agriculture. While always, women's productive role at agriculture has been introduces as concealed form and rarely manifested economically and socially, and maybe be most intangible participants at economic process (Emadi, 2001).

Although at all societies, rural women were introduces as one important factor for achieve to rural development goals but base on different economic, social and cultural reasons, they were considered less by programmers and practitioners, practically. Women as one intangible factor at agricultural economy, form great share of all human workforce needed for agriculture part, across the world (Ghaffari, 2000).

Rural women are considered either directly by producing livestock and agriculture products and rural industries and either by help to agriculture part as workforce and their share at third world countries is far more than other countries. Usually statistics about women's share at agriculture productions is less than real extent because largely, at these statistics seasonal job, part time job, no wage and housekeeping activities sere not considered. Nevertheless, they are forces for creating revolution and potential resources to progress rural economy and increase growth rate of food production (Nawab Akbar, 1997).

Conclusion and discussion:

According to the most important factor of economic population development and growth rate are human resources of that community and also each community consists of activist men and women that under the social interaction have direct influence on community economic and development therefore strategies are required to developed community base on more and active participation of women that include the half of society instruct in economic, political and social foundation. Women as an effective member of society, can crystalline their lead roles in various responsibilities formations. These

responsibilities include promoting the concept of participation and employment in life and building the suitable areas for freely activity and introduce the right of economic management, ownership and.... This requires that all fees and necessary training for women to be considered. Due to the fact that the concept of women's participation, is not necessarily the female employment, although certainly part of the participation of women will be crystallized in their employment, but in this context, home and family affairs by women and their role in nutrition and child growth and Their education are also many responsibilities that women often are responsible for them. Throughout history we have always been seen that women have always been active but in culture and tradition, this mentality largely exists that if the job exists, it would be for men. Because they are responsible for their families Economic or wherever there is a good opportunity for participation, men have a prior right.

Perhaps the reason that women are less important in the development is this thought and action. Because women are in occurred opportunities in the second stage, or even sometimes do not come into account. Rural women at agriculture activities have key role as producer. Rural women are most efficient among society women and are such individuals that work in productive occupations, thus it is obvious that attention to rural women as powerful force at rural development can have very positive impacts at this regard.

Mohammad Vahid Ghalafi, at one research, as "empowering women at rural development process" has put his main emphasis on agriculture part. so , first he , assessed rural women's status and consequently their share at development process and economy of agriculture , thus he briefly analyzed different and multiple women's role and their impact on agriculture part and related activities and through that he has determined their role at rural development process.

Mr. Aghaee in on research as "rural women's role at economy of agriculture and their success at agriculture development programs " further assessing their status at different countries and also emphasis on their participation at production activity of family , has expressed factors that led to ignorance of their role at economy of agriculture .

Lahsae Zade at research as "assessing Iranian rural women's role at economy arena: first assessed their position at occupation structure then has compared it with rural men's occupation base. He expressed that rural women have equal importance compared to men.

Safiri, in his doctoral dissertation as "assessing quantitative and qualitative women's occupation ant

its relation to economic development" has considered some of their problems of occupation due to obstacles which refers to structure of countries. And some contain social-economic and cultural obstacles.

Changizi Ashtiani in one research as "counting women's share at production of country" addressed that studying historical process of social and economic development of countries represent that at development process , lagged countries are those which proper and favorite balance between men and women's participation wasn't created , and also there isn't any fair and equal opportunities to flourish creativity .

Rasool Purarabi , in his thesis as "assessing women at economic activities in rural area of Ramsar " has shown that more than 96% of rural women , at least had participated at economic activity that was supplement for family income . But they don't participate at basic decision making of family, in spite of their affective role and vast attendance at economy of family, and also they enjoy owning production factors, less.

Development Realization is impossible without women's participation at different social-economic aspect. Therefore, to understand unknown, researchers should strive and take basic step in this regard. Some programs should be provided at national level as long term projects at the field of education and Cultural Revolution in order to create needed knowledge in society and in women to identify their rights, education and extending modern techniques, creating infrastructure facilities and also rural development.

Since, village is suitable place for agriculture and additional related activities, so it can be said that women's role at village and possibility to institutionalize proper infrastructure, we able to have suitable perspective toward development process.

Agriculture part as one of the most important productive parts of country have critical responsibility in preparing needed food security that can help this part to access its major goal according to efficiency of workforce up to proper level . In this regard, women play critical role. Nevertheless, they couldn't represent their abilities at this field, due to various limitations which women face. Among this especial attention to this group of society and preparing them supporting, educational and extensional services for them can help to remove their vast future problems , according to major role of this forgot group at agriculture activities and finally lead to increase and improve their efficiency about agriculture and consequently lead to increase welfare and comfort of rural society .

In order to be able to remove obstacles and problems of women's activity at villages , we should

reinforce stamina if women's work by one exact and codified programming in order to be able to progress at one correct direction.

Villager access to education at different level, possibility to enjoy suitable occupation opportunities and also industrial, technical and healthcare equipment has caused that cities go out from concentration and attraction of inside and outside capitals, and so possibility of fair distribution of resources and facilities between city and village be provided, and government instead of bear heavy cost of urban population, spend these costs for rural development and support rural women whom get more damage while face lack of facility and compared to men enjoy less migration rate and also have to adopt existing conditions and use available facilities. In today world, it is impossible to achieve development goals without applying abilities of half of people of society (i.e. women).

Women at most countries, have low access to economic resources at the field of economic activity. They should reinforce them at this field by supplying economic facilities. Another part that changed women's attendance at economic affairs is agriculture activities. Opportunities which they gain at this part can have important impact on economic function and related social relations

Same discussions were presented about identifying women's role on environment changes (especially in preserving natural sources) that related to women's life and job. Women's access to agriculture credits, because increasing and improving their efficiency at agriculture. Women's membership at cooperatives, also help them to receive facilities in order to supply needed inputs of agriculture, sale productions and make some production with aim of increasing efficiency. Most of researches found that women's education is related to their agriculture efficiency. Indeed, years which women used educational programs, related to their productions meaningfully. So, by identifying their needs, demands and interests and also by determining their issues, resources and preferences, we should prepare proper extensional and educational programs for them.

Also literacy programs and generally their basic education should be considered specifically with aim of better women's enjoyment of extensional and educational programs. And also access opportunities to different resources and needed inputs at agriculture activity should be provide for them. Development programs for rural women mostly have certain importance that should be considered at extension activity. Thus extensional programs should contain emphasis and trends on work with rural

women there are two ways that extensional programs can attract women:

- 1- Extension personnel can create interest in rural women by regular programs.

Women have certain problems and it is impossible to create interest through one program, because adult men of society are base of movement and needs at agriculture societies. At many countries, especial programs are under development for rural women that perform by female extension personnel. At field of issues such as internship in economy of family, especial training for girls to product vegetables and fruits, managing poultry and simple picking techniques and methods of how behave to spouse.

- 2- Extension personnel of agriculture, always should collect comments about important points and gain data from female leaders of society, and collect comments of women's club members and other affective and significant women. Women should have possibility to participate at programs of rural committee or other groups with assistance of performance factors of extension that through those local women's problems or every certain issue which can be helped through extensional services is clear.

Since, village is suitable place for farming and additional activities, so it can be said that women's role at villages, has been toward this point and by developing agriculture part and possibility to institutionalized appropriate infrastructure, we would have suitable attitude toward development process. Agriculture part has critical responsibility, as one of the productive part of country for supplying needed food security, that it can assist this part to access this main goal up to proper level, in accordance with workforce efficiency. To achieve this goal, women play main role, too. In spite of that, they couldn't represent their abilities in this field, because of limitations that they face.

Villager's access to education at different level, and their enjoyment possibility of suitable occupation opportunities and also industrial, technical and healthcare equipment, caused that cities go out from concentration and attraction of inside and outside capitals, and so possibility of fair distribution of resources and facilities between city and village be provided.

Government instead of bear heavy cost of urban population, spend these costs for rural development and support rural women whom get more damage while face lack of facility and compared to men enjoy

less migration rate and also have to adopt existing conditions and use available facilities . In today world, it is impossible to achieve development goals without applying abilities of half of people of society (i.e. women).

Empowering women is one of principal discussions of development process for many countries of today world. existing factors contain women's education , their ownership sample , their occupation opportunities and function of labor market but if we go beyond this rather classic variables , these factors also contain occupational relations nature , how to behave family and generally society with economic women's activity and economic and social conditions which encourage or prevent change at these moods .

Last conclusion is that men and women, play role at agriculture programs and rural development but each has different needs and knowledge base on kind of their activities, since total people activities were done to supply their needs and so governments should consider regional programming in their policy making and programming. This issue dose not achieved unless by identify climate, population, cultural, economic and politic constituents of each region and also kind of relation of these constituents with constituents outside village and region.

These kinds of study and recognition have provided causes of better programming and adopted with needs of region, and prevent loss of investment. If education, health, occupation, cure and ... facilities be provided in village and improving rural life level be considered, so migration would be regulated. At the other hand, protecting agriculture and livestock products and local industry, and attracting well condition markets for it, by governments, can be affective for villager's interest about rural life. Finally, positive attitude of development programmers, would help significantly to improve condition of one benefited rural family, and would act as a factor to diminish gap between urban family and rural family.

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Climate change caused by dust and its effects on the characteristics of Morphophysiology, quantitative and qualitative yield of plants in Khuzestan province

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Abstract: Human in the last 20 years climate change has faced a lot of his works on display touches gradually. Dust (size 4 microns) resulting from natural phenomena in which these changes occur, the mitigation of harmful effects is very difficult and almost "out of control And why is Iran being on the belt of this phenomenon (geographical location and latitude 24 40 °) regions of the country constantly, especially "the South have faced with this phenomenon but in recent years the amount, concentration of suspended solids, number, time stability and the establishment, expansion and influence of this phenomenon has increased. Spread and persistence of dust caused climate change in terms of amount of light received, changes in air temperature and relative humidity changes in the These changes on plant metabolism and affects the .amounts directly and carbon dioxide and oxygen is indirectly Dust particles are .performance characteristics of qualitative and quantitative Morphophysiology and affect the plants no moisture absorption and potential abundance of water that attracts humidity and dry air over the process of Dusts on plant surfaces are green and the moisture levels, reduced .expanding leaf surfaces and limit plant growth On the other hand placing the green plants on the surface, .water pressure are limited turgid growth will intensify disrupting the process of receiving light and can reduce plant photosynthesis and are dark spots on plants and garden With low growth, reduced plant height and dry matter .products to create a market-friendly to reduce the intensity accumulation, especially "in plants such as sorghum and alfalfa hay spatial and reduced product sweep sorghum According to estimates made .south province reduced panicle length, have a severe drop Radashth product phenomenon to about 40 to 50 percent crop damage are: for example, "reduce product pomegranates from 6 tons to two tons and reduce product from 50 to 60 pounds below the five kilogram PJ per tree in 2009 resulting this is a phenomenon. Because of the dust early harvested crops such as pomegranates reduce serious product and its quality Dust phenomena addition to .is low. The amount of the paste processing and production quality is very low reducing the impact of harvesting dates is seriously diminish the quality of this product is too. At present rates of harvest dates in Khorramshahr is faced with a significant decrease. In 2009 only six thousand and 500 tons of palm groves of palm harvest and harvest dates grade level to zero level and harvest dates Palm owners only grade 2 and below have hope. Dust phenomena in addition to increasing sequence s pests, reducing rates of photosynthesis and .quality Field dates will be

[Tayeb Saki Nejad, Climate change caused by dust and its effects on the characteristics of Morphophysiology, quantitative and qualitative yield of plants in Khuzestan province. Journal of American Science 2011;7(6):7-9]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: climate change, dust, crops, Khuzestan (IRAN)

1. Introduction

Source of suspended particles of dust which is known as the Saudi desert, North Africa due to changes in water regime due to dam by Turkey, Syria, Iraq and Iran on the branches of the Tigris and Euphrates is. Also, the water transfer to the center of Iraq's Tigris and seasonal shortages of rainfall and drought some swamp areas and destroy vegetation exacerbate this phenomenon and new sources of dust in the West region of Iraq, Syria, Jordan and northern Saudi Arabia

offers. This should be as dust and pollution resulting from its recent low of 20 percent domestic origin is undesirable due to the use of water resources and drought is in the deserts of Khuzestan. Combination of physical and chemical analysis of dust in the atmosphere and other provinces of Khuzestan shows the dust consists of grains of sand are not merely, but a complex combination of chemical elements are. Elements in the dust composition of sodium, silica, carbon, calcium, potassium and some other elements in

soil organic matter and metals also exist, in July last year in Khuzestan province dust concentrations exceeding 840 micrograms per thousand cubic meters this rate was seven times standard.

Zrasvndy and Mokhtari (2009), referring to the year end from October 86 to 31 cases with mean dust phenomenon lasting 46 hours had occurred in Khuzestan, while the beginning of the year so far seen 22 cases of Khuzestan dust phenomena Mean survival was 60 hours, despite the chemical pollutants, microbial and radioactive, has stressed: Unfortunately our results Reviews on large samples of dust and soils in the city of Ahvaz near the border with Iraq and Iran confirm this. For example, the amount of elements like uranium, thorium, arsenic, lead, zinc, nickel and cobalt samples in little more than normal amounts of it. Samples tested in the third period and the amount of maximum visibility of the direct relationships between particle size and the distance over by them are; apparatus ICP-MS analysis have been given the frequent use of weapons of biological, chemical by Saddam's regime and use America's Depleted Uranium, the existence of pollution on great surprise. Another point to be noted that this type of soil and dust more than two types of clay and silt (quartz) is. Lighter clay and dust from the long distance makes it. Dust in remote areas of Khuzestan, which is seen more of this type. Due to high clay ability to absorb organic and inorganic chemicals, fine texture and the risks much more than this type of soil silt soil (quartz) grains that have large adsorption capability is less. On the other hand there in these studies high levels of bacteria and pollen have also been reported. Although the amount of nuclear, chemical and microbial contamination in dust is low but because the provinces are exposed to this pollution (Khuzestan, Fars, Boushehr and Isfahan, Lorestan) Supplier Home and garden crops also can minimal pollution entering food chain, huge risks for the health of the entire nation to create.

2. Results and discussion

Iran produces many agricultural products, especially garden products with comparative advantages and sometimes absolute, and numerous opportunities this feature has provided. Southern provinces of the country due to special climatic conditions it contains large groves, which caused side industries and become dependent on dates be formed in these provinces and agricultural economy of these areas, particularly city of Khorramshahr, Abadan, Shadegan and times productions palm side is the main

focus. But in recent years and following the climate change in these areas, water resources province and severely damaged the emerging phenomenon of static dust on the line and cause extensive groves of these areas the greatest loss of surface water invade the soil has undergone. Maher news agency reported deaths in the south as "South Palm die standing" writes: Palm southern Khuzestan all Iranian people and lush palm-resistant know, but this year's Palm owners in these areas due to salinity and "Palm" phenomena of drought and dust, with more than 50 percent reduction in the production of Palm and dates have been encountered. More, the report: In eight years war, many of the palm in these areas due to the Collections at the center of war and where military operations sides severely destroyed and damages were in some statistics announced that about 70 percent of Palm in the war and the effects Next caused it disappeared. However, action planning and paying for replacement planting of appropriate incentives to prevent the government from reducing the number did not receive palms. In the interim, Abadan and Khorramshahr cities due to palm abundance, despite the loss of countless trees during the war also produced Bellwether Palm and dates were in the country, but this year's excessive water salinity ""Palm" " about 90 percent water groves of these areas through streams radiating from its supplies, production Palm, and dates in the city of Abadan, Khorramshahr, Arvndknar and Mino Island with the loss of at least 50 percent has encountered.

Falling ratings in 2008, 38 countries in the world palm production advantages were a total of 6 million and 422 thousand tons of dates were produced in the world. Of these countries, five countries index, ranking the production of the palm of your had and thus Egypt produced one million and 130 thousand tons in the first rank, Iran producing one million tons per second, Saudi Arabia produces 970 thousand tons in third countries UAE and Pakistan, respectively, producing 755 thousand tons and 510 tons, ranking fourth and fifth production date stood. But now Iran's second position was unstable and produced a sharp decline in Iran last year or two notable advantage is lost and this concern by saying, "Mousavi Sydmjyd" province chief of Agriculture is obvious: this year Update two phenomena of drought and dust in the province in addition to reduced production of some dates, reducing the quality of this product have also associated. He adds: Last year (2006) over 160 tons of dates were produced in Khuzestan that amount this year reaches 110 thousand tons and 50 tons will be reduced along. In some areas such as staff, and the purchase price Shadegan dates due to poor quality products has decreased. Head of Agricultural Jihad Organization and Kohnuj Jiroft also reduce production 20 percent this year dates have expressed concern:

According to the forecast production rate in the region dates due to complications dates cluster is about 20 percent.

Pour Rokni (2009) Director of Agriculture Khorramshahr groves destroyed the false news knows, but reducing quality and quantity is confirmed dates: This year we produced 30 percent reduction and dust in addition to lower harvest dates, The impact on product quality and production this year has had a degree of dates and harvest will not second-class and mostly lower. He promoted the planting of grapes in Khorramshahr as robust and fruitful tree beside the palm trees and sent says: several thousand cuttings of the variety of grapes known to have distributed among farmers to help farmers, which is less than the damage caused by the loss of production dates to see the damage. Pour Idris (2009) Director of Agriculture also 50 percent reduction in Abadan harvest dates compared to last year's crop does and says: Last year, the Palm Groves of Abadan and Kharg Arvndknar about 60 thousand tons, Rtb and harvest dates, but this year We anticipate that this amounts to 30 thousand tons. His rising water EC (salinity) Bhmshyr island main reason for the drop in quality and quantity of palm knows Abadan and adds: groves of our grade 2 and 3 are

produced in ha about 3 tons and this figure is very low. "Idris pour" insurance plan free two million 700 thousand palm trees and it also says the government in support of Palm owners knows. Sami (2009) confirmed the managers said Agriculture Khorramshahr and Abadan says: Studies indicate that the dust this year and young groves irrigated with fresh water "Palm" planting in two or three years greatly increased the salinity cause of death of young palms has been the addition to seasonal storms and transient in Khuzestan occurs in young palm from being dug and removed it from the production cycle is effective. However, it seems disregarding the effects contaminating water sources and disregard province dust phenomenon in the province now, gradually and shows his palm proud of this territory has humiliated the Islamic homeland.

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**Calculate changes of bean germination process in the presence of various compounds of biological fertilizer
Humic acid mixed with micro and macro elements**

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Abstract: Biological products that are organic fertilizers include different types of microorganisms have the ability to convert the elements of the form unavailable to available form through biological processes have them. Biological fertilizers increased microbial activity of microorganisms and intensify them to make food available in forms which are easily absorbed by the plant are. Huomic acid as an organic acid from humus and other natural resources through the hormonal effects of improved nutrient absorption and increased root and shoot biomass is. Therefore, it seems, especially biological fertilizers Huomic acid increased root biomass, increased solubility of nutrients in the soil and can increase the absorption is increased yield. Germination of seeds is a complex physiological process triggered by imbibitions of water after possible dormancy mechanisms have been released by appropriate triggers. Organic matter due to the beneficial effects on physical properties, chemical and biological soil has an important role in soil fertility, plant nutrition and crop yield have increased. Huomic acid humus material that is part of the property due to the complex hormonal and audience an important influence in increasing crop production and supply is balanced. Effect of micro-fertilizers in the new debate is the speed and germination. Huomic micro elements like iron and acid compounds or elements Clat Huomic complete micro or treatment Huomic Clat, complete micro and macro elements on the speed of germination and affect. These substances cause a change in speed and percentage germination for causing water absorption and osmotic regulation are. The purpose of this experiment was how to effect of micro fertilizers on germination. After three days of testing, counting and investigation was initiated seeds results indicate that the five treatments applied after the third day: 10 numbers in the control of the number 5 seed was germinated but in treatment Huomic Clat magnesium and calcium from number 10 seed did not do any germination.

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Keywords: Huomic Acid, micro & macro elements, Seed

1. INTRODUCTION

Biological products that are organic fertilizers include different types of living cells and microorganisms capable of converting nutrients inaccessible form accessible form through biological processes have the (32). This material increases the number Microorganisms and microbial activities increased to make food available in the form which are easily absorbed by plants are (27).

Huomic acid as an organic acid from humus and other natural resources through the hormonal effects of improved nutrient absorption and increased biomass and root shoots are (5). Is investigated in many Huomic acid reduces the need for fertilizers and improved ability to use them has been. In many cases, if the soil organic matter is enough to require chemical fertilizers can be eliminated completely, because the soil through microbiological processes

and plant nutrient producing humus need to be resolved (25).

Huomic acid on growth and root shoots of wheat cultivars were investigated. The results showed that the ratio of root to leaf area affected was significantly increased (5). In similar study (11) Huomic acid increases in root growth was lettuce .

Research (13) Four Huomic acid levels (0, 10, 20 and 30 g m) and four levels of sulfur (0, 125, 250 and 375 g m) on yield components and macro nutrients absorbed by plant spinach were studied. Huomic acid intake to yield 29% over the control (1810 g m) increased. Huomic acid intake increased dose, a significant increase in plant nitrogen was obtained. Huomic acid and sulfur significant effect on emergence rate and number of leaves did not. Increased acid consumption Huomic absorptions increased macro elements so that for phosphorus,

potassium, calcium and magnesium were 0.56, 6.30, 1.33 and 0.55kg in wet weight was spinach .

However, there are many studies that the ability of humus material in growth of aerial parts of different species in different growing conditions has been reported (19, 24 and 25). However, the mechanism of reaction to these substances is less known. Likely that the effects of acid Huomic through its early roots and activities - and nitrate divided between plant root and shoot growth may alter the starting Saytvknyn specified in division, and ABA poly amine root and shoot of is the effect on shoot growth (24). It seems that Huomic acid intake increased the enzyme activity was increased nitrate accumulation in the shoot and the root is reduced. The simultaneous significant increase in concentration and poly amine cytokine in shoot is observed (19 and 24) .

It seems that taking acid soil application and foliar application Huomic different results regarding the absorption of minerals from the soil to be (19 and 24). A Present (17) Huomic acid on plant growth and nutrient uptake by wheat at different concentrations of salt were studied. Huomic solid acid (0, 1 and 2 kg) one month before planting the soil was added and the acid liquid Huomic (0, 1 / 0 2 / 0 percent) in two stages 20 and 35 days after emergence of solutions were sprayed. Salinity reduces crop growth and dry weight loss and absorption of nutrients such as nitrogen and magnesium Krdd. Soil application of solid acid intake increased Huomic nitrogen and liquid intake that increases the absorption of phosphorus, potash, sodium manganese, zinc and cobalt were. However Huomic acid intake by increasing root growth was increased nutrient absorption (25, 27).

a. GERMINATION OF SEEDS

The seed of a higher plant is a small package produced in a flowering plant or gymnosperm containing an embryo and stored food reserves. Under favorable conditions rapid expansion growth of the embryo culminates in rupture of the covering layers and emergence of the radicle. Radicle emergence is considered as the completion of germination. The definition that a visible protrusion of radicle tip is the completion of germination is not only a definition issue of seed physiologists. This transition point is also characterized by the loss of desiccation tolerance and this is a molecular checkpoint, a developmental molecular switch from the germination program to the seedling program. The seed looks apparently dead. In fact, even with

biochemical tests for the metabolic processes we associate with life (respiration, etc.) the rate of these processes is so slow that it would be difficult to determine whether there really was anything alive in a seed. Germination is the resumption of growth of the dormant embryonic plant inside the seed; it implies complex physical and chemical changes that occur as the embryo begins to develop into a young shoot and root (seedling). The germinating seed sends its first root (radicle) into the soil and the first stem with the first leaves (cotyledon) toward the sunlight(1, 5,6).

b. GERMINATION IN DICOTYLEDONS

1. The primary root emerges through the seed coats while the seed is still buried in the soil.
2. The hypocotyls emerges from the seed coats and push its way up through the soil. The two cotyledons protect the epicotyls structures — the plumule — from mechanical damage.
3. Once the hypocotyl emerges from the soil, it straightens out.
4. The cotyledons spread apart exposing the epicotyls, consisting of the primary leaf (or leaves) and the apical meristem. In many dicots, the cotyledons not only supply their food reserve to the developing plant but also turn green and make more food by photosynthesis until they drop off (1).

c. Organic matter

Organic matters due to the beneficial effects on physical properties, chemical and biological soil have an important role in soil fertility, plant nutrition and crop yield have increased. Huomic acid humus material that is part of the property due to the complex hormonal and audience an important influence in increasing crop production and supply is balanced. Huomic products with micro and macro elements of plant needs in addition to quantitative and qualitative improvement in products of plant resistance against pests and diseases also increases

d. Huomic acid

Humus of different compounds, including acid Huomic Folic acid respectively to complex nutrients, their ability for plant uptake increases continuously as a result of plant nutrients during the growing season will reach. Huomic acid intake according to the plant increased quantitative and qualitative performance of the product is remarkable. The earth used as fertilizer, sprayed on plants and seeds and use in irrigation systems is usability (9).

e. Application advantages:

- 1 - Increased nutrient absorption.
- 2 - Increase beneficial soil microbial populations.
- 3 - Hormonal modification of soil physical properties.
- 4 - Hormonal and enzymatic effects on plant growth.
- 5 - Pests and diseases and reduce pesticide use.
- 6 - Plant resistance to drought and salinity stress.
- 7 - Increasing product quality.
- 8 - Increasing the percentage of seed germination.
- 9 - Balanced PH soil.

2. MATERIAL AND METHOD

Humic acid extracted in the application of plants in crop water uptake, germination rate and breathing increase. Similar results were obtained in soybeans. Speed of germination in barley, maize and wheat in the presence of acid was substantially increased Humic. Speed and germination of seeds treated lettuce and tomatoes in containers Humic acid extracted from oxidized Lignite increased. However Humic material evidence to show that seeds of life increases is still not observed. Beans treated with acid Humic as seed germination rate significantly increases.

Different amounts of acid in Humic obtained from urban wastes Humic acid derived from organic sources on tobacco seed germination of barley and found that Humic acid derived from urban waste regulators greater role in the germination rate and germination time was reduced . Humic in experimental acid and calcium on the germination of tomato seeds was examined and results showed that growth and Humic acid and calcium content of nitrogen applied and what amount of nitrogen and potassium increased the root.

.Humic micro elements like iron and acid compounds or elements Clat Huomic complete micro or treatment Huomic Clat, complete micro and macro elements on the speed of germination and affect. These substances cause a change in speed and percentage germination for causing water absorption and osmotic regulation are. The purpose of this experiment, how to effect of micro fertilizers on germination. Horse bean seeds were used in this experiment. 10 seeds were placed in each container separately. The treatments are:

- 1 – control
- 2 - Iron treatment Huomic Clat
- 3 - Clat Huomic zinc
- 4 - Clat Huomic zinc and iron treatment
- 5 - Magnesium and calcium treatment Huomic Clat

This way the seeds first immersed into distilled water for 2 hours and then represented to within experimental treatments containing seeds are added at room temperature 25 degrees Celsius and the daily number of stored seeds germinated notes are all treatments and ultimately get results And brought in the formula are presented. The average time needed for germination (MTG): The average times needed for the germination index of germination velocity and acceleration are considered below were calculated from the relationship (Ellis and Robert., 1981):

$$MTG = \frac{\sum(nd)}{\sum n}$$

- n = number of seeds germinated during the day d
- d = number of days from beginning of germination
- n = is the total number of germinated seeds.

3. RESULT

After three days of testing, counting and investigation was initiated seeds results indicate that the five treatments applied after the third day:

- 1 - 10 numbers in the control of the number five seed was germinated.
- 2 - The number 10 seed in the treatment of iron Huomic Clat was germinated 5 numbers.
- 3 - Number 10 seed treatments Huomic Clat were germinated on 4 numbers.
- 4 - Number 10 seed treatments Huomic Clat and iron on number 6 was germinated.
- 5 - Number 10 seed treatment Huomic Clat magnesium and calcium did not do any germination.

Table1: MTG Result

Treatments	MTG
control	5.5
Huomic Clat Iron	5.1
Clat Huomic zinc	6.2
Clat Huomic zinc and iron	4.9
Magnesium and calcium Huomic Clat	n.s

Therefore, the effect of fertilizer containing macro and micro elements on germination is determined according to results of experiments on biological fertilizers bean seed was determined that probably the effect of fertilizers used in nutrient absorption, growth hormone stimulation increases the germination of seeds But actions are different

combinations of calcium and magnesium fertilizers prevent seed germination is.

4. DISCUSSION

Calat Humic acid produced by the different nutrient elements such as sodium, potassium, magnesium, zinc, calcium, iron, copper, and... In order to overcome the shortage of nutrient elements, plant growth will increase due to the effects of hormonal compounds useful in increasing production and improving the quality of agricultural products are. Humic acid solution used in the diet increased the growth of branches, roots and nitrogen content in the aerial and the disappearance of chlorosis in corn leaves was Lupin. It also causes acid Humic high chlorophyll concentration, more lateral roots grow, improve nutrient uptake and high consumption and low consumption of other biological effects are large. In a three-year study of 3 with phosphorus acid Humic without it looked on the growth of potatoes. The results showed that phosphorus content of leaflets on treatments with acid levels Humic 0.03% increase. Humic gland treated with acid to more than 10 times in two to three years of study increase. The results showed that treatment with acid Humic lumps on density had no significant effect. Due to environmental considerations, most recently using a variety of organic acids to improve the quality and quantity, and garden crops has increased. Very small quantities of organic acids significantly effects on improving physical and chemical and biological properties of soil due to have beneficial effects on hormonal compounds to increase production and improve the quality of agricultural products have. Humus organic matter can be established to define which parts Humic acid, acid and humic & folic is composed. The most part the composition of soil humus acid and acid Humic folic form a variety of sources (terrestrial plants and vegetative resources) are obtained with regard to its source in molecular size and chemical structure together are different. Humic acid compounds naturally in soil, peat, coal, and ... There. Tests showed that adding humus to the soil in the planting material of barley and sugar beet, potatoes, watermelon, tomato, a significant performance increase was caused by Calat elements enhance absorption by the plant material and humus are caused storage long-term soil carbon, root and stem growth in plants, nitrogen uptake and storage, increased photosynthesis, increased resistance to disease and Be(10, 13).

Seeds from Ages and ages ago, since mankind have been considered. Due to the size at first was a practical aspect, because many seeds of a major

source of food in most parts of the world. Thus, information about their seeds nutritional value, chemical composition, changes in the composition of storing their acorns additionally, the ability to warehouse and stored seeds, viability, etc. holding power is concerned. Farmers and gardeners to factors that are related to the growing seeds are interested in large part because of the common agricultural contracts and associated with growth and plant breeding in order to obtain their seeds (2, 5).

Physiologists in order to study the effect of the seed temperature, moisture, oxygen, light and other factors affecting their growth and the emergence of transplant have been used. Most successful modern agriculture in the United States and Western Europe depend on the genetic quality of having good quality seeds and the ability to prove they tried growing emergence seedling transplant and strong growth, parallel to create pressure to increase food production around the world, using modified and quality has been emphasized, similarly, need to plant other products such as vegetable oils, textiles and industrial chemicals, excess demand for greater access to seed varieties and new varieties are created. Although the importance of quality seed is fully known and documented, but still clean and recognition of quality seeds for a scientific basis not sustain. Objective The present experiment discusses some recent research in the field of seed physiology and the impact on the metabolism of micro-fertilizers is germination. That is not working on it (6).

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Calculate dynamic changes in bean yield in different plant densities

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Abstract :General purpose of testing conditions to get the best crop production figures for comments in order to get maximum yield is. Appropriate distribution of plants per unit area in one of the most consistent factor is to increase yield. In order to study the effect of different densities on bean cultivars, experimental farm in 2008 Farm Research, Islamic Azad University of Ahvaz was executed. Factorial experiment in randomized complete block design with three replications was formed. The first factor consists of three densities (45, 55, 65) plants m and the second factor consists of three digits (ZOHREH, SHAME and JAZAYERI) were. The results showed that between different varieties of grain yield and all yield components (seed number per pod and NO. pod) statistically significant difference in the level of 5 percent there. ZOHREH figure was superior to other cultivars and varieties having SHAME with little JAZAYERI showed no statistical difference. Grain yield in different cultivars ZOHREH, SHAME and JAZAYERI, respectively 1523.33, 1372.67, 1352 kg ha was. . Most biological functions in the plant density of 55 3042.89 kg/ha obtained the density of levels with other significant difference at 5 percent showed. Highest harvest index and density of about 55 plant varieties ZOHREH m according to the results the best varieties for planting varieties bless and best density, density of 55 plants per square meter is .

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Keywords: bean, density, variety, yield

1. Introduction

Grains of the main sources of protein-rich food for human and animal nutrition are known. About 22 percent in human nutrition of plant protein, 32 percent fat and 7 percent of carbohydrates are whole grains provide. Similarly, 38 percent of protein in animal feed plant, 16 percent fat and 5 percent of the carbohydrate source is provided. Some grains in addition to international trade oil production for different purposes are used in human and animal nutrition.

Among grains, soy, beans and peas in terms of acreage, respectively first to third place are met. Nightingale eyed beans in tropical countries especially African countries; the wide level is automatically assigned.

Density effect on yield and yield components

Salvador (2006) in testing the effect of population density on the yield of green pod bean showed plant growing season in both surveys. Randomized complete block design experiment with three replicates and densities 11-17-33 m cultivated plant varieties, including limited growth Test results showed that the green pod yield increased with increasing density and the best density for plant varieties in 33 m was recommended .

McEwen and Mafyt (1998) Effects of planting date and seed rate on yield reported that cultivation on suitable plant density increased from 12 to 36 plants m No. pod the plant from 6.6 to 6.4 reduced, but at the same density of pods per square meter was 177 to 235 .

Sabagh Poor (1996) reported quoting with increasing density and number of pods per plant, seeds per pod, although reduced amounts of these components per unit area can be accelerated .

Nori and Nabi Pur Kashani (2004) to evaluate the effect of plant density on growth, yield components and grain yield of mung bean in spring cultivation experiment with a factorial randomized complete block design with four replications. The first factor includes four row spacing (10, 15, 20 and 25 cm) equal to (80, 100 133 and 200 thousand plants per hectare) and the second factor includes three varieties of mung bean (Gohar, VC1973A and NM92) was. The results show that the highest grain yield with density 13.3 plants per square meter and 15 cm plant spacing (3010.1 kg per ha) and cultivar VC1973A 2976.4 kg per ha grain yield and minimum density of 20 plants m square distance of 10 cm 2645.2 kg per hectare and gem figure 2227.1 kg ha was obtained. Among yield components, pod number per square meter than other increase in yield explained .

Agha Alikhani Qlavndv Ala (2004) to investigate the effect of different planting densities of

10, 13, 20 and 40 plants m on yield and yield components of two varieties of gem-ray and a line (VC-1973A) Vetch Green experiment was performed. The results showed that VC-1973A lines yield the highest won and according to the earliness and ripening time than the other two varieties are preferred for mechanized harvesting. Mung bean planting density on yield very significant effect on the surface was a percentage, so that densities of 20 and 10 plants m highest kg / ha 2221 and the lowest kg / ha 1650 grain yield were produced. Among yield components, only the number of pods per plant was affected by the density. Correlation studies showed that the density of characters with the first pod height and distance from the ground and positive correlation with grain yield per plant, harvest index and number of branches and pods correlation was negative. Moreover, it seems, the number of pods that a high correlation ($0.88 = r$) with grain yield per unit area is the most important component is the yield of mung bean .

2. Materials and Methods

This test Crop in 2008 University Research Farm in three kilometers south of Ahwaz, Ahwaz city geographic 31 degrees 20 minutes North and longitude 48 degrees 41 minutes east and 18 m above sea level is located. To determine the physical properties and chemical field soil test before planting field soil sampling conducted Shadow following results were obtained .

Treatments were tested in compression as the main treatment and bean cultivars as sub-treatment is intended. In this review Tuesday Picks 45, 55 and 65 plants per square meter as the main factor was applied. That it will provide for easy order results with D1, D2 and D3 will be shown. The bean genotypes tested Tuesday as has been under cultivation, these figures include ZOHREH, SHAME and Jazayeri (V1, V2 and V3) were .

3. Results and Discussion

A- Yield

The differences in yield of different densities were significant at the five percent level (Table 1). Densities of 55 plants per square meter with 1658.89 kg of grain per hectare compared to other compression rates were highest. Appears to cause yield loss in density of 65 plants per square meter due to competitive absorption of radiation in plants, food and moisture, the grain yield also increased in density 45 plants per square meter than the density of 65 plants per square meter due to better distribution of inputs environment (light, nutrients, moisture) between plants, yield per plant (number of pods per plant) increased.. Perhaps one reason for high grain yield (pods) at plant

density of 55 square meters in total dry matter is more, the test results and Aspyng Naynhys (1998) on beans and bean showed that with increasing density of grain yield per plant reduced yield loss in high density increasing percentage of sterile flowers and pods severe loss and significant reduction in dry matter were attributed was consistent. (Shams and Zanganeh, 2004)

Analysis of variance of grain yield (Table 1) suggests that the cultivar effect on grain yield at 5% average means and comparisons with related Table 1 a significant difference between the figures does not show. Been blessed with grain varieties (1523.33) kilograms per hectare than the other two varieties are superior yield the lowest figure Jazayeri 1359 kg ha rate showed. Differences in yield characteristics and differences of cultivars and varieties of genetic material also allocate more productive and more reproductive parts of seeds per pod number were attributed to the ZOHREH. The test results Akynvla and Whitman (1988) were consistent .

Table1. Analysis of variance

Mean square		df	SOV
HI %	Seed yield		
9.60**	1603 ^{ns}	2	R
2160.06**	418882.11**	3	Density
68.314**	74839.00**	2	Cultivar
52.1**	94.974 ^{ns}	6	D * C
05.0	50.1151	16	E
9	10	-	%CV

B- Harvest index

Density effect on harvest index was significant at five percent. (Table 1) such that the highest rate of harvest index 70.3 percent owned density was 55 plants per square meter. Growth in the appropriate space density creates a balance between weight and total weight of the pods were dry, while the density of 45 plants per square meter competition, seed dry weight loss and increased biological function leading to decreased harvest index. Effect of variety on the harvest index, significant differences in the level of five percent did not show. Comparison of the results shown in 4-19, between SHAME and variety of JAZAYERI observed harvest index is not statistically different, but with the ZOHREH of both varieties showed significant differences. Jazayeri cultivars had the lowest harvest index due to reduced photosynthesis and reduced material handling light to penetrate the lower parts of the plant community and therefore economic yield in this figure dropped to reduce and eventually harvest index has shown .

C- Component Yield

C-1- Number of pods per plant

Analysis of variance table 1 that showed effect of density on NO. Pods are significant difference in the 5% level indicated. So the density of 45 plants per square meter pods per plant (11.01) and the density of 65 plants the number of pods per plant (9.08) was reduced. Table comparing mean density of the best in terms of number of pods per plant density of 55 plants (average densities) were observed. In fact, with increasing density of pods per plant is always less. Because it suggests that reducing plant density per unit area, increase the plant community is light in hand more space available for plant development plant placed. In this case, dominance of low-end buds and side branches begin to grow more plants and should develop with the development of active plant leaf area and plant more institutions take advantage of the environment (light, moisture and nutrients) increases And so the plant will produce more flower number and flower number increased because of increased pods are ultimately the number of pods per plant is greater. . Bennett et al and Graham in the eye beans nightingales and battery in soybeans reached similar results. Between cultivars as well as the number of pods per plant, significant difference at 5% level showed. Jazayeri than two digits and ZOHREH SHAME fewer pods per plant have produced but statistically between the two JAZAYERI and the variety SHAME there was much difference. It can be caused due to developmental differences and abilities enjoying the environment are different cultivars. ZOHREH number of pods per plant with an average 11.33 and 10.29 with a mean figure Jazayeri pods per plant, respectively, the highest and lowest No. Pod produced at the plant .

C-2- Number of seeds per pod

Based on Analysis of variance table 1 number of seeds per pod, plant density influenced statistical difference at 5% level indicated. Probably due to incorrect estimation error is tested. Most grain density 55 plants m average was 11.87. Lowest density of 65 seeds per plant was due to competition between plants for the use of environmental features is a plant that has been less developed and reduced yield per plant and blessed with an average number of seeds had the highest number 15.83 .

C-3- Seed weight

Compare different levels of congestion on the seed weight showed increased density of grain weight decreases with increasing density, which provides nutritional space per plant is reduced, competition between plants was more a result the amount of food

and reduced the share of each plant That's why the single-grain weight is reduced, statistically significant differences between different levels of congestion is not present. In this experiment, seed weight was not significantly affected by cultivar and statistically different between the treatments tested there was no significant difference. But between the three cultivars, varieties ZOHREH had the highest seed weight. The pilot reported that the pattern of cultivation on seed weight had no significant effect because the seed weight or seed has considerable stability .

4. Conclusion

General purpose of testing conditions to get the best crop production figures for comments in order to get maximum yield is. Appropriate distribution of plants per unit area in one of the most consistent factor is to increase yield. Grain yield components including No. pod, number of seeds per pod with a reduction in density from 65 to 55 plants per square meter increased. This indicates that the bean plants increased the available space to attempt to directory creation of conditions to be able in most exploited to enhance yield. Most grain density was 55 plants per square meter. Cultivars and the yield of its components had different variety than the ZOHREH of the other two varieties were superior. Harvest index was affected by the plant density and harvest index in the best density equivalent to 55 plants m 70.3 respectively. Figures of the harvest index were together statistical difference in terms of variety and ZOHREH to the other two varieties were superior .

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Calculate the growth dynamics of root and shoot of bean plants

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Abstract: Dry matter accumulation patterns in most grains are sigmoid-type curve. In the first stage of this model is that if growth is slow, then there is a rapid phase after the flowering stage is followed by growth that is in pod formation stage. Studies have shown that leaf area development and dry matter accumulation in most cereal grains, especially cold for a long period after transplantation is very slow. Accordingly, in order to effect the kinds humic acid plant growth and bean seeds under climatic conditions of Ahvaz in the form of a split-plot experimental design with randomized complete block design based on years of farming 2010 was designed and executed. Factor with three bean varieties ($V_1 = \text{Barekat}$, $V_2 = \text{Jazayeri}$, $V_3 = \text{Shame}$) in the main plot factor with four types humic acid ($F_0 = \text{control}$, $F_1 = \text{humic acid}$, $F_2 = \text{full macro humic acid}$, $F_3 = \text{acid Micro humic full}$) rate of 2 ppm in the sub-plots were placed. The results showed that the use of acid in all varieties humic increased plant growth parameters such as crop growth rate (CGR), plant height, grain yield, harvest index and biological function has been compared to the control. the highest total dry weight of the acid treatment Humic full macro level was 5909 kg per hectare and the lowest rate to the control was 4332 kg per hectare Effective grain filling period (*EFP*) The increase in the treatment process itself revealed. Varieties planted in the province and the third type humic acid with a control rate at 2 ppm was placed in sub-plots. The highest and lowest average number of lateral roots in this experiment in order Humic acid treatments and control macro level 241.7 and 136 numbers were obtained. Note that between the number of acid root treatment and between macro and micro humic acid and acid micro Humic significant difference was found. the highest root dry weight to macro Humic acid treatment with a mean 4.22 grams of control treatment and lowest with mean 2.63 has been hot Total root number from 592 to 899 in number in the control humic full macro will increase the number of roots, a positive regression ($r^2 = 0.89$) with the amount of biological fixation (percentage of nitrogen nodules) showed. [Simin Haghighi, Tayeb Saki Nejad, Shahram Lack. Calculate the growth dynamics of root and shoot of bean plants. Journal of American Science 2011;7(6):19-26]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: growth dynamics, root, shoot, bean plants

1. Introduction

Beans as one of the most important sources of vegetable protein-rich grains, the second important source of human food are considered. This plant belongs to the legume family and lounges are below the butterfly family. Bean a member of the large genus with over 130 members *Vicia* are. Grains but the main diet of many poor people makes up the world because substantial amounts of protein quality in grain cereal products in combination with a compound can provide biologically valuable food (8). Amount of protein found in seeds 2-3 times more protein in cereal grains and 10-20 times more protein in glandular plants and forage legumes are also due to having high protein food value is high. Bean plant having 25-23% protein as well as in other food grains high value and having the ability to stabilize nitrogen, have very good effect that causes the periodic amplification and chemical and biological soil fertility is. Nitrogen fixation in grain

legumes by 56-112 kg per hectare a year have been reported (3).

Cereal cultivation based on FAO data (2006) over 7.5 million hectares have been. Bean cultivation in Iran is approximately 35 thousand hectares (4). Statistics suggests increasing importance and widespread as an important source of food grains in many countries and cultures have longstanding experience in Khuzestan is Bean (7). Product to achieve maximum week, despite the needed amount of nutrient elements in the environment and balanced distribution of bean roots is essential. Consumed at the absence of elements in plant growth and development is effecting the amount of nitrogen fixation (6). In 23.8 million hectares are salt and sodium, which causes the nutrient uptake by plants are (9). Organic matter due to the beneficial effects on physical and chemical properties and soil biology have an important role in

soil fertility, plant nutrition and increased functionality and are the product.

Influx molecular nitrogen in the surface of the Biosphere by Rizobium bacteria called biological nitrogen fixation. Humic acid substances, including the dual effect of biological influences on consolidation is a phrase that the root development and lead to more contact with the roots and the bacteria are Rizobium other hand has a positive effect on the activity of soil microorganisms and can increase biological nitrogen fixation in legumes is (13).

2. Material and Method

2.1. Land preparation and planting

In order to run tests in 2010 on land preparation operations include basic irrigation, deep plowing to 20 cm, 15 cm and depth of the disk was trowel. Urea nitrogen fertilizer rate of 30 kg per ha nitrogen as fertilizer while planting base land was given. After preparation, land plot plan map based on the dimensions of a plot scheme was tested was 6 × 4 m and 7 lines in each plot to kill took over six meters. The space between two rows of seeds on the distance of 60 cm and 15 cm rows were considered.

2.2. Plant growth analysis

Every 12 days once the two plants harvested per plot and then measure the height and number of lateral branches and leaf area index, samples in oven for 48 hours and the temperature 75 degrees to measure the parameters of dry matter accumulation and leaf area index were placed.

2.3. Grain growth analysis

In order to check the growth of seed pods form after every five days once the sample was taken and all pods from each plot by two plants collected during and after measured pods and seed number per pod in the oven 48 hours and temperature 75 ° C dried and then dry the seeds and pods were determined. The grain filling rate and the effective period of grain filling was calculated using the formula.

2.4. Root growth analysis

For review every 12 days once the root growth of two plants per plot completely removed and the roots as cylinders of soil were removed. After separating the roots of plants, their roots washed sub number; root dry weight and volume were measured. Rooted in the oven for 48 hours at temperatures 75 ° C were placed and then dry them this time was calculated. To calculate the size of the root count and root dry weight of lateral roots and the difference through the law of Archimedes cylindrical water volume, volume of roots was calculated.

2.5. Statistical calculations

Analysis of variance, split plot design computer software cholera *EXCELL2007*, *MSTATC* was done and for comparing characteristics of the LSD test was used.

3. Result

3.1. Calculate the growth dynamics shoot

3.1.1. Leaf area Index (LAI)

LAI is simply the product of leaf area than the land surface on the shadow throws. Chart review of the bean leaf area index in a sigmoid curve itself shows, the primary growth in all treatments were 55 days after planting LAI slow process and its value had nearly the number 0.8 show that this trend will expand the family LAI is Leguminoseae. But should note that taking acid types humic cause shorter periods of three varieties grow on bean plants has been tested. According to the diagram (1, 4) added to the macro elements Humic acid treatment than the other three acid Humic increase LAI and shorter growing period will have been getting.

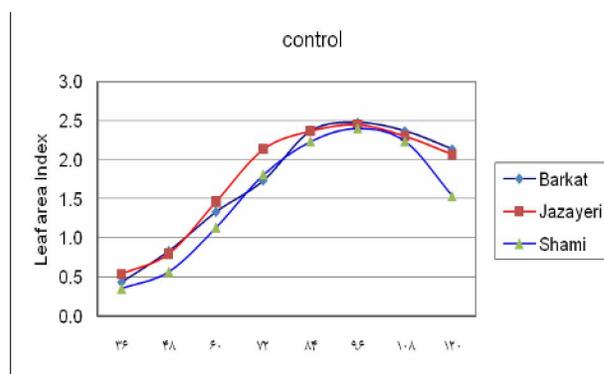


Fig1. Leaf area Index of cultivar in control treatment

Bean plants Foliar Spray in the eyes of nightingale's second trifoliolate stage with organic compounds have significant effects on vegetative growth found. Treated leaves and fresh mass were fresh led to higher photosynthetic activity (14).

Effect Humic sprayed acid on traits such as stem height, leaf number, shoot fresh weight, shoot and root dry weight accumulation and leaf NPK in eggplant and pepper seedlings found that stem diameter, number of leaves, shoot fresh weight, shoot and root dry weight significantly Humic acid application on pepper and eggplant seedlings increased(17).

The effect of variety on leaf area index, LAI maximum number Jazayeri the figures showed that between dinner and blessing with the numeric value 3.5 the maximum is reached. Jazayeri figure in the early stages of growth below the figure dinner LAI showed her and even to 50 days after planting cultivars had more leaf area index dinner. But the number of islands during this period of flowering and leaf area index had increased

considerably probably related to the plant and its potential impact has been the quality of fertilizers.

rich in carbon and increased leaf dry matter has increased LAI and increased absorption of radiation in order to increase photosynthesis and plant growth and ultimately improve the material increases dry has.

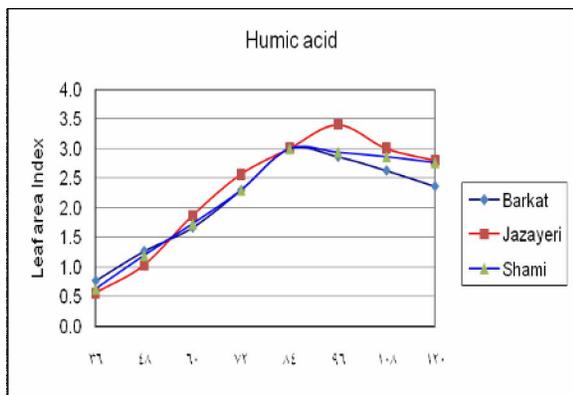


Fig2. Leaf area Index of cultivar in humic acid treatment

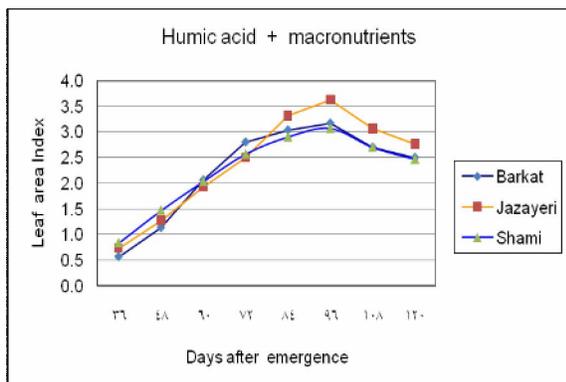


Fig3. Leaf area Index of cultivar in humic acid + macro treatment

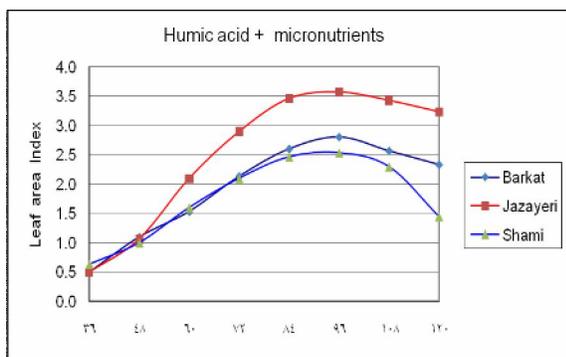


Fig4. Leaf area Index of cultivar in humic acid + micro treatment

3.1.2. Total shoots dry matter accumulation (TDW)

Results of variance analysis shows the effect of acid on dry matter accumulation of total Humic in different periods of significant growth at 5% has. This shows that the consumption of the kind Humic acid organic fertilizer

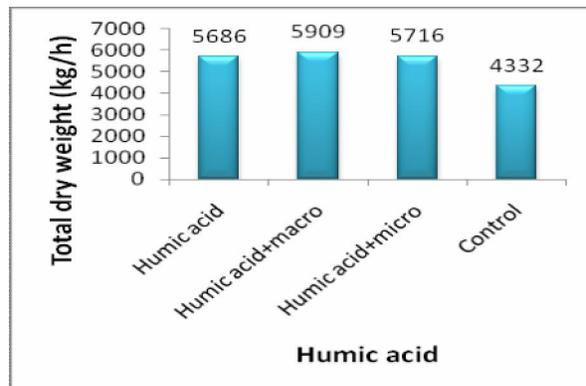


Fig5. Effect treatment on TDW

Results Comparison table shows the consumption of acid varieties humic significant effect on total plant dry matter accumulation has. So that the highest total dry weight of the acid treatment Humic full macro level was 5909 kg per hectare and the lowest rate to the control was 4332 kg per hectare. The process of dry matter accumulation totally dependent on leaf area index has expanded to include other phenomena, or any positive or negative effects of treatments on leaf area index components to put together TDW gives affected (Saki nejad, 2010)

The effect of variety on dry matter accumulation was significant and the most and the least performance figures associated with the numeric value Jazayeri 5543 kg ha blessed with a figure of 5260 kg ha dry matter respectively.

3.1.3. Dry matter accumulation of leaves (LDW)

Results of variance analysis shows the effect of acid on leaf dry weight Humic significant effect on levels of 5% is shown. In this experiment according to the diagram (6, 7) the highest leaf dry weight to humic acid treatment and the amount of macro elements 898.5 kg per hectare and the lowest rate to control treatment 644.9 kg per hectare was. Increasing the amount of leaf dry weight in this treatment could be due to increased LAI and increased photosynthesis and vegetative growth period in its result is the macro elements, nitrogen is available, the increase in leaf dry weight has been treated.

Bean plants Foliar spray materials humic nightingales' eye on vegetative growth of treated leaves showed no significant increase was LAI (15).

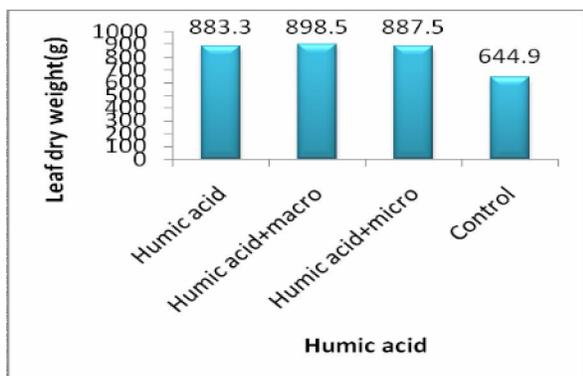


Fig6. Effect treatment on LDW

Humic by increasing nitrogen content, plant dry weight increase and leaf area is.

Increasing acid humic increase in nitrogen content and dry matter accumulation in the growth is. In the pilot was on acid humic oat dry weight was increased (3, 9). Experimental acid sprayed humic increase in wheat shoot dry weight was. These results are consistent with the results of these researchers (14).

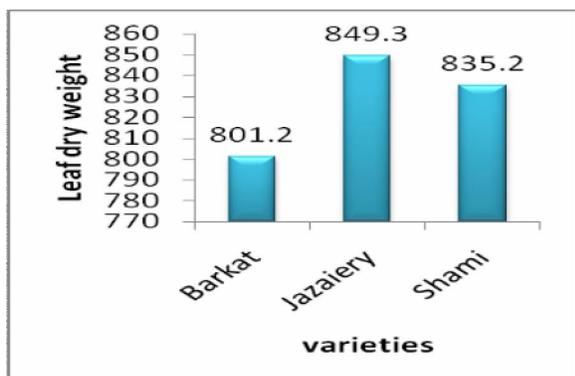


Fig7. LDW in cultivars

Analysis of variance showed that the effect of cultivar on leaf dry weight at 5% level was significant and the highest leaf dry weight to figure the amount of islands 849.3 kg per hectare and the minimum to figure Blessing rate of 801.2 kg per hectare respectively.

Greater amount of leaf dry weight in islands can figure because of genetic factors, including high fertilizer absorption properties (absorption of nitrogen) and the potential to produce more leaves than other varieties and character compatible with the environment is Khuzestan.

3.1.4. Dry matter accumulation of Stem

Analysis of variance humic acid effect on stem dry weight at 5% level is significant. Chart (8, 9 and 10) on shoot dry weight of most acid-related macro humic

numerical average 1798 kg per hectare and the lowest rate of 1471 kg per hectare to control treatment.

Urinary cultivar also shoot dry weight at 1% level was significant. Highest stem dry weight to number average number Jazayeri 1745 kg per hectare and the lowest figure blessing to the numerical average was 1617 kg per hectare. It can be inferred that due to the nitrogen in acid Humic enriched with macro elements that make more vegetative growth period and increase the number and height of secondary stems may be related. Most of the average shoots dry weight in the genetic characteristics of plant varieties to the islands, including the number of secondary stems and flexibility or adaptability of this cultivar is associated with the testing environment.

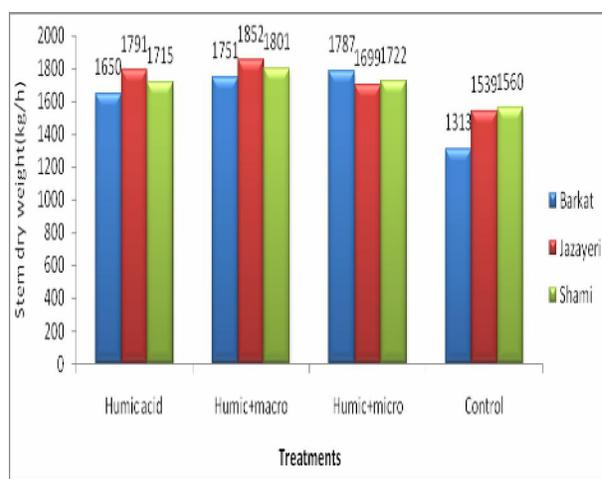


Fig8. Effect treatment on dry matter accumulation of Stem in cultivars

Acid and acid Humic Folic stem growth in plants stimulates different. Seeds treated humic acid solution 38% increase in stem dry weight demonstrated (21, 25).

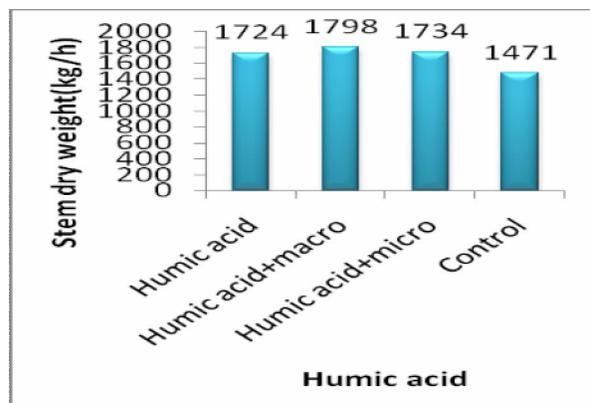


Fig9. Effect treatment on dry matter accumulation of Stem

Increased stem dry weight can be due to an increase in plant height, he said. Humic acid increased with increasing enzyme activity robisco photosynthetic activity and thus plant growth is in (27).

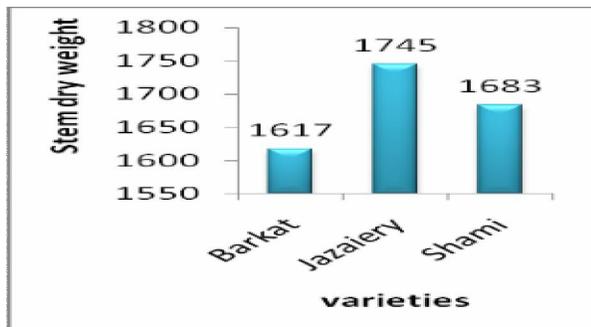


Fig10. Dry matter accumulation of Stem in cultivars

3.2. Calculate the growth dynamics of root

3.2.1. Dry matter accumulation of root

According to variance analysis table and figure humic acid effect on root dry weight, respectively, at 1% and 5% were significant. Comparison of treatments given, the highest root dry weight to macro Humic acid treatment with a mean 4.22 grams of control treatment and lowest with mean 2.63 has been hot.

Increased weight and volume and number of secondary roots Humic by acid can be a good indicator of the environment by limiting resources, plant and considered generally can be said that increasing the acid concentration Humic root biomass will increase significantly.

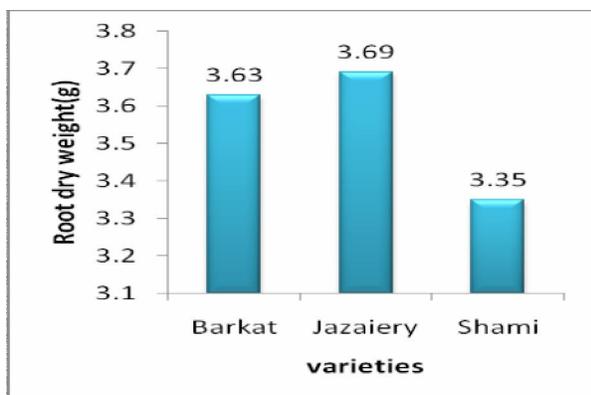


Fig11. dry matter accumulation of root in cultivars

Comparison between the average root weight highest figures related to the islands and the lowest figure to figure, respectively dinner averages 3.69 and 3.53 was hot. Also worth noting is that the average weight figure blessing roots have been significant.

Findings with the results of many investigators regarding the effect of acid on root growth Humic match.

Effect of Acid on Plant Humic Bent Grass Humic specifically found that the concentration of acid 400 mg significantly assimilation rate and root weight increase.

During the trial on wheat Humic acid levels 54 mg, 50% increase in length and 22% increase in dry matter to roots along.

Nitrogen uptake in the presence of acid Humic showed significant increase. Consumption humic acid solution or powder form in the soil increased root length and weight of carrots and whole plant growth were increased (15).

3.2.2. Number of root

The results of variance analysis table used humic acid types and the number of varieties of plant rootlet Bean significant effects at 5% level is. Humic acid increases the numbers of secondary roots are. The highest and lowest average number of lateral roots in this experiment in order Humic acid treatments and control macro level 241.7 and 136 numbers were obtained.

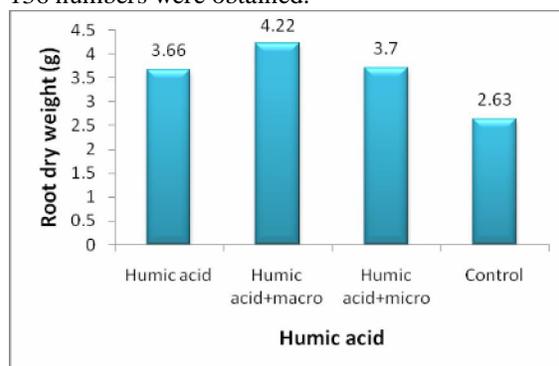


Fig12. Effect treatment on dry matter accumulation of root

Note that between the number of acid root treatment and between macro and micro humic acid and acid micro Humic significant difference was found. Foliar application materials Humic significantly antioxidant concentration in leaves increased and enhanced photosynthesis, respiration, nucleic acid synthesis and ion uptake and root growth is (23).

Treatment compared to the number of digits rootlet, to the highest and lowest average figures Chipset about the amount of islands and dinner 214.8 and 200.5 is the root number. But between the average number of secondary roots and dinner blessing figures differ significantly in terms of comparing test average there.

Most rooted in the interaction cultivar and cultivar Humic acid in acid Jazayeri Humic macro numerical value 254.3 the number of roots and the lowest figure in the control treatment mean blessing 7.126 numerical number allocated to the roots is.

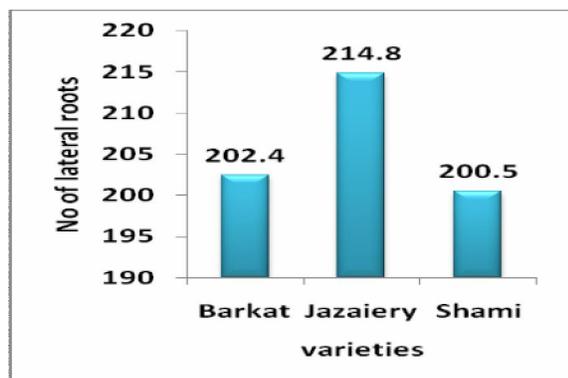


Fig13.No. root in cultivars

Research on the effect of acid on the elemental composition humic roots in bean plants was studied. The results showed that acid respectively humic significant increase in root dry weight of bean plants to the amount of 30.1% and 56.6% found. Also Humic acid increases sodium and potassium content of the roots, but significant effect of calcium and iron, and no significant decrease in copper, manganese and zinc contents were. (27). Foliar application materials Humic significantly antioxidant concentration in leaves increased and enhanced photosynthesis, respiration, synthesis of nucleic acids and ions were absorbed (11).

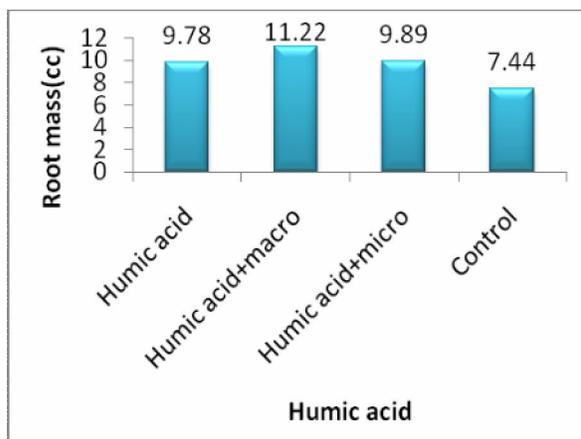


Fig15. Effect treatment on root volume

Effect of variety on the root volume is significant and the most and the least volume, respectively, to figure the volume of 10 islands and having dinner with volume number 9.25 is CC.

Based on comparisons with related tables mean the most to root volume and acid varieties Jazayeri Humic macro numerical value and the minimum to 12 digits in the control treatment having dinner with the numeric value is 7 cc.

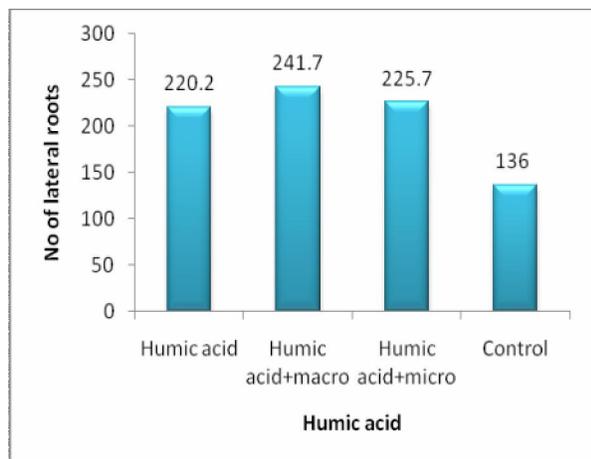


Fig14. Effect treatment on No. root

3.2.3. Root volume

Results of variance analysis table shows the interaction of acid and acid Humic and varieties at 5% on increased volume of work has roots. Average based on comparisons with related tables to the highest volume of acid treatment Humic 11.22 macro numerical value to control treatment and lowest average number 2.63 cc respectively.

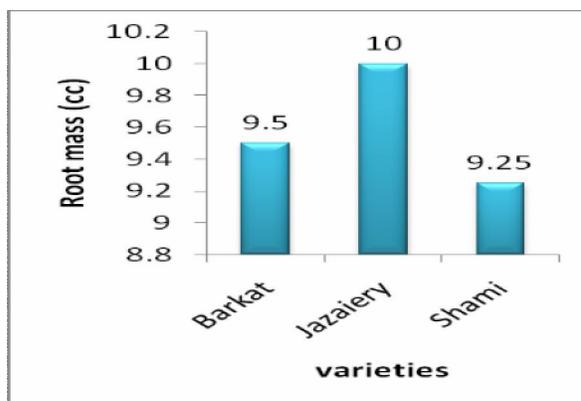


Fig16. Root volume in treatment

Size-dependent root is the root number. Because macro humic acid cultivar islands could not increase the number of roots after root large amount of time is allocated to.

Humic acid increases the numbers of lateral roots are in broad bean plants. the pilot plant showed that Bent Grass Humic acid concentration of 400 mg, root dry weight significantly increased the enzyme activity from 23% to 100%, which increased its increased root respiration and growth factors that were more. Researchers Humic material effect on the development of plant root systems of grasses and found Bennett Humic acid significantly in root dry weight of plants Bent Grass 1.5 g

control treatment to 2.5 g treatment increased with acid Humic was(4, 12)

4. Discussion

Review process of dry matter accumulation, leaf area index and net photosynthesis

Dry matter accumulation patterns in most grains are sigmoid-type curve. In the first stage of this model is that if growth is slow, then there is a rapid phase after the flowering stage is followed by growth that is in pod formation stage. Studies have shown that leaf area development and dry matter accumulation in most cereal grains, especially cold for a long period after transplantation is very slow (22).

A positive relationship was between total dry weight of aerial plant and grain yield there. However, the maximum total production of dry matter does not necessarily yield the most direct relationship with no. Route because the formation of biological function (TDM) and economic performance (dry seeds) are different. Maximum of dry bean yield in the physiological maturity stage is achieved. After this step, the total dry matter yield 10 to 20 percent and it decreases due to the shadow set of leaves, this transfer of nutrients to the roots and secrete various substances from roots to soil. According to comments bean LAI were 3.5 to 4 vary (8).

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3/4/2011

Effect of drought stress on stomata resistance changes in corn

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Abstract: To evaluate the effects of drought stress in different periods growth stomata behavior, research using factorial experiment design, randomized complete block with four replications and two factors with four levels of water stress as the first factor and three levels of growth periods As the second factor in the three crop years (1999-2000 & 2000-2001 and 2001-2002) the Islamic Azad University Research Station at 3 km south of Ahwaz, Ahwaz city was designed and executed. Analysis of variance at 1% showed in all three years of water stress treatment, periods of growth and interaction of these two stomata resistance and lower leaf surface supernatant separately showed significant effect. by applying different levels of water stress, stomata resistance and lower leaf surface increased supernatant Duncan test was at 5% level in three years of the three groups presented mean that treatment (severe water stress treatment) and the highest treatment (control, no water stress) the lowest stomata resistance showed. Duncan test at 5% level one to two average growth for the period presented the highest stomata resistance in all three years and the treatments were obtained and lowest stomata resistance was observed in treatment. Duncan test at 5% level interactions show treatments with treatments that apply the lowest stomata resistance values were the other words in the early stages of plant growth when water is enough to provide resistance, stomata express that little but more severe stress in the course of Growth stomata resistance was .increased considerably, the underside of leaf stomata resistance levels much higher than the leaf supernatant [Tayeb Saki Nejad, Effect of drought stress on stomata resistance changes in corn. Journal of American Science 2011;7(6):27-31]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: corn, stomata resistance, drought stress

1. Introduction

Regulation of osmotic pressure, ions entering K^+ , increased Considerably finds that this increases the potential for pressure cells, particularly cells such protective stomata than cells around them and opening holes the search is, although under non-stress, entering the water, transport of ions K^+ into cells protection and stimulation causes stomata opening is. (14)

vegetative growth stage, on corn and sorghum low water potential could be in the leaf which in light are located, the openings to close, but close as complete is not conducted and resistance openings in bar 20 - = ten seconds cm was calculated, the reproductive stage, resistance to pore leaves in maize and sorghum with fluctuations water potential did not change, the openings in the reproductive stage to water stress, showed no sensitivity in maize stomata closure in bar 8 - = was starting. Stomata opening and closing of water stress, 15 to 20 minutes Smokes, compared to the effect of CO_2 concentration on stomata opening and closing, which is very fast and nearly 2.5 to 5 minutes, the time allocated to longer does. (19)

General hypotheses stomata opening and closing by different researchers has reported as follows:

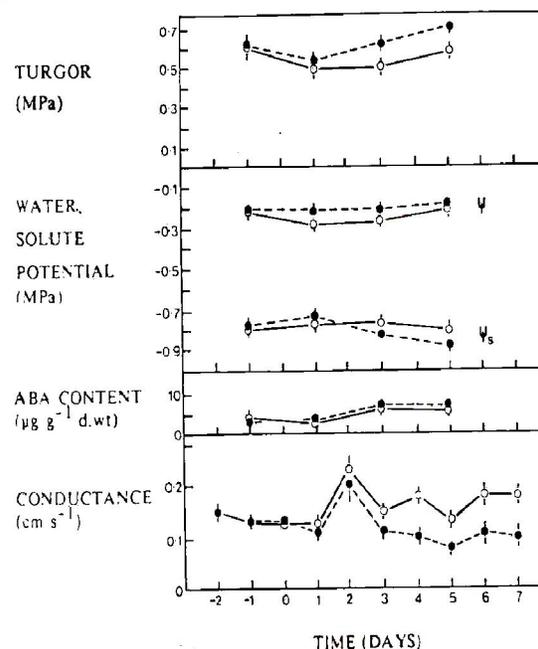


Figure 1: Changes in water potential, stomata conductance and ABA concentration of corn leaves in water available (0) and no water available (*) (15)

1 - Hypothesis converts starch to sugar in photosynthesis and accumulation of carbohydrates, causing water entry to openings that this phenomenon is the disappearance of starch and increase in the first hours of the day happens (Mansfield and Jones 1971)

2 - Active proton transport hypothesis, increasing the ion K +, causing the water entering the guard cells and open cells is (Fisher 1968, 1969 Sleet, Mac Liam 1965

3 - Proton transfer hypothesis (Van Kirk and Rashke 1978)

Stomata opening and closing the water affected if this expression that the synthesis of ABA prevents absorption of + K and H + release was followed by packing the holes are getting. Water deficit, ABA stimulates the synthesis and stomata closure is exacerbated (Figure 1).

the opening and closing holes on the effect of drought stress before flowering period, compared to other periods of corn growth was more complete and because of water shortage in this period, the CO2 entering for photosynthesis greatly reduced. (16)

Aperture size and number of plant species in very different and variable declared and measured the number of openings in the supernatant and lower levels in leaves of different plants, no significant difference demonstrated. (22)

2. Material and Method

2.1. Design model

Research was performed in Islamic Azad University research farm in southwest and 3 kilometers away from the city of Ahwaz factorial experiment in randomized complete block design. Research projects in the form of factorial experiment with the basic design with two randomized complete block with four replications factor and mathematical model was performed following a three-year basis;

$$X_{ijk} = \mu + \delta_i + \delta_j + \delta_k + \delta_{jk} + \epsilon_{ijk}$$

In this model, each view X_{ijk} value, the average population, the effect of first factor, the effect of the second factor, the effect of blocks, Interaction first and second factor and the effect of experimental error is. Because the use of a factorial

Experiment to prevent mixing of (soil × irrigation) and complete separation from the plot, to prevent water penetration to the adjacent plots and also the importance of the same first factor and the second is (Table 1).

Table 1: Review of different treatments tested

Main plot: Drought stress Levels	Sub-plots: Different growth phases
I₀ : Full irrigation point of FC, control, without water stress	S ₀ : growing phase, the establishment of the plant stem to the emergence
I₁ : 75% of the amount of irrigation treatments I₀, mild stress	S ₁ : natal phase: to stem the rise of coffee being resilient and end silk pollination
I₂ : 50% of the amount of irrigation treatments I₀, severe stress	S ₂ : grain filling phase: the end of pollen grain maturity and the emergence of black layer
I₃ : 25% of the amount of irrigation treatment I₀, very severe stress and point of PWP	-

2.2. Stomata resistance

Stomata resistance measurements as recorded in the field was conducted by device Prometer lower and upper levels of the three parts of each leaf base, middle and top leaf stomata resistance was measured

3. Result

Analysis of variance at 1% showed that the three years of water stress treatment, periods of growth and interaction of these two stomata resistance and lower leaf surface supernatant separately showed significant effects .

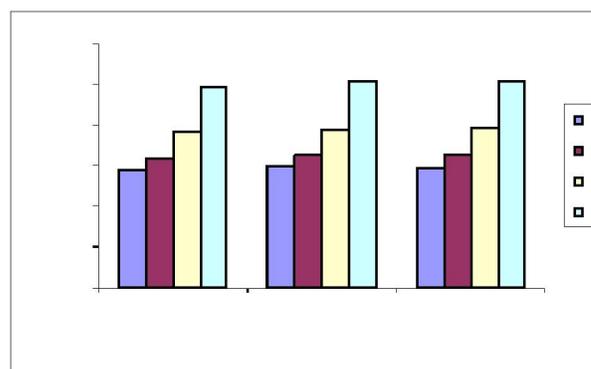


Fig2: Effect of drought stress on stomata resistance value (S / cm) of leaf area in 3 years

Applying different levels of water stress, stomata resistance and lower leaf surface increased supernatant and Duncan test at 5% in each experiment, three groups

of three years provided that the average treatment (severe water stress treatment) and the highest treatment (control, without water stress) the lowest stomata resistance showed. Duncan test at 5% level one to two average growth for the period presented the highest stomata resistance in all 3 years and the treatments were obtained and lowest stomata resistance was observed in treatment .

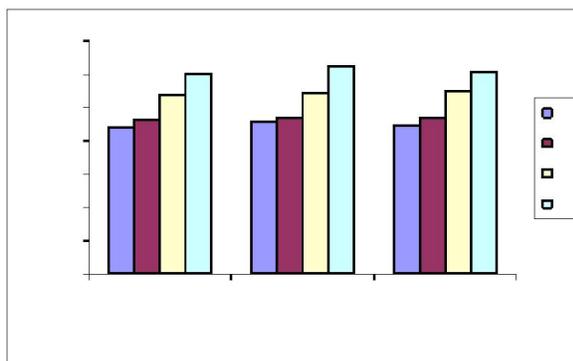


Fig3: Effect of drought stress on stomata resistance value (S/cm) in 3 years leaves behind the experiment.

Duncan test at 5% level interactions showed that treatment with low doses applied treatments stomata resistance had the other words in the early stages of plant growth when enough water is available, stomata resistance from its incidence was slightly But imposing severe stress during growth and stomata resistance was increased considerably, the underside of leaf stomata resistance levels much higher than the leaf supernatant .

Plants during vegetative behaviors such as being tube leaves, stomata resistance than the other courses was less a result, any stress modulates the incoming water could not be done.

Growing plant root system had not found a perfect result and limit the spread radius of the water absorption was very low, but the osmotic pressure regulating growth stages and appeared fully supported in terms of water supply for root shoots increased physiological behaviors such as percentage of the tube to increase leaf stomata resistance decreases in the intensity of stress was imposed, leaves and leaf water potential than the end of the primary leaves showed severe reduction of leaf relative humidity by applying different levels of water stress decreased leaf lowest percent relative humidity treatments and 75 percent were compared to control treatment, water stress decreased approximately 20 percent(21).

Stomata resistance in the supernatant and the back surface of leaves with increased drought stress, which leaves behind the increase in stomata resistance, was higher than the leaf. Stomata resistance during growth in the supernatant and lower leaf surfaces were much less than the periods of growth and the opinion

Hambl (1995) at the beginning of growth in terms of stomata physiology are the result of evolution without much resistance to water stress did not show, but with age and evolution of plant stomata guard cells, stomata resistance increased.

Stomata resistance in a combined analysis of variance and lower surfaces of leaves high in the three years of treatment effects, treatment year, in water stress, and periods of growth in the two year interactions were significant.

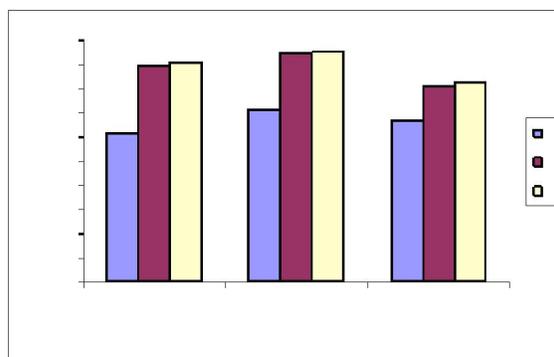


Fig4: the amount of stomata resistance (S / cm) on front and back of leaves in different periods of growth in three years

4- Discussion

With decreasing soil water potential, root and leaf water potential also decreased, soil water potential decreased in a constant process of different levels of water stress treatments showed root and leaf water potential against the resistance showed a decreasing trend of constant, although soil water potential decreased leaf water potential and root resistance to water stress treatments showed significant but become more severe water stress than leaf water potential root water potential, decreased more in the roots of resistance against soil water potential decreased more than shoot the especially the leaves(14),

The root can be adjusted decisive role for its effects on stress and actually gets created is the first

organ that will be exposed to drought and can regulate their osmotic pressure to perform, he also believes that its root in some water. Because the store and saves water and proximity to sources of water that changes in soil water potential is less than shoot and shoot in the most severe environmental changes are subject to the severe water stress (0.8 MPa) in the root resistance the potential loss of water ended and root water potential was significantly reduced (point 1.8 MPa) the doors yen Point plant became fully wilt mode, re-injecting water and soil water potential in roots and leaves showed some increase. Plants wilt at this point not depending on external conditions were the permanent wilting point, were the result(13).

Most sensitive period of vegetative growth period was in corn, i.e. before the appearance of the double ring following reasons high resistance against drought could rise to self:

A- Set of osmotic pressure in other words, this period was observed with decreasing leaf osmotic potential, relative humidity decreased rapidly in plants result of a severe drought occurred.

B- plants during the vegetative practices, such as pipes to leaf stomata resistance than the other courses was less the result of any stress modulates the incoming water could not be done(4, 11 and 19).

A growing plant root system had not found a perfect result and limit the spread radius of the water absorption was very low, but the osmotic pressure regulating growth stages and appeared completely in terms of root support for water supply increased the shoot physiological behaviors such as percentage leaves to tubes and increased stomata resistance could regulate the intensity of stress was incurred, leaf water potential than leaves at the end leaves showed severe reduction of early relative humidity leaves with different levels of applied water stress decreased leaf lowest percent relative humidity treatments and 75 percent respectively compared to control treatment, water stress decreased approximately 20 percent. Stomata resistance in the supernatant and the back surface of leaves with increased drought stress, which leaves behind the increase in stomata resistance, was higher than the leaf. Stomata resistance during growth in the supernatant and lower leaf surfaces were much less than the periods of growth and the beginning of stomata development in terms of evolution have thus physiology little resistance to water stress did not show, but with age and evolution of plant stomata guard cells, stomata resistance increased(14, 18).

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3/4/2011

Effect of GA₃ hormones on growth dynamics of Bean

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Abstract: In order to effect hormone gibberellins acid on properties such as bean plants Morphophysiology: internodes' length and stem number, plant height, leaf growth dynamics and crop growth rate research as a factorial experiment in randomized complete block design with three replications in crop year 2010 Farm Research HASHEMI located in the city HAMIDIEH province was conducted, first factor hormone gibberellins acid on four levels, respectively, treated (d₀) control (no hormone gibberellins acid) treatments and d₃, d₂, d₁, respectively, 5, 50 and 250 ppm and the second factor included three plant growth periods: (vegetative phase= s₀, Flowering phase = s₁ and pod set phase = s₂) for the hormone gibberellins spray on beans were considered. Dose 50ppm hormone gibberellins acid, more leaf area index (*LAI*) with 1.98 in comparison with other surfaces have been in the treatment group a was used Hormone gibberellins acid applied best courses in the vegetative period before flowering leaf dry weight, 752.2 kg/ha been in a treatment group were. And the flowering period to Pod set treated with 678.3 kg/ha-level statistical treatment Pod set b to aggregation with 666.6 kg/ha c level was statistically. Dose of the hormone gibberellins acid maximum height of internodes 4.07 inches compared to other hormone levels have been in statistical was. Other doses differ quite significantly with this level did not have the lower levels were. The results showed that the hormone gibberellins acid increased crop growth rate to 35 percent in d₃ = 20.15 g/m²/day treatment than control treatment was d₀ = 14.5 g/m²/day. Hormone gibberellins acid effects on bean plant stem internodes' distances showed that on average 2.2 inches were added to the internodes' length. Especially the increase in the lower internodes bean plant stems were most evident in the treated internodes' d₂S₀ height d₀S₀ than the control treatment was significant. [Somaye ghalandari, Tayeb Saki Nejad, Shahram Lack. Effect of GA₃ hormones on growth dynamics of Bean. Journal of American Science 2011;7(6):32-39]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: GA₃, Growth dynamics, Bean

1. Introduction

Like auxin hormone, the GA also to approximate all the physiological processes of growth and reproduction of plants are well controlled. The most obvious effect of increased gibberellins plant growth through the long distance between the nodes makes their stems (4).

This effect is normally associated with temporal pallor normally leaves the host after about 10 days are normally on. a special case of the effect of gibberellins in the plant can be Cocker (Cocker, such as types of corn, beans, peas and ornamental plants) which causes hereditary gibberellins production without sufficient power are observed(6).

Sprinkle gibberellins solution on the shoot elongation and stem caused plants to natural plant height is. Because small amounts of gibberellins (about one thousand micrograms per liter) to do it just a number Biological testing of the most important ways to encourage the growth of gibberellins based on long stems Cocker plant is built. gibberellins can be many two-year plants (without stems), which requires cold for flowering are, without seeing the cold, forced to

produce flowering stems to. how do the stem end so that the gibberellins have one hand into a cell to be intensified and the other hand, each of the cells are too large and thus the stem grows and Plant flowers sits (2).

Hormone gibberellins acid on shoot growth

Hardtke, C. (2003) Expression of gibberellins on rice shoot hormone gibberellins acid had a long shoot growth which caused a substantial impact on internodes distance is an effective host.

El- Dengawy,(2005) with effect levels and timing of application of gibberellins acid on growth and product components with conventional spraying beans hormone gibberellins acid concentrations 2.5, 5 and 7.5 mg gibberellins hormones in times of 7 and 14 and 28 days after planting the beans whole plant had a normal expression of gibberellins hormones increased the shoot length was bean plant.

Long (1965) Physiology of flowering plants in Hanna said that being taller Gibberellins acid causes stem and produce flowers in many flowering plants are long days.

Davies et al. (2002) Gibberellins on Flowering in review Hana reported that gibberellins induction of flowering by long days either in plants to both short-day plant rejections with a significant rise is shoot.

experiment with the application of three concentrations of the hormone gibberellins acid on plant beans, regular doses of 2.5, 5 and 7.5 mg at intervals of 7 and 14 and 28 days after germination beans regular stated that plant height in different times of application, had significantly increased levels of response to hormone gibberellins was linear(6).

Dolan L and Davies, J. (2004) Effect of hormone gibberellins acid on the size and height of shoot meristem capitates spike differentiation stages in the two rice varieties, the concentration of 50 ppm in two stages, early differentiation and late spike to spike differentiation control without gibberellins acid intake was concluded that other varieties of gibberellins in the early stages of differentiation was used to spike the number of side branches and Griffins 65.5 and 48.1 percent rate increased, but the application of gibberellins acid in the secondary or late stage adverse distinction spike numbers, Griffins 36.2 and 43.4 percent rate was reduced. but the other varieties used in the same amount of hormone gibberellins acid in early stage of differentiation than control spike increase in the number of fertile and strong side branches and spikelet spike rate was 92.3 and 72.7 percent, but the application of gibberellins acid late in the second stage of differentiation or a reduction in the number of spike branches and lateral spikelet's per spike were observed.

Effect of gibberellins acid on the size and height of the shoot meristem capitates spike differentiation stages in the two rice varieties, the concentration of 50 ppm gibberellins acid observed that the longitudinal growth of the shoot meristem capital due to cell elongation cell division and developed, in which both varieties of rice due to increase in height of stem cells for stem diameter was increased so the number of side branches that were correlated with stem diameter were also high(11).

Effect of application of the hormone gibberellins acid on shoot said that the Arabidopsis plant hormones have an important role in the development so that the spraying gibberellins on shoot growth and shoot high value also went up gibberellins in roots and primary root growth increased said(4).

in a study examining the effect of auxin and gibberellins acid soybean plants used and the height was missing was the performance down, they concluded that the application of gibberellins concentration 50 mg in the vegetative stage to spray soybean leaves, increased internodes length and stem thickness of the primary shoot and shoot and thus increase total dry matter is increasing (13).

during the three stages before the first leaves produced before the emergence of second leaf and the internodes is 30 days after each was 0.5 cm and the leaves were fully emerged, the hormone gibberellins acid was sprayed on leaves and observed that the number of stem nodes, number of branches and height of branches had increased(7).

2. Material and Method

This test Crop year 2010 on the farm located in the village of Sayed Hossein HASHEMI Hamidieh city was conducted.

Place testing semi arid dry climates and low temperatures are 4 - and the highest degree of temperature 51.8° C, average annual temperature in the station 23.9 ° C has been reported.

The statistical test of the factorial design are equally important in terms of factors examined in a randomized complete block design with three replications was.

D: Different concentrations of the hormone gibberellins acid.

S: Bean plant growth in different periods.

(d0 =No hormones, , d1 = 5ppm and d2 = 50ppm and d3 = 250ppm (and the second factor for three phase bean plant growth hormone gibberellins acid spraying include: (s0 =vegetative phase, s1 = flowering phase and s2 =phase Pod set)

2.1. Analysis of plant growth and seed

To review the growth and dry matter accumulation bean plants were sampled action. Sampled from all plots to 15 days away from each other during the eighth stage was performed. Three lines for the sample was determined after removal of the top 50 cm Down each line as sidelines, three plants randomly taken from each plot and the plastic bag with a label to each plot and samples were transported to the laboratory and measured the following took place on them:

2.2. LAI measurements

Determine LAI weight method was used. In this way, using standard paper (A4), which is a specific area, was used in this way that it leaves the paper had been drawn and shape, then shaped leaves that had been drawn in the oven with a temperature of 70 machine degrees Celsius for 24 hours and dry weight placed them came to be and making a fit according to standard weight paper and dry leaves of all plants sampled amount of area harvested leaves from the field in general and specific indicators leaf stage in the sample were determined.



Fig1. Hormone spray in field



Fig2. Different stages of plant growth in field

2.3. Process of determining dry matter accumulation in different plant organs (leaves, stems, seeds)

Measuring dry matter accumulation process in each of the different organs in each bean plant sampling was done first, after the separation of different plant organs in the laboratory, the device with the oven temperature 75 ° C for 48 hours of was that they were set to dry. SAS computer program components by increasing LAR, CGR, RGR, NAR, LWR, and SLA were calculated.

3. Result

3.1. Leaf Growth Dynamics (LAI)

Applying different doses of the hormone gibberellins acid on leaf area index of plant beans in 1 percent was significant. But applying hormone during different growth in any of the periods of growth of there was not significant. Interactions between hormone gibberellins acid in different doses and periods at 1 percent of growth were significantly different.

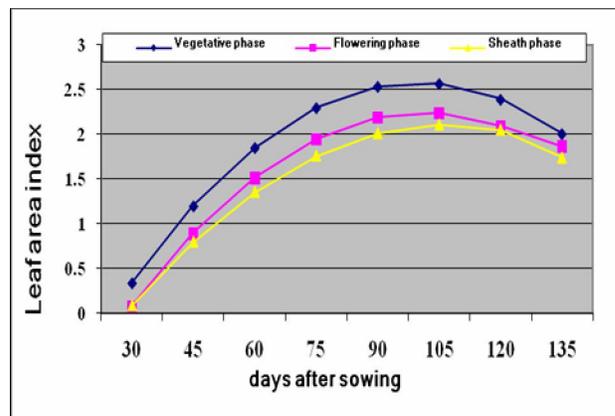


Fig3. LAI changes at different stages of growth

Dose 50ppm hormone gibberellins acid, more leaf area with 1.98 in comparison with other surfaces have been in the treatment group a was used, dosages longer much different from its impact on leaf area did not show in statistics b were.

Period, the highest growth period before flowering leaf area in comparison with other periods of growth and having 1.90 were in a statistical and other courses, flowering period to Pod set respectively 1.59 and 1.51 in the treatment group was b.

Mean comparisons with related table interaction Gibberellins acid and various periods of growth than all treatments and control have increased the concentration of 50 ppm respectively in the period before flowering and vegetative concentration of 5 ppm in the same period of highest LAI their shown in the treatment group a were, and the interaction of

gibberellins and Volume growth for the treatments of 250 ppm and control in the ranks next placed so that control treatment lowest leaf area with 1.47 and 1.36 and 1.43 ranked(Fig3).

Can be concluded that if the hormones in the vegetative period be imposed because of better plant was still young and can be influenced by the environment to be exposed, and the leaves grow more and produce more dry matter to be followed and that the higher dose The performance of the same amount of hormones is not above said high concentrations can cause hormone gibberellins acid on the growth mode is a deterrent.

the list et al stated that providing a larger leaf surface exposed to sunlight led to a fixed building dioxide uptake More carbon is, inversely, plants with lower leaf area index, carbon dioxide are less stabilized and increased leaf area can be, can stabilize carbon dioxide in the plant increased, the hormone acts in the vegetative period This positive result can be achieved (8, 5 & 11).

The effect of different doses of hormones gibberellins acid 50 ppm dose than other doses in the higher level and actually had a higher level of bean leaf in the plant is established, other doses at lower levels and control without hormone lowest LAI had the trend. (Fig4).

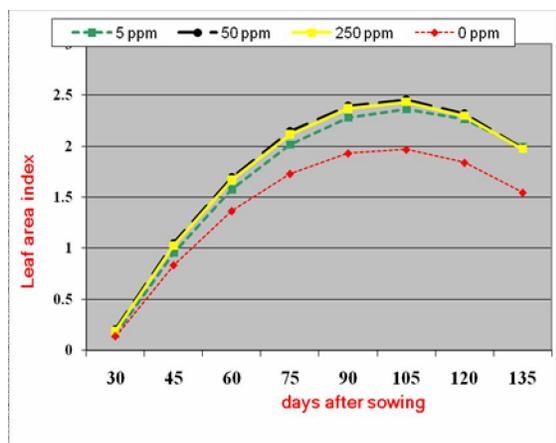


Fig4. Effect GA₃ Hormone on LAI changes

In examining the time course of growth hormone actions, vegetative growth period before flowering had the highest LAI process and during the flowering period Pod set lower level and has been in the last level.

3.2. Leaf dry weight

Leaves the factory plants are making food, whatever leaves more power plant construction will also generate high and significant impact on

performance will rise. Gibberellins acid application according to the role that cell development is the increasing role can is crucial (10).

Applying different doses of gibberellins acid on shoot dry weight in a percentage was significant..

Hormone gibberellins on different periods of growth in a significant percentage were in the interaction of hormone and duration of different developmental levels also was a significant percent.

The dose of hormone gibberellins acid on leaf dry weight concentration of 50 ppm bean leaf dry weight with 813 kg per hectare compared to other hormone levels have been in a treatment group were. A dose of 250 ppm with 750.2 kg per hectare in other doses was statistically b level c were statistically.

Hormone gibberellins acid applied best courses in the vegetative period before flowering leaf dry weight, 750.2 kg/ha been in a treatment group were. And the flowering period to Pod set treated with 678.3 kg ha-level statistical treatment Pod set b to aggregation with 666.6 kg/ha c level was statistically.

In examining the interaction hormone and growth period treatment of the hormone in the phase of eruption had received the highest amount of dry weight were treatment and the hormone gibberellins in the concentration of 50 ppm in the growth period before flowering were received with 958 kg ha In the rest of the group was a statistical interaction between the levels were lower.

Any leaves are younger and more recent actions on the hormone more effective would be the leaf during the vegetative growth hormone has received more time for growth and response to hormones and growth and development will be more.

With the above results that express hormone gibberellins acid in leaf growth and leaf development and thus its final dry weight is involved, was consistent(3).

3.3. Shoot dry weight

Bean plant stems strong and stout, smooth (glabrous) and full leaf height is 180-30 cm (4). Any power that is stronger stems will increase its maintenance. Strength stems should be so well able to keep the pods; the hormone gibberellins in these cases had positive effects on the stem (2).

Different doses of hormones gibberellins acid and time of application actions and interactions in hormone levels were a significant percent.

In between doses of 5 and 50 and 250 ppm difference very noticeably been observed but the dose of 50 ppm with 1724 kg per hectare than other hormones level were concentrations of 5 and 250 ppm respectively in 1600 and 1623 kg b Statistical acres located on the surface were treated with control 1490 kg ha shoot dry weight in Table 4-9 were statistically c.

In various periods of growth that gibberellins acid treatment at the time of eruption before flowering in the treated group had found a weight was 1627 kg ha. And flowering periods of growth and Pod set respectively in 1606 and 1522, respectively, in b and c were statistically.

The interaction of growth hormone gibberellins and vegetative period before flowering and stem dry weight most control treatment having the lowest shoot dry weight was. So that a concentration of 50 ppm gibberellins Hormones during vegetative growth before flowering with 1693 kg ha has the highest shoot dry weight. And the other treatments were next in ranking.

Younger stems much of the hormone acts on it would be more, because growth is still not complete, the most effective dose given was 50 ppm, then we can say: because the dose of 250 ppm is more work than most 50 ppm no deterrence because hormone concentrations are high.

3.4. Morphological characteristics of plant

3.4.1. High plant

Different doses of the hormone gibberellins acid on plant height in a bean is a significant percentage of time the hormone acts on the surface of a bean plant height percentage has a significant interaction of hormone levels during exercise is a significant percentage.

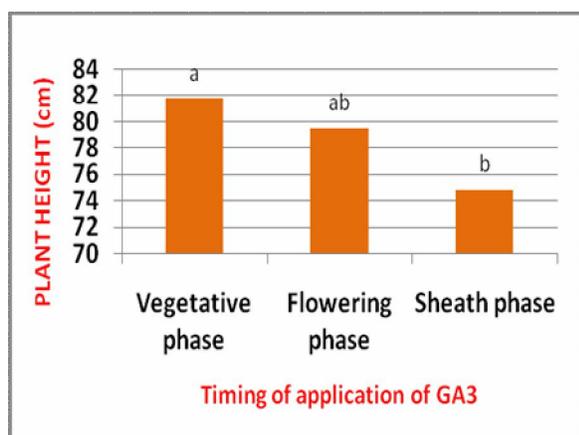


Fig5. High plant at different stages of growth

Dose hormone gibberellins acid 50 ppm maximum 85.56 cm plant height compared to other hormone levels have been in a treatment group and the doses were again placed in the next rank and control the height of the 71.23 cm All lower level d were statistically.

In between periods of growth there was no significant difference but a significant growth period

before flowering greatest height 81.72 cm was located in a statistical exercise and other times were lower in rank.

In examining the interaction term growth hormone and stem height above the vegetative growth period was such that concentrations of 50 ppm cm 46/91 vegetative period before flowering stems have the highest elevation and the elevation control or due to actions Not all hormones were lower (Fig5)

Hormone gibberellins acid hormone that is involved in cell division, the young stems than the high quality of these hormones are also concentrations of 50 ppm to 250 ppm might be more effective deterrent because high concentrations of hormone.

Daykin, Scott, Francis and Causation, 1997), Stewart (1977), Al-Khsswneh, Karam and R.A.Shibli. (2006) believed that which were generally Gibberellins acid impress with cellular processes, including stimulating cell division and cell elongation growth is increasing. Gibberellins role in increasing cell distension through its effect on the osmotic concentration of cell sap is, the somehow stimulate the enzyme activity by causing parser starch hydrolysis of starch can be accumulated by cells that ultimately cause the cells are osmotic potential. Negative intracellular osmotic potential on water exchange within and outside the cell and ultimately affect cells following the water absorption and stretching are suffering from dilated, Gibberellins acid also significantly increased cell wall is opened. This increase may be due to acidification of cell walls and thus absorption of calcium ions into the cytoplasm is, was consistent.

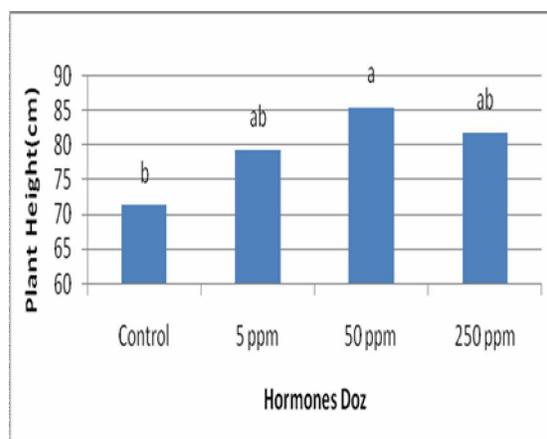


Fig6. Effect GA₃ Hormone on High plant

3.4.2. Number of nodes

Node number of morphological factors is less affected by environmental factors placed. This attribute is located less controversial, but studies done in the way

when you can sub in numbers and performance is somewhat effective

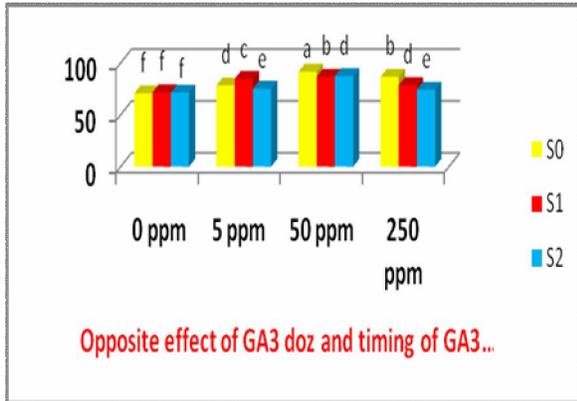


Fig7. Interaction GA3 & different stages of growth On node high plant

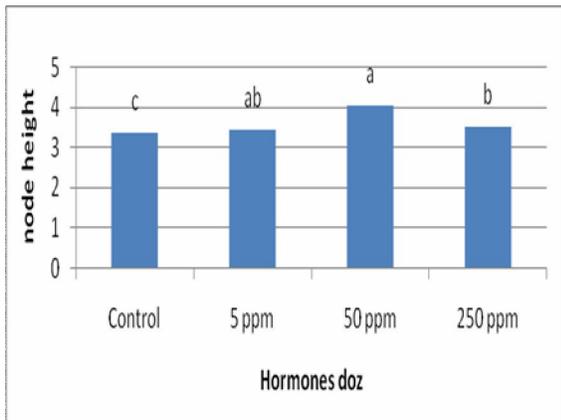


Fig8. Effect GA₃ Hormone on node High plant

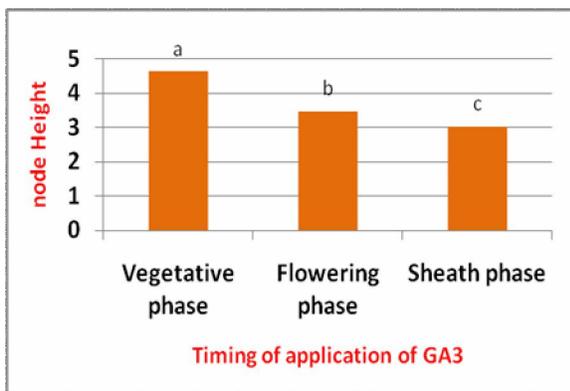


Fig9. Node High plant at different stages of growth

Dose hormone gibberellins acid level is a significant percentage. Hormone gibberellins acid applied at different growth periods as a percentage level is significant. Interaction between different doses and periods of growth hormone level is a significant percentage Interaction hormone gibberellins acid on the number of nodes at a percentage level is significant.

Different hormones in different doses did not completely clear, but a dose of 50 ppm with number 25.89 knots were in a statistical group and the control treatment having the least number of nodes and other concentrations were located between the two doses.

Vegetative period before flowering with 25.28 count the number of nodes than most other developmental courses ranked in the treated group was a fact. Other periods of growth were the next in rank.

Interactions of gibberellins acid on growth Vdvrh vegetative growth before flowering period with 50 ppm concentration has the highest number of nodes compared to other treatments and was in a treatment group and other treatments in rank and were statistically lower.

Morphological trait is the number of nodes, hormone dose 50 ppm in the most effective growth Period before flowering has had on the number of nodes, perhaps because of this characteristic of the environment takes less tangible changes have been too. With the above results and Saeed Abdul (1997) stated that GA is effective on the trait was consistent number of nodes.

3.4.3. Internodes length

Legume genotypes during early growth of plants having a high dry mass and grain products tend to have wings. Genotypes can be appropriate and applied growth regulators like gibberellins foreign to these results can be achieved(3).

Dose hormone gibberellins acid in a significant percentage is applied in different periods of growth hormone also was significant at 1% level, and interaction different periods of growth at 1% were significant.

Dose of the hormone gibberellins acid maximum height of internodes 4.07 inches compared to other hormone levels have been in statistical was. Other doses differ quite significantly with this level did not have the lower levels were.

Hormone actions in the period before flowering vegetative internodes length with maximum height of 4.62 inches were followed and the course gave a statistical level, other courses at the next level were b and c.

The interaction of hormones in exercise time and height difference between nodes, but not quite obvious all doses 50 ppm hormones before flowering

vegetative period of the node with the highest (3.78 cm) were.

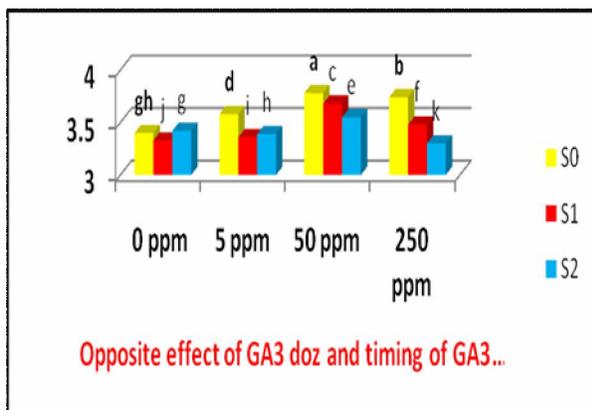


Fig10. Interaction GA3 & different stages of growth On number High plant

Because of the obvious differences of hormone gibberellins acid on internodes length were observed can be said that this morphological trait is less than the effect of the environment, but such a dose of 50 ppm during the vegetative growth before flowering than other levels and courses Top of the node created is better to say that external plant hormones at the time of eruption to get better.

The hormones in cell division and cell elongation is effective and sub-branches of the nodes there are, whatever nodes have more and more space are perhaps counting the number of nodes that are affecting the performance increase was consistent(11).

4. Discussion

Production, solar energy received by the practice and transforms it into food and other usable materials. Agronomic practices generally, are designed to get some kind of light through the cover to completely change the density of ground vegetation, and spacing of plants and spread rapidly increasing Leaf, drawn up(2, 3).

LAI is a measure of the total surface of the leaves in a unit area regardless of leaf age, position, angle and thickness and other characteristics such as leaf color, fluffy and degree of the tube to be calculated. Increase the speed of LAI is important because it determines the rate of plant photosynthesis capacity expansion is considered the beginning of bean vegetation growth was very slow so that the growth of nearby weeds will not compete was the need for weeding will be done in time if the reproductive period of plant photosynthesis and transport materials for construction materials up to a maximum of their pay, LAI is a good bean yield will also increase (12, 14).

4.1. Process of leaf area changes

LAI important factor in plant production and performance is what the plants ability to absorb carbon dioxide is more efficient in producing dry matter also will be a larger share, at the beginning of the growing trend of increased plant leaf area is small but quiet, near Flowering time the process reached its peak and then everything that the aging of plant leaves near the bottom because we lost production and the consumer will somehow be decreasing trend (12) Height, stem length or in other words one of the main and important criteria for plant quality is expressed. Strength stems should be able to partially weight of flowers, pods and seeds inside the pods to tolerate, given the role that stem remobilization photo assimilate to other organs such as root and requires that the terminal buds, shoot length specified is important, so that it surrounds the ability to shoot up the environment and can have a good competitor for weeds is grown (18, 19).

Test Hardtke, (2003) Effect of gibberellins on the shoot outside the plant height were observed, this increase in shoot length due to the effect of this substance in plant growth is facilitated, so that gibberellins acid stimulates cell division and accelerates a length and cell enlargement it provides.

Abdul (1984) Gibberellins acid, as has the increase in stem length and diameter of plant seedlings has been

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Personal Empowerment among Al-Anon/Nar-Anon Members in Iran

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Abstract: As addiction affects not only on addict person but also on family members, so relationship behaviors is an important part of codependents' life which needs to recover in order to achieve health promotion. This study investigates to find whether the "12-Step Program" empowers families of addicts/alcoholic in term of relationship with others or not. In other words, this study aims to find differences of relationship behaviors by comparing families of addicts/alcoholics who practice the "12-Step Program" and who do not. Theory of empowerment is the key theory to conduct this study. The findings of this study indicate that the "12-step program" is an effective program to enables codependents to improve their relationship with others in comparison with those who do not practice this program (control group). In other words, independent samples t-test reveals that codependents' relationship behaviors are recovered duo to practicing the "12-Step Program" in Al-Anon/Nar-Anon groups in Iran.

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Keywords: 12-Step program, Addiction, Al-Anon & Nar-Anon, Codependency, Families of Addict, personal empowerment.

1. INTRODUCTION

Bournes (2008) defined codependency as the tendency to put others needs before own needs. A codependent ignores his/her feelings, enquiries and desires for others' sake. In fact their satisfaction depends on how well other people satisfy with them. Moreover, their self-esteem constructs based on taking care and solving problems for others.

Co-dependency may be obvious in various conditions. But, most simply recognized in families of addict/alcoholic (Beattie, 1989). On the other side, the results of various surveys carried out by the *Islamic Culture Ministry* (2007), showed that addiction is the first social harm in Iran (Iranian Attitude toward Drug Abuse, 2004 & 2008). Although the area of substance abuse and alcoholism was studied globally, but there is not much research about codependency syndrome particularly in Asia.

To discovering more about codependency, the following characteristics were found by Weinhold and Bradshaw (2008), which are related to their relationship with others such as clings to others, other-centered, addicted to people, craves intimacy and closeness.

Moreover Weinhold and Bradshaw (2008), stated some characteristics related to controlling behavior for recognizing Co-dependency. They believe people with codependency troubles are people-pleasers who try to control others' understandings and make a good influence on them. They have a lot of skills in

controlling others. They try to control everything and everywhere, but their efforts will be failed because it is an impossible task.

In this situation, certain tools are needed to empower codependents so that they will be able to find themselves and return to the reality. The empowerment theory states that individuals can control their own lives by empowering or improving their resources (Rowlands, 1997).

Based on this theory, families need to gain the ability to achieve their highest personal and collective aspirations and goals (Robbins, Chatterjee & Canda, 1998). In fact, empowerment is about seeking to increase awareness about the issues surrounding codependents and trying to provide general education for families, which means that codependents need to empower themselves through education and support.

As stated above, troubled relationship is one of the problems among codependents and they need to recover their wrong relationships with others. In other words, empowerment is the process by which people come to have control over their lives. improvement of individual power or strength, the capability of taking action, or developing the ability of communication are the further implication of empowerment phenomenon at the individual level (Schultz, 1980).

Also Weinhold and Bradshaw (2008) in *Breaking free of the Codependency Trap* mentioned that people who is recovered from codependency have close relationship with others without fearing that they

would forget their needs.

Additionally, Patty Simko (2006), in her documents about codependency, mentioned two important behaviors. She believes if codependents worked on accepting others as they are without trying to change them for their needs, they can help their recovery process. When they learn to accept others' faults, failures and inadequacies, they can refrain from giving advice or trying to fix others unless they are asked for help.

In terms of recovery programs, Al-Anon & Nar-Anon are two community resources (founded in 1951) that provide support to anyone affected by a relative or friend's drinking or drug abuse (Fisher & Harrison, 1999). The concept of this program is back to the 12-step program designed by Alcoholics Anonymous (AA) which was founded in 1935 (Lowinson, et al., 2004).

One essential core of Al-Anon/Nar-Anon groups is the sense of friendship with those who have same problem. As Rowlands believed that sharing experience with others who have same problem is one important way to empower a person (ÖSTE, 2003). So that, based on two reasons the most important tool of this recovery program is the fellowship of the group. Firstly, this factor gives the person an opportunity to be with people who are talking about the disease and recovering from it. Secondly, 12-step groups such as Al-Anon/Nar-Anon are the most likely place to surround him/herself with those who will support him/her in his/her efforts, and those who are striving to live by new rules. Such environments will support their efforts to recover (Greenberg, 1994).

Consequently, this study examines the practicing of the 12-step program and finding its result on "relationship with others". Comparing Experimental group and Control group to each other attempted to answer whether there are any significant differences in relationship with other behaviors between two groups of codependents or not.

2. METHODOLOGY

Shiraz City in southwest of Iran was chosen as the research scope because of the high rate of addiction in this city. As this research was designed based on causal comparative design so, two sets of data were chosen from two populations (Gay, Mills and Airasian, 2006).

Four meetings of Al-Anon/Nar-Anon groups in Shiraz city were considered as the first population. The second population was families who conveyed their addicts/alcoholics to the recovery camps. They did not practice 12-step program. As in causal comparative design 30 person for each group is an

accepted number as a sample size (Wallen & Fraenkel, 2001) so 60 families were chosen randomly for two groups.

One important factor in causal comparative design is homogeneity between two groups as experimental and control groups. Based on this factor, groups should be matched to each other on one or more criteria. By this way these important criteria can be controlled by researcher and making sure that only independent variable has effected to group (Wallen & Fraenkel, 2001).

As mentioned in the previous paragraph, Use of Tranquilizers by families, participate in other programs (except of 12-step program) and attending psychotherapy continually were considered as three control variables which were controlled by researcher.

Five-point Likert scale ranging from (1) "strongly agree" to (5) "strongly disagree" was employed to measure each item of questionnaire. As all items are negatively worded so the score is started from 1 to 5.

3. RESULTS AND DISCUSSIONS

The main subject of this study is family of addict. Families who suffered from addiction show some signs of codependency in their relationship which is needed to recover by appropriate program like the 12-step program. Based on the literatures codependents have many problems in their relationship with others.

Fifteen items were analyzed individually in the relationship part. The mean ratings, standard deviations, t-value and p-value were run for both experimental and control group. Based on literature the most important subject which is considered in this part is external focus such as: importance of other judgment, other needs-centered, controlling behavior and lack of self-esteem.

Table 1 shows significant differences in fourteen items between families who practice the 12-step program and families who do not practice this program. In other words, families of addicts who practiced the 12-step program were normal in their relationship with others. On the other hand families who did not practice this program had problems in their relationship with others.

Bibee (2005) believes rescuer in codependency is one of the roles that codependents play. In other words, a rescuer takes responsibility for someone else's problems. At first glance, this may not seem to be a bad thing, but this role is like an arsenal of weapons that defend the codependent contracts and helps to keep these relationships stable.

Table 1: Relationship Items of Two Groups

Statement	Mean	SD	t-value	p-value
I always have an intention to help the people in need				
Ex-group	2.70	1.23	1.94	0.05
Co-group	2.13	1		
I lose my self-esteem confronting capable people				
Ex-group	3.97	0.92	5.68	0.000
Co-group	2.40	1.19		
Others behaviors is not acceptable for me				
Ex-group	4.13	0.73	6.48	0.000
Co-group	2.60	1.07		
I am excessive generous for my family				
Ex-group	3.13	1.33	4.35	0.000
Co-group	1.83	0.95		
My family can make me angry or sad by their behavior				
Ex-group	3.43	1.30	6.83	0.001
Co-group	1.60	0.67		
Saying No is too difficult for me				
Ex-group	4.27	0.78	9.66	0.000
Co-group	2	1.01		
I try to satisfy others				
Ex-group	3.07	1.46	5.39	0.000
Co-group	1.50	0.63		
My family's preference is more important than mine				
Ex-group	3.50	1.22	3.49	0.003
Co-group	2.43	1.13		
I am ready to help anywhere, anytime for anyone				
Ex-group	2.97	1.12	4.06	0.000
Co-group	1.80	1.09		
I often change my behavior for compatibility with others				
Ex-group	3.47	1.40	3.51	0.002
Co-group	2.27	1.20		
My relationship with my family is going down the hill(trouble)				
Ex-group	4.10	0.48	6.64	0.000
Co-group	2.57	1.16		
Other's judgment about my behavior is important to me				
Ex-group	3.53	1.10	5.12	0.000
Co-group	2.13	1		
I try to solve people problems				
Ex-group	3.57	0.93	7.93	0.000
Co-group	1.83	0.74		
I feel responsibility toward others' mistakes				
Ex-group	4.30	0.79	9.76	0.000
Co-group	2	1.01		
I must control everything otherwise we encounter with troubles				
Ex-group	4.10	0.96	8.32	0.000
Co-group	2.03	0.96		

In this study, the researcher examined differences between two groups of families and found out the 12-step program made significant differences in codependents' behavior in terms of responsibility for others' need. On the other hand, families who did not have experience of the 12-step program, play rescuer role in their life. They are excessive generous for their family. It means family members preference are definitely more important than theirs (Ajri & Shatar, 2010). Moreover they are ready to go wherever their help is needed, and feel responsibility towards others' mistakes. Furthermore they try to satisfy others by solving their problem.

To support this finding, Wise and Ferreiro (1995) found common elements through their seeking process on nurses. They found that external focus, caretaking and boundary problems are the main characteristics of nurses as codependents. Another significant finding in this study was control, particularly when nurses dealing with non-compliant patients. This study also found the significant difference in terms of controlling behavior between ex-group and co-group.

Based on the present research's findings, families who did not practice the 12-step program felt that, it is an obligation for them to control everything otherwise they encounter with troubles, and they cannot accept other's behaviors. On the contrary families who practice the 12-step program do not have controlling behavior about people or family. In other words, they recovered their relationship with others. The mean scores of two groups show significant differences between families who practiced the 12-step program and those who did not practice this program.

Moreover, Gehert (1993) stated family of special child tell themselves their personal needs and desires are unimportant next to their child's. Codependents find themselves saying yes when they mean no, doing things they do not want to, and not doing the things they desire. This can extend beyond the immediate family into all codependents' relationships, so that they let everyone take advantage of them. Finally stress, feeling used, depressed, and angry are appeared (Ajri & Shatar, 2010).

In this study, relationship with others was examined to identify differences between families in ex-group and co-group. Researcher found families who did not practice the 12-step program show signs of codependency in their relationship. For example they lost their self-esteem confronting capable man, saying no was too difficult for them, they often changed their behavior for compatibility with others, and other's judgment about their behavior was important to them.

On the other hand, independent samples t-test

revealed families who practiced the 12-step programs differed significantly from another group in their relationship with others. In other word, codependents that practice the 12-step program were improved in relationship with others rather than another group.

The only item that Independent samples t-test showed no significant difference in the mean score was: *I always have an intention to help the people in need*. This item among other items had similar answer among experimental group (mean = 2.70., SD = 1.23) and control group (mean = 2.13., SD=1) with $t(60) = 1.94, p < 0.05$ (refer to Table 1).

4. CONCLUSION

Health promotion occurs in processes of enabling people to grow personal skills, to support and develop helpful situations and communities in order to represent community development. One important part of health promotion approach is self-help group which needs to consider in every community. In other words, health promotion is about empowering people to have more control over their lives, which can be occurs in self-help groups such as Al-Anon/Nar-Anon.

One of the most common themes in the self-help group research is empowerment (Cheung, Mok & Cheung, 2005). Personal empowerment happens after an individual joins the self-help group. Many findings have supported a positive relationship between self-help group participation and empowerment, and its consequences. As members interact with each other to make meaningful changes, empowerment occurs. If group members are empowered, they achieve the ability of collecting the profits of self-help group activities (Cheung, Mok & Cheung, 2005).

The present study, which was conducted in Iran, found significant differences between personal empowerment among participants' and non-participant codependents of the 12-step program.

The result of this study suggests that empowerment can refer to the occurrence of changes of the individual in personal qualities such as relationship with others. Changes in attitudes and skills related to interaction with other people such as the ability to say No to others, not be a controller, not be responsible for the problems of others, not be eager in caring too much for others, which may be classified as interpersonal empowerment (Rowlands, 1997)

As community development seeks to empower individuals and groups of people, by the skills they need to defend on their own behalf, improve their healthy lives, consequently self-help groups like "12-step program" can be one of the most important components to reach these goals.

Moreover sharing the experience with other

members who have same problems in their life in Al-Anon/Nar-Anon groups will empower families to solve their difficulties through practicing 12-step program (Ajri & Shatar, 2010). The present study revealed that personal qualities were changed among codependents in experimental group by practicing 12-step program and it leads to promote their relationship with others despite of control group.

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Effect of different doses of the hormone gibberellins acid on the process of protein changes in bean plants***Somaye ghalandari¹, Tayeb Saki Nejad², Shahram Lack³**

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Abstract Due to poor land of Khuzestan and land pollution due to application of chemical fertilizers, use of materials that can no harmful effects on the environment, planting with very low doses, had positive effects on plants have quality performance, it seems necessary. Why research in this area in order to affect hormone levels and time use gibberellins acid (GA3) on the process of change and increasing amounts of protein bean seeds, bean seeds to increase the quality performance (*Vicia FabaL.*) were performed. The research farm located in the city Hamidieh hashemi research during the season and in 2010 was done, figure used in this experiment using BARAKAT variety. Use design was factorial experiments in randomized complete block design with three replications. Factors tested included four concentrations of the hormone gibberellins acid: (no hormones = d_0 , $d_1 = 5$ ppm, $d_2 = 50$ ppm and $d_3 = 250$ ppm) and the second factor the third period, hormone sprayed: (phase of eruption = s_0 , Flowering = s_1 and phase pod set = s_2), respectively. Measuring grain protein levels indicated that the hormone gibberellins acid spray treatment growth period increased grain protein and the greatest amount of protein in the amount of treatments d_2s_0 , d_1s_0 and 29.28 percent, respectively. . [Somaye ghalandari, Tayeb Saki Nejad, Shahram Lack. Effect of different doses of the hormone gibberellins acid on the process of protein changes in bean plants. Journal of American Science 2011;7(6):45-49]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Bean, the hormone gibberellins acid, proteins**1. INTRODUCTION**

The seed storage proteins are N, polymeric amino acids that are bound together by peptide bonds have been necessary for seedling growth are 20 types of proteins are composed of amino acid, all of which exist in nature. Of being more or all amino acids together different protein molecules there are so very large molecules, proteins, complex and high molecular weight and their chemical diversity is limited, if sometimes crude protein as protein is used instead of why crude protein, protein compounds that also encompasses. And this figure is the same method of calculation Kjeldal nitrogen and beat up the conversion ratio, usually 6.25 is obtained. The grief can simply use value crops such as cereals and legumes to supply enough energy is so, can the amount of protein required and sufficient to meet the body, in addition to protein quantity and value, quality and biological value must also be considered.

Important Prvlamynhay Zyyn in cereals including maize, wheat gliadin in the atmosphere is Hvrddyyn. Glvtlynhay some important crops include maize Zkayyn, glutenin in wheat, barley and Avryzyny Hvrddyyn in the rice, some of the major globulin in seeds include legumes legumin, Veisi Lane, Glysy Nin, and Rashyn Vygnyn. in germination, proteins into amino acid hydrolysis and are then transferred to the embryo axis to be there with a new composition and protein taken together constitute Make a mix of amino

acids is balanced. For this reason, buds and seeds with high protein quality are excellent and in large quantities are used in human food, because seeds of cereal protein are substantially in the food industry, as a puree in food manufacturing, such as used Noodles.

Plant hormones that regulators are produced by the plant and within plant normally produces from the impact transferred to the place, where they affect physiological processes. So the hormone regulators are naturally found in plant while in general, regulators can also be natural and synthetic hormones, so all are not. Configuration is based on work that they do their names are different, such as hormones, growth and flowering material (2).

Currently the world's five groups of known plant regulators, many of which have practical applications in agriculture are large and important. These groups are: is auxin, gibberellins, the cytokenin, the ethylene, inhibiting substances (Asfanva, 2008)

2. Material and Method

This test Crop year 2010 on the farm located in the village of Sayed Hossein HASHEMI Hamidieh city was conducted.

Place testing semi arid dry climates and low temperatures are 4 - and the highest degree of temperature 51.8° C, average annual temperature in the station 23.9 ° C has been reported.

The statistical test of the factorial design are equally important in terms of factors examined in a randomized complete block design with three replications was.

D: Different concentrations of the hormone gibberellins acid.

S: Bean plant growth in different periods.

(d0 =No hormones, d1 = 5ppm and d2 = 50ppm and d3 = 250ppm (and the second factor for three phase bean plant growth hormone gibberellins acid spraying include: (s0 =vegetative phase, s1 = flowering phase and s2 =phase Pod set)

To review the growth and dry matter accumulation bean plants were sampled action. Sampled from all plots to 15 days away from each other during the eighth stage was performed. Three lines for the sample was determined after removal of the top 50 cm Down each line as sidelines, three plants randomly taken from each plot and the plastic bag with a label to each plot and samples were transported to the laboratory and measured.

At the end of each growing season, seed treatment to measure 20 grams protein seeds Kjeldal method to estimate the elements were sent to specialized laboratories.

3. Result

Percent Protein

Of bean plants are important sources of protein, more protein in the leaves of beans and seeds are collected and globulins been more than kind and amount of amino acids cysteine, glutamic acid, arginine and ammonia nitrogen that is less, dependent on the nitrogen percentage Protein has a higher protein nitrogen everything will go well above (5).

Gibberellic acid at a dose level of 1 percent is significant, the different developmental courses of any level is not significant, dose interaction gibberellic acid and different periods of growth at 1 percent is significant (3).

Doses of 5 and 50 and 250 ppm compared to the control levels were statistically a higher protein value.

Long period of vegetative growth before flowering with (28.98 percent protein) has the highest percentage of protein and were in a statistical level, the rest period of growth in the levels were statistically lower levels.

The interaction of dose and period of growth hormone on protein and nitrogen developmental growth period before flowering and the dose of 5 and 50 and 250 ppm respectively, with values 29.97 and 29.83, and 30 percent of the highest statistical level, a comparison Others have gained and (Chart 1,2).

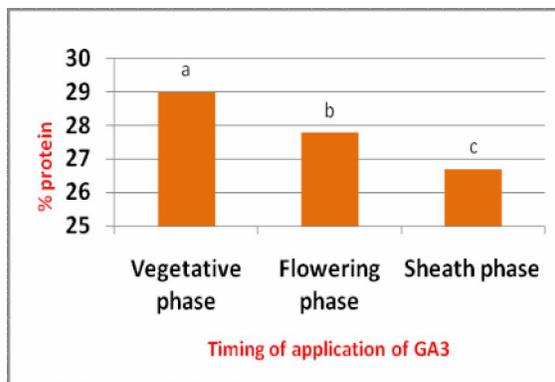


Fig1. Effect timing of application of GA3 on % protein

Perhaps because the hormone synthesis and plays a role in attracting more Assimilate protein, followed by large amounts of protein.

With the above results and by Shft and Shabana Ullah and colleagues reported that the GA is an effective role in protein synthesis and cell enlargement are the hormones produced in the fruit seeds and sprayed it increases the quantity and quality of fruit is (15).

Combinations of growth hormones and regulators through increased construction activity RNA and RNA polymerase proteins, the rate of construction increases was consistent (17).

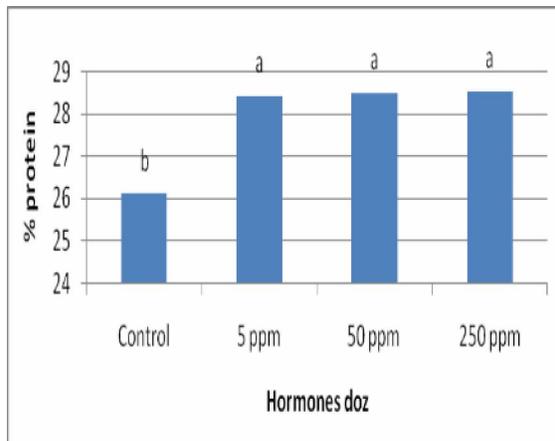


Fig2. Effect hormone doz GA3 on % protein

Percent nitrogen

Structure of protein synthesis and amino acid nitrogen than is the main protein that whatever goes up BFM high nitrogen and high in protein will be gone (small building).

Dose Hormone Gibberellic acid at 1 percent is significant, the hormone acts on the percentage of time means nitrogen is the interaction of different doses and periods of growth hormone level is a significant one in (Table 4-3).

effect of dose on the percentage of nitrogen, all doses of 5 and 50 and 250 ppm respectively, with values of 55 quarters and 56 quarters and 50 quarters at the level of statistical a are located only control treatment is that in statistical b is located.

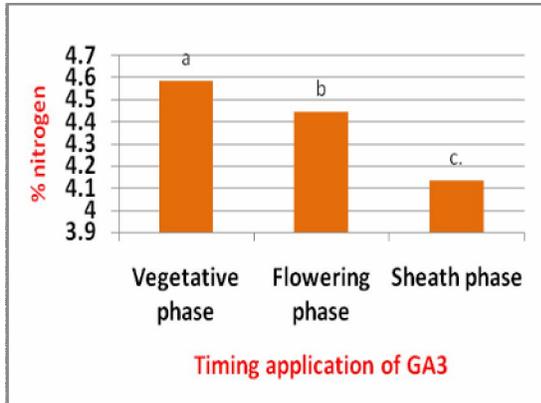


Fig3. Effect timing of application of GA % nitrogen

Effect of hormone actions in the time period before flowering eruption rate 4.58 percent nitrogen was in statistical and developmental courses set pod up gradation value 4.31 percent were located in c statistics. The interaction of hormone dosage and time of hormone actions vegetative growth before flowering period with a dose of 5 ppm and 50 ppm respectively, with values of 79 quarters and 4.80 percent were in a statistical treatment and control without taking hormone with 4.18 percent statistical level f is the lowest level was statistically.

The nitrogen and protein are dependent; high-protein nitrogen will rise.

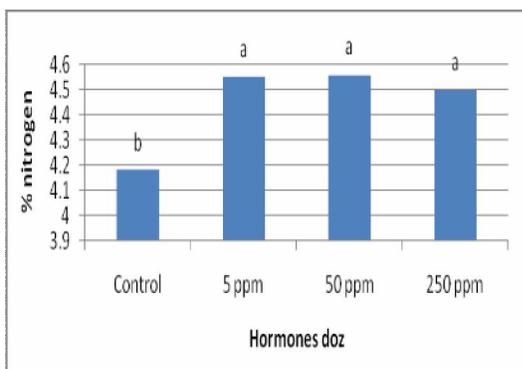


Fig4. Effect hormone doz GA3 on % nitrogen

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Enhanced Production of Biosurfactant from Isolated *Pseudomonas* Sp Growing On Used Edible Oil¹Soniyamby A.R., ²Praveesh B.V., ³Vimalin Hena J., ⁴Kavithakumari P., ¹Lalitha S and ¹M Palaniswamy

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Abstract: The production of surface active compounds or biosurfactants by microorganisms has been a subject of increasing interest in recent years especially due to the potential applications in enhanced oil recovery. A number of studies have indicated that the type of medium and growth conditions can influence the type and yield of biosurfactants. The present work demonstrated that the isolated bacteria, *Pseudomonas sp* from used edible oil was able to utilize the used edible oil as carbon and energy source to produce rhamnolipid at a concentration of 7.6 g/L. The temperature, incubation period, and nitrogen source optima of biosurfactant production was found at 36 °C, 72 hr and sodium nitrate respectively.

[Soniyamby A.R., Praveesh B.V., Vimalin Hena J., Kavithakumari P., Lalitha S and M Palaniswamy. Enhanced Production of Biosurfactant from Isolated *Pseudomonas* Sp Growing On Used Edible Oil. Journal of American Science 2011;7(6):50-53]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Rhamnolipid. *Pseudomonas* sp. Used edible oil. Biosurfactant

1. Introduction

Surfactants are amphiphilic molecules that tend to lower the interfacial tension. Biosurfactants are microbially produced surface-active compounds. They are amphiphilic molecules with both hydrophilic and hydrophobic regions causing them to aggregate at interfaces between fluids with different polarities such as water and hydrocarbons (Banat, 1995; Fiechter, 1992; Georgiou *et al.*, 1990 and Karanth *et al.*, 1999). Biosurfactants are widely used in the petroleum, pharmaceutical, cosmetic and food industries. Most of these compounds are chemically synthesized and it is only in the past few decades that surface-active molecules of biological origin have been described. At present biosurfactants are readily biodegradable and can be produced from renewable and cheaper substrates, they might be able to replace their chemically synthesized counter parts (Arino *et al.*, 1996).

Various types of biosurfactants are synthesized by a number of microbes particularly during their growth on water-immiscible substrates. A majority of biosurfactants are produced by bacteria. Among them, the *Pseudomonas* species is well known for its capability to produce rhamnolipid biosurfactants with potential surface-active properties when grown on different carbon substrates. Rhamnolipid biosurfactants produced by *Pseudomonas aeruginosa*, in particular offer special advantages because of their potent emulsifying activity and low critical micelle concentration (Cooper *et al.*, 1981).

There are several renewable substrates from various sources, especially from industrial waste have

been intensively studied for microorganism's cultivation and production at an experimental scale. The genus *Pseudomonas* is capable of using different substrate such as glycerol, vegetable oil, mannitol, fructose, glucose, n-paraffin, soap stock, molasses, to produce rhamnolipid type biosurfactants.

Used edible oils and fats are considered as a problematic waste, contributing to the environmental pollution. It is well known that microorganisms are able to grow on vegetable oils or fats and produce new products with potential industrial application such as lipase (Haba *et al.*, 2000) and biodiesel (Alcantara *et al.*, 2000 and Haba *et al.*, 2000) and used olive or sunflower cooking oil as carbon source for biosurfactant production.

The purpose of this work was to study the production of rhamnolipid-type biosurfactants by a strain isolated from used edible oil and produce biosurfactant using used edible oil as energy source, as well as to evaluate different production parameters on biosurfactant production.

2. Materials and Methods**Bacterial isolates:**

Pseudomonas sp was isolated from used edible oil. The culture was identified as per IS 13428:1998 Annex D.

Screening for Biosurfactant Activity:

Biosurfactant activity of isolated *Pseudomonas* sp was detected by using oil-displacement method (Youssef *et al.*, 2004 and Praveesh *et al.*, 2010]. Forty milliliters of distilled

water was added to a petri dish followed by the addition of 10 µl of crude oil to the surface of the water, ten µl of sample was added onto the centre of the oil film. The diameters of the clear zone on the surface were measured and compared with control using uninoculated medium.

Biosurfactant Production using different carbon source:

Production of the emulsifier was carried out in 250 mL Erlenmeyer flasks containing 50 mL of the medium composed of (g/l): KH₂PO₄: 0.5, K₂HPO₄: 1, KCl: 0.1, MgSO₄.H₂O: 0.5, FeSO₄.7H₂O: 0.008, CaCl₂: 0.05, Urea: 6 and 0.05 mL of trace elements solution (Br: 0.026, Cu: 0.05, Mn: 0.05 and Zn: 0.07) (Sifour *et al.*, 2004), carbon source (used edible oil, rice water, diesel, petrol and whey) was added at 4% (wt or vol/vol), pH was adjusted to 7.0. The medium was inoculated with 5% of the 18 hours bacterial culture grown on nutrient broth. Incubation was carried out at 37 °C in an incubator shaker at 150 rpm for 48 hours.

Quantification of Biosurfactant:

A modified orcinol method was used to assess the amount of rhamnolipids in the sample (Chandrasekaran *et al.*, 1980). A volume of 200 mL of the acidified culture supernatant was extracted three times with 1 mL of diethyl ether, and then the fractions were pooled, dried and resuspended in 1 mL of 0.05 M sodium bicarbonate. A 200 mL sample was treated with 1.8 mL of a solution of 100 mg of orcinol in 53% H₂SO₄ and boiled for 20 min. After cooling at room temperature for 15 min, the A421 was measured. Rhamnolipid concentrations were calculated from standard curves prepared with L-rhamnose and expressed as rhamnose equivalents (in milligrams per milliliter).

Optimization of culture conditions:

The factors such as temperature, incubation period and nitrogen sources affecting production of biosurfactant were optimized by varying parameters one at a time. The experiments were conducted in 200 mL Erlenmeyer flask containing production medium. After sterilization by autoclaving, the flasks were cooled and inoculated with culture and maintained under various operational conditions separately such as temperature (20, 25, 30, 35 and 40 °C), incubation period (24, 48, 72, 96 and 120 h), and nitrogen source (ammonium sulfate, sodium nitrate and urea each at 0.5%). After incubation the culture filtrate was assayed for biosurfactant productivity.

Determination of the emulsifying activity:

To estimate the emulsifying activity, two equal volumes of supernatant and different hydrocarbon such as kerosene, sunflower oil and petrol (2mL each) were added in a test tube and mixed at high speed for 2 min. The emulsion stability was determined after 24 hr. The emulsification index, E24 (%) was the ratio of the height of the emulsion layer by the total height of the mixture (Iqbal *et al.*, 1995).

Result and Discussion

Isolation and Screening of Biosurfactant Producing *Pseudomonas* sp:

A total of 13 strains of *Pseudomonas* sp were isolated from used edible oil. All isolates were screened for extracellular biosurfactant by oil displacement method. Of these, one strains showed very strong positive reactions indicated by clearing of oil more than 6mm in diameter. The bacterium was identified as *Pseudomonas* sp (Table 1) and used for further study.

Table 1. Identification of *Pseudomonas* sp

Test Performed	Results
Gram staining	Gram Positive
Morphology	Rod
Skim milk agar	Greenish yellow colony with clearing of medium
Oxidase test	Positive
Catalase test	Positive
Hugh-Liefson test	Non fermentative
Gelatin Liquefaction	Positive
Asparagine proline broth	Turbidity, Fluorescence under UV

Biosurfactant Production:

Biosurfactants can be produced with high yield by some microorganisms, especially *Pseudomonas* sp. (Maneerat, 2005). The *Pseudomonas* sp used in this study, produced rhamnolipid biosurfactants of 2.24 g/L when grown with used edible oil. The production of rhamnolipid using used edible oil as carbon source was higher than the other sources such as rice water, diesel, petrol and whey (Fig.1). Few reports have been published on the use of vegetable oil as substrates for rhamnolipid production. From olive oil, a production of 2.7 g/L was produced by Haba *et al.*, (2000).

Effect of Temperature on Biosurfactant Production:

Biosurfactant production was studied for different incubation temperature and the result is presented Fig.

2. In our study the maximum production of 2.78 g/L was found at 36 °C. With a rise in temperature the biosurfactant production was decreased. This was in good agreement with the results obtained earlier for biosurfactant from *Pseudomonas aeruginosa* (Praveesh *et al.*, 2010).

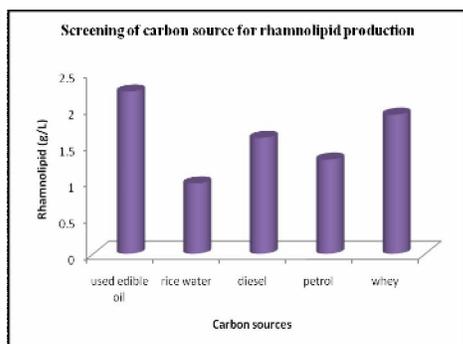


Figure 1

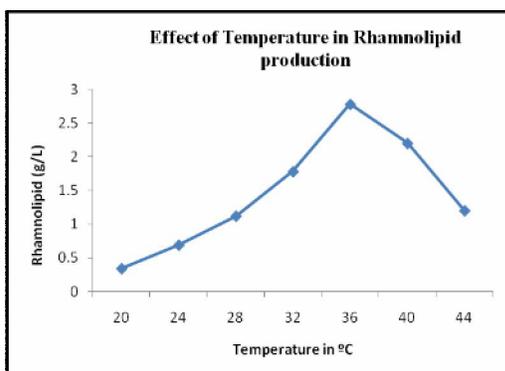


Figure 2

Effect of Incubation period:

The effect of incubation time on biosurfactant production was determined by incubating the culture medium at different time intervals (24 – 168 h) with an interval of 24 h. Rhamnolipid production was found to be maximum (5.86 g/L) at 72 h (Figure 3). The production gradually decreases from 72 to 168 h.

Effect of Nitrogen source:

The nitrogen source can be an important key to aim at increasing the production of rhamnolipids by *Pseudomonas* sp. Different nitrogen sources were tested to determine the best source for biosurfactant production. Figure 4 showed that sodium nitrate (7.6 g/L) is more effective than ammonium sulfate and urea. *Pseudomonas* sp is able to use nitrogen sources such as ammonia or nitrate. However, in order to obtain high concentrations of rhamnolipids it is necessary to have restrained conditions of this macro-

nutrient. Our studies showed that nitrate is more effective in the production of rhamnolipids than ammonia and urea, which is in agreement with other studies reported in the literature (Cooper and Zajic, 1980; Edwards and Hayashi, 1965 and Guerra-Santos *et al.*, 1983).

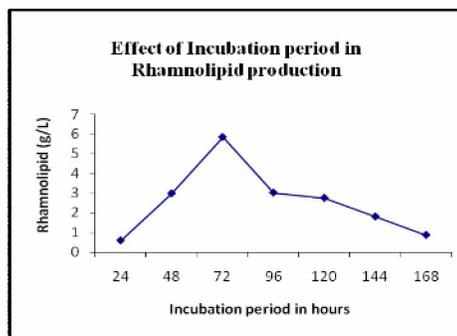


Figure 3

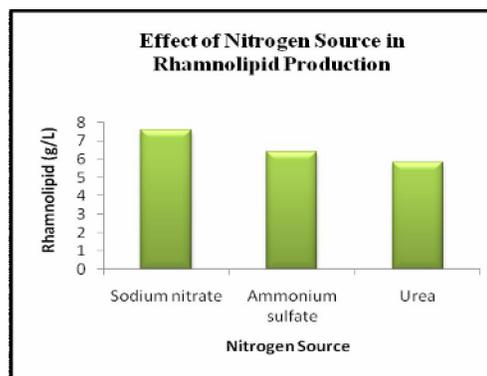


Figure 4

Emulsifying activity:

The highest value of emulsification index (E_{24}) was observed with kerosene (68%) during our study (Fig 5). Sunflower showed lower emulsification index when compared to kerosene, but diesel did not showed much difference.

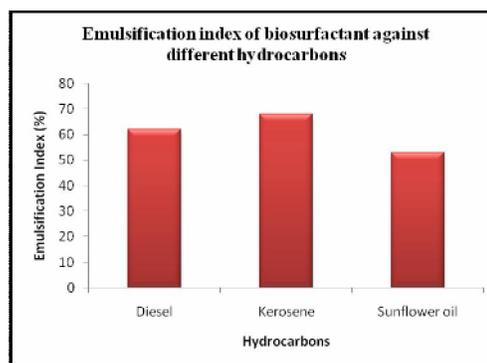


Figure 5

Conclusion

The strain isolated from used edible oil was identified as *Pseudomonas* sp. It has the capacity to use used edible oil as energy sources to produce rhamnolipids, seems to be an interesting and low cost alternative.

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Effect of Nursing Management Protocol on Selected Side Effects of Interferon and Ribavirin among Hepatitis C Patients

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Abstract: Interferon related side effects need extensive researches especially the management strategies of these side effects are available. This study was carried out to assess the effect of nursing management protocol on selected side effects of Interferon and Ribavirin among hepatitis C patients. A convenience sample of 60 hepatitis C patients of both sexes in liver out patient clinic at Shebin El- Kom teaching hospital was selected for data collection. Tools for data collection included Tool 1: Structured interview questionnaire. It includes 3 parts to assess medical data and knowledge of patients. Tool 2 : Fatigue severity scale to measure fatigue severity among studied sample. Tool 3: Anxiety scale to assess the anxiety level of studied sample. All studied sample had several complains related to Interferon before giving the nursing management. Also there were statistical significance differences in all laboratory findings and body temperature before and after the study by 8 weeks. There were statistical significant improvement of the knowledge after 4 and 8 weeks from beginning of the study. Also, there was significant improvement in anxiety and fatigue level after 8 weeks from beginning of the study. It is concluded that: nursing intervention and knowledge about chronic hepatitis C, its treatment and management of Interferon related side effects seemed to have positive effects on improving patients knowledge about diseases and managing side effects of treatment and self care modalities that reflected by improvement in laboratory findings, vital signs, patients complains, anxiety level and fatigue level. It is recommended that: Promotion & enhancement of the self care modalities to the patient; a strict written instruction with pictures about disease process, prohibited and allowed foods, rest and physical activities and follow up should be continued after termination of the treatment through a rehabilitation program.

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Keywords: Nursing management protocol, selected side effects, Interferon and Ribavirin, Hepatitis C

1. Introduction:

Hepatitis C virus (HCV) primarily attack the liver and the chronic hepatitis C infection is now recognized as an important and global health care problem that afflict about 170 million individual world wide⁽¹⁾. Epidemiological data suggested that those with the highest prevalence of HCV are 20-39 years of age. Among those individuals and in the twenty- five years following initial infection, twenty to twenty five percent develop cirrhosis and three to five percent develop fatal complications such as hepatocellular carcinoma which results in an estimated death rate of 8000 to 10000 annually from hepatitis associated chronic liver diseases⁽²⁾.

Liver hepatitis C continues to be a public health problem in Egypt. Its incidence may be increasing and its prevalence is the highest reported worldwide. The overall prevalence of anti HCV was 18.9 %⁽³⁾. While Allen⁽⁴⁾ reported that an estimated 15 to 20 percent of the population has been exposed to hepatitis C compared to less than 5 percent in neighboring Sudan and 2 percent in the United States. In some areas of Egypt the rates are even higher. The

infection rate among Egyptians 10 to 50 years old was 19.4 percent in southern Egypt, 26.5 percent in central Egypt and 28.4 percent in northern Egypt Also in Egypt, patient admission in the National Liver Institute Hospital has been increasing at a very high rate over the past years. In 2002, more than 90,000 patients received treatment in outpatient's clinics and inpatients services that double the number for 1999⁽⁵⁾. But Marwan *et al.*⁽⁶⁾ reported that 10% of Egyptian population has hepatitis B and C viruses

All patients with long term hepatitis C are potential candidates for antiviral therapy. During the last decade, Interferon alfa (INF-a) monotherapy was established as antiviral treatment of choice for treatment of naive patients with chronic hepatitis C for fighting viruses in the body, regulating the reproduction of cells and regulating the immune system⁽⁷⁾. Several small amounts of Interferon is a naturally produced by cells of the immune system of the body. But there have been considerable advances in the treatment of this disease in recent years. Nowadays the most effective and generally available

treatment for HCV is a combination therapy that includes alfa Interferon (INF-a) and Ribavirin⁽⁸⁾.

One of the major concerns with this therapy is its adverse effects. The amount of Interferon that occurs naturally in the body is very small, when it is injected, the amount in the body increases greatly. This is the cause of side effects, even though it is a naturally occurring substance. Some of these side effects may happen in the first or second hours and be over with quickly. Others can last several hours or more. Most of them will get better or disappear over times as therapy continues and body gets used to the therapy⁽⁹⁾. The most expected and common side effects with Interferon alfa and Ribavirin can be categorized to five group which are constitutional symptoms (flu-like symptoms) such as fever, myalgia, headache, chills and fatigue that varies from mild to sever, occurs in up to half of all patients and may start two to three hours after the drug is given ,injection site reaction, hematological side effects including anemia, thrombocytopenia and neutropenia that make patients more vulnerable to infection, bleeding or bruising, neuropsychiatric side effects and thyroid disorders⁽¹⁰⁾. Moreover Bianchi *et al.*⁽¹¹⁾ reported that among the most prominent neuropsychiatric side effects are symptoms of depression and cognitive impairment. These side effects negatively impact the patient quality of life

Lankarani⁽¹²⁾ stated that improving compliance with therapy can be enhanced by some measures such as patient education, close follow up, adequate treatment of side effects and minimizing dose changes. While lack of expertise in the proper management of these side effects as well as lack of educating patient may lead to higher rates of drug discontinuation or dose reduction with resultant lower efficacy of treatment.

Nurses are in a key position to carry out health education since they are the health care providers who have continuous contact with patients and their families and have the best opportunities to assess potential problems or side effects, discuss medical regimen and give teaching about all aspects of care which includes maintaining physical activity, recognizing activity limitations, conserving energy, following dietary modifications and adhering to medication schedule with attending to side effects⁽¹³⁾.

People find it helpful to have their Interferon before going to bed at night, so that; the side effects are less noticeable. Simple measures to prevent or treat these side effects are adequate hydration by drinking plenty of liquids (two to three quarts of fluids per 24 hours), light to moderate regular exercises, alternating schedule of injection days with lighter work loads, giving injection in different

places, conserve energy by getting plenty of rest and maintain nutrition⁽¹⁴⁾. Actinomiphene and Ibuprofen before the time of injection may prevent these symptoms as fever, headache and/or generalized ache. If patient experience these side effects, he/she should discuss them with health care team who can prescribe medications and/ or offer other suggestions that are effective in managing such problems. Also the patients usually lack energy reserves and must learn how to conserve it to decrease the demands on liver. The patients should identifies activities that cause fatigue and bed rest is recommended until the patient regain strength in which activity level is increased gradually as the patient condition improves⁽¹⁴⁾.

Diet is the most important interventions that should be maintained to ensure that the diet will meet the required caloric needs by providing oral care before meals, serving portions of foods and fluids within dietary restrictions of Sodium, offering small frequent meals by offering four to six per day which can prevent gastric distension that increase fatigue, being in high fowler position during meals, arranging medication schedule so that it doesn't interfere with meals and discouraging smoking and intake of caffeine beverage as tea and cola that can increase cardiac load and decrease O2 availability that can increase fatigue⁽¹⁵⁾.

Reducing anxiety is a difficult task. Occasionally, the patients need interventions to deal with anxiety rather than to control it. Techniques such as guided imagery, deep breathing and relaxation technique may help⁽¹⁶⁾. Also National Hepatitis C Program⁽¹⁷⁾ mentioned that making arrangement for maximal job flexibility and limitation of stress at work can be extremely helpful and encourage patients to share their felling with friends and family

Aim of the Study

The aim of this study was to assess the effect of nursing management protocol on selected side effects on Interferon and Ribavirin among hepatitis C patients.

Research question:

What is the effect of nursing management protocol on selected side effects on Interferon and Ribavirin among hepatitis C patients?

2. Material and Methods

Design:

A quasi experimental design was utilized.

Setting:

The study was carried out in liver out patient clinic at Shebin El-Kom teaching hospital.

Subjects:

A convenience sample of 60 hepatitis C patients of both sexes that was available during the time of data collection, in the previously mentioned setting was selected according to the following criteria:

- Had been receiving at least one treatment dose
- During the first three months of treatment.
- Experiencing selected side effects as fever, headache, fatigue, anxiety and anorexia.

Exclusion criteria:

- Presence of these side effects due to other medical causes before starting nursing management protocol.

Tools:

Three tools were used and utilized by the researchers

Tool 1: Structured interviewing questionnaire: developed by the researchers to assess patient's medical data and knowledge. It consisted of:-

Part one: Sociodemographic data such as age, sex, marital status, education and occupation.

Part two: Medical data as laboratory investigations (Hemoglobin level, White blood cell count, Platelets, Alanine aminotransferase and Aspartate aminotransferase), vital signs and patients complain after drug was taken.

Part three: Assessment of patient knowledge about:

- Disease process (definition, causes, signs and symptoms and treatment).
- Drug used (name, action, dose, route of administration and frequency).
- Side effects of the drug taken.
- Measures used to manage these side effects.

Tool 2. Fatigue severity scale:

It was adopted from Krupp⁽¹⁸⁾ It used to measure fatigue severity. It consisted of nine statements, and the researchers read each statement carefully and circle a number from 1-5 that best describes patient degree of agreement with each statement, however 1 indicates strongly disagree (low fatigue level) and 5 indicates strongly agree (high fatigue level). The total score ranges from 9-45 however, the score from 13.5 to 22.5 means mild fatigue, score from 23 to 31.5 means moderate fatigue and score more than 31.5 means severe fatigue. The Arabic version of scale was used.

Tool 3. Anxiety scale:

This scale was developed by Taylor⁽¹⁹⁾ then translated by the researchers to assess the anxiety level. It was composed of 50 statements to which the answer was either (yes) or (no). Every answer by yes was given a score 1 and no was given zero. Sum of

yes was given the total anxiety score. A score of 0-16 were denoting being free from anxiety. A score of 17-20 were denoting mild anxiety. As score from 21-26 was presenting moderate anxiety and score from 27-29 was indicating severe anxiety. Finally, score above 30 was indicating panic

Method

1-Official permission: Before the study began and after explanation of the purposes of the study, a written approval was obtained from the director of out patient clinics to carry out the study.

2-Tools development: The study tool one was developed by the researchers after extensive review of the relevant literature. This tool was tested for content validity by five experts in the field of nursing and liver specialists. Modifications were done accordingly then the tool was designed in its final format and tested for reliability using a test-retest method and a Pearson correlation coefficient formula was used. It was found to be 0.987.

3-Consent: Consent was obtained from patients to participate in the study. The researchers initially introduced themselves to all potential subjects and they were assured that the collected data were absolutely confidential.

4-Pilot study: A pilot study was conducted on 3 patients to test feasibility, clarity and applicability of the tools then necessary modifications were done accordingly.

5-Data collection: Data were collected from October 2008 to the end of April 2009. The researchers initiated data collection by firstly collecting sociodemographic and medical data. Then each participant's knowledge was assessed for disease process, drug used, side effects and measures used to control these side effects. Fatigue and anxiety were assessed for each participant by using tool 2 and 3.

6-Health education:

-After collection of pre study data. The data obtained were meant to aid in formulating nursing management that tailored to suit patient's side effects.

-Each patient was scheduled for a minimum of 3 teaching sessions in three consecutive visits to out patient clinics. Each session lasted forty five minutes for each patient. Patients received verbal instructions supplemented by written materials as an illustrative guide for more clarifications.

- Each patient was given health instructions about disease process as: definition, causes signs and symptoms and treatment; drug used for treating HCV as: name, dose, route of administration and frequency; side effects of Interferon alfa and

Ribavirin and methods to control these side effects. These educations were done individually.

-Patients were asked to repeat the knowledge and skills learned several times until the researchers made sure that it was successfully mastered.

-The other two sessions were done to reinforce the provided knowledge and respond to patients questions.

7-Follow up: Each patient was assessed and monitored three times(pre nursing management protocol, after four weeks and after eight weeks) using all tools to assess the effect of nursing education on these side effects.

Statistical analysis:

Data was collected, tabulated and statistically analyzed using SPSS version 2 statistical program. Comparison between patient's qualitative data before and after the study by 4 and 8 weeks was done using Mc Nemar test at 5% level of significance.

3. Results

Table (1) revealed that more than three fourth of studied sample (76.7%) were male. As regard marital status, the majority (90%) of the studied sample were married. In relation to educational level, about half (46.7%) had basic education. While 70% were workers. The mean age of studied sample was 41.06 ± 9.31 years. More than half (53.3%) discovered the diagnosis from one year or more.

Table (2) showed that there were significance differences of Hemoglobin, leukocyte count and Alanine aminotransferase enzyme level before the study and after 8 weeks. While there were highly significance differences of platelet count and asparate aminotransferase enzymes before the study and after 8 weeks.

Table (3) showed that before the study had begun, 60% of studied sample had fever, tachycardia and tachypnea. While after 8 weeks from the beginning of the study, 66.7% of them had normal temperature and 60% had normal pulse and respiration. Regarding blood pressure, it was noticed that 16.7% of the studied sample had hypotension before the study. While after 8 weeks, hypotensive patients were represented by 36.7% of studied sample. Moreover all of studied sample (100%) had several complains after drug administration. But 53.3% had the same results after 8 weeks. There were highly significance difference of patients complain before the study and after 4 and 8 weeks.

Table (4) showed that there were statistical significance differences between knowledge of studied sample before the study and after 8 weeks regarding definition of viral hepatitis, action and side

effects of medication, management of anorexia and fatigue. While there was a highly statistical significance difference between patient's knowledge before and after 8 weeks related to signs and symptoms of hepatitis C virus, treatment and its dose and route, management of fever and headache.

Table (5) demonstrated that there was an improvement in anxiety level of studied sample after beginning of study than before beginning of the study (70% were panic before the study while after 8 weeks only 13.3% were panic). There was a statistical significance difference between anxiety level before and after the study by 8 weeks.

Figure (1) illustrate that there was continuous improvement of fatigue level along the study period in which 93.4% of studied sample had sever fatigue before the study but after 4 weeks 43.4% had sever fatigue. While after 8 weeks only 20% had sever fatigue. There was a highly statistical significance difference between before and after the study by 4 and 8 weeks regarding fatigue level.

Table (I): Sociodemographic characteristics of studied sample.

Sociodemographic characteristics	Study group (n=60)	
	No.	%
Sex		
• Male	46	76.7
• Female	14	23.3
Marital status		
• Married	54	90
• Single	6	10
Educational level		
• Illiterate	6	10.00
• Basic	28	46.7
• Secondary	4	6.7
• University	22	36.6
Occupation		
• Worker	42	70
• House wife	2	3.3
• Professional work	16	26.7
Discovery of diagnosis		
• <1 year	28	46.7
• ≥1year	32	53.3
Age (years) X ± SD	41.06± 9.31	

Table (2): Some laboratory investigations (Hb, WBCs, Platelets, ALT and AST) of studied sample before and after study had begun (X ± SD)

laboratory investigations	Before the study (n=60) X ± SD	After 4 weeks (n=60) X ± SD	After 8 weeks (n=60) X ± SD	Mc Nemar test	
				P1	P2
Hemoglobin (gm/dl)	9.1±0.2	9.2±0.2	9.9±0.2	0.8	0.05*
White blood count (cu mm)	6535±273	6660±396	8090±637	0.5	0.08*
Platelets (cu mm)	113.9±3	130.7±8.9	170.7±4.9	0.04*	0.00**
Asparate aminotransferse(u/l)	85.2±3.5	73.5±2.3	73.3±8	0.00**	0.000**
Alanine aminotransferse(u/l)	99.2±5.1	91.9±4.2	88.8±6.6	0.04*	0.05*

P1=test of significance between before the study and after 4 weeks.

P2= test of significance between before the study and after 8 weeks.

Table (3): Distributions of studied sample according to their vital signs and patient complain before and after study had begun

Vital signs and patient complain	Before the study (n=60)		After 4 weeks (n=60)		After 8 weeks (n=60)		Mc Nemar test		
	No	%	No	%	No	%	P1	P2	P3
Temperature(C)									
• Normal	24	40	24	40	40	66.7	>0.05	>0.05	<0.01**
• Fever	36	60	36	60	20	33.3			
Pulse									
• Normal	24	40	24	40	36	60	>0.05	>0.05	>0.05
• Tachycardia	36	60	36	60	24	40			
Respiratory rate									
• Normal	24	40	28	46.7	36	60	>0.05	>0.05	>0.05
• Tachypnea	36	60	32	53.3	24	40			
Blood pressure									
• Normal	50	83.3	50	83.3	38	63.3	>0.05	>0.05	>0.05
• Hypotension	10	16.7	10	16.7	22	36.7			
Complains									
• Yes	60	100	60	100	32	53.3	---	<0.001**	>0.001**
• No	0	0	0	0	28	46.7			

P1=test of significance between before the study and after 4 weeks.

P2= test of significance between before the study and after 8 weeks.

P3= test of significance between after 4 weeks and 8 weeks

Table (4): Distributions of studied sample regarding their knowledge about hepatitis C virus before and after study had begun

Knowledge about hepatitis C virus	Before the study (n=60)		After 4 weeks (n=60)		After 8 weeks (n=60)		Mc Nemar test		
	No	%	No	%	No	%	P1	P2	P3
Definition of viral hepatitis									
• Correct	4	6.7	20	33.3	20	33.3	<0.05*	<0.05*	>0.05
• Incorrect	56	93.3	40	66.7	40	66.7			
Causes									
• Correct	18	30	18	30	24	40	>0.05	>0.05	>0.05
• Incorrect	42	70	42	70	36	60			
Symptoms & Signs									
• Correct	0	0	4	6.7	24	40	>0.05	<0.001**	<0.01**
• Incorrect	60	100	56	93.3	36	60			
Treatment									
• Correct	16	26.7	58	96.7	58	96.7	<0.001**	<0.001**	>0.05
• Incorrect	44	73.3	2	3.3	2	3.3			
Action									
• Correct	0	0	10	16.7	12	20	>0.05	<0.05*	>0.05
• Incorrect	60	100	50	83.3	48	80			
Dose									
• Correct	12	20	38	63.3	46	76.7	<0.01*	<0.0001**	>0.05
• Incorrect	48	80	22	36.7	14	23.3			
Route									
• Correct	16	26.7	46	76.7	44	73.3	<0.001**	<0.001**	>0.05
• Incorrect	44	73.3	14	23.3	16	26.7			
Frequency									
• Correct	26	43.3	22	36.7	28	46.7	>0.05	>0.05	>0.05
• Incorrect	34	56.7	38	63.3	32	53.3			
Side effects									
• Correct	0	0	2	3.3	18	30	>0.05	<0.01*	<0.01*
• Incorrect	60	100	58	96.7	42	70			
Management of fever									
• Correct	0	0	42	70	36	60	<0.0001**	<0.0001**	>0.05*
• Incorrect	60	100	18	30	24	40			
Overcoming anxiety									
• Correct	10	16.7	26	43.3	44	73.3	<0.05*	<0.0001**	<0.01*
• In complete	50	83.3	34	56.7	16	26.7			

Continue table (4): Distributions of studied sample regarding their knowledge about hepatitis C virus before and after study had begun

Knowledge about hepatitis C virus	Before the study (n=60)		After 4 weeks (n=60)		After 8 weeks (n=60)		Mc Nemar test		
	No	%	No	%	No	%	P1	P2	P3
Management of anorexia									
• Correct	16	26.7	26	43.3	40	66.7	>0.05	<0.01*	<0.01*
• Incorrect	44	3.3	34	56.7	20	33.3			
Management of fatigue									
• Correct	26	43.3	32	53.3	46	76.7	>0.05	<0.01*	<0.01*
• Incorrect	34	56.7	28	46.7	14	23.3			
Controlling Headache									
• Correct	16	26.7	28	46.7	42	70	>0.05	<0.001**	<0.001**
• Incorrect	44	73.3	32	53.3	18	30			

P1=test of significance between before the study and after 4 weeks.

P2= test of significance between before the study and after 8 weeks.

P3= test of significance between after 4 weeks and 8 weeks

Table (5) Distribution of studied sample regarding their anxiety level before and after study had begun

Anxiety level	Before the study (n=60)		After 4 weeks (n=60)		After 8 weeks (n=60)		Mc Nemar test	
	No	%	No	%	No	%	P1	P2
• Free from anxiety	0.0	0.0	4.0	6.7	10.0	16.7	0.01**	0.06*
• Mild anxiety	2.0	3.3	14.0	23.3	24.0	40.0		
• Moderate anxiety	0.0	0.0	6.0	10.0	6.0	10.0		
• Sever anxiety	16.0	26.7	14.0	23.3	12.0	20.0		
• Panic	42.0	70.0	22.0	36.7	8.0	13.3		

P1=test of significance between before the study and after 4 weeks.

P2= test of significance between before the study and after 8 weeks.

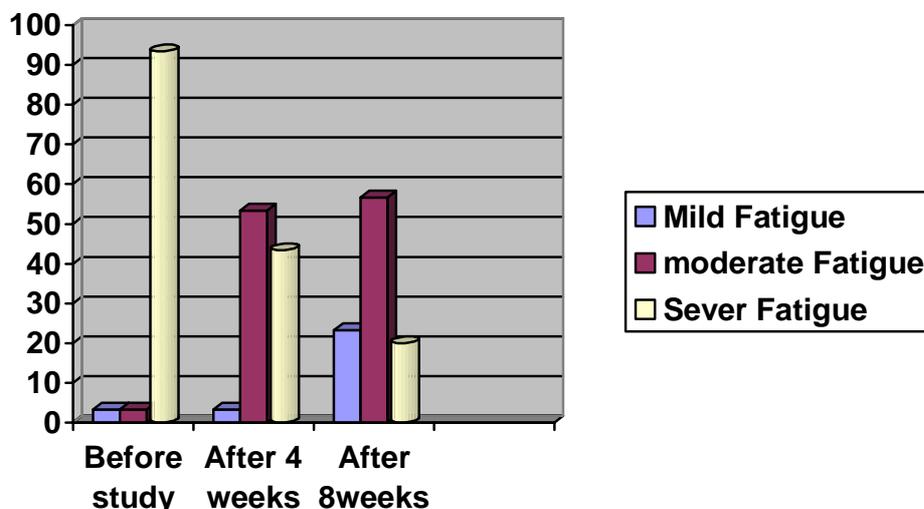


Figure (1) Distribution of studied sample regarding their Fatigue level before and after study had begun

4. Discussion

Because of the world wide prevalence of hepatitis C virus and the associated cirrhosis and mortality, treatment is an important issue which may be carried out by combination therapy of Interferon and Ribavirin. But the adverse effects with this combination therapy are not rare. These effects could be managed effectively which has a great impact on patient compliance during the course of treatment⁽¹²⁾. The current study represented that the mean age of the sample was 41.06 ± 9.31 years. This finding was lower than the results of Heneedy⁽²⁰⁾ who reported that the mean age of her study sample was 49.8 ± 8.3 for study group and 49.3 ± 8.7 years for control group. This may be explained by the lower sample size of the current study which could not be generalized.

As regard to sex, the studied sample showed that, the majority of them were male. This was in line with Alavian *et al.*⁽²¹⁾ who reported that more than three fourth of studied sample were male.

Laboratory investigations:

National Hepatitis C Program⁽¹⁷⁾ mentioned that Interferon can suppress bone marrow production of Red blood cells, White blood cells and platelets that leads to anemia, neutropenia and thrombocytopenia. This was in agreement with the findings of the current study in which the mean Hemoglobin level, Platelet count was decreased than normal level before giving the proposed nursing intervention. But the mean white blood cell level was the lowest normal level (6553 ± 273 cu mm). Also Lankarani⁽¹²⁾ mentioned that anemia and thrombocytopenia were the most significant hematological side effects of combination therapy in

which there is usually a drop of approximately 2-3 g/dl of Hemoglobin level and 10-50% of platelet count. Moreover findings of the present study showed significant improvement of Hemoglobin level, White blood count and Platelet count after application of the proposed nursing intervention. This was in agreement with Heneedy⁽²⁰⁾ who stated that nursing intervention for patients with liver diseases has a number of positive effects on physical responses including laboratory findings. The results of the current study revealed that the mean Asparate Aminotransferase and Alanine Aminotransferase were increased before applying the nursing intervention with a significant improvement after applying the nursing intervention. This was supported by Alavian⁽²¹⁾ who showed that mean Asperate and Alanine Aminotransferase were decreased after patient education and this alteration was significant.

Vital signs and patients complain:

Manns *et al.*⁽⁷⁾ mentioned that most common adverse events reported for Interferon during the clinical studies were flu like symptoms especially fever that varies from mild to sever and occur in more than half of all patients. This was consistent with the findings of the present study which revealed that more than half of all subject had fever.

In addition, the results of the present study showed that less than one fifth of the studied sample had hypotension before giving the proposed nursing intervention protocol. This was in accordance with the study of National Hepatitis C Program⁽¹⁷⁾ which denoted that there are less common side effects of Interferon as hypotension that occurs in 10-29% of

patients receiving this therapy. Also it was observed from the current study that there were continuous improvement of vital signs after giving nursing intervention to patients and this improvement was significant for temperature. This result was supported by Heneedy ⁽²⁰⁾ who found that there was an improvement of respiration, pulse and blood pressure among her study after giving nursing intervention.

Alter *et al.*, ⁽²²⁾ stated that adverse reactions can occur with any drug even over- the counter medications. The most frequent side effects of Interferon are fever, headache, fatigue, nervousness, loss of appetite, loss of thinning hair and injection site erythema and simple measures such as adequate hydration, light to moderate exercises and alternating schedule of injection to days with lighter workload are very effective. This was in line with the finding of the current study which observed that all of studied sample complained of fever, headache, anxiety, anorexia and fatigue before giving the proposed intervention. While after the study by 8 weeks, there was significantly reduction of number of patients who had these side effects.

Patient's knowledge:

Canobbio *et al.* ⁽²³⁾ emphasized that those patients with liver diseases need education, counseling and support to enable them to adjust to their chronic illness and its treatment ⁽³³⁾. Results of the current study showed that there was significant improvement of sample knowledge in approximately every aspects of knowledge given to them than pre intervention. This may be attributed to the theoretical sessions that were provided to cover all aspects of hepatitis C virus (definition, causes, signs and symptoms, treatment, action, dose, route, frequency, side effects and how to deal with it) which eventually increase patients knowledge. These results were consistent with Fareed ⁽²⁴⁾ who showed a statistical significant difference between before and after conduction the nursing management protocol that indicates an improvement of patients total mean score of knowledge after intervention. This result was also in line with Elshikh ⁽²⁵⁾ who found that a significant differences between control and study groups as regard to total knowledge scores after protocol of care. In the present study, patients pre intervention denoted that almost three fourth of them lack any essential knowledge about their medication, action, dose, route, frequency, possible side effects and how to manage it. The educational sessions had given a significant increase in their knowledge about Interferon. This finding was consistent with that obtained by Elshiekh, ⁽²⁵⁾ who found that repetition teaching on patient medication have significantly

increase their knowledge regarding dose, special precautions and possible side effects of drug.

Anxiety level:

Anxiety can be defined as an accompanying emotion of stressful encounters. As the disease state is considered stressors, the Interferon adds another stressor to patients ⁽²⁶⁾. Lankarani ⁽¹²⁾ stated that Interferon based regimen can induce a variety of neuropsychiatric adverse events including depression, anxiety and panic attack. Also National Hepatitis C program ⁽¹⁷⁾ mentioned that sever anxiety is a very common side effects in clinical trial in 30% or more of patients and if patients are aware that medications predispose them to anxiety and learn how to deal with it, they can control anxiety more effectively. These were in consistent with the results of the present study in which before nursing intervention about three fourth of the sample were panic and the rest had sever anxiety but after 8 weeks less than half of the sample had mild anxiety and about one fifth was free from anxiety. While the result was in contrast with result of Hunt *et al.* ⁽²⁷⁾ who reported that their sample exhibited fewer emotional problems as well as lower incidence of anxiety during Interferon therapy. This discrepancy may be attributed to in-completing the questionnaire by all their participants (only about three fourth) so we can not generalize their results.

Fatigue level:

The finding of this study revealed that about all of studied sample had sever fatigue before giving the intervention. But after 8 weeks more than one fourth of the sample had mild fatigue and more than half had moderate level of fatigue and these results were in accordance with Heneedy ⁽²⁰⁾ who found that fatigue was decreased among the study group subjects than control group after giving the nursing intervention.

5. Conclusion:

The present study revealed that enrichment of patients with nursing intervention and knowledge about chronic hepatitis C, its treatment and management of Interferon related side effects seemed to have positive effects on improving patients knowledge about diseases and managing side effects of treatment and self care modalities that reflected by improvement in laboratory findings, vital signs, patients complains, anxiety and fatigue level.

Recommendations:

a). Promotion and enhancement of the self care modalities to the patient; a strict written instruction with pictures about disease process, allowed foods,

rest and physical activities and follow up should be continued after termination of the treatment through a rehabilitation program.

b). Special attention should be given regarding teaching patients family members who have an active role in patient care to help them comply with the prescribed medical and nursing intervention.

c). Replication of the study using a large probability sample from different geographical areas to allow greater generalizability of the results.

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Principles and methods of Adult education

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Abstract: Any activity that gets your students involved makes the learning experiential. This includes small group discussions, experiments, role playing, skits, building something at their table or desk, writing or drawing something specific – activity of any kind. Activities also keep people energized, especially activities that involve getting up and moving about. Most adult students are in your classroom because they want to be. Some of them are there because they have Continuing Education requirements to keep a certificate current, but most are there because they've chosen to learn something new. This principle is not about why your students are in your classroom, but about why each thing you teach them is an important part of the learning. I'll use my own pickle-making lesson as an example.

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Introduction:

Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education.

Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out.

As indicated earlier, a strength of adult education in Kentucky is the dedication of the many teachers often serving under difficult conditions, without adequate support, and often with compensation and benefits less than teachers in the public schools. Testimony before the task force characterized the work of adult educators as "missionary" work. Recognizing the seriousness of the adult literacy issue in Kentucky, it should be a major concern that the Commonwealth does not have a comprehensive approach to the professional preparation, development, and support of adult educators. The challenge for Kentucky will be to move from a system that still depends on teachers with limited training in working with adults, to one in which professional competence in working with adults is a basic requirement. Any strategy to make this transition

must involve both professional development and support for the teachers now in the field as well as a new system for a new generation of adult educators.

Principles for the Teacher of Adults Teaching Adult Learners

The teacher of adults has a different job from the one who teaches children. If you're teaching adult students, it's important to understand the five principles of teaching adults. It's important to know how adults learn.

Malcolm Knowles, a pioneer in the study of adult learning, observed that adults learn best when:

1. They understand why something is important to know or do.
2. They have the freedom to learn in their own way.
3. Learning is experiential.
4. The time is right for them to learn.
5. The process is positive and encouraging.

Principle 1: Make Sure Your Adult Students Understand "Why"

Most adult students are in your classroom because they want to be. Some of them are there because they have Continuing Education requirements to keep a

certificate current, but most are there because they've chosen to learn something new.

This principle is not about why your students are in your classroom, but about why each thing you teach them is an important part of the learning. I'll use my own pickle-making lesson as an example.

When I learned to make pickles, my teacher and neighbor, Marilyn, explained:

- It's important to soak the cucumbers in ice water over night. This helps make the pickles crisp.
- If you put a towel under the jars in the canner, they won't bounce against each other and break.
- When sterilizing the jars, it's important to fill each at least halfway with water, AND fill the canner they're sitting in with water. Too little water and the towel mentioned in the previous bullet will catch on fire. You know this kind of information comes from experience.

Principle 2: Respect that Your Students Have Different Learning Styles

There are three general learning styles: visual, auditory, and kinesthetic.

Visual learners rely on pictures. They love graphs, diagrams, and illustrations. "Show me," is their motto. They often sit in the front of the classroom to avoid visual obstructions and to watch you, the teacher. They want to know what the subject looks like. You can best communicate with them by providing handouts, writing on the white board, and using phrases like, "Do you see how this works?"

Auditory learners listen carefully to all sounds associated with the learning. "Tell me," is their motto. They will pay close attention to the sound of your voice and all of its subtle messages, and they will actively participate in discussions. You can best communicate with them by speaking clearly, asking questions, and using phrases like, "How does that sound to you?"

Kinesthetic learners need to physically do something to understand it. Their motto is "Let me do it." They trust their feelings and emotions about what they're learning and how you're teaching it. They want to

actually touch what they're learning. They are the ones who will get up and help you with role playing. You can best communicate with them by involving volunteers, allowing them to practice what they're learning, and using phrases like, "How do you feel about that?"

Pickle Example: I'm generally a kinesthetic learner. Marilyn talked to me about her pickling process, explaining why she uses the ingredients she does, and showed me how she dips a liquid measuring cup into the hot brine and pours it into the jar using a wide-mouthed funnel, but my greatest learning came when I fumbled through the second jar all by myself.

Most people use all three styles while they're learning, and of course, this is logical since we all have five senses, barring any disabilities, but one style almost always is preferred.

The big question is, "How do you, as the teacher, know which student has which learning style?" Without training in neuro-linguistics, it might be difficult, but conducting a short learning style assessment at the beginning of your class would benefit you and the students. This information is as valuable to the student as it is to you.

There are several learning style assessments available online, some better than others. I like the one at Ageless Learner.

Share your thoughts about learning styles.

Principle 3: Allow Your Students to Experience what they're learning

Experience can take many forms. Any activity that gets your students involved makes the learning experiential. This includes small group discussions, experiments, role playing, skits, building something at their table or desk, writing or drawing something specific – activity of any kind. Activities also keep people energized, especially activities that involve getting up and moving about.

The other aspect of this principle is honoring the life experiences your students bring to the classroom. Be sure to tap into that wealth of wisdom whenever it's appropriate. You'll have to be a good timekeeper because people can talk for hours when asked for

personal experiences, but the extra facilitation needed will be well worth the gems your students have to share.

Pickle Example: Once Marilyn had shown me how to prepare one jar, she busied herself in the kitchen doing her own thing, close enough to keep an eye on me and to answer my questions, but allowing me the autonomy to go at my own speed. When I made mistakes, she didn't interfere unless I asked. She gave me the space and the time to correct them on my own.

Principle 4: When the Student Is Ready, the Teacher Appears

“When the student is ready, the teacher appears” is a Buddhist proverb packed with wisdom. No matter how hard a teacher tries, if the student isn't ready to learn, chances are good he or she won't. What does this mean for you as a teacher of adults? Luckily, your students are in your classroom because they want to be. They've already determined that the time is right.

It's your job to listen carefully for teaching moments and take advantage of them. When a student says or does something that triggers a topic on your agenda, be flexible and teach it right then. If that would wreak havoc on your schedule, which is often the case, teach a bit about it rather than saying flat out that they'll have to wait until later in the program. By then, you may have lost their interest.

Pickle Example: My mom canned pickles all during my childhood years, but I had no interest in participating, or even in eating them, sadly. Several years ago, I helped Marilyn can pickles, and even then, I was simply helping and not really learning. When I finally started enjoying pickles and planted my own cucumbers, then I was ready to learn, and Marilyn was right there to teach me.

Principle 5: Encourage Your Adult Students

For most adults, being out of the classroom for even a few years can make going back to school intimidating. If they haven't taken a class in decades, it's understandable that they would have some degree of apprehension about what it will be like and how well they'll do. It can be tough to be a rookie when

you've been an expert in your field for many, many years. Nobody enjoys feeling foolish.

Your job as a teacher of adult students includes being positive and encouraging. Patience helps too. Give your older students time to respond when you ask a question. They may need a few moments to consider their answer. Recognize the contributions they make, even when small. Give them words of encouragement whenever the opportunity arises. Most adults will rise to your expectations if you're clear about them.

A word of caution here. Being positive and encouraging is not the same as being condescending. Always remember that your students are adults. Speaking to them in the tone of voice you might use with a child is offensive, and the damage can be very difficult to overcome. Genuine encouragement from one person to another, regardless of age, is a wonderful point of human interaction.

Pickle example: I'm a worrier. I worried about spilling brine all over Marilyn's stove, about dropping the full jars as I lifted them out of the hot bath, about making a mess of her kitchen. Marilyn assured me that spills were easily cleaned up, especially when vinegar was involved since it's used for cleaning anyway! She encouraged me as I gingerly moved boiling hot jars. Throughout the pickle-making process, Marilyn remained calm, unruffled. She paused by me every once in a while to comment, “Oh, don't they look beautiful!”

Because of Marilyn's understanding of how to teach me, her adult student, the art of making dill pickles, I now have the confidence to make them in my own kitchen, and I can't wait for my next batch of cucumbers to be ready.

This is your challenge as a teacher of adults. Beyond teaching your subject, you have the opportunity to inspire confidence and passion in another human being. That kind of teaching changes lives.

Conclusion:

Beyond the issues relating directly to DAEL (Department of Adult Education and Literacy), the task force heard a number of concerns about the Commonwealth's overall approach to adult literacy.

- Lack of coherent statewide leadership and coordination among multiple complementary initiatives aimed at the same problem.
- Lack of continuity in state leadership. Cited in particular was the difficulty sustaining a high level commitment to the issue long enough to make a difference because of changes in priorities of the state's political leaders. A high level of turnover in the leadership of the Department of Adult Education and Literacy has also contributed to the instability.
- Tendency to think of adult education as a separate categorical program rather than a strategy that cuts across the mission and responsibility of multiple Commonwealth programs and initiatives (e.g., early childhood education, welfare reform, economic development, and corrections).
- Multiple uncoordinated categorical federal initiatives that tend to drive (and fragment) policy for an overall state effort that is largely funded by Kentucky.
- Inadequate coordination of services to meet the needs of individual adults, communities, employers, and regions is hindered by:
 - Vertical financing and regulatory relationships between separate federal and state programs and local providers and administrative units. These vertical relationships can hinder the horizontal coordination of services for individual adult learners, communities, and employers.
 - Turf wars among providers, local politics, and long-standing conflicts among neighboring counties.
 - Inadequate links with and leverage of other public and private initiatives and investments to reach the target population. Major sources of help include employers, postsecondary education, and workforce development.
 - Lack of a state financing policy and strategy for provider performance incentives and collaboration, and tax and other employer incentives for leverage of non-state resources.
 - Lack of programmatic and administrative flexibility to meet the rapidly changing needs of adult learners, employers, regional economies, and communities.

When the issue is examined from a county-by-county perspective, a significant mismatch is found between the availability of services and the target population.

The problem is partially one of resources. Yet an even more serious problem is the lack of local leadership and coordination of available resources—both public and private. A deliberate strategy is needed to focus state priorities on the target population at the lowest literacy levels (Levels I and II) and in the counties with largest percentages of adults at these levels. Unless Kentucky can narrow the disparities within the state, the Commonwealth will be unable to narrow the disparities in per capita income and other critical indicators between Kentucky and its competitor states.

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5/5/2011

Assessing Lesson Plans for Adults

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Abstract: adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Though rarer today than in the past, some teachers discount the importance of learning styles. They continue to teach in their one major method without trying to vary instructional methods. This is a mistake that will lead to less learning in the classroom. On the other hand, many students and to a lesser degree some teachers make the mistake of thinking that they cannot learn using methods that are not focused on their learning style. This is also a huge mistake that in the end will result in less learning. If teachers do not help their students find ways to be successful learning information presented in any style, they are not helping them succeed in the future. The fact is that students will be faced with many different styles of teaching during the educational career. Only by finding ways to adapt and learn using other styles, will students end up succeeding. [Mehran Bozorgmanesh and Mojtaba Sadighi. **Assessing Lesson Plans for Adults**. Journal of American Science. 2011;7(6):69-72]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: adult learning, Lesson Plans

Introduction:

Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal.

Therefore, it is helpful to distinguish between at least these dimensions of the issue:

1. "Literacy" refers to the knowledge, skills, and competencies of individuals. The federal Adult Education and Family Literacy Act (Title II of the Workforce Investment Act) defines literacy as "an individual's ability to read, write, speak in English, compute and solve problems, at levels of proficiency necessary to function on the job, in the family of the individual, and in society." Literacy is often defined in terms of specific domains such as "basic academic skills," "workplace skills," "life skills," "parenting skills," or skills

necessary to exercise one's rights and responsibilities for citizenship. Different dimensions of literacy are often categorized by terms that cluster several dimensions of literacy important for different clients. Examples include workplace literacy (combining both basic academic skills and workplace skills), and

family literacy (combining basic academic skills and other skills essential for successful parenting).

2. "Education attainment" usually refers to the numbers of years of schooling completed or the level of credential (e.g., high school diploma or associate degree) an individual has obtained. Despite concerns about the meaning of credentials, there is a strong correlation between educational attainment and literacy.

3. "Literacy initiatives" often are defined in terms of the needs of a particular target group. These may be parents of young children, youth who have dropped out of high school without earning a high school diploma, welfare recipients, persons with limited English-speaking ability, incarcerated adults, or adults in the workforce.

Lesson Plans for Adults:

Lesson plans for adult education don't have to be difficult. Follow these easy steps and see how effective you can be. Every good course design begins with a needs assessment. For our purposes here, we're going to assume you've completed this assessment and you understand what your students need and what your objectives are for the course you're designing. If you don't know your objectives, you're not ready to design your course. With your

objectives in hand, course design can be easy. Like any gathering of people for any reason, it's good to begin at the beginning and address who is there, why they've gathered, what they hope to accomplish, and how they'll accomplish it.

Welcome and Introduction:

Build in 30 to 60 minutes at the opening of your class to conduct introductions and review your objectives and agenda. Your beginning will look something like this:

1. Greet participants as they arrive.
2. Introduce yourself and ask participants to do the same, giving their name and sharing what they expect to learn from the class. This is a good time to include an ice breaker that loosens people up and makes them feel comfortable sharing.
3. Write their expectations on a flip chart or white board.
4. State the objectives of the course, explaining why certain expectations on the list either will or won't be met.
5. Review the agenda.
6. Review housekeeping items: where the restrooms are, when the scheduled breaks are, that people are responsible for themselves and should take a restroom break early if they need one. Remember, you're teaching adults.

Module Design:

Divide your material into 50-minute modules. Each module will contain a warm-up, a short lecture or presentation, an activity, and a debriefing, followed by a break. At the top of each page in your teacher's guide, note the time needed for each section and the corresponding page in the student's workbook.

Warm-Up:

Warm-ups are short exercises (5 minutes or shorter) that get people thinking about the topic you are about to cover. It can be a game or simply a question. Self-assessments make good warm-ups. So do ice breakers.

For example, if you're teaching learning styles, a learning-style assessment would be a perfect warm-up.

Lecture:

Keep your lecture to 20 minutes or less if possible. Present your information in full, but remember that adults generally stop retaining information after about 20 minutes. They will listen with understanding for 90 minutes, but with retention for only 20.

If you're preparing a participant/student workbook, include a copy of the primary learning points of your lecture, and any slides you're planning to use. It's good for students to take notes, but if they have to furiously write *everything*, down, you're going to lose them.

Activity:

Design an activity that gives your students an opportunity to practice what they just learned. Activities that involve breaking into small groups to complete a task or to discuss an issue are good ways to keep adults engaged and moving. It is also a perfect opportunity for them to share the life experience and wisdom they bring to the classroom. Be sure to build in opportunities to take advantage of this wealth of relevant information.

Activities can be personal assessments or reflections that are worked on quietly and independently; they can be games or role playing; or they can be small group discussions. Choose your activity based on the best way to provide the adults in your class with an opportunity to experience what you just taught.

Debriefing:

After an activity, it's important to bring the group back together and have a general discussion about what was learned during the activity. Ask for volunteers to share reactions. Ask for questions. This is your chance to make sure the material was understood. Allow for 5 minutes. It doesn't take long unless you discover that learning hasn't happened.

Take a 10-minute Break:

It's important to get adult students up and moving every hour. This takes a bite out of your available time, but it'll be well worth it because your students will be far more attentive when class is in session,

and you'll have fewer interruptions from people who have to excuse themselves.

Tip: While breaks are important, it's crucial that you manage them well and begin again precisely on time, regardless of stragglers, or chatter will get carried away. Students will learn quickly that class begins when you said it would, and you'll gain the respect of the entire group.

Evaluation:

End your courses with a *short* evaluation to determine whether or not your students found the learning valuable. Emphasis on the short. If your eval is too long, students won't take the time to complete it. Ask a few important questions:

1. Were your expectations of this course met?
2. What would you have liked to learn that you didn't?
3. What was the most helpful thing you learned?
4. Would you recommend this class to a friend?
5. Please share comments about any aspect of the day.

This is just an example. Choose questions that are relevant to your topic. You're looking for answers that will help you improve your course in the future.

Conclusion:

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning

that the assays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning. Some research findings that can be a learning process for the Guidelines for training operations are applied, is given below:

1- To maximize learning, information must be provided an organized manner. Entries can be simple or complex can be arranged around related concepts are organized. Starting point for organizing content knowledge for adults and adults is linked to past experiences

2- Learning, especially regarding skills development, will be added frequently.

3 - Duties and meaningful content than meaningless subjects are learned more easily and are later forgotten. This issue, especially for older adult learners is true. Challenges of adult learning facilitators by the way that content was significantly associated with the experiences and needs of learners is.

4- Passive than active participation in learning activities, learning increases. Adult educators are allowed to participate actively in India, a stable and meaningful learning to help

5- Environmental factors affect the learning. Tangible things such as noise, crowded places, temperature, light and ... Learning process can be prevented. Other factors such as stress, ridicule, pressure, fatigue and low health can also reduce learning.

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Rural people participation in Participatory Rural Appraisal (PRA)¹Mina Abarashi and ²Maryam Nikmanesh^{1,2} Damavand Branch, Islamic Azad University, Damavand, Iran

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Abstract: There exist different methods of data collection and analysis, each with its own strengths and weaknesses. Through time, more appropriate and refined methods have been developed. In the context of rural development, information regarding the communities, their livelihoods, their beliefs, the physical environment in which they live, and their resource endowments need to be gathered and interpreted in a manner that identifies their priorities with a view of developing better understanding of their status and designing appropriate intervention projects directed at resolving their problems. The different ways of data collection and interpretation can be seen under two perspectives (IUCN, 2001): qualitative versus quantitative, and participatory versus top down. While the quantitative methods generate information that can be captured numerically, the qualitative methods generally do not generate specific numbers. Qualitative methods are concerned with exploring meanings, processes, reasons, and explanations. [Mina Abarashi and Maryam Nikmanesh. **Rural people participation in Participatory Rural Appraisal (PRA)**. Journal of American Science 2011;7(6):73-77]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Participatory Rural Appraisal (PRA), participation

Introduction:

Much of the spread of participatory rural appraisal (PRA) as an emerging family of approaches and methods has been lateral, South-South, through experiential learning and changes in behavior, with different local applications. Rapid spread has made quality assurance a concern, with dangers from “instant fashion”, rushing, formalism and ruts. Promising potentials include farmers’ own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Changes in personal behavior and attitudes, and in organizational cultures, are implied. PRA parallels and resonates with paradigm shifts in the social and natural sciences, business management, and development thinking, supporting decentralization, local diversity, and personal responsibility.

RRA was criticized for being extractive and highly dependent on expert interpretation. It was thus found useful to replace it with PRA which involves a process of learning from, with and by rural people about rural conditions. PRA shares much with its parent, RRA, but is distinguished from it in practice by correcting two common errors: roles of investigation are reversed; and rushing is replaced by relaxation and rapport. At the heart of all these developments was Robert Chambers, although Paulo Friere has also had strong influence especially in similar developments in education circles (Provention Concertium).

PRA are good for:

- Providing basic information in situations where little is known

- Identifying and assessing problems
- Appraising, designing, implementing, monitoring, and evaluation programs and projects
- Getting a better picture of needs and organizations’ ability to meet them
- Developing and transferring appropriate technologies
- Appraising emergencies
- Planning projects that are more relevant, restructuring administrations, assisting in decision-making and policy formation
- Generating hypotheses, ruling out inappropriate ones
- Providing guidelines for survey designs and assessing the applicability of their results to other places.
- Fleshing – out complementing, interpreting, or giving depth and context to information obtained through other methods.

PRA is not very useful for:

Working in situations in which the problem is not usefully addressed at the local or group level, for example, in situations where large-scale structural reorganization is necessary (but even then, local views may help to shape the change).

The objectives of the PRA are:

- to enable rural people to organize their knowledge, share experience among themselves and gather information on resources they have
- to understand the rural environments and social as well as economic dynamism
- to understand the trends in the rural socio economic conditions

- to enable the community identify their problems, causes of these problems and possible solutions

- to enable the community develop a community action plan to address their problems

In order to limit the PRA to the objectives set and to have consistency in conducting the PRA in the different villages, a PRA manual was prepared by the socio economic team. In line with the manual, emphasis was accorded to the following topics:

1) Village History. The first day of the PRA discussion begins with history of the village which enabled participants to easily and comfortably tell about the history of their village.

2) Agriculture and Livestock. Focus group discussions were made on agriculture and livestock rearing practices including the problems encountered and possible solutions.

3) Social service. The provision of social services like education and health including the associated problems were also discussed in focus group discussions.

4) Village institutions. Institutions, both from within the village and outside, as well as formal and informal with which the rural communities interact have been addressed.

5) Trend lines. Trends in food availability, forest, population growth, wealth, rainfall and poverty are addressed in this section.

6) Wealth ranking, problem analysis, and community action plan. Finally, the participants ranked the community on the basis of its wealth, discussed the major problems and formulated action plan. The PRA is to be followed with a more quantitative and structured socioeconomic survey, which will then be followed by specialized researches in specifically selected areas; notably, poverty and coping mechanisms, microfinance, marketing, utilization and management of natural resources, and gender.

At the end of the 1980s, Participatory Rural Appraisal was developed in response to the too mechanistic and extractive implementation of RRAs. In PRAs the target group is encouraged to learn and the role of outsiders is reduced to a facilitator of the learning process. PRA aims to empower local people by encouraging them to share, enhance and analyse their knowledge of life and conditions and to plan, act, monitor and evaluate.

As with RRA it is hard to define what exactly a PRA is (some even prefer not to define it and just refer to "a family of approaches"). PRA shares the basic principles of RRA (quick, multidisciplinary, observations, etc.), yet now it is the local people who are encouraged to analyse their own situation and

plan activities to improve it. The three basic pillars of PRA (and the basic differences from RRA) are:

1. the behaviour and attitude of outsiders, who facilitate rather than dominate;
2. the methods, which are open, group-oriented, visual and comparative;
3. sharing of information, food, experiences, etc. between in- and outsiders.

For the tools used, two issues stand out:

1. 'Handing over the stick': instead of outsiders trying to understand the knowledge of the local people, PRA tries to facilitate local people to develop their capabilities. They collect and analyse the data and propose actions to be undertaken.

2. Visualisation and sharing: local people convey their ideas and knowledge in a visual way. In verbal communication, outsiders dominate the dialogue more easily (via eye contact, cross-checking, etc.) than in communication via visual aids. When a map is drawn by a stick in the soil all can contribute, and local people feel more confident than when outsiders try to draw a map on a piece of paper with a pen - a typical tool of powerful outsiders. Sharing also explicitly involves the food and shelter during the PRA.

The most commonly used tools are:

- participatory mapping: a group of villagers makes a map of the community. The way they do this and what they find important provide good entry points for discussions about crucial aspects of village life;

- village transects: together with a (small) group of villagers the team walks through the village (or another relevant area) and discusses the things observed;

- ranking: people are asked to compare units (e.g. families /trees /crops) and to group them according to their own criteria. For example, via pair-wise comparing the importance of certain trees, people find out which criteria they use to assess the usefulness of these. Ranking is also used to stratify the local population, e.g. via wealth ranking. Both the results of the ranking and the criteria used provide entry

points for further discussions.

- historical recalls: the lifestyle of families are recalled and the main events are used as reference points in the analysis of the present situation;

- calendars: people indicate how things change over time, e.g. in which months they have to borrow money, when their children get malaria, when the rains are normally expected, etc.

Combining information obtained from all the tools provides the villagers with an explicit picture of their daily life. This not only helps them to start a discussion on their main problems and how to tackle

them, it also boosts their self-esteem because they are able to make this analysis themselves.

PRA techniques(Gibson, 1992):

The most common methods are the following:

1- Diagramming, Mapping and Modeling:

- transects
- maps (resource, social, farm)
- venn diagrams
- seasonally analysis
- historical analysis (time lines, trend lines, activity profiles)

2- Ranking and scoring

- pair wise ranking
- matrix ranking
- matrix scoring
- well-being analysis and wealth ranking
- proportional piling
- pie charts (injera charts)

3- Problem analysis

- identification and specification
- causal chaining
- prioritization

PRA has evolved and spread from beginnings in Ethiopia, India, Kenya, Sudan and elsewhere, and in early 1994 is known to be being quite widely practiced in parts of Bangladesh, Botswana, Ethiopia, francophone West Africa, India, Indonesia, Kenya, Nepal, Nigeria, Pakistan, the Philippines, Sri Lanka, Sudan, Uganda, Vietnam, and Zimbabwe, while starts have been made in at least a score of other countries in Latin America, Africa and Asia. Hundreds of nongovernment organizations (NGOs) have adopted PRA and developed applications, as have a number of government departments. The use of PRA methods is being increasingly explored by students and faculty in universities for research, and by training institutes for fieldwork. Spread appears to be accelerating.

five key principles that form the basis of any PRA activity:

1. Participation:

PRA relies heavily on participation by the communities, as the method is designed to enable local people to be involved, not only as sources of information, but as partners with the PRA team in gathering and analyzing the information.

2. Flexibility:

The combination of techniques that is appropriate in a particular development context will be determined by such variables as the size and skill mix of the PRA team, the time and resources available, and the topic and location of the work(Dunn, 1991).

3. Teamwork :

Generally, a PRA is best conducted by a local team (speaking the local languages) with a few outsiders present, a significant representation of women, and a mix of sector specialists and social scientists, according to the topic.

4. Optimal Ignorance :

To be efficient in terms of both time and money, PRA work intends to gather just enough information to make the necessary recommendations and decisions.

5. Systematic :

As PRA-generated data is seldom conducive to statistical analysis (given its largely qualitative nature and relatively small sample size), alternative ways have been developed to ensure the validity and reliability of the findings. These include sampling based on approximate stratification of the community by geographic location or relative wealth, and cross-checking, that is using a number of techniques to investigate views on a single topic (including through a final community meeting to discuss the findings and correct inconsistencies).

Conclusion:

Kamla Bhasin (1999) suggests that development practitioners should constantly ask themselves: “am I increasing the confidence of the poor, their faith in themselves, and their self – reliance, or am I making them instruments of my own plans of action, imposing my own ideas on them and that of my organization and/or institution?” Social Development is a process of gradual change in which people increase their awareness of their own capabilities and common interests, and use this knowledge to analyse their needs; decide on solutions; organize themselves for cooperative efforts; and mobilize their own human, financial and natural resources to improve, establish and maintain their own social services and institutions within the context of their own culture and their own political system. To give effect to this understanding of social development, participation of communities in their own development is important. The participatory approaches, including PRA provides first step/stage in sustainable community development.

As a result of the PRAs, the communities are expected to attain many benefits including:

- Expressing their own ideas and concerns;
- Organizing their knowledge about the past and present;
- Identifying as a community their problems, the causes of these problems and possible solutions;
- Developing a common plan to address these problems;

- Developing the ability to use their own resources more effectively and attract more resources from the outside. The academicians/researchers involved in the PRAs are expected to get the following benefits:

- Developing better understanding of rural environments and social as well as economic dynamism taking place there;
- Appreciating the fact that communities are capable of analyzing their problems and outlining possible solutions to their problems;
- Participating in designing possible solutions to community problems;
- Utilizing the results of the PRA work as a research output for publications and presentations;
- Building their research and problem investigation capabilities;
- Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;
 2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;
 3. utilization of the research questions/problems identified during the PRAs for further investigation;
 4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.
- PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas. During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

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Energy Coefficient for Irrigated Wheat Production in Western Provinces in Iran

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ABSTRACT: The data for diesel fuel energy consumption on tillage, planting, cultivation, irrigation, harvesting and grain hauling as well as electricity for pumping water from wells obtained by questioners for four western provinces of Iran. The data was analyzed by SPSS software and then compared with the calculation results for the similar activities. Calculations were run for the worst case situation that is the hardest soil type for tillage, lowest forward speed and field efficiency for all. The results showed that the least energy consumption for every one of the practices was higher than the calculated figures; in some cases more than triple. The energy used for irrigation was the dominating. More energy was put into the water wells than for the hardest soil tillage. Statistics showed that the farmers in these provinces used 24.10-38.98 GJha⁻¹ to produce one hectare of irrigated wheat compared to 23.67 GJha⁻¹ calculated for the worst case. International data for semi tropical area in India for the drought years was cited as 15.289 GJha⁻¹ experimental data for energy consumption for every practice was separately analyzed and compared with the calculated figures. Tillage with an average coefficient of 57.38 lha⁻¹ and planting with an average 34.16 lha⁻¹ showed no significant differences between the provinces at 5% probability level. Energy coefficient for the other activities that is cultivation, irrigation, harvesting and grain hauling did show significant differences between some of the provinces. The average energy consumption for these activities was 1.045, 21.268, 1.406 and 2.99 GJha⁻¹ respectively. The worst case calculated values were 0.232, 18.813, 0.680 and 1.748 GJha⁻¹ respectively. The energy coefficient per ton of produced wheat was also obtained.

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Keywords: Energy consumption, Irrigated wheat, Energy coefficient, Western provinces, Iran

1. Introduction

The importance of energy consumption in agricultural is not only vital for reducing the production cost; especially with nearing WTO; to have competitive products but it shows the efficiency with which we use the technology. Knowing the energy coefficients makes us able to suggest the ways and means of reducing energy consumption.

Research on energy coefficient for strategic products and especially for wheat has not been accomplished so far in Iran. The Iranian organization of fuel optimization in agriculture is the first to conduct such a research. In a state wide project, experimental data were gathered by questioners from different provinces which were then analyzed statistically in this presentation for four of the provinces namely Hamadan, Kordestan, Kermanshah and East Azerbaijan. The results were compared with calculated values and international literatures. Calculations were run for an assumed worst case situation that is a hard soil, lowest field efficiency and speed for comparison with experimental results. Experimental data were obtained for different field activities namely tillage, planting, cultivation, harvesting and transport. The energy use for pumping water from wells being high

and costly in this semi arid region; was separately determined from the cultivation energy. Cultivation energy was thus divided into three components that are cultivation fuel consumption, irrigation fuel and electricity consumption. The calculations were performed accordingly and compared. The main objective of the research was to find out the mean energy consumption per hectare and per ton of wheat and comparing with the calculation results and international data. Such a comparison was necessary to determine the effectiveness of technology use in Iran.

2. Materials and Methods

Questioners were distributed to 30 farmers in each province but some of the returned answers were not valid. Thus SPSS analysis for unequal observations was used. The number of valid observations for each province is shown in second row of table 2. Calculation equations and methods were as follows:

2.1. Machine Operations

The fuel consumption for tillage as well as for other operations was calculated in two parts (1) energy for machine operation and (2) energy

for prime mover that is tractor. Drawbar power for plowing and converted into equivalent PTO power was calculated from the following equation (Hunt, 1995),

$$P_{PTOm} = w \times b \times v (7 + 0.049 \times v^2) / (0.96 \times 0.77 \times 10 \times 3.6) \quad \text{W}$$

$$= w \times b \times v (7 + 0.049 \times v^2) / 266(1)$$

here: P_{PTOm} = equivalent PTO power for drawbar power, kW

- w = working width of machine, m
- b = working depth, cm
- v = forward speed, km/h

$(7 + 0.049 \times v^2)$ = unit draft for a hard soil, Ncm^{-2}

The mostly used equipment in Iran for tillage (primary and secondary), planting, cultivation, harvesting and grain hauling have the specifications as outlined in table 1. The figures in this table were used for the calculations. The results are shown in the last column of the table 1.

The overwhelming tractors in Iran are MF285 with 47 kW PTO power (Anonymous, 2000). With the factory mounted weights, they weigh 3100 kg. (Nagy C.N. 1999) presented the following equation for fuel consumption of tractors per hour from Nebraska tractor test standards for tractors of 50-100 PTO hp (37.31-74.63 kW),

$$L / h = 4.93 + 0.199 \times 0.75 \times \text{required } P_{db} \quad (2)$$

which was used to calculate the hourly fuel consumption for tractor. Calculated power was divided by 2.60 kWhl^{-1} and divided by farm capacity to obtain the energy consumption in lha^{-1} (Anonymous, 2005 and Deere, 2001).

2.2 .Irrigation Water

About 49% of irrigation water in Iran is extracted from deep and semi deep wells and 51% from surface water sources such as rivers, Qanats and springs (Iran Water and Sewage Department, 2007). Out of all 458069 wells, 77.53% are diesel engine operated and 22.47% are operated by electric motors. Deep well is defined as one with dynamic depth of 75 m and flow of 23.5 Ls^{-1} and semi deep well as one with 20 m deep and flow of 11 Ls^{-1} . Assuming the water was extracted with the above proportional factors, surface irrigation efficiency of 0.35, and using equation (3), the energy coefficient for irrigation water was developed as in equation (4) which must be noticed that it is applicable only for Iran and under the above mentioned assumptions (Anonymous, 2008):

$$P_{\text{well}} = \frac{Q \rho g h}{1000 \times e_p \times e_t \times e_m} \quad (3)$$

$$E_c = 0.162 \text{ lm}^{-3} + 0.067 \text{ kWhm}^{-3} \quad (4)$$

Where: P_{well} = required power for pumping water from well, kW

Q = water flow, Ls^{-1}

ρ = water density, kgm^{-3}

g = 9.81

h = dynamic depth, m

e_p = pump efficiency = 0.8

e_t = transmission efficiency = 0.6 for diesel and 1 for electric motors

e_m = 0.85 for diesel engine and 0.9 for electric motor

E_c = energy coefficient per cubic meter of water drawn from wells.

The wheat net irrigation water need for different provinces were obtained from a NET WAT software (Anonymous, 2006) as shown in the first line of fourth row in table 2. The relevant fuel and electric energy was calculated and shown in the fourth and fifth row in table 2.

2.3. Statistical Analysis

Due to inequality of experimental data, a completely random design with unequal number of observations was used and analyzed by SPSS software.

3. Results

Mean experimental and calculated fuel for all operations and electricity for irrigation as per hectare and per ton are shown in table 2 and depicted by barographs in figure 1. The results for different operations were as follows:

3.1 Tillage

With minimum and maximum of 51.71 lha^{-1} and 61.35 lha^{-1} , no significant differences were observed between the provinces. However the least experimental data was higher than the maximum calculated value.

3.2 Planting

No significant differences were observed at 5% level between the provinces. The least fuel consumption coefficient of 28.82 lha^{-1} was more than twice the maximum calculated energy of 12.9 lha^{-1}

3.3. Irrigation

Net irrigation water need for the wheat (excluding any possible rain fall) for different provinces (Anonymous, 2006) and the relevant calculations are given in row seven in table 2. Significant differences were observed between the provinces with respect to energy use for irrigation. The fuel used in Hamedan and Kordestan provinces was less than the calculated

value while for the Kermanshah and East Azarbaijan was greater.

The lower consumption for the first two provinces may be attributed to their colder weather and more rain. Besides the dynamic head of the wells may be less and the flow rate greater than what was indicated by the Water and Swage Department of Iran and which was assumed in the calculation. No valid data was available on these two characters. However, the rather high yields in these two provinces may indicate that the water

was not a limiting factor. It may also be that more wells were operated electrically rather than by diesel engines. The low yield in Kordestan might have been the result of under irrigation as it is observed that the fuel and electric power consumption in this province is less than all other provinces.

The electric power usage of all the provinces was also greater than the calculated value.

Table1. Machine working specifications and energy coefficient

Machine	Working width (m)	Working depth (cm)	Speed (Kmh ⁻¹)	Field Efficiency %	Field Capacity (hah ⁻¹)	PTO Power Equivalent (kW) ⁻¹	Energy coefficient Lha ⁻¹
Moldboard plow	0.9	20	4	0.74	0.27	24.53	31.8
Tandem disk	3.6	10	8	0.77	1.66	42.40	6.8
Land plane	3.0	-	8	0.77	1.39	42.56	8.1
Total tillage							46.7
Sweep Cultivator	5 row	-					6.1
Broadcaster	10	-					3.1
disking	3.6	6	8	-	-	-	12.0
Seed drill	2.5	3-5					5.1
Grain combine	4.8	-					38.9
Trailer in farm	4 tones	-					32.8
Trailer on road	4 tones	-					13.2

¹power for prime mover included

3.4. Harvesting

No significant differences were observed between the provinces with respect to their harvest energy coefficients and yields except for the Kordestan province. The higher yield the more energy consumption may be expected but interesting enough, the fuel used in Kordestan with the least yield is significantly higher than the other three with higher yields. No reasonable analysis may be drawn in this regard except for inaccuracy of the data. The higher energy used in Hamedan and East Azarbaijan may be attributed to improper combine engine injector pump, tire pressure, and unsuitable forward speed.

3.5. Grain Hauling

Significant differences were observed between three provinces that is Hamedan, Kermanshah and East Azarbaijan while the yield were not significantly different. The only reason that can be assumed is their respective unequal distance from the silo where the wheat was delivered to. The lower fuel consumption for Kordestan was expected due to its lowest yield. The lowest energy consumption for East Azarbaijan despite its rather high yield could be

because of less distance of the farms from the silo.

3.6 Energy Coefficient per Ton

No significant differences were observed between the provinces except for Kordestan which was highly significant. This was expected because of its low yield, and the fact that its energy usage for the cultivation, electricity for irrigation, and harvesting was greater than the other provinces not to mention that its net irrigation water need was also higher.

4. Discussion

4.1. Tillage

The higher energy coefficient for this operation could be due to the following factors:

- Soil is mostly plowed dry because rain falls seldom at the time of plowing and irrigating the field to the its field capacity is not affordable.
- Tractor injection pump might have not been properly adjusted.
- Too much slippage.
- Improper tire pressure for prime movers.
- Improper use of tractor hydraulic system.
- Using foot pedal rather than hand throttle.
- Improper tillage depth adjustment.

Table 2. Calculated and experimental mean energy coefficient for the provinces, Lha⁻¹

Practices	Calculated	Provinces			
		Hamedan	Kordestan	Kermanshah	East Azarbayjan
No. of Observations		18	7	30	29
Tillage	46.78	57 ^a	51.71 ^a	61.35 ^a	59.45 ^a
Min.		40	19	17	26
Max.		96	99	145	90
SD		16.16	29.26	34.23	16.19
Planting	12.9	35 ^a	37.71 ^a	28.82 ^a	35.61 ^a
Min.		13	27	8	12
Max.		24	65	63	75
SD		8	15.09	17.51	14.39
Cultivation	6.10	20 ^{bc}	49 ^a	13.00 ^c	28.00 ^b
Min.		8	18	4	10
Max.		32	90	24	120
SD		4.3	28.20	4.94	21.14
Harvesting	38.90	52 ^b	60.57 ^a	32.15 ^c	43.38 ^{bc}
Min.		24	10	14	24
Max.		82	78	51	100
SD		16	24.41	10.50	18.06
Hauling grain	46.00	116 ^a	69.14 ^b	96.90 ^{ab}	32.55 ^c
Min.		60	57	18	6
Max.		164	95	212	80
SD		32	13.85	76.40	19.23
Sub total	128	280 ^a	268 ^a	232 ^{bc}	199 ^c
Min.		212	206	100	123
Max.		351	354	412	280
SD		39.30	50.85	93.51	38.86
Net water Req. (m ³ ha ⁻¹)		3388	3543	2207	2625
Calculated fuel		548.85	573.97	357.53	425.25
Fuel (irrigation)	476.40	179.73 ^d	268 ^c	409.85 ^b	587.86 ^a
Min.		116	206	210	592
Max.		276	354	496	6300
SD		34.3	50.85	61.85	1104.97
Sub total	604.26	459.73 ^c	536.13 ^c	642.07 ^b	786.85 ^a
Min.		383	412	438	374
Max.		531	708	841	1210
SD		44.00	101.70	108.08	162.22
Calculated Elec, GJha ⁻¹		0.82	0.85	0.53	0.62
Elec., GJha ⁻¹	0.71	6.63 ^{bc}	5.3 ^c	12.93 ^a	9.08 ^b
Min.		1100	258	972	592
Max.		2640	3610	6750	6300
SD		282.3	1305.42	1397.56	1104.97
Total (GJha ⁻¹)	23.87	24.10	25.67	37.33	38.98
Min.		19	17	30	23
Max.		27	40	54	55
SD		2.08	7.55	6.39	7.30
Yield (tha ⁻¹)		5.033 ^a	1.100 ^b	4.619 ^a	5.472 ^a
Min.		3.200	0.900	1.000	1.600
Max.		7.500	1.200	8.000	8.893
SD		1.506	0.129	2.036	1.950
Fuel (Lt ⁻¹)		91.34 ^c	487.39 ^a	139.00 ^{bc}	143.80 ^{bc}
Min.		55	343	67	56
Max.		141	596	600	444
SD		30.98	88.25	133.59	93.85
Total (GJt ⁻¹)		4.79 ^c	23.34 ^a	8.08 ^{bc}	7.12 ^{bc}
Min.		2.853	14.287	4.504	3.262
Max.		7.277	33.249	35.735	32.546
SD		1.634	6.607	7.966	4.467

* Figures with the same letter were not significant at 5% level.

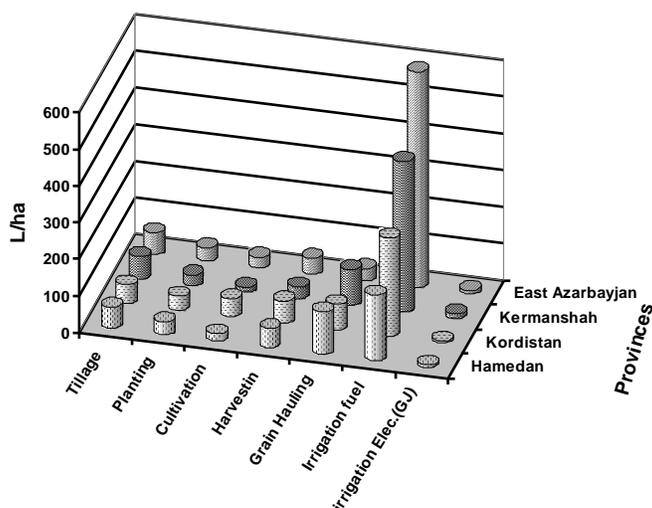


Figure 1. Barographs for the Fuel and Electricity coefficient for different operations and provinces

4.2. Planting

The possible reason for high energy consumption in planting may be as follows:

- (a) Implementation of seed broadcasters instead of drill planters for which the farmer has to sow $1^{1/2}$ to twice as much grain as is recommended by expertise.
- (b) Improper overlap.
- (c) Extra disking needed with broadcasters to cover the seeds.
- (d) Heavy and hard soil.

4.3. Irrigation

Higher energy consumption may be accounted for the following factors:

- Inaccurate experimental data
- Unmatched prime mover with the flow rate and dynamic head of the wells.
- The recommended efficiency coefficients used in equation 3 might have not been suitable for the provinces.

4.4. Harvesting

A non significant difference for the three provinces that is Hamedan, Kermanshah and East Azerbaijan was expected because the crop yield differences were insignificant and it is harvested by custom operators. Combine contractors start harvesting from the south and move toward north of Iran. Three different routes are taken. One strip in the west bank, second in the central and the third in the east side of the country.

4.5. Grain Hauling

Higher energy coefficient per hectare may be expected for higher yields as it seen for the two provinces of Hamedan and Kermanshah but for East Azerbaijan with the highest yield, the usage is not only lower than these two provinces, but even less than the calculation. The reason as it was mentioned can be due to the less distance of the farms in this province from the silo. Other factors besides greater distance from the silo; such as improper maintenance of the tractors and trailers may be considered for higher consumption in the other provinces.

5. CONCLUSIONS

The energy coefficient per hectare and per ton for all provinces was higher than the related calculated value which might be lowered by rectifying the possible remedies. The mean energy coefficient in producing winter wheat for all the provinces was 31.52 GJha^{-1} and 430.77 lt^{-1} (equivalent to 16.37 GJt^{-1} (Srivatsava et al, 2001)) while for the same climate that is dry and hot places in India (Singh et al, 2002.) it has been 15.29 GJha^{-1} for morocco (Baali and Van Ouwerkerk, 2005.) and 13.96 GJha^{-1} and 19.58 GJha^{-1} for another part of India (Sidhu, et al, 2004). Slotze et al, 2000 extracted data for conventional Wheat production from three references with means equal to 17.33 GJh^{-1} and 3.10 GJt^{-1} .

Although the high figures of domestic energy coefficients may be due to the water supply but the mean machinery coefficient of 244.75 lha^{-1} versus the

128 lha⁻¹ calculated for the worst case indicates that it is not all the water supply to blame for. It can surely be caused by low technology knowledge in using implements.

Another argument may be that high energy usage is due to hard soil and dry plowing; but the energy coefficient for cultivation, harvesting and hauling grain are also higher than the calculated value. These operations do not depend much on soil hardness. It is therefore clear that the technology is not being used to its universal efficiency. Main reason for that could be due to low educational level of the machinery operators and poor maintenance of machinery.

A main source of rather low yield is the combine losses. High combine losses of at least 12.5% (Behroozi Lar et al, 1995) are either because of machine improper adjustment or the delay in harvesting or both. It is reported that in some places in the north east of the country the combine reaches there about 60 days after wheat maturity. One of the problems in the country is harvesting chaff rather than mixing it with soil. This is one of the reasons for hard soil which causes the increase in energy coefficient for soil working machines.

All experimental energy coefficients per hectare and per ton were higher than the related worse case calculation and much higher than the international references.

It was concluded that agricultural technology in Iran can not be beneficially used without teaching the machine operators, and the irrigation method should be changed from surface to pressurized one.

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A method for detection and extraction of circular shapes from noisy images using median filter and CHTMasoud Nosrati ^{*1}, Ronak Karimi ², Hamed Nosrati ³, Ali Nosrati ⁴^{1,2} Young Researchers Club, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.^{3,4} Islamic Azad University, Kermanshah Branch, Kermanshah, Iran.minibigs_m@yahoo.co.uk

Abstract: One of the challenging topics in image processing is extracting the shapes from noisy backgrounds. There are some methods for doing it from different kinds of noisy backgrounds. In this paper, we are going to introduce another method by using 4 steps to extract circular shapes from impulse noisy backgrounds. First step is applying median filter to disappear "salt and pepper" noise. This step causes edge smoothing. So, as the second step, a laplacian sharpening spatial filter should be applied. It highlights fine details and enhances the blurred edges. Using these two steps sequentially causes noise reduction in an impressive way. Third step is using Canny edge detection for segmenting the image. Its algorithm is talked during the paper. Finally, forth step is applying Circular Hough Transform (CHT) for detecting the circles in image. At the end of paper different use cases of this method is investigated.

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Keywords: Extracting circular shape; median filter; laplacian filter; Canny edge detection; Circular Hough Transform (CHT).

1. Introduction

Extracting shapes from noisy backgrounds was always been a challenging problem in image processing. Recent studies represented some solutions, but no one could give 100 percent guaranteed results.

In this paper, we are going to introduce another method which is a combination of different filters and techniques. Our purpose is to achieve a better result in detecting the circular shapes within an impulse noisy background. Due to this, 4 steps are listed to be applied to image. First step is using median filter for removing impulse points in the image. These points have an absolutely different color from their neighborhood pixels, and they can have bad effects in the result of edge detecting process. So, median filter will be applied to remove them. Other implicit effect of this filter is smoothing the edges. It can make the edge detection harder and the have bad effects on the result. So, another filter that should be applied as the second step, is laplacian sharpen spatial filter. This filter causes the details become more impressive and the edges become clearer. An implicit effect of this filter is noise increasing in image, but we don't worry about it, because the next step will neutralize this effect. Now, it is time to detect the edges. Due to it, some methods were introduced like Sobel and Canny edge detection. Here, we employ Canny edge detection as the third step, because it has a better performance in detecting the thin edges and when the edges are not very sharp and clear. As the edges were detected, it is

time to extract the circular shapes. So, as the fourth step, we will employ Hough transform. In general it can be used for any type shapes. But this special form of this transform is called Circular Hough Transform (CHT).

We are going to investigate all of the mentioned steps in depth during the "Methodology" section. Then, special uses of this method will be talked in "Use cases", and finally "Conclusion" is placed at the end of the paper.

2. Methodology

In this section, we are going to explain the basic concepts of techniques which are used in this paper in details. Also, their application on the proposed image to extract the circular shapes will be investigated.

2.1 Median filter

One of the most efficient solutions for disappearing "salt and pepper" noises is applying median filter. Median filter belongs to the group of order static nonlinear filters. It could be easily used for erasing impulse noise. The process is that it replaces the value of a noise pixel with the median gray levels in the neighborhood of that pixel. It causes the impulse noise in the background be disappeared, but also an extra consequence is blurring the edges. This effect could be neutralizing impressively by applying the laplacian sharpening spatial filter [1].

2.2 Laplacian sharpening spatial filter

The purpose of using laplacian sharpening spatial filter is for highlighting fine details and enhance them which are blurred such as edges. As you know, laplacian is a linear and rotation invariant operator. Laplacian equation can be written for each dimension independently. Partial second-order derivatives in x and y directions could be calculated by (I) and (II).

$$\nabla^2 f = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2}$$

$$\frac{\partial^2 f}{\partial x^2} = f(x+1, y) + f(x-1, y) - 2f(x, y) \quad (I)$$

$$\frac{\partial^2 f}{\partial y^2} = f(x, y+1) + f(x, y-1) - 2f(x, y) \quad (II)$$

$$\nabla^2 f = [f(x+1, y) + f(x-1, y) + f(x, y+1) + f(x, y-1)] - 4f(x, y)$$

$$g(x, y) = f(x, y) \pm \nabla^2 f(x, y)$$

A 3x3 laplacian mask which could be obtained is as Figure 1.

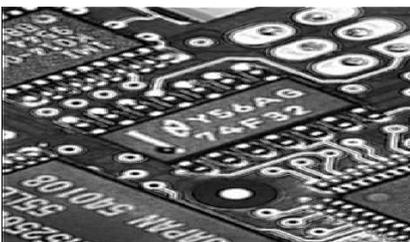
-1	-1	-1
-1	9	-1
-1	-1	-1

Figure 1. One pass realization of 3x3 laplacian mask

Result of its application is indicated in Figure 2 [1].



(a)



(b)

Figure 2. (a) Original image, (b) Sharpen image

Laplacian filter by itself causes the increasing noise in the image. But using it in consequence of median filter avoids from occurring this problem. Since the major part of noise is reduced in median filtering process.

2.3 Canny edge detection

Edge detection is an important topic in the research area of image analysis [2]. The purpose of edge detection in general is to significantly reduce the amount of data in an image, while preserving the structural properties to be used for further image processing. Several algorithms exists, and this worksheet focuses on a particular one developed by John F. Canny (JFC) in 1986 [3]. Even though it is quite old, it has become one of the standard edge detection methods and it is still used in research [4] [5].

The aim of JFC was to develop an algorithm that is optimal with regards to the following criteria:

1. **Detection:** The probability of detecting real edge points should be maximized while the probability of falsely detecting non-edge points should be minimized. This corresponds to maximizing the signal-to-noise ratio.
2. **Localization:** The detected edges should be as close as possible to the real edges.
3. **Number of responses:** One real edge should not result in more than one detected edge (one can argue that this is implicitly included in the first requirement).

The algorithm runs in 5 separate steps:

1. **Smoothing:** Blurring of the image to remove noise.
2. **Finding gradients:** The edges should be marked where the gradients of the image has large magnitudes.
3. **Non-maximum suppression:** Only local maxima should be marked as edges.
4. **Double thresholding:** Potential edges are determined by thresholding.
5. **Edge tracking by hysteresis:** Final edges are determined by suppressing all edges that are not connected to a very certain (strong) edge.

Figure 3 shows the result of applying this algorithm on an image [6].

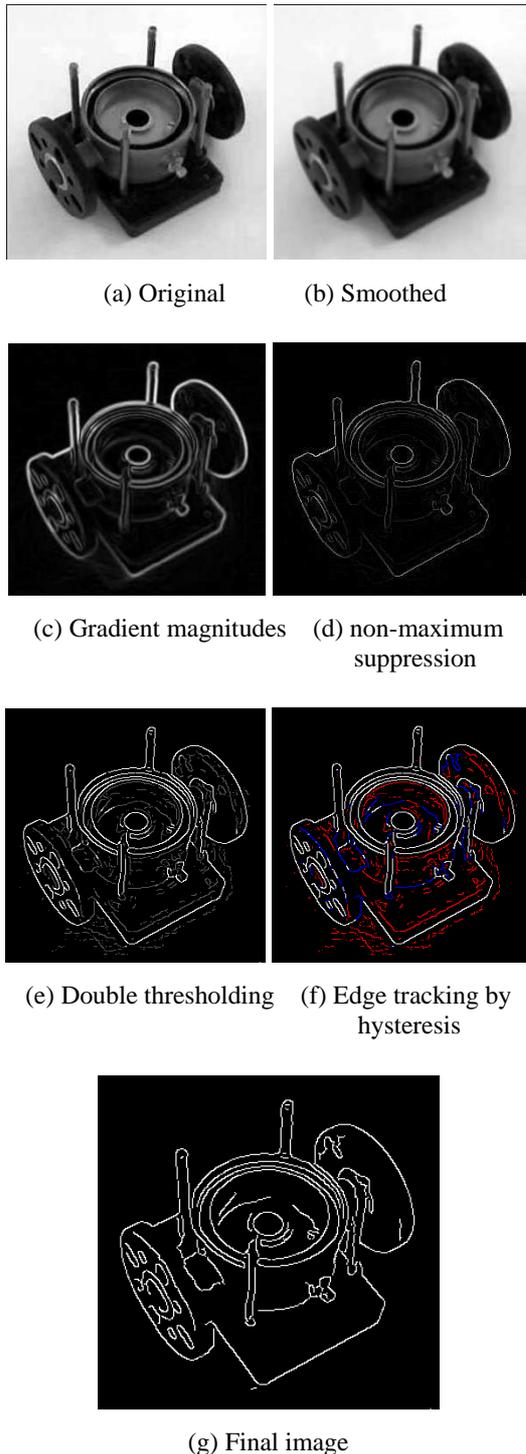


Figure 3. Applying Canny edge detection algorithm to example image

Even though Canny algorithm involves smoothing process, but it doesn't dispel the need for using median filter. Because smoothing step just blur

the image and it causes the little noises to be smoothen. But median filter causes impulse noise to be disappeared.

2.4 Circular Hough Transform (CHT)

A commonly faced problem in computer vision is to determine the location, number or orientation of a particular object in an image. For example, recognizing of roads in an aerial image or detection of circles in the image are two samples of this problem. But it can be solved using Hough transform. Often the objects of interest have other shapes than lines, it could be parabolas, circles or ellipses or any other arbitrary shape. The general Hough transform can be used on any kind of shape, although the complexity of the transformation increase with the number of parameters needed to describe the shape [7].

The CHT has been recognized as robust techniques for curve detection. This method can detect object even polluted by noise. The CHT was sketched by Duda et al. [8]. The CHT is one of the modified versions of the HT. The CHT aims to find circular patterns within an image. The CHT is used to transform a set of feature points in the image space into a set of accumulated votes in a parameter space. Then, for each feature point, votes are accumulated in an accumulator array for all parameter combinations. The array elements that contain the highest number of votes indicate the presence of the shape. A circle pattern is described by (III).

$$(x_p - x_0)^2 + (y_p - y_0)^2 = r^2 \tag{III}$$

Where x_0 and y_0 are the coordinates of the center and r is the radius of the circle. An example of conventional CHT is shown in Figure 4.

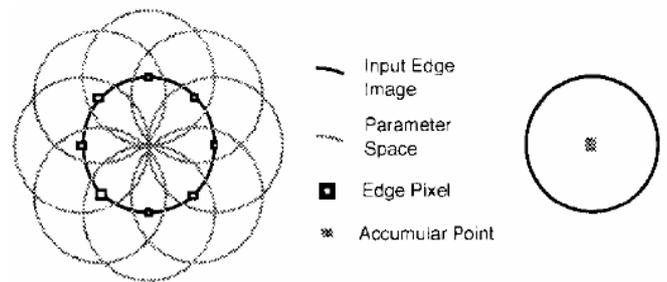


Figure 4. The contribution of the edge points to the accumulator space

The black circles indicate a set edge points within the image. Each edge point contributes a circle of radius R to an output accumulator space indicated

by the grey circles. The output accumulator space has a peak where these contributed circles overlap at the center of the original circle. Modification to the CHT has been widely implemented to either increase the detection rate or reduce its computational complexity [9] [10].

The algorithm for Circular Hough Transform can be summarized to following steps [11]:

//HOUGH BEGIN

1. For each edge point

Draw a circle with center in the edge point with radius r and increment all coordinates that the perimeter of the circle passes through in the accumulator.

2. Find one or several maxima in the accumulator

//HOUGH END

3. Map the found parameters (r, a, b) corresponding to the maxima back to the original image.

After applying the median and laplacian filter, Canny edge detection and CHT, circular shapes will be achieved efficiently.

3. Use cases

A question which may be asked is "What are the uses of this method?"

Following items can indicate just a small part of use cases of proposes technique:

- Building extraction: Most of building extraction methods can specify the buildings with polygonal rooftops and they have a weak performance in detecting circular buildings. For example look at the method which was introduced by Masoud S. Nosrati et al. [12].
- Digital filming: While taking film from sport matches like football and volleyball it can be possible to trace the ball by enhancing this technique. It means that a simple camera can take film automatically by using a developed form of this method.
- Biometric security: One way for identification of people is using their iris characteristics. For detecting the iris area this technique can be used. Eyelashes act like impulse noise and the filters which are used in this technique can make the detection process easier and more accurate.

- Astronomy: Proposed method can be used for detecting the planets surrounded by narrow clouds and recognizing the black holes in the special dim images.

Many other use cases can be found in chemistry, physics, biology, computer science and other fields of study. Also, with a little change in this method, other shapes in different noise styles can be extracted.

4. Conclusion:

In this paper, we introduced a method for extracting circular shapes from impulse noisy images. Due to this, 4 steps were nominated which were:

1. Applying median filter for erasing the impulse noise.
2. Applying laplacian sharpening spatial filter for neutralizing the blurring effect of median filter and sharpen the edges in the image.
3. Applying Canny edge detection.
4. Applying Circular Hough Transform for extracting the circular shapes in the image.

At the end of paper, different use cases of this method was investigated.

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5/7/2011

A short paper on steps of designing an appropriate websiteMasoud Nosrati ^{*1}, Ronak Karimi ², Hamed Nosrati ³, Ali Nosrati ⁴^{1,2} Young Researchers Club, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.^{3,4} Islamic Azad University, Kermanshah Branch, Kermanshah, Iran.minibigs_m@yahoo.co.uk

Abstract: In the modern world that the lives are going to have an online aspect in addition to traditional life, having suitable websites for different purposes plays a big role in social communications. High quality communication is the product of good interaction, and a good online interaction is the product of a good website.

In this paper, we want to introduce some basic steps that can help to provide a guideline for designing a suitable website. We have tried to cover both technical and psychological aspects of a website. These steps are divided into 3 parts: pre-design, design, and post-design steps. Each one of them is consist of some steps that are described in details through the paper.

[Masoud Nosrati, Ronak Karimi, Hamed Nosrati, Ali Nosrati. A short paper on steps of designing an appropriate website. Journal of American Science 2011;7(6):89-91]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Website design; information systems; modeling website; publishing website.

1. Introduction

Nowadays, World Wide Web (www) plays a definite role in the human societies. Almost all the social relationships are going to have an online aspect in addition to traditional aspects. In this world having a suitable website helps to make high quality relationships and get a social higher level. But a major question witch may be asked is that "What are the steps of designing a suitable website?"

In this paper, we are going to answer this question in technical way. Here we are focus on the performance of the website. And we are not going to over talk on some common aspects such as: beauty, attraction, regularity, complexion, easy working, etc [1].

In the second section, we will get into the steps of designing a good website and each step will be described in details.

2. Steps of design

In general, we categorize the steps of a website design to the following sections. Then, we will investigate them:

Pre-design phase:

- Specifying the goals
- Collecting information about users and their needs
- Organizing the information
- Modeling

Design phase:

- Designing the interface
- Providing the contents
- Testing the website
- Publishing

Post-design phase:

- Supporting and maintenance

2.1 Specifying the goals

Before you start to work, you need to pay attention to an important point that is the goals of the website. Each website has a general purpose and may include some implicit goals, too. Specifying these goals help you to distinguish the way of design.

For example, a big e-shop website may include some goals such as: contributing, delivering, selling, etc. Knowing these goals helps to designer to consider different separated functions for doing each one. It may lead to scheme the website to some micro-sites that work together to obviate these needs. Also, it simplifies the general purpose of website and avoids the designer to face with complex relationships between different parts of website [2].

2.2 Collecting information about users and their needs

As the second step, you have to know that who your audiences are. Having some general information about users' community such as: age, gender, education, taste, needs, etc. can help you to provide more suitable contents.

Another important point is about hardware and user equipments. You have to determine the type of user hardware, in order to adapt the created website to it, and avoid placing some contents that user can't be able to use [3].

2.3 Organizing the information

The purpose of organizing information is to deliver the proper information to corresponding user.

There are some methods to do this. For example we can point out the following ones:

- *Tree structured information:* Using this kind of structure provides access levels for achieving information. It can be used for organic and multilevel user sites.
- *Pure linear structured:* In this type, pages that include information are in a sequential order and placed one after another. They show all of information to all of users in a sequential way.
- *Linear structured with alternatives:* In this type, user can select the path of movements between information by answering YES or NO to asked questions. This type can be used for some special parts of websites or for risk management systems.
- *Complex structured:* Combination of the above structures makes a complex structured information system. Almost all of big sites use this kind of structure.

2.4 Modeling

One of the important parts of website designing is modeling. It means that before you start to work by your computer, draw a model of website on the paper (or by drawing tools on the computer). It helps you to know what material you want to place in the pages and what kinds of information should be displayed. Also, location of each item will be set. This step gives you some ideas about interface of website, because you are not facing with computer limitations in this phase [4] [7].

2.5 Designing the interface

After drawing the model on the paper and making decision about the page style and contents, it is time of beginning to implementation. During the previous steps, you decided what you want to create and specified the characteristics of your website. Now, you have to make it. This step needs to your sufficient technical information and experience.

Remember that use optimized codes as much as possible to decrease the computing complexity. Speed is very important, and fast interfaces are very pleasant to users. Also, showing suitable help messages in appropriate locations of page can motivate users not to close your website in the browser, and return for other times [5].

2.6 Providing the contents

Providing information is the most important part of the website design. It should be tried to organize the information in the best way. Due to this, optimization and categorizing are some useful techniques that can help to provide a suitable content

[6].

Generally, it should be tried to deliver the best content to user in the easiest way. Content should be in a suitable meaningful form so that the meaning can be easily received by the user. It should convey the concepts in the best form [7].

2.7 Testing the website

When you create a website, you have to be aware of its performance. Function of websites in the real world uses should be evaluated before publishing.

As the basic testing, you can check out all the links in the pages. Also, multimedia contents should be covered.

Another important point is the various platforms that users have. One step of testing is to check the website on different web browsers. Website should be designed so that has a similar output on the different platforms and browsers. Always consider the most common browsers like Internet Explorer, Firefox and Opera. Your website should have similar results on all of them.

Other important point is considering the network traffic. It should be tried to use optimized techniques that high traffic of website doesn't defect on the performance [8]. Heavy traffic causes reducing the speed of website and also it may crash.

2.8 Publishing

Previous steps give some guidelines to create a proper website with a suitable interface and good performance. After creating the pages, it is time to publish the website in the internet. An important point which should not be neglected is that you should choose an appropriate host and domain. Your host must support the traffic of your site and it must provide a sufficient bandwidth. Host should be always on and never off. Interruption in servicing is not pleasant to users. Also, the domain that you choose should be related to the name and title of website. It has to be short and easy to remember as much as possible.

2.9 Supporting and maintenance

Supporting is the important post-creating activity that is done by designer. Each website needs to be refreshed from time to time. It is very important to update the content and improve the positive features of website. The purpose is to avoid losing audiences, because users like diversity.

Don't forget that a website is like a plant that grows and goes up everyday, and you have to look after it, in order to have the best fruits [9] [10].

3. Conclusion

In this paper, we talked about basic steps for designing a good website. Due to this, we divided these steps to three parts: pre-design, design, and post-design steps. Then described all of them and told our reasons and advices on each one. The steps including: specifying the goals, collecting information about users and their needs, organizing the information, modeling, designing the interface, providing the contents, testing the website, publishing and supporting and maintenance, were described in details during the second section of the paper.

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An algorithm for minimizing of Boolean functions based on graph data structure

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Abstract: In this paper, we intend to introduce a new heuristic algorithm to apply maximum minimization to Boolean functions with normal SOP form. To implement the proposed algorithm, we use the graph data structure and define the adjacencies. Also, we demonstrate some conditions to achieve the maximum minimization. Through this paper, the problem of shared vertices in more than one adjacency is talked, and the solution is presented. Karnaugh map is used to clarify the matter.

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Keywords: Minimization of Boolean functions; Graph data structure; SOP functions; discrete mathematics.

1. Introduction

Minimization of Boolean functions is one of the basic operations in Boolean algebra [1]. This is also useful in digital circuits design [2], and it was been regarded to decrease the price of manufactured circuits by removing extra gates [3,4]. In this paper, we present an algorithm to minimize the Boolean functions extremely. We use the graph data structure to implement this algorithm.

Before it, some methods and algorithms was introduced like "Factoring Boolean functions using graph partitioning" [5] or "A Heuristic Method of Two-Level Logic Synthesis" [6]. These methods are absolutely heuristic, and they don't give the maximum minimized form of Boolean function all the time. The method that we are going to introduce is a simple way to reach the maximum minimized form of Boolean function. Also, it could be used in education, because of its simplicity.

In second part which is entitled as "Graph data structure and agreements", the structure of proposed graph and its objects and methods will be talked. In addition, some agreements are presented which are considered during this paper. In third part that is named "SOP functions and graph", the relationship between SOP functions and graph data structure is objected. Furthermore, the conditions of minimization of function by proposed graph are demonstrated. In "Minimization algorithm", that is forth part of this paper, the algorithm of minimization and its description is presented. Eventually, "conclusion" is places as fifth part.

2. Graph data structure and agreements

First time, graph has been used for solving the classic problem of Königsberg bridges by

Leonhard Euler in 1736. After that, graph came into mathematics world [7].

A graph is constructed of two sets, V (vertices) and E (Edges). For example, look at Figure 1.

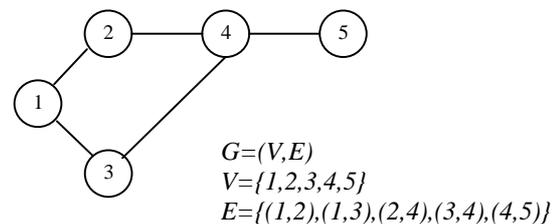


Figure 1. A simple example of graph

A path in graph is a set of vertices we should cross to get to a special vertex. If the initial and final vertices are the same, this path is called cycle, and if all the edges in a cycle are met just one time, it is called a simple cycle [8,9,10].

According to these definitions, there is one simple cycle in Figure 1, which is $\{1,2,4,3\}$. Here, we make two agreements and describe the reason in third part of paper.

Agreement1: Each vertex makes a simple cycle by itself.

Agreement2: A couple of adjacent vertices make a simple cycle.
(Adjacent vertices are those which are related by an edge.)

According to these agreements, the simple cycles for Figure 1 are like below:

$\{1\}, \{2\}, \{3\}, \{4\}, \{5\}$
 $\{1,2\}, \{1,3\}, \{2,4\}, \{3,4\}, \{4,5\}$
 $\{1,2,4,3\}$

Now, we can implement the class of proposed graph data structure [11,12]. This class contains some objects to store V and E , and also some methods to create and remove vertices and edges [13,14]. In addition, there is a method that returns the list of all simple cycles which begins with V_i . Another method is defined to return the number of all adjacent vertices of V_i , too.

Class Graph

```

{
  //Objects
  // Data containers to store Vertices and Edges

  public:
  Graph();
  // To create an empty graph
  bool IsEmpty();
  // If graph has no vertices returns TRUE(1), else
  // returns FALSE(0)
  void AddVertex(Vertex V);
  // Insert a new vertex
  void AddEdge(Vertex U , Vertex V);
  // Insert a new edge between u and v
  void RemoveVertex (Vertex V);
  // Deletes v and all edges incident to it
  void RemoveEdge(Vertex U , Vertex V);
  // Deletes edge (u,v)
  list Cycles(Vertex Vi);
  // Returns the list of all cycles that begins with Vi
  int AdjacentVertices(Vertex Vi);
  // Returns the number of adjacent vertices of Vi
}
    
```

3. SOP functions and graph

Boolean functions are used for indicating the performance of complex two-level circuits with AND - OR gates. These functions could be shown in normal SOP (Sum Of Products) or POS (Product of Sums) forms [15,16,17]. We aren't going to talk about algebraic concepts or the way of generating SOP or POS forms. Just propose that we have a SOP function which should be minimized.

There are different ways to minimize SOP functions. One is using the algebraic rules, which is hard and confusing for large functions with many variables. Another is using Karnaugh map. It could be used for functions with 2 to 6 variables, by drawing the map of adjacency. In fact, Karnaugh map is an illustrative form of truth table. It puts the adjacent statements near each other and provides the opportunity of selecting appropriate adjacency.

Figure 2 shows the Karnaugh map for 4-variables Boolean functions. In this map, different states of variables are showed by 0 and 1 [18].

0000	0001	0011	0010
0100	0101	0111	0110
1100	1101	1111	1110
1000	1001	1011	1010

Figure 2. Karnaugh map for 4-variables Boolean functions

It is seen that each two adjacent cells has one different bit. In other word, the XOR of two adjacent cells equals $2^r, r=0,1,2,\dots$

Consider that function (I) should be minimized by this map. By replacing the variables with 0 and 1 (function (II)), its Karnaugh map will be as Figure 3.

(I)
 $f(w,x,y,z) = w'x'yz' + w'xy'z + w'xyz' + w'xyz + wx'yz' + wx'yz + wxyz'$

(II)
 $f(w,x,y,z) = 0010 + 0101 + 0110 + 0111 + 1010 + 1011 + 1110$

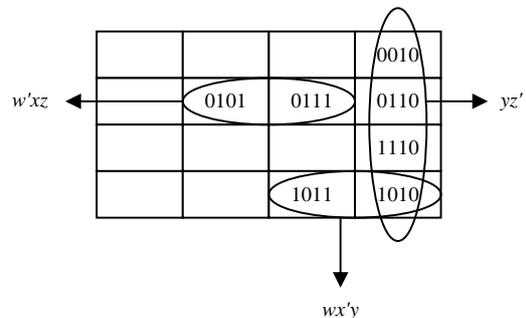


Figure 3. Karnaugh map for function (I) with appropriate adjacencies

In Figure 3, appropriate adjacencies are selected, and minimization operation - which is remaining similar bits and removing the others [19] - is done. Essential condition to choose an appropriate adjacency is defined as (*).

(*)

The number of cells in an adjacency should be equal to 2^k , $k=0,1,2,\dots$ and no similar bits equal to k .

Another point which should be regarded is that always the biggest adjacencies that contain more cells should be selected, in order to make the function more minimized, by reducing more different bits [1,18]. Also, it should be paid attention that in functions with complete statements - where all statements are present - minimized function equals to 1.

It is seen that minimized function (I) will be like function (III).

(III)

$$f(w,x,y,z) = yz' + w'xz + wx'y$$

Suppose that f_v is a desire Boolean function. It could be adapted to graph data structure, if for each statement in it, create a vertex and show adjacencies by edges. For example, Figure 4 shows the graph of function (I).

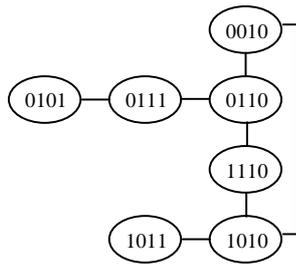


Figure 4. Graph of function (I)

To minimize the function of this graph, first the biggest appropriate adjacencies should be found for each vertex. It has to be done regarding agreements 1 & 2. Now, you can find out the reason of making these agreements. Minimization is operated according to the adjacencies (not vertices), so for each alone vertex, an adjacency should be considered. For two adjacent vertices it has to be done, too. In mathematical definition of simple cycles in no directed graphs, simple cycles with less than 3 vertices are not defined [5,9].

Regarding condition (*), Table 1 shows the biggest simple cycles in graph of Figure 4.

Vertex	Simple cycle (*)	Minimized
0010	0010-0110-1110-1010-(0010)	yz'
0101	0101-0111-(0101)	$w'xz$
0111	0111-0101-(0111) 0111-0110-(0111)	$w'xz$ $w'xy$
0110	0110-1110-1010-0010-(0110)	yz'
1110	1110-1010-0010-0110-(1110)	yz'
1011	1011-1010-(1011)	$wx'y$
1010	1010-0010-0110-1110-(1010)	yz'

Table 1. List of biggest cycles of graph Figure 4 regarding condition (*) for each vertex

For vertices *0010*, *0110*, *1110*, *1010* cycles are the same. Consequently, the minimized forms are similar, too. For vertex *0111* two appropriate adjacency is available. In other word, the biggest cycle is not unique. If both of them be involved in final minimized function, then one extra statement is imposed to it. So, one of them must be chosen as below:

If vertex V has more than one biggest cycle regarding (*), choose the adjacency that its first vertex (next to proposed V) has less adjacent.

In our example, vertex *0111* has two adjacent *0101* and *0110*. First one has 1 adjacent vertex, and second has 3. So, first one has to be chosen and $w'xz$ should appear in final minimized rather than $w'xy$.

The reason is when you choose the path which its first vertex has less adjacent, probability for this vertex to be included in other adjacencies is less, and if it has no other adjacent vertices, it couldn't participate in minimization operation. So, to make sure that it never happens, choose the path with less. But, if the number of adjacent vertices for both of them was equal, then you can choose one randomly. Because, they have similar circumstances and it doesn't differ that which one is selected.

4. Minimization algorithm

To implement the maximum minimization on the introduced graph, the algorithm in below is offered.

\\ ----- *Minimization algorithm based on graph data structure* -----

```

Create Graph of Boolean function;
If all the vertices and edges are present then return 1;
Else
{
  For each vertex V
  {
    Find biggest cycles with the condition (*);
    If biggest cycle is not unique then
    {
      Find the num of adjacent vertices of first vertex next to V in path;
      If the numbers of adjacent vertices are equal then
      Choose one randomly;
    Else
      Select the path with lest adjacent vertices for its first vertex;
    }
    Minimize (take the similar bits and reduce others);
    Store the minimized forms;
  }
  Reduce the repeated minimized statements;
  Return the minimized function;
}

```

First, it creates a graph according to Boolean function. Then, it checks whether the function is complete, return 1. Else, find the biggest cycles for each vertex, and if it wasn't unique, choose the appropriate one. After that, minimizes the adjacency by taking the similar bits and reduce others. Then, it stores the minimized form. When these steps were done for all the vertices, some statements will be created per vertices (as you see in Table 1). After reducing the repeated ones, final minimized function will be achieved and returned.

5. Conclusion

In this paper, we introduced a new heuristic algorithm to apply maximum minimization to SOP Boolean functions. Therefore, graph data structure as the essential base of this algorithm was defined, and two agreements were made which forked from the difference between mathematical definition of simple cycles and what we need for our object. Then, the method of minimization was talked, which used the concepts of Karnaugh map. Finally, the algorithm of minimization presented.

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Embedding stego-text in cover images using linked list concepts and LSB technique

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Abstract: In this paper, we intend to introduce a steganography algorithm for embedding a message into a RGB 24-bit color image. It will be done by using the concepts of linked list data structure. It will help us to achieve some important advantages. First, we can create a “stego-key” by the address of message blocks. Second, it makes the detection of message harder. Also, there will be other benefits that are mentioned during the paper.

Another point about the presented algorithm is the flexibility. For example, it could be written in recursive way. To prove it, we wrote a recursive function called “Read()” for extracting the message from the cover image. At the end of paper, characteristics of this algorithm will be talked.

For embedding data, LSB (Least Significant Bit) technique is been used.

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Keywords: Steganography; secure communication; data covering; carrier image; linked list; LSB.

1. Introduction

On line facilities are closely tied with the issues concerning availability, integrity, confidentiality and authentication of information exchanged over communication media, which has lead to the evolution of information hiding techniques for securing communication [1]. To do this, one of the common strategies is using steganography algorithms. The word steganography is derived from the Greek words “stegos” meaning “cover” and “grafia” meaning “writing” defining it as “covered writing” [2]. Steganography is one such pro-security innovation in which secret data is embedded in a cover [3]. In other words, steganography is the process of hiding a secret message within a larger one in such a way that someone cannot know the presence or contents of the hidden message. Although related, Steganography is not to be confused with Encryption, which is the process of making a message unintelligible - Steganography attempts to hide the existence of communication [4]. The notion of data hiding or steganography was first introduced with the example of prisoners' secret message by Simmons in 1983 [5].

In steganography we are faced with two types of components: message and carrier. Message is the secret data which should be hidden; and carrier is the context that hides the message in it. Carrier can be of any types of data such as text, image, audio, etc. Message with embedded hidden information is called “stego-text” [6].

In this paper, we are going to hide a binary message in an image as the carrier material which we call it “cover image”. Message will be embedded

sporadically with a structure like linked list, and random locations of its data blocks. By this, we are going to achieve two important goals:

- a) Make the detection of message harder to gain to stricter security.
- b) Create a security key for extracting message. Since the head of the message has a random location in the cover image, so the initial address of it can be used as a key.

For embedding the message in a 24-bit RGB image, we use the LSB (Least Significant Bit) technique. So, in the second section which is titled “Background” we will talk about basic concepts about RGB color space and the LSB technique fundamentals. In the third section that is named “Linked list structured message embedding”, we will get into the structure of message and the number of pixels needed to store it. Main part of this section is devoted to embedding algorithm. In the fourth section, titled as “Discussion on features” we are going to talk about the characteristics, advantages and uses of this technique. Finally, “Conclusion” is placed in the end of paper.

2. Background

An image can be represented by a collection of color pixels. The individual pixels are represented by their optical characteristics like “brightness”, “chroma” etc. Each of these characteristics can be digitally expressed in terms of 1s and 0s [7]. There are different color spaces that present different forms for storing images. A color space is a method by

which it is possible to specify, create and visualize color [8]. The most common color space among all is RGB (Red, Green, Blue). Each pixel in a 24-bit bitmap image in this space is described by 3 sets of 8 bits (3 bytes), that each set contains the intensity value of individual red, green and blue. Combination of these values forms the characteristics of the pixel. Figure 1 illustrates this matter.

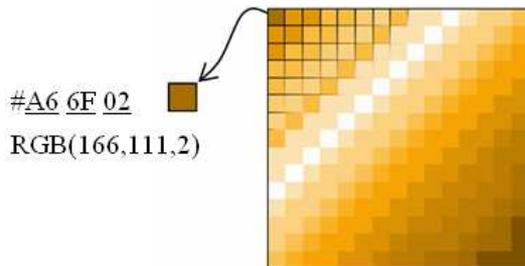


Figure 1. A pixel in RGB color space

Least Significant Bits (LSB) insertion is a simple approach for embedding information in image file. The simplest steganography techniques embed the bits of the message directly into least significant bit plane of the cover image in a deterministic sequence. Modulating the least significant bit does not result in human-perceptible difference because the amplitude of the change is small [9]. To hide a secret message inside an image, a proper cover image is needed. Because this method uses bits of each pixel in the image, it is necessary to use a lossless compression format, otherwise the hidden information will get lost in the transformations of a lossy compression algorithm. When using a 24-bit color image, a bit of each of the red, green and blue color components can be used, so a total of 3 bits can be stored in each pixel. For example, the following grid can be considered as 3 pixels of a 24-bit color image, using 9 bytes of memory:

```
(00100111 11101001 11001000)
(00100111 11001000 11101001)
(11001000 00100111 11101001)
```

When the character A, which binary value equals 10000001, is inserted, the following grid results:

```
(00100111 11101000 11001000)
(00100110 11001000 11101000)
(11001000 00100111 11101001)
```

In this case, only three bits needed to be changed to insert the character successfully. On average, only half of the bits in an image will need to

be modified to hide a secret message using the maximal cover size. The result changes that are made to the least significant bits are too small to be recognized by the human visual system (HVS), so the message is effectively hidden [10].

As you see, the least significant bit of third color is remained without any changes. It can be used for checking the correctness of 8 bits which are embedded in these 3 pixels. In other words, it could be used as “parity bit”.

3. Link list structured message embedding

In this section we are going to embed the message in cover image with a structure like what linked lists place in the memory. As you know, linked list is a data structure like an array, but the most important difference between them is in their placement in RAM. Arrays sit in sequential order of memory places, but linked lists get sporadic addresses, and each item (which is called “node”) stores proposed data and also the address of the next item in the memory [11]. Using this concept, we will embed the separate bytes of message sporadically in cover image, so that, address of the next byte far apart in the image be placed just after embedding each byte. By this, two advantages will be achieved: First, non sequence of message structure makes the detection harder, and it increases the security level. Second, the address of first byte of message could be used as stego-key. As you know, while working with linked lists, always the address of first node is stored in a pointer for accessing the linked list data. Losing this address means losing the data stored in linked list. So, we can take this concept to work in steganography for creating a key for message. Figure 2 shows the structure of message in the cover image.

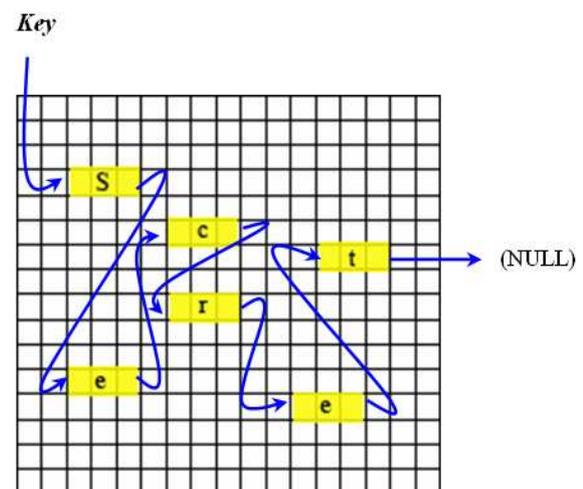


Figure 2. Embedding a linked list structured message in cover image

Another important point we have to consider is about the random location of message bytes. Each image provides a 2 dimension (X, Y) space for putting the message in it. Now, what we need is an algorithm to generate the address of no repeated locations. There are some algorithms for it. For example, you can suppose the image as a simple 1 dimension array, and then do the block scheming. Each block can be a set of pixels for storing a byte of message and also some extra pixels to store the next byte address. The number of pixels in a block depends on the size of image. For an image with $x*y$ pixels, following equation can be used to determine the number of pixels needed for storing the address:

$$(I) \quad p = \left\lceil \frac{k}{3} \right\rceil : x * y \leq 2^k$$

That p is the number of pixels for address. There are $(x*y)$ items that should be addressed. So, we need k bits so that $x*y \leq 2^k$. It can be concluded that the number of pixels will be equal to p in (I).

For example, suppose that there is a $20*30$ pixels image. For addressing:

$$20 * 30 \leq 2^{10}$$

$$p = \left\lceil \frac{10}{3} \right\rceil = 4(\text{pixels})$$

So each block in this image should contain 3 pixels for a byte of message, plus 4 pixels for address of the next byte.

After block scheming, now you can use the random numbers generation algorithms to choose the blocks for storing data in them. We aren't going to describe these algorithms. Just suppose that there is a function which is named "*RandomBlocks()*" and it does the block scheming and random block selection. For more information about generating random numbers see [12].

Here, we present an algorithm for embedding the message in a cover image with linked list structure. It is done by a function which we call it "*write()*".

Class block

```
{
    block(); // Constructor
    void SetData(byte); //Sets the byte for data part of current
block
    void SetLink(block); //Sets the block for link part of current
block
    byte GetData(); // returns the Data part of current block
    block GetLink(); // returns the Link part of current block
    block GetAddress(); // returns the address of current block
}
```

function Write(message)

```
{
    new=RandomBlock();
    new.SetData(First byte of message);
    key=GetAddress();
    previous=new;

    for each byte in message // From second byte
    {
        new=RandomBlock();
        new.SetData(byte);
        previous.SetLink(new.GetAddress());
        previous=new;
    }
    previous.SetLink(NULL);
}
```

For reading the message a recursive algorithm is presented. It is done by *read()* function. While calling this function for the first time, *key* should be sent as a parameter of this function.

byte Read(block)

```
{
    if (block.GetLink==NULL) return block.GetData();
    else return read(block.GetLink);
}
```

4. Discussion on features

In this section, we are going to get into the characteristics of this algorithm. So, the following lines can be pointed out:

- Presented algorithm can be used for any kind of message embedding such as text, images and even the files; because all of them can be reached in bytes form.
- Considering equation (I), maximum bytes of the message that can be embedded in an image with $x*y$ pixels (n_b) is calculated as follow:

$$(II) \quad n_b = \frac{\sum(\text{pixels})}{p+3} = \frac{x * y}{p+3}$$

- It is easily possible to add new blocks of data in the chain of message. Also, removing them could be done easily.
- More than one message can be embedded in a cover image. It means we can have more than one chain of message with different keys. This feature could be very useful when the receiver of message is more than one, and each of them should receive their own message.
- This algorithm can be used as a layer of programming in the process of securing data.

5. Conclusion

In this paper, we talked about basic notions of steganography and also took a look at LSB embedding technique in RGB 24-bit color images. After that, a way for image block scheming was introduced, in order to create a structure like linked lists. Also, some rules were defined to set the size of each block. It was mentioned that the goal of block scheming was creating stego-key and making the detection of message harder. Finally, the algorithm for embedding the message was presented, and its characteristics were talked.

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Investigating the basic principles for proper GUI design

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Abstract: User interface is a general connection tool for getting the request of user and give back the responses. A special type of user interface is GUI (Graphical User Interface), which is very important in computer world, and you can't find any application without it. Designing a suitable GUI is definitely an important part of designing any application. Due to this, there are some principles that help to create an appropriate GUI. In this paper, we are going to talk about the necessity of a suitable GUI for an information system. So, the goals of GUI will be investigated. Then we will get into common characteristics of a proper GUI.

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Keywords: User interface; Graphical User Interface; GUI; GUI Purpose; information system; information display.

1. Introduction

When the computers came to existence world faced to impressive developments in various fields of science and industry. Consequently, the societies faced with giant revolution in technology. These changes had many effects on the people lives. These advances went to where that computers and information technology got a definite place in everyday life. One of the important outcomes of these advances is information system. Information system is an integrated set of components for collecting, storing, processing, and communicating information. Business firms, other organizations, and individuals in contemporary society rely on information systems to manage their operations, compete in the marketplace, supply services, and augment personal lives [1]. Designing of User Interface is an important part of designing an information system, and it involves the design of computers, applications, mobile communication devices and websites with the focus on the users integration and experience [2] [3]. It includes a wide range of projects from computer systems to cars and commercial planes. All of these projects require some skills and knowledge for the end-user [4] [5]. One of the most challenging matters in this field is the need for principles for designing an appropriate Graphical User Interface (GUI) for information systems and databases full of information. In this paper, we are going to represent some guidelines for designing a user friendly GUI according to technical and psychological bases.

2. Aims of UI design for a special information system

In this section, we will cover some basics which show the goals and consequently the way for

designing a user interface. First, we will talk about types of a user interface and then get into some principles that clarify the general purpose and policies of user interface design.

2.1. Types of user interface

Generally, there are two types of user interfaces which are listed and investigated below [6]:

- Standard User Interface (SUI): In this type, view and user friendliness of user interface is less important and the performance is the main measure. UIs from this type are suitable for applications which are designed for experts.
- Graphical User Interface (GUI): This type is used for the general purpose heterogeneous audience applications. It is based on graphical features and computer vision.
- As the first step of UI design, you have to decide which one to use. SUI is out of the contents of this paper, because we are going to investigate the features of a user friendly UI and it goes to GUI design.

2.2. User community cognition

Recognizing the users is an important step in GUI design, so that Hansen [7] nominates it as the first essence of user engineering.

To design an influential GUI, first the detailed information about user community should be taken, such as gender, age, education, taste, type of needed information, width and depth of information, etc [8] [9]. Different people have different tastes. Analyzing information about users in order to find

some alike taste points causes to achieve guidelines for designing GUI. It is enough clear that main goal of GUI is to have a better interaction with user [10] [11]. So, recognition of what user wants helps to close this goal.

2.3. Information System tasks recognition

After user community cognition, the tasks of information system should be specified. An information system must be known in order to determine the needs, outcomes and facilities that it can provide [12].

Another important point is basic information providing. According to the content information, there should be ways for uninformed users to improve their knowledge about the content. It means that basic information of the content information should be available through GUI for users that have less knowledge; or at least nominate some resources including books, papers, guidelines, etc for them. It has to be tried to help users to spend less time to find information about content. A GUI designer is most known about the essential information which a common user may need, so he/she should consider it during the design.

3. Common characteristics for an appropriate GUI

Nowadays information systems with huge databases are increasing all over the world and each one has an individual GUI. They have their own audiences and applications. But one matter is the same among all of them. That is trying to have better interaction with users to close the user to information which he need. The quality of this interaction is specified by the GUI. A good work that can be considered through GUI design is asking users about their needs. It is often neglected that applications provide a questionnaire to collect the users' ideas. But it can help to make a more user friendly GUI. So, always try to have a feedback facility to get your audience ideas. It helps to discover weak and powerful parts of your work [13]. Furthermore, there are some guidelines that can help to design a proper GUI for applications, which are listed below:

3.1. Information display page

The page that shows the result of queries is probably the most important part of GUI. Shires and Olszak [14] who are pioneers of this field state the following tips for designing a good information display page:

- An ideal page should follow the suitable vision rules such as: balance, regularity, sequence, etc.

- Using space between the sections and paragraphs.
- Putting the different parts of GUI in recommended places. For example, it is better to place the search box in top of page and show the queries in middle.
- Observing punctuation and using suitable fonts.
- Using sequence of pages in place of cramming information in a long volute page.
- Integrating information by putting all information about a special subject in one page.
- Indicating information directly.
- Categorizing the information.
- Labelling the pages and all the items in it.

3.2. Visual components of GUI

Basic visual elements are: dots, lines, shapes, color, texture, and surface which are seen in all views. Regarding the impressive role of visual elements which includes main part of human reception [15], it is recommended that all the subjects that are used to guide user be through images, animations, diagrams and other visual elements. Non-textual materials can help users to comprehend easier, faster and more efficient. Also, it avoids users from boring and eyes fatigue. Less text should be used for help section, because it is time consuming and boring.

Graphical balance of the page is very important. Background, color, font, style, etc. should be selected carefully, so that it be readable, easy to understand and attractive [16].

3.3. Colors

Color scheming is one of the most important parts of GUI design. Different colors can impress emotions in different ways. So, they should be consciously used through design [17]. Shneiderman states that more than 7 colors should not be used in a page [18], but Galitz is for with 4 colors [19].

Another point about color scheme is that users who are suffering from vision problems should not be forgotten. Studies ([20], [21], [22], [23], and [24]) have found that the majority of computer workers experience some eye or vision symptoms [25]. To help these users, colors with high contrast can be used. Observing color conflict, contrast in darkness, contrast in hot or cold colors, supplement conflict, simultaneous conflict, quantity and quality conflict are other solutions [26].

3.4. Symbols

Using the symbols makes the screen more attractive, and users like to see familiar symbols in the page. It helps them to percept the concepts through visual symbols, instead of reading the words. But it should be paid attention that placing unfamiliar or expert symbols for novice users might be confusing. So, these symbols shouldn't be used in wide, and they must be supported by a textual guide as tool tip or any thing else. Rogers believe that establishing a meaningful connection between the symbol and the concept in the unfamiliar user's mind causes some problems [27]. In addition, symbols can cross the language fronts and convey the meaning through visual elements. So, Russo and Boor are concerned about the different meaning of symbols in different cultures [28]. Also, using the symbols may lead to appearing symbolic languages. For example, using triangle in players means "Play", so using the double triangle embodies "Double speed play". For integrating the symbols, ISO suggests some guidelines [29].

3.5. Buttons and options

Users intend to achieve information with only few clicks on buttons and options. It should be tried to avoid design messy pages as it is possible. Crowded pages make users confused and unmotivated to continue. It is better to use key options in page and hide other options under a menu or extra options button. Information should be delivered to user as soon as possible.

Captions of buttons and other option links are very important. They can be self guides to assist the users. Appropriate labels can help user to send what he wants to application and consequently, he can take the best results close to what he want. There should be some buttons to load some pages which contain a brief form of information page. It helps user not to face with a huge mass of information and be able to distinguish the information he really needs [30].

3.6. Application messages

Messages exported from GUI have an impressive role in acceptance feeling of users. Choosing suitable words is very important. Also, error messages that convict user for the mistakes can be confusing and cause nervousness. These messages should be in guidance form to prevent novice users from anxiety. Shneiderman [18] reminds the following features for GUI messages:

- Containing useful tips for users
- Positive tone
- User oriented

- Appropriate wording
- Using no similar messages for different goals
- Considering multilevel users
- Integrity in literary form, words and abbreviations
- Correcting the error by the software as much as possible

3.7. Help

Help is a part of GUI that provides the opportunity of learning through working with application. Branjnik et al. believe that help should be designed strategically and based on conceptual model to include the knowledge in it [31]. Trenier categorizes the questions that might be asked by the users as follow:

- What is my mistake?
- Is my act true or false?
- Where am I and then what should I do?
- How do I do?
- How can I get information?
- Why information system faced with problem? [32]

Placing help section in the application pages, is necessary, with the condition that information be comprehensive and sufficient and be able to answer to these questions in a clear way.

3.8. Fast response

Slow response from application leads to dissatisfaction of users. GUI designers should pay much attention to this point that users intend to achieve information in the least time. Even though the novice users have much stamina, but common and professional users can't undergo to lose time.

In some cases that limitation of hardware causes slow speed of actions, GUI designer can create some solutions. The least thing that designer can do is determining the time of each action and inform it through showing appropriate messages. Response time is defines as expectation of user about necessary time for completing an action, which is based on previous experiences of user. Generally, Shneiderman states that following factors effect the user's expectation:

1. Previous experiments
2. Personality differences of users
3. Functional differences [18]

3.9. Interaction of user and information system

The best GUIs are so designed that are able to response different request of their users. It is

recommended that GUI make users to interact with database directly. So, in database applications the tool of this interaction should be provided. One of the best tools which can be used is search box. User can specify what he wants exactly by this tool. Search box should have varied options to give opportunity for searching through all kinds of resources. Also, messages that are exported from search box should be clear and fluent. Generally, every tool that makes the interaction more powerful must be used in GUI design. Remember that users will be motivated only if they feel the interaction [33].

3.10. Target Platforms

Designed GUI is going to run on a target platform. Target platform might be some kinds of portable devices such as mobile cell phones, PDAs, laptops, etc. It is very important to observe some limitations of these devices such as screen size, keypad limitations, etc. Another important point is observing the energy-efficiency factors to avoid using so much battery energy [34].

3.11. Beautiful environments

Human is a beautiful friendly creature and beauty has an undeniable role in his life. Nowadays, computer graphical tools help to create beautiful images. Using this beauty through GUI design helps to the user motivation to return to the application for more other times. Paying attention to following tips is very effective to design a pretty GUI:

- Coherent page layout
- Using suitable colors and fonts
- Embedding related animations (but don't use them so much)
- Using related images and symbols and place them in recommended places
- Margin scheming
- Paying attention to psychological principles [35]

4. Conclusion

In this paper, first the aims of a user interface were talked. Then some considerations were investigated to clarify the way of GUI. They were "Types of UI", "User community cognition" and "Information system tasks recognition". Specifying these subjects helps to achieve general purpose of GUI function for the special applications.

After finding the function of GUI, it was turn to design. There have investigated some common features that can improve the user friendliness of a GUI. They were: Information display page characteristics, visual components of GUI, effect of colors, symbols characteristics, buttons

and options, messages, help of software, effect of fast responding, importance of interaction between user and information system, target platform considerations and beauty.

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Taking a Brief look at steganography: Methods and ApproachesMasoud Nosrati ^{*1}, Ronak Karimi ², Hamed Nosrati ³, Ali Nosrati ⁴^{1,2} Young Researchers Club, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.^{3,4} Islamic Azad University, Kermanshah Branch, Kermanshah, Iran.minibigs_m@yahoo.co.uk

Abstract: In this paper, we are going to introduce different types of steganography considering the cover data. As the first step, we will talk about text steganography and investigate its details. Then, image steganography and its techniques will be investigated. Some techniques including Least Significant Bits, Masking and filtering and Transformations will be subjected during image steganography. Finally, audio steganography which contains LSB Coding, Phase Coding, Spread Spectrum and Echo Hiding techniques will be described.

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Keywords: Steganography; text steganography; image steganography; audio steganography.

1. Introduction

The word steganography is derived from the Greek words “stegos” meaning “cover” and “grafia” meaning “writing” defining it as “covered writing” [1]. Steganography is one such pro-security innovation in which secret data is embedded in a cover [2]. The notion of data hiding or steganography was first introduced with the example of prisoners' secret message by Simmons in 1983 [3].

Steganography and cryptography are closely related. Cryptography scrambles messages so they cannot be understood. Steganography on the other hand, will hide the message so there is no knowledge of the existence of the message in the first place. In some situations, sending an encrypted message will arouse suspicion while an “invisible” message will not do so. Both sciences can be combined to produce better protection of the message. In this case, when the steganography fails and the message can be detected, it is still of no use as it is encrypted using cryptography techniques. [4]

There exist two types of materials in steganography: message and carrier. Message is the secret data that should be hidden and carrier is the material that takes the message in it [5].

There are many types of steganography methods. In this paper, we are going to take a short look at different steganography methods. Figure 1 in below shows the different categories of file formats that can be used for steganography techniques [6].

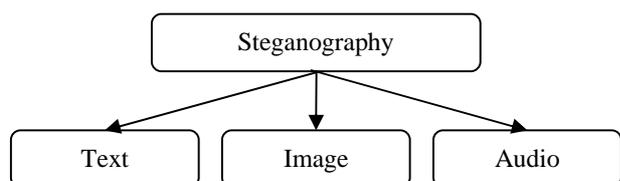


Figure 1. Steganography types diagram

In the second section, text steganography will be talked. Then we will get into images steganography principals in the third section. Finally audio steganography will be investigated.

2. Text steganography

Text steganography can be achieved by altering the text formatting, or by altering certain characteristics of textual elements (e.g., characters). The goal in the design of coding methods is to develop alterations that are reliably decodable (even in the presence of noise) yet largely indiscernible to the reader. These criteria, reliable decoding and minimum visible change, are somewhat conflicting; herein lies the challenge in designing document marking techniques. The document format file is a computer file describing the document content and page layout (or formatting), using standard format description languages such as PostScript2, TeX, @off, etc. It is from this format file that the image - what the reader sees - is generated.

The three coding techniques that we propose illustrate different approaches rather than form an exhaustive list of document marking techniques. The techniques can be used either separately or jointly. Each technique enjoys certain advantages or applicability as we discuss below.

2.1. Line-Shift Coding

This is a method of altering a document by vertically shifting the locations of text lines to encode the document uniquely. This encoding may be applied either to the format file or to the bitmap of a page image. The embedded codeword may be extracted from the format file or bitmap. In certain cases this decoding can be accomplished without

need of the original image, since the original is known to have uniform line spacing between adjacent lines within a paragraph.

2.2. Word-Shift Coding

This is a method of altering a document by horizontally shifting the locations of words within text lines to encode the document uniquely. This encoding can be applied to either the format file or to the bitmap of a page image. Decoding may be performed from the format file or bitmap. The method is applicable only to documents with variable spacing between adjacent words. Variable spacing in text documents is commonly used to distribute white space when justifying text. Because of this variable spacing, decoding requires the original image - or more specifically, the spacing between words in the un-encoded document.

2.3. Feature Coding

This is a coding method that is applied either to a format file or to a bitmap image of a document. The image is examined for chosen text features, and those features are altered, or not altered, depending on the codeword. Decoding requires the original image, or more specifically, a specification of the change in pixels at a feature. There are many possible choices of text features; here, we choose to alter upward, vertical endlines - that is the tops of letters, b, d, h, etc. These endlines are altered by extending or shortening their lengths by one (or more) pixels, but otherwise not changing the endline feature [7].

There is another form of text steganography which is defined by Chapman et al. as the text steganography is a method of using written natural language to conceal a secret message [8].

3. Image steganography

Hiding information inside images is a popular technique nowadays. An image with a secret message inside can easily be spread over the World Wide Web or in newsgroups. The use of steganography in newsgroups has been researched by German steganographic expert Niels Provos, who created a scanning cluster which detects the presence of hidden messages inside images that were posted on the net. However, after checking one million images, no hidden messages were found, so the practical use of steganography still seems to be limited.

To hide a message inside an image without changing its visible properties, the cover source can be altered in "noisy" areas with many color variations, so less attention will be drawn to the modifications. The most common methods to make these alterations involve the usage of the least-

significant bit or LSB, masking, filtering and transformations on the cover image. These techniques can be used with varying degrees of success on different types of image files.

3.1. Least Significant Bits

A simple approach for embedding information in cover image is using Least Significant Bits (LSB). The simplest steganography techniques embed the bits of the message directly into least significant bit plane of the cover image in a deterministic sequence. Modulating the least significant bit does not result in human-perceptible difference because the amplitude of the change is small [9]. To hide a secret message inside an image, a proper cover image is needed. Because this method uses bits of each pixel in the image, it is necessary to use a lossless compression format, otherwise the hidden information will get lost in the transformations of a lossy compression algorithm. When using a 24-bit color image, a bit of each of the red, green and blue color components can be used, so a total of 3 bits can be stored in each pixel. For example, the following grid can be considered as 3 pixels of a 24-bit color image, using 9 bytes of memory:

```
(00100111 11101001 11001000)
(00100111 11001000 11101001)
(11001000 00100111 11101001)
```

When the character A, which binary value equals 10000001, is inserted, the following grid results:

```
(00100111 11101000 11001000)
(00100110 11001000 11101000)
(11001000 00100111 11101001)
```

In this case, only three bits needed to be changed to insert the character successfully. On average, only half of the bits in an image will need to be modified to hide a secret message using the maximal cover size. The result changes that are made to the least significant bits are too small to be recognized by the human visual system (HVS), so the message is effectively hidden [4].

As you see, the least significant bit of third color is remained without any changes. It can be used for checking the correctness of 8 bits which are embedded in these 3 pixels. In other words, it could be used as "parity bit".

3.2. Masking and filtering

Masking and filtering techniques, usually restricted to 24 bits or grayscale images, take a different approach to hiding a message. These methods are effectively similar to paper watermarks,

creating markings in an image. This can be achieved for example by modifying the luminance of parts of the image. While masking does change the visible properties of an image, it can be done in such a way that the human eye will not notice the anomalies. Since masking uses visible aspects of the image, it is more robust than LSB modification with respect to compression, cropping and different kinds of image processing. The information is not hidden at the "noise" level but is inside the visible part of the image, which makes it more suitable than LSB modifications in case a lossy compression algorithm like JPEG is being used [4].

3.3. Transformations

A more complex way of hiding a secret inside an image comes with the use and modifications of discrete cosine transformations. Discrete cosine transformations (DCT), are used by the JPEG compression algorithm to transform successive 8 x 8 pixel blocks of the image, into 64 DCT coefficients each. Each DCT coefficient $F(u, v)$ of an 8 x 8 block of image pixels $f(x, y)$ is given by:

$$F(u, v) = \frac{1}{4} C(u) C(v) \left[\sum_{x=0}^7 \sum_{y=0}^7 f(x, y) * \cos \frac{(2x+1)u\pi}{16} \cos \frac{(2y+1)v\pi}{16} \right]$$

$$, C(x) = \begin{cases} \frac{1}{\sqrt{2}} & x=0 \\ 1 & \text{else.} \end{cases}$$

After calculating the coefficients, the following quantizing operation is performed:

$$F^Q(u, v) = \left\lfloor \frac{F(u, v)}{Q(u, v)} \right\rfloor$$

Where $Q(u, v)$ is a 64-element quantization table. A simple pseudo-code algorithm to hide a message inside a JPEG image could look like this [4]:

```

Input: message, cover image
Output: steganographic image containing message
while data left to embed do
  get next DCT coefficient from cover image
  if DCT  $\neq$  0 and DCT  $\neq$  1 then
    get next LSB from message
    replace DCT LSB with message bit
  end if
  insert DCT into steganographic image
end while

```

4. Audio steganography

In audio steganography, secret message is embedded into digitized audio signal which result slight altering of binary sequence of the

corresponding audio file. There are several methods are available for audio steganography. We are going to have a brief introduction on some of them.

LSB Coding

Sampling technique followed by Quantization converts analog audio signal to digital binary sequence. In this technique LSB of binary sequence of each sample of digitized audio file is replaced with binary equivalent of secret message.

Phase Coding

Human Auditory System (HAS) can't recognize the phase change in audio signal as easy it can recognize noise in the signal. The phase coding method exploits this fact. This technique encodes the secret message bits as phase shifts in the phase spectrum of a digital signal, achieving an inaudible encoding in terms of signal-to-noise ratio.

Spread Spectrum

There are two approaches are used in this technique: the direct sequence spread spectrum (DSSS) and frequency hopping spread spectrum (FHSS). Direct-sequence spread spectrum (DSSS) is a modulation technique used in telecommunication. As with other spread spectrum technologies, the transmitted signal takes up more bandwidth than the information signal that is being modulated. Direct-sequence spread-spectrum transmissions multiply the data being transmitted by a "noise" signal. This noise signal is a pseudorandom sequence of 1 and -1 values, at a frequency much higher than that of the original signal, thereby spreading the energy of the original signal into a much wider band.

The resulting signal resembles white noise. However, this noise-like signal can be used to exactly reconstruct the original data at the receiving end, by multiplying it by the same pseudorandom sequence (because $1 \times 1 = 1$, and $-1 \times -1 = 1$). This process, known as "de-spreading", mathematically constitutes a correlation of the transmitted Pseudorandom Noise (PN) sequence with the receiver's assumed sequence. For de-spreading to work correctly, transmit and receive sequences must be synchronized. This requires the receiver to synchronize its sequence with the transmitter's sequence via some sort of timing search process. In contrast, frequency-hopping spread spectrum pseudo-randomly retunes the carrier, instead of adding pseudo-random noise to the data, which results in a uniform frequency distribution whose width is determined by the output range of the pseudo-random number generator [10].

Echo Hiding

In this method the secret message is embedded into cover audio signal as an echo. Three parameters of the echo of the cover signal namely amplitude, decay rate and offset from original signal are varied to represent encoded secret binary

message. They are set below to the threshold of Human Auditory System (HAS) so that echo can't be easily resolved.

Video files are generally consists of images and sounds, so most of the relevant techniques for hiding data into images and audio are also applicable to video media. In the case of Video steganography sender sends the secret message to the recipient using a video sequence as cover media. Optional secret key 'K' can also be used during embedding the secret message to the cover media to produce 'stego-video'. After that the stego-video is communicated over public channel to the receiver. At the receiving end, receiver uses the secret key along with the extracting algorithm to extract the secret message from the stego-object.

The original cover video consists of frames represented by $Ck(m,n)$ where $1 \leq k \leq N$. 'N' is the total number of frame and m,n are the row and column indices of the pixels, respectively. The binary secret message denoted by $Mk(m, n)$ is embedded into the cover video media by modulating it into a signal. $Mk(m, n)$ is defined over the same domain as the host $Ck(m,n)$. The stego-video signal is represented by the equation:

$$Sk(m, n) = Ck(m, n) + ak(m, n) Mk(m, n), k = 1, 2, 3 \dots N$$

Where $ak(m, n)$ is a scaling factor. For simplicity $ak(m, n)$ can be considered to be constant over all the pixels and frames. So the equation becomes [11]:

$$Sk(m, n) = Ck(m, n) + a(m, n) Mk(m, n), k = 1, 2, 3 \dots N$$

5. Conclusion

In this paper, we talked about steganography and its types. First we had a look at text steganography and Line-Shift Coding, Word-Shift Coding and Feature Coding techniques as different methods of it. Then we got into image steganography and introduced LSB, Masking and filtering and Transformations. As the ending part, Audio steganography was talked and LSB Coding, Phase Coding, Spread Spectrum and Echo Hiding were investigated.

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Non-steroidal anti-inflammatory phonophoresis versus topical application in improvement of hand grip strength in psoriatic arthritic patients

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Abstract: The purpose of this study was to compare the efficacy of ibuprofen phonophoresis versus topical application of ibuprofen in improvement of hand grip strength in psoriatic arthritic patients. Methods: Forty patients who had asymmetrical psoriatic arthritis in hand participated in this study. Their ages ranged from 30 to 50 years. Patients were classified randomly into two groups of equal numbers; group (1) (control group) received routine physical therapy (hot therapy, stretching and strengthening exercises), in addition to sham ibuprofen phonophoresis, while group (2) (studied group): received routine physical therapy, in addition to ibuprofen phonophoresis. Each patient was evaluated for grip strength, tender and swollen joint count before and after one month of treatment. The results revealed that there was a significant difference between both groups regarding to grip strength, tender and swollen joint count, with the percentage of improvement in group 1 were 56%, 54%, and 55% ,while in group 2 were 82%, 80% and 76% respectively. It is concluded that the results of the current study confirms the effectiveness of phonophoresis as a therapeutic modality enhancing the delivery of ibuprofen so increasing the percentage of improvement of grip strength in the studied group .

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Key Words: Ultrasound, phonophoresis, ibuprofen, grip strength, psoriatic arthritic.

1. Introduction:

According to the National Psoriasis Foundation, psoriatic arthritis (PsA) is defined as a type of inflammatory arthritis [1]. It is a chronic inflammatory, seronegative, immunologically triggered arthritis of unknown origin, which have a lasting influence on the quality of life of affected individuals [2,3]. Between 10% and 20% of people with psoriasis develop psoriatic arthritis, for the majority of people this is between the ages of 30 and 50, but it can also affect children. Men and women are equally affected [1, 3].

The cause of PsA is currently unknown. A combination of genetic and immune as well as environmental factors are likely involved. The underlying process in PsA is inflammation, which causes tenderness, pain and swelling in the joints and connective tissue with associated stiffness. PsA commonly affects the ends of the fingers and toes. Therefore, the treatments are directed to reduce and control inflammation [4].

Non-steroidal anti-inflammatory drugs (NSAIDs) are drugs with analgesic, antipyretic and anti-inflammatory effects. The term "non-steroidal" is used to distinguish these drugs from steroids, which have a similar eicosanoid-depressing, anti-inflammatory action [5].

Ibuprofen is a NSAID, which relieves pain and swelling .It works by blocking the enzyme that makes

prostaglandins. Decreasing prostaglandins helps to reduce pain, swelling, and fever. It is generally prescribed for arthritis related inflammatory pains [6]. Although NSAIDs are widely used in symptomatic treatment of PsA, they produce potential hazards including gastrointestinal side effects, particularly in the elderly[7]. Physiotherapy may be considered as one of the recommended management option in these patients as phonophoresis with NSAIDs is commonly used to treat inflamed tissues [8].

Phonophoresis is the migration of drug molecules through the skin using ultrasound (US) therapy [9], which is used to enhance percutaneous absorption of drugs. Phonophoresis with anti-inflammatory and local anesthetic agents is used in the management of pain and inflammation in musculoskeletal conditions. This technique is a non-invasive, well tolerated and involves minimal risk of hepatic and renal injury [10].

Restoration of normal hand function in PsA patients is a goal that is necessarily subordinate to sustain life. In daily activity, grasping and transporting object is a frequently encountered task and its dysfunction can severely impact the patient's normal living [11].

Assessment of grip strength with dynamometry was the most common method of reporting motor outcome. Dynamometry is an instrument that is

designed to provide simple, accurate, and reliable method for measuring hand grip strength [12].

Therefore the aim of this study was directed to compare the efficacy of NSAIDs "Ibuprofen" phonophoresis versus topical application of ibuprofen in improvement of hand grip strength in psoriatic arthritic patients.

2. Subjects, Material and Methods

Subjects:

Forty patients from both sex participated in this study, who had asymmetrical psoriatic arthritis in hand referred by physician of dermatology. The study was done in out clinic of physical therapy (Faculty of Physical Therapy –Cairo University). Informed written consent was obtained from all participants. At the time of this study there was no Human Research Ethics Committee had been established in the faculty. The patients were randomly classified into 2 groups of equal number. Group 1 (control group): received routine physical therapy in the form of hot therapy, stretching and strengthening exercises [13], in addition to sham ibuprofen phonophoresis (i.e. topical application). Group 2 (studied group): received routine physical therapy, in addition to ibuprofen phonophoresis. The patient's age ranged from 30 to 50 years. Elapsed time since the beginning of the disease was less than 1 year. All patients received the same medication. Patients were excluded if they had one or more of the following: positive rheumatic factor, circulatory disorders, diabetes, pregnant woman or skin diseases like urticaria

Measurement procedures:

Each patient was evaluated for hand grip strength, tender joint count and swollen joint count before and after one month of treatment. Hand held Jamar dynamometer device 12-0600 was used to measure hand grip strength. The readout of dynamometer dial is represented in pounds and in kilograms. It is graded from zero till two hundred pounds and from zero to ninety kilograms [12]. Grip measurement was performed with the elbow at about 90° according to the American Society of Hand Therapists (ASHT) recommendations [14]. The patients were instructed to assume the sitting position while the affected limb was placed in shoulder adduction and internal rotation, elbow flexion, forearm in mid position and wrist in neutral position. The patients were instructed to squeeze the dynamometer as much as possible. Three consecutive measurements were performed with a 2 minutes inter-measurement interval. The mean strength value of the three trials was calculated and considered as

the hand grip measure [15]. Joint counts for tenderness and swelling were the sum of the number of affected joints [16].

Treatment procedures:

All patients of control and studied group received the same routine physical therapy program in form of hot therapy, stretching and strengthening exercises. Strengthening exercise in form of isometric exercise for hand muscles and fingers, which can help to maintain muscles strength and joints flexibility. Hot therapy in form of warm baths (10 minutes) would be applied before stretching exercise for wrist joint and fingers to relieve joint pain and increase range of motion. Routine physical therapy program would be done daily as a home routine along the treatment time [13]. Sham ibuprofen phonophoresis was applied to control group while studied group received ibuprofen phonophoresis using ultrasonic therapy unit (Nonius, sonopuls 434, S. No. 03-202 type 1463.900 manufactured by Enraf Holland), which was set at frequency of 1MHz, the intensity at 1.5 w/cm², and with continuous mode. A 5cm long strip of cream containing 5% ibuprofen was applied over the affected area. The treatment was given 3 sessions / week, 5 minutes for each session and for one month. [17].

3. Results

The results of this study showed that there were no significant differences between both groups in relation to patients' age and the elapsed time since the beginning of the disease. The results showed that the mean of patients' age were 38.4±5.99 and 38.95±6.18 years for group (1) and group (2), respectively with P value= 0.78, while the mean of the elapsed time were 5.55±3.5 and 5.95±3.3 respectively with P value equal 0.71. The results also presented that there was no significant difference in the patients' sex between both groups with the P= 0.752.

As shown in table 1 the mean value and standard deviation of hand grip strength, tender joint count and swollen joint count for control group at the beginning of the study (pre) were 2.49±0.57 kg, 16.5±1.85, and 14.75±3.63, respectively, while they were 3.9±0.63Kg, 7.65±2.37, and 6.6±1.98, respectively after treatment (post). The results revealed a statistically significant improvement (P<0.05) in hand grip strength and tender as well as swollen joint count joint between pre and post treatment. Fig 1 represented the percentage of improvement of group 1 (control)

Table (1): The statistical analysis of mean differences of grip strength, tender joint and swollen joint count in control group (1) pre &post-treatment

Statistics	Grip strength(Kg)		Tender joint count		Swollen joint count	
	Pre	Post	Pre	Post	Pre	Post
Mean	2.49	3.9	16.5	7.65	14.75	6.6
S.D±	0.57	0.63	1.85	2.37	3.63	1.98
T- value	-9.411		12.69		9.35	
Level of significance	P<0.05		P <0.05		P <0.05	

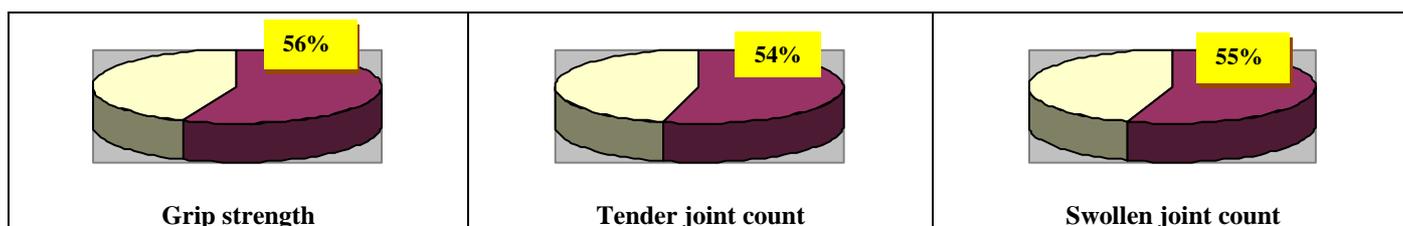
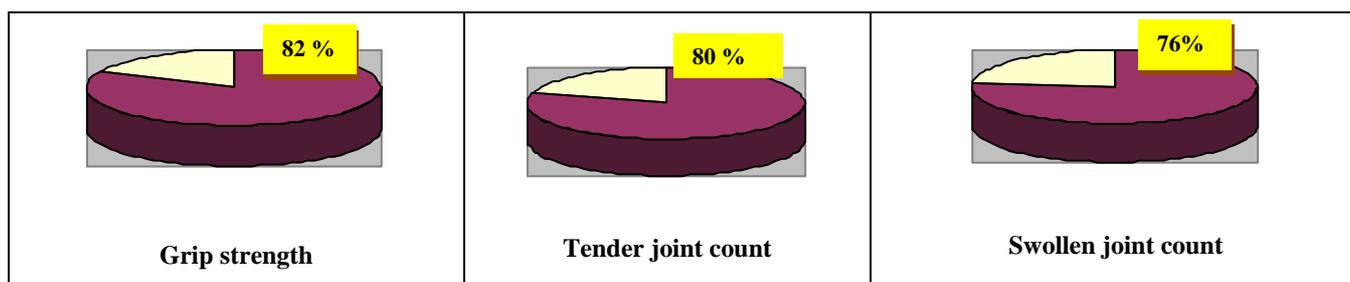
**Fig (1): The percentage of improvement of grip strength, tender joint count and swollen joint count for group 1 (control)**

Table (2) showed that the mean value and standard deviation of grip strength ,tender joint count and swollen joint count for the studied group at the beginning of the study were 2.75 ± 0.72 Kg, 17.35 ± 1.34 , and 15.7 ± 1.91 , respectively, while they were 5.01 ± 0.99 Kg, 3.4 ± 1.66 , and 3.7 ± 2.38

respectively post treatment. The results revealed a highly statistically significant improvement ($P<0.05$) in hand grip strength and tender as well as swollen joint count joint between pre and post treatment. Fig (2) represented the percentage of improvement for group (2) (studied group).

Table (2): The statistical analysis of mean differences of grip strength , tender joint and swollen joint count in studied group (2)pre &post-treatment.

Statistics	Grip strength(Kg)		Tender joint count		Swollen joint count	
	Pre	Post	Pre	Post	Pre	Post
Mean	2.75	5.01	17.35	3.4	15.7	3.7
S.D±	0.72	0.99	1.34	1.66	1.91	2.38
T- value	-9.44		26.05		19.78	
Level of significance	P	<0.01	P	<0.01	P	<0.01

**Fig (2): The percentage of improvement of grip strength, tender joint count and swollen joint count for group 2 (studied group)**

The mean differences of hand grip strength and tender as well as swollen joint count between both groups before treatment showed statistically non significant difference (t value= -1.244 & $P < 0.221$, t value= -1.66 & $P < 0.105$, and t value= -1.091 & $P < 0.28$, respectively), while after treatment the mean difference showed statistically highly significant

difference (t value= -4.199& $P < 0.01$, t value= 6.65& $P < 0.01$, and t value= 4.179 & $P < 0.01$, respectively).

4. Discussion:

The main findings of this current study showed that there were statistically significant differences between both groups with the percentage

of improvement in group (2) was more than group (1). This confirms the effectiveness of the phonophoresis as a therapeutic modality enhancing the delivery of the drug hence improving patient's grip strength.

Phonophoresis is commonly used in physical therapy practices. The procedure generally utilizes an ultrasound apparatus that generates frequencies of 0.7 to 1.1 MHz and intensities usually range from 0.0 to 3.0 Watts / cm² [9,18]. US is often used in physical therapy because of its deep-heat and pain-relieving effects. When US enters the body, it can affect the cells and tissues through its thermal and nonthermal mechanisms [19].

Phonophoresis has been suggested by early studies to enhance the absorption of analgesics and anti-inflammatory agents [9]. Effectively, medicines contained within or under the ultrasound gel are pushed by the sound waves of the US and driven to a much deeper level than those massaged by hand [17]. Researchers have noted varying results with regard to the therapeutic benefits of phonophoresis (such as pain relief and improved range of motion) [6,20,21]. Meshali et al [6], stated that ibuprofen is poorly absorbed transdermally when applied as a gel even in the presence of high levels of alcohol as a penetration enhancer and they concluded that treatment with US increased ibuprofen absorption by at least three folds, which demonstrates the potential uses of phonophoresis in transdermal drug delivery. Deniz et al [20], showed that both continuous and pulsed US diclofenac gel phonophoresis is more effective for pain and functional status of patients with knee osteoarthritis than topical application of diclofenac gel. In order to enhance the level of skin permeation of Triamcinolone Acetonide (TA), Yang et al [21], investigated various US conditions such as the frequency (1.0, 3.0 MHz), the intensity (1.0, 2.5 W/cm²), and the duty cycle (continuous, pulse) using a 0.5% TA gel. They concluded that the 1MHz frequency showed a relatively higher transport than either 3 MHz or no-ultrasound treatment.

Meshali et al [22], demonstrated that ultrasound application at 1.5 w/cm² continuous mode is optimum for transdermal delivery of the model NSAIDs drugs (ibuprofen, piroxicam and diclofenac sodium) across cellulose and rabbit skin membrane and they stated that the results could be adopted in clinical setting for enhanced management of pain and inflammation by ultrasound.

The phonophoretic effect of US reported that US enabled a greater transport of whole molecules across synthetic or organic semipermeable membranes than was afforded by sham ultrasound [23].

The effect of the US duty cycle on the skin permeation was highest with the continuous mode than with the pulsed mode [21]. There are many explanations for the increased permeability of the membranes. There would be a decrease in the donor solution-membrane interfacial-potential-energy barrier caused by the US treatment. Such a decrease as well as an increase in cavitation might increase the level of drug permeation [24]. A reduction in the boundary layer thickness (close to the membrane), which creates additional resistance to drug transport as a result of mixing the solutions, would also increase the level of drug permeation. The radiation pressure caused by the US wave would exert pressure on the drug molecules as well as on the skin [25]. In addition to the previous, it is known that phonophoresis facilitates the transdermal absorption of a drug as a result of the thermal effects such as an increase in tissue temperature and the mechanical effects such as cavitation and acoustic streaming [26,27]. It is believed that the effect of US might be related to the depth of the vibration as well as the duty cycle. The increased mechanical vibration by the US increases the skin temperature particularly in continuous US mode. This increase in temperature caused by heat liberation using US might increase the level of drug permeability [28].

From the previous it was concluded that, phonophoresis is an effective method to enhance the delivery of ibuprofen and so enhance the improvement of grip strength.

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Biodegradation of PAH Compounds in the Rhizosphere of *Tamarix nilotica*: A Salt tolerant wild plant

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Abstract: During a scientific visit to a coastal area at Suez, Egypt, it was observed that *Tamarix nilotica* plant naturally dominated on oil polluted site in this area, indicating that this plant is a tolerant of the combined adverse effects of salinity and petroleum pollutants. This observation stimulated a study to investigate the rhizosphere effect of this plant on the degradation and removal of petroleum aromatic hydrocarbons (PAH) compounds from this coastal saline soil. Accordingly, samples were collected from the rhizosphere and from the non-rhizosphere soil and studied. The results show that the rhizosphere soil of *Tamarix nilotica* was rich in total heterotrophic bacteria and oil-degraders. In the rhizosphere soil oil-degraders were of higher percentage (30.7%) compared to the non-rhizosphere soil (4.6%). Residual total petroleum hydrocarbons (TPH) in the non-rhizosphere soil was 2.25% (w/w), while in the rhizosphere soil the percentage was 0.9% (w/w). This indicate a reduction of 60% of the TPHs. The saturates fraction in the rhizosphere as compared to the non-rhizosphere soil was reduced by 87.5%, while the aromatics were reduced by 60.7%. It is of interest to find that the non-degradable asphaltenes and resins were reduced in the rhizosphere by 1.1% and 2.5% respectively. As a total the amount of PAHs (mgkg⁻¹ soil) were 1073.5 and 541.94 in the non-rhizosphere and rhizosphere soil respectively, i.e. with a loss of 49.5% in the rhizosphere. Chrysene and dibenzo(ah)anthracene as compared to the other PAHs were more frequent in the non-rhizosphere soil. These two compounds were reduced by 55.7% and 24.3% respectively in the rhizosphere. As a total the four-ringed PAHs as compared to other PAH groups were highly reduced (60.3%) in the rhizosphere, this was followed by the three-ringed PAH group (52.5%). The five-ringed and the six-ringed groups were weakly reduced (37.8% and 33.8% respectively). The 8 carcinogenic PAH group were collectively reduced in the rhizosphere by 49.1%. A particular notable distinction of the rhizosphere of *Tamarix nilotica* is the greater efficiency to degrade the carcinogenic PAH compounds especially flouranthene (75.4%), benzo(a)anthracene (63.4%) and pyrene (60.2%). Results of Gas Chromatography (GC) analysis for the detection of the accumulated PAHs in the shoot tissue of *Tamarix nilotica* plant growing in the polluted area as compared to that growing in non-polluted area show that the identified peaks in the tissue of both plants were 15 and 14 peaks respectively. The sum of the 15 PAHs was 528 mgkg⁻¹ dried tissue, whereas the sum of the 14 PAHs was 769 mgkg⁻¹ dried soil. This result indicate an accumulation value of 1.46.

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Keywords: Biodegradation , salt-tolerant plant , *Tamarix nilotica* , PAHs degradation

1. Introduction:

Microorganisms and plants can have complementary roles in phytoremediation of polluted soils. Phytoremediation refers to the use of plants to clean up moderately contaminated soils (Joner *et al.*, 2004). When the pollutants are organic compounds, phytoremediation may comprise rhizodegradation (microbial degradation in the rhizosphere) and phytodegradation i.e. degradation of compounds absorbed by plants (Flathman and Lenza, 1998).

Rhizodegradation of organic pollutants such as PAHs based on the effects of plant root exudates which constitute different growth factors, enzymes, vitamins, amino acids ... etc. (Corgie *et al.*, 2004). The application of plants for remediation of soil contaminated with PAHs is one of the promising environmental and cost effective approach. Rock and Sayre (1998) estimated phytoremediation cleanup

cost of \$162/m² petroleum contaminated soil compare to \$810/m² for excavation and incineration.

To date a great variety of grass species and legumes (Appril and Sims, 1990; Flathman and Lenza, 1998; Pradham *et al.*, 1998; Banks *et al.*, 1999; Kulakow *et al.*, 2000; Davis *et al.*, 2004 and Eman, 2008) have been applied for phytoremediation, but the predictive power of these phytoremediation studies is compromised by the brief duration and constant environmental conditions often employed (Muller and Shann, 2006).

Trees have received little attention with regard to the dissipation of PAH compounds, although their perennial life-history and extensive root systems suggest they may be suitable for phytoremediation (Muller and Shann, 2006). Trees such as poplar (Jordahl *et al.*, 1997, Newman *et al.*, 1999; Tessar *et al.*, 2000), alder (Caraman *et al.*, 1998), red mulberry

(Olson *et al.*, 2001) and pine seedlings (Liste and Alexander, 2000) have been applied for phytoremediation.

Rare investigations have been carried out on the use of salt tolerant plants for phytoremediation of hydrocarbon-polluted soil.

During a scientific visit to a coastal area at Suez, it was observed that *Tamarix naltolica* plant dominated a hydrocarbon-polluted site in this area, indicating that this plant is a tolerant of the combined adverse effects of salinity (2.9% w/w) and petroleum pollutants. As a result of the general lack of knowledge and availability of using *Tamarix naltolica* plant for phytoremediation, the above observation stimulated a study to investigate the rhizosphere effects of *Tamarix naltolica* plant on the degradation and removal of PAH compounds from this coastal saline soil. Accordingly, soil samples were collected from the polluted rhizosphere soil (soil in direct contact with roots) and also from the polluted non-rhizosphere soil (soil 50 cm away from the effects of roots).

2. Material and Methods

Chemical and Physical Analysis of Soil:

Physical and chemical analysis of the soil were determined according to the methods described in Jackson (1967) Soil pH, total salinity, cationic and anionic compositions and total carbonates were determined. Particle size analysis (dry sieving) of tested soil samples was accomplished according to Jackson (1967).

Collection of rhizosphere and non-rhizosphere soil

A polluted coastal area in which *Tamarix naltolica* is dominant was chosen at Suez for the present study. Rhizosphere soil samples (soil in direct contact with roots) and non-rhizosphere soil samples (soil 50 cm away from the roots) were collected from this polluted area .

Counts of total bacteria and fungi

For counting colony forming units (CFU) of bacteria and fungi, the usual dilution plate method was used as described by Al-Gounaim and Diab (1998). Nutrient agar (Oxoid) supplemented with 0.4% soluble starch was used for counting bacteria. For counting fungi malt-yeast extract agar was used. Plates for counting bacteria were incubated at 30°C for a period of 5-7 days. Plates for counting fungi were incubated at 25-26°C for 10-12 days. At the end of the incubation periods, the developed colonies were counted and expressed as CFU/g dried soil.

Counting of hydrocarbon-degrading microorganisms

For counting oil-degraders, the three Most Probable Number (MPN) method was used as described by Chaîneau *et al.* (1996).

The culture medium was dispensed in test tubes, each received 5 ml of the medium. After sterilization, 0.1 ml sterilized oil was added to each tube. One gram of the soil sample was introduced to a test tube containing 10 ml sterilized water, a series of dilution was made. Three tubes of the culture medium were inoculated from each dilution (1 ml for each tube). The inoculated tubes were incubated at 30°C for 21 days. At the end of the incubation period, tubes showing growth were recorded and the MPN values were obtained from the MPN index of the three tubes as found in the Standard Method for the Examination of Water and Waste Water (1989) .

Extraction and determination of the residual oil contents from soil samples and plant shoots

Five grams from each sample of the soil and plant shoot tissue were mixed with 3g anhydrous sodium sulfate to remove moisture and extracted with chloroform by using the shaking method (Chen *et al.*, 1996). The extract was pooled and evaporated. The residual oil was suspended in n-hexane and filtered to remove the non-soluble fraction (asphaltene). The hexane soluble fraction was fractionated by liquid solid chromatography into saturates and aromatics (Chaîneau *et al.*, 1995). The saturated fraction was discarded, and the aromatic fraction in benzene was reduced to one ml. 1µl of this extract was used for GC analysis.

Gas chromatography (GC) analysis of the aromatic fraction for the resolution of PAH compounds.

Although hundreds of PAHs exist in the polluted environment, the US Environmental Protection Agency (EPA) had identified 16 PAH compounds as priority pollutants, which are monitored routinely for regulatory purposes. In the present work identification and quantification of the individual 16 PAHs were determined in the aromatic fraction using Varian 3900 gas chromatography equipped with a CP 9050 liquid samples and configured with FID, using helium (Grade G) as a carrier gas, with a flow rate of 1 ml/min. A CP Sil 19CB column (25 m long x 0.32 mm diameter x 0.2 µm thickness for the stationary phase 1 was used. Temperature programming of initial holding at 40°C (holding 2 minutes) was applied. The total time of analysis was 45 min., injector and detector temperatures were 250°C and 280°C respectively, injection volume was 1 µL or 2 µL for some samples.

The quantification of PAHs was based on the application of reference standard of the 16 PAHs

(100 ppm for each), obtained from Supelco Co. Samples were run in duplicates and the mean values were taken.

3. Results and Discussion

Physical and chemical analysis (Table 1) of the soil of the area in which *Tamarix nilotica* plant is grown is sandy in nature, with pH 8.1 and total salinity of 2.92%. Nitrogen and phosphorus were of low concentrations (Table 1). The results also show that most of the soluble ions concentrations were of higher values in the rhizosphere soil compared to the non-rhizosphere soil.

The results in Table (2) show that one gram of the rhizosphere soil contained (CFU/g) 30.6×10^6 of bacteria, 4.2×10^2 of fungi, and 9.4×10^6 hydrocarbon-degrading bacteria. This is in contrast to the non-rhizosphere soil which contained (CFU/g) 40.2×10^4 of bacteria, 2.4×10^2 fungi and 18.3×10^3 hydrocarbon-degrading bacteria respectively. Oil-degraders in the rhizosphere soil were higher (30.7%) as compared to the non-rhizosphere soil (4.6%).

Residual total petroleum hydrocarbon content of this soil (Table 3) was 2250 mg/100g in non-rhizosphere soil. These results demonstrated that *Tamarix nilotica* plant grown in this habitat is a tolerant to the combined adverse effects of salinity and petroleum hydrocarbon pollutants.

These results indicated the stimulatory effects of the plants roots (especially for HC-degraders), this is confirmed from the values of R/S (Table 2) which ranged from 3 (for the fungi) to 513.7 for HC-degraders. Corgie *et al* (2004) reported that plant roots provide ideal attachment and supply exudates consisting of amino acids, organic acids, sugars, enzymes ... etc. Binet *et al* (2000) reported that microbial communities have been documented to be larger and more active in planted versus unplanted soil, and the rhizosphere is often enriched in organisms capable of hydrocarbon degradation. Rugh *et al* (2005) reported the abundance of PAH-degrading bacteria in contaminated soil planted with different native Michigan plant species.

Table 1: Physical and chemical analysis of the rhizosphere soil (R) and non-rhizosphere soil (S) of *Tamarix nilotica*

Particle Diameter (mm)			Chemical Analysis		
		%			%
2-1 mm	R	15.82	PH	R	7.8
	S	18.82		S	8.1
1-0.5	R	19.40	CaCO ₃ (ppm)	R	34.6
	S	23.47		S	26.5
0.5-0.25	R	28.77	TS (5)	R	2.92
	S	33.74		S	2.62
0.25-0.125	R	28.77	Ca ²⁺ (ppm)	R	13.92
	S	20.56		S	12.60
0.125-0.063	R	14.01	Mg ⁺² (ppm)	R	853.2
	S	3.55		S	269.3
<0.063	R	0.32	No ⁺ (ppm)	R	20987.5
	S	0.00		S	14422.5
Texture class	R	Sand	K ⁺ (ppm)	R	826.8
	S	Sand		S	644.0
			11CO ₃ ⁻ (ppm)	R	549.0
				S	442.3
			Cl ⁻ (ppm)	R	20915.5
				S	18079.5
			SO ₄ ²⁻ (ppm)	R	46915.1
				S	45412.4
			PO ₄ (ppm)	R	0.25
				S	0.12
			N ₂ (ppm)	R	100
				S	60

Table 2: Mean counts (CFU/g air dried soil) of total heterotrophic bacteria, fungi and oil-degraders in the rhizosphere soil (R) and the non-rhizosphere soil (S) of *Tamarix nilotica* plant.

Microorganisms	CFU / g Soil		R/S Ratio
	S	R	
Total heterotrophic bacteria	40.2x10 ⁴	30.6x10 ⁶	76.5
Total fungi	2.4x10 ²	4.2x10 ²	3.0
Oil-degrader	18.3x10 ³	9.4x10 ⁶	513.7
Percentage oil-degraders	4.6	30.7	

Table 3: Residual oil content and its fractions (mg/100 g soil) in the non-rhizosphere soil (S) and in the rhizosphere soil (R) of *Tamarix nilotica* plant.

Oil and its Fractions	Mg/100 g soil		Reduction (R)
	S	R	
Saturates	800 ± 28.3	100 ± 7.1	87.5
Aromatics	1060 ± 84.5	417 ± 24.0	60.7
Resins	200 ± 14.1	195 ± 7.1	2.5
Asphaltene	190 ± 7.0	188 ± 11.3	1.1
Total	2250	900	60

When the residual hydrocarbons from the rhizosphere soil and non-rhizosphere soil was extracted and fractionated (Table 3), it was found that 2250 mg of TPH/100g soil was extracted from the non-rhizosphere soil, this is in contrast to 900 mg/100g of the rhizosphere soil used was measured, i.e. with a reduction of 60%.

As for the different fractions of the TPH extracted (Table 3) it was found that the rhizosphere soil contained less amounts of these fractions (especially the saturates and aromatics) as compared to the non-rhizosphere soil. Saturates fraction was 800 mg/100g soil in the non-rhizosphere soil while in the rhizosphere soil only 100 mg/100 g soil was recorded, i.e. with a reduction of 87.5%. On the other hand, the aromatic fraction was 1060 mg/100 g of the non-rhizosphere soil, this is in contrast to 417 mg/100 g of the rhizosphere soil, i.e. with a reduction of 60%. It is of important to observe that reduction values of 2.5% and 1.1% of the non-degradable resins and asphaltene respectively were recorded in the rhizosphere of this wild salt-tolerant plant (*Tamarix nilotica*). Al-Abdulla *et al* (2006) extracted 706mg/100g soil of the saturated fraction from the

rhizosphere soil and 1234.2 mg/100g from the non-rhizosphere soil of the wild desert plant *Salsola imbricate*, i.e. with a reduction of 42.8% in the rhizosphere soil. As for the aromatic fraction, the same trend was observed giving reduction value of 45%, which is slightly higher than the reduction value of the saturates (42.8%). The above authors also calculated the reduction values of the saturates and aromatics fractions in the non-rhizosphere soil and in the rhizosphere soil of the wild desert plant *Cyperus conglomerates*. They recorded loss of 37.1% and 40.2% for the saturates and aromatic fractions in the rhizosphere soil. These authors then recommended the use of these wild desert plants for the phytoremediation of the polluted desert soil.

Polycyclic aromatic hydrocarbons (PAHs) of the residual aromatic fraction in the non-rhizosphere soil and rhizosphere soil of this wild salt-tolerant plant were quantified by GC-FID analysis. The results (Table 4, Fig. 2) show the resolution of 15 different individual PAH compounds in the non-rhizosphere soil, and 13 PAHs in the rhizosphere soil. Naphthalene was absent from both non-rhizosphere and rhizosphere soil, while acenaphthylene and acenaphthene were absent from the rhizosphere soil.

Table 4: Residual PAH contents of the rhizosphere soil (R) of *Tamarix nilotica* plant as compared to non-rhizosphere soil (S). Loss (%) of PAHs is also given.

PAH Compounds	No. of Rings	S mg/kg Soil	R mg/kg soil	Loss %
1. Naphthalene	2	-	-	-
2. Acenaphthylene	3	8.1 ± 0.50	-	100
3. Acenaphthene	3	4.7 ± 0.10	-	100
4. Flourene	3	15.3 ± 0.40	5.6 ± 0.43	63.4
5. Phenanthrene	3	100.7 ± 3.10	51.10 ± 2.70	49.3
6. Anthracente	3	22.0 ± 1.60	14.87 ± 1.90	52.5
Total		150.80	71.570	52.50
7. Flouranthene	4	68.3 ± 5.40	16.8 ± 1.28	75.4
8. Pyrene	4	57.3 ± 2.47	22.8 ± 0.92	60.2
9. Benzo(a)anthracene	4	72.6 ± 4.77	26.6 ± 2.83	63.4
10. Chrysene	4	277.6 ± 12.60	122.9 ± 5.97	55.7
Total		475.8	189.1	60.3
11. Benzo(a)flourathene	5	15.33 ± 1.25	7.57 ± 1.04	50.6
12. Benzo(k)flouranthene	5	83.0 ± 2.16	44.77 ± 3.24	46.1
13. Benzo(a)pyrene	5	109.0 ± 7.36	55.70 ± 4.14	49.0
14. Dibenzo(ah)anthracene	5	156.0 ± 4.32	118.13 ± 16.19	24.3
Total		363.33	226.17	37.8
15. Benzo(ghi)perylene	6	13.3 ± 0.85	7.3 ± 1.80	45.1
16. Indeno(1,2,3-c,d)pyrene	6	70.0 ± 1.63	47.8 ± 3.81	31.7
Total		83.3	55.10	33.8
Total		1073.50	541.94	49.5

As a total the amount of PAHs (mg/kg soil) were 1073.5 and 541.94 mg/kg oil in the non-rhizosphere and -rhizosphere soil respectively. Weissenfels *et al* (1999) estimated 1815.1 mg/kg sandy soil collected from former wood impregnation plant. Al-Gounaim *et al* (2006) estimated 2256.8 mg/kg of moderately polluted (2-3% oil w/w) desert non-rhizosphere soil, and 1264.9 mg/kg of the rhizosphere soil of the wild desert plant *Cyperus conglomeratus*, i.e. with a reduction value of 40.0%. On the other hand, the same authors found 1643.9 mg/kg of the non-rhizosphere soil, and 532.6 mg/kg of the rhizosphere soil of the wild desert plant *Salsola imbricate*. This demonstrated 67.6% loss in the rhizosphere of this plant. Davis *et al* (2004) reported that phytoremediation is emerging as potentially cost effective technology; plants have often been shown to reduce the level of PAHs in soil. Rugh *et al* (2005) reported that root-micobe interaction is considered to be the primary process of PAH phytoremediation, since bacterial degradation has been shown to be the most dominant pathway for environmental PAH dissipation. However, the precise mechanism driving PAH rhizostimulation symbiotic largely unsolved.

Most studies on PAH phytoremediation have utilized herbaceous annuals and grasses. When

compared to these plant types, Moeller *et al* (2006) suggested that tree roots are structurally and functionally differed, particularly with regard to their perennial and woody nature and relationships with ectomycorrhizal fungi. Unique root dynamics associated with these trials including exudation and root turnover, could lead to relatively more complex rhizosphere dynamics and important effects on PAHs degradation in the rhizosphere.

Rugh *et al* (2005) found that most of the tested plant species stimulated biodegradation of a broad range of PAH compounds related to the unplanted soil. Spriggs *et al* (2005) found that the rate of dissipation of PAHs was greater for willow followed by poplar, and the unvegetated soil controls. These data support the hypothesis that trees can enhance the degradation of target PAHs in soil. The above authors reported that it is important to note that the degradation rates were measured under greenhouse conditions. Rate of dissipation under field conditions could vary significantly from these results. Hwan *et al* (2008) found that more PAHs were dissipated in the rhizosphere soil than in unplanted soil. This enhanced dissipation of PAHs in planted soil might be derived from increased microbial activity and plant release enzymes.

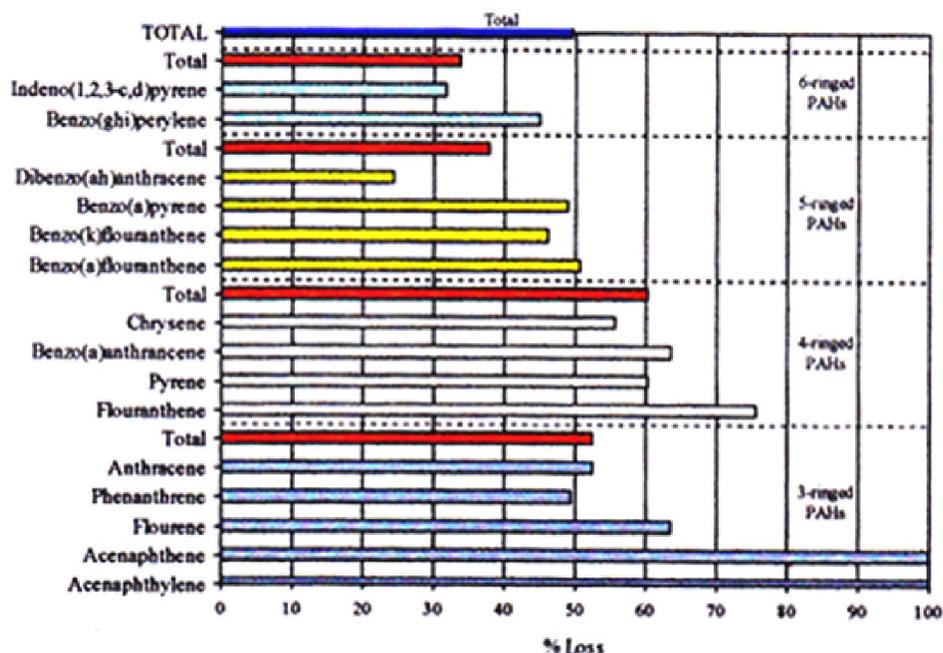


Fig. 2: Reduction values (%) of PAH compounds in the rhizosphere of *Tamarix nilotica* plant (calculated on the basis of PAH content of the non-rhizosphere soil).

In the present work, it can be observed that (Table 4) Chrysene and dibenzo(ah)anthracene as compared to the other PAHs were more frequent in the non-rhizosphere soil (277.6 and 156.0 mg/kg soil respectively). However, this indicates reduction values of the two PAHs in the rhizosphere soil of 55.7% and 43.4% respectively. Spriggs *et al* (2005) reported that the decrease in concentration of chrysene is noticeably smaller in the presence of poplar and willow vegetation.

As a total the four-rings PAHs as compared to the other PAH groups were more reduced in the rhizosphere soil (60.3%). This was followed by the three-rings PAHs (52.5%). The five-ring and the six-ring PAHs were weakly reduced (37.8% and 33.8% respectively). Spriggs *et al* (2005) reported that the reduction trends of four-ring and five-ring PAHs were noted during 18-monthes study period of phytoremediation, although none were at significant levels when compared to unvegetative controls. Although PAH compounds with increasing number of rings may be microbially degraded, limitation exist which may hinder the bioremediation efficiency.

For simplicity the results in the rhizosphere soil can be summarized in the following point:

PAHs with high reduction values (75.4-100%) were three compounds namely: acenaphthylene (100%), acenaphthene (100%) and flouranthene (75%).

PAHs with reduction values of 50.6-63.4% are six compounds namely: flourene(63.4%),

benzo(a)anthracene (63.4%), pyrene (60.2%), chrysene (55.7%), anthracene (52.5%) and benzo(a)flouranthene (50.6%).

The other PAH compounds had reduction values of 24.3% (for dibenzo(ah)anthracene to 49.0% for benzo(a)pyrene.

Spriggs *et al* (2005) found that acenaphthene, anthracene, flouranthene, naphthalene and phenanthrene decreased significantly in green ash (*Fraximus pennsylvanica*) and hybrid poplar (*Populus deltoids*) phytoremediation treatment when compared to the unplanted soil controls.

Rentz *et al* (2004) reported that studies of trees including hybrid poplar, red mulberry and willow indicated that root exudates and/or extracts can actually inhibit the phenanthrene degradation. Muller *et al* (2006) found that pyrene mineralization was not affected by planting. They also found that phenanthrene was consistently lost more rapidly than either anthracene or pyrene.

Results of the reduction values of the carcinogenic PAH compounds (Table 5, Fig. 3) show that as a total the eight carcinogenic PAHs resolved were reduced in the rhizosphere soil by 49.1%, and it is important to observe that all of the four-rings PAHs recorded were carcinogenic compounds. This is in contrast to three of the five-rings and one of the six-ring PAHs also are of carcinogenic effects. Knopp *et al* (2000) reported that the four-ringed PAHs chrysene and dibenzo(ah)anthracene, and the six-ringed PAH indeno(1,2,3-c,d) pyrene are

considered by the International Agency for Research Cancer (IARC) as carcinogenic compounds. Other PAH compounds are known to have carcinogenic activity (Irwin, 1997) such as:

*Flouranthene.

*Benzo(a)anthracene.

*Benzo(b)flouranthene.

*Benzo(k)flouranthene.

*Benzo(a)pyrene.

Table 5: Residual carcinogenic PAH compounds in the rhizosphere soil (R) of *Tamarix* plant as compared to those in the non-rhizosphere soil(s)

Carcinogenic PAHs	No. of Rings	S mg/kg Soil	R	
			Mg/kg soil	Loss %
1. Flouranthene	4	68.3 ± 5.40	16.8 ± 1.28	75.4
2. Pyrene	4	57.3 ± 2.47	22.8 ± 0.92	60.2
3. Benzo(a)anthracene	4	72.6 ± 9.77	26.6 ± 2.83	63.4
4. Chrysene	4	277.6 ± 12.60	122.9 ± 5.97	55.7
Total		475.8	189.60	60.2
5. Benzo(k)flouranthene	5	83.0 ± 2.16	44.77 ± 3.24	46.1
6. Benzo(a)pyrene	5	109.3 ± 7.36	55.70 ± 4.14	49.0
7. Dibenzo(ah)anthracene	5	156.0 ± 4.32	118.13 ± 24.30	24.3
Total		348.3	218.60	37.2
8. Indeno (1, 2,3-c,d) pyrene	6	70.0 ± 1.63	47.80 ± 3.8	31.7
Total		894.1	455.5	49.1

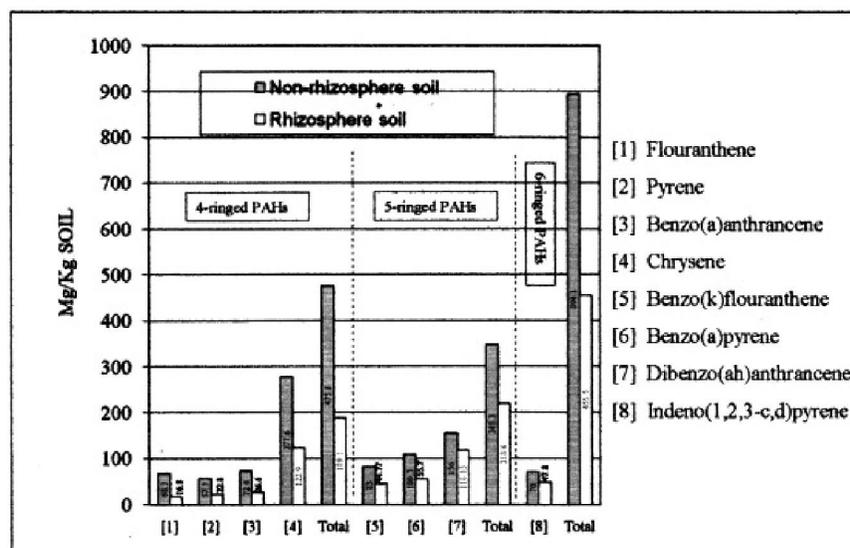


Fig. 3: Carcinogenic PAH compounds (mg/kg soil) in the rhizosphere and non-rhizosphere soils of *Tamarix nilotica*.

PAH compounds usually occur in mixtures in the environment, and they tend to be more carcinogenic. Irwin (1997) reported that co-carcinogenic activity was noted for both flouranthene and pyrene when combined with mixtures of other PAHs in dermal treatment of mice. Collectively, the carcinogenic four-ringed PAHs were highly reduced (60.3%) in the rhizosphere of this plant.

Maximum reduction value in the individual PAHs was 75.4% (for flouranthene) followed by 63.4% (for benzo(a)anthracene) and 60.2% (for pyrene). On the other hand, minimum reduction

values were 24.3% (for dibenzo(ah)anthracene) List and Alexander (2000) reported that accelerated dissipation from pyrene-spiked soil has been shown with pine seedling.

Jordahl *et al* (1997) found that population of benzene, toluene and xylene degrading microbes were five times more abundant in the rhizosphere of poplar trees than in the surrounding soil.

A particular notable distinction of *Tamarix nilotica* rhizosphere is the greater efficiency to degrade the carcinogenic PAH compounds especially flouranthene, benzo(a)anthracene and pyrene.

The present results revealed that the roots of the wild salt-tolerant plant (*Tamarix nilotica*) growing in the polluted seashore sediments were densely associated by oil-degraders and other bacterial groups, which reflected the disappearance of higher amounts of TPH and polycyclic aromatic hydrocarbons (PAHs). Accordingly this plant demonstrated successful phytoremediation of this polluted sediments.

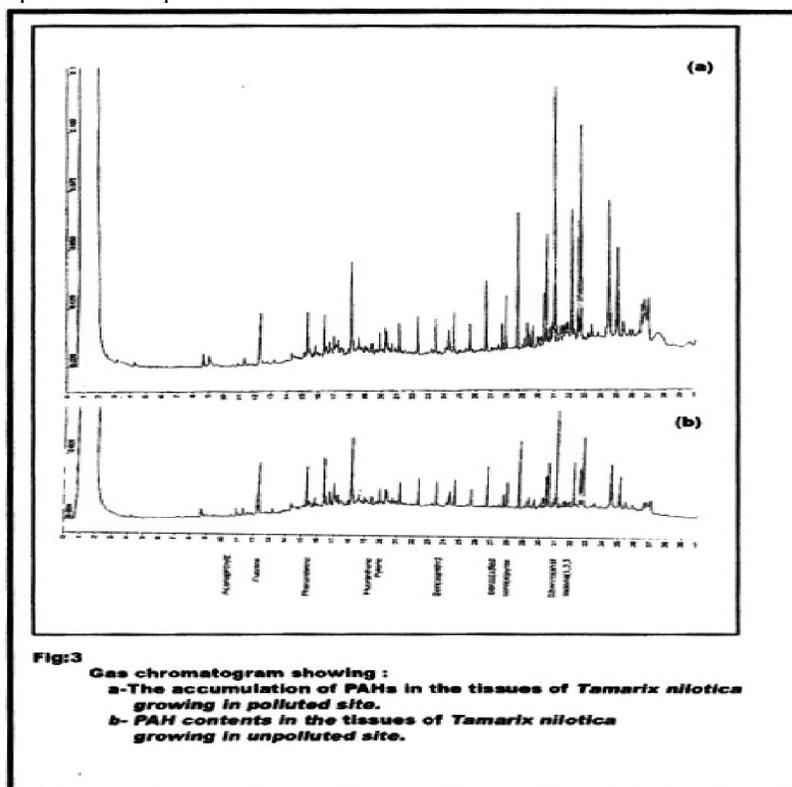
To improve and to accelerate this process in a short period of time, Haung *et al* (2005) developed a multi-process phytoremediation system (MPS) that is composed of : land farming (aeration and exposure to light), contaminant-degrading bacteria, plant growth promoting rhizobacteria and growth of the tolerant plants.

Results of the GC analysis for the detection of the accumulated PAH compounds in the shoot tissues of *Tamarix nilotica* plant growing in the polluted sediments as compared to its growth in the non-polluted area (Fig. 3) show that the total number of peaks resolved for PAH compounds were 201 in the tissues of the plant growing in the unpolluted area, on the other hand , 222 peaks recorded for plants tissues of that growing in the polluted sediments, i.e. with increase of 21 peaks. The identified peaks in the tissues of both plants were 15 and 14 peaks of identified PAH compounds for plant in the unpolluted area and plant in the polluted sediment

respectively. The sum of the 15 PAHs was 528 mg/kg dried tissue whereas the sum of the 14 PAHs was 769 mg/kg dried tissues. These results indicate accumulation value of 1.46 for total PAHs. The results in Fig. (3) show that the more accumulated PAHs was indeno (1,2,3-c,d) pyrene.

It is of important to note that rare (if none) investigations on the accumulation of PAH compounds in the tissues of salt-tolerant plants. Most studies have utilized the annual and herbaceous non-salt tolerant plants. Kipopulou *et al* (1999) found PAH median values of 161 and 42 Mg/g in lettuce and cabbages respectively, grown in the industrial area of Thessaloniki, Greec. Bakker *et al* (2000) reported that the sum of PAHs in samples of leaves of *Plantago major* collected at 50 m from an oil refinery was 8000 µg/g whereas PAH concentration in grass samples of the same site was 2000 µg/g.

Grova *et al* (2000) reported a concentration of 51.8 µg/g for 8 PAHs in rural grass sample. Nadal *et al* (2004) found that in chard samples the highest value (sum of 16 PAHs) was observed in the residential area, followed by the industrial and the unpolluted zones with concentrations of 179.50 and 28 µg/g dry weight respectively. The same authors reported that the concentrations in vegetation under the influence of petrochemical industries were notable higher.



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The Effect of Soft laser Application on Orthodontic Movement (In vitro study)

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Abstract: The present study was designed to evaluate the effect of low level laser therapy on alveolar bone remodeling and rate of tooth movement secondary to application of orthodontic forces. 42 male Guinea pigs were used in this study. The animals were divided into two groups (each group contains 21 animals), group (1) received soft laser therapy at the treatment site and group (2) as a control group. The orthodontic device was cemented to the lower central incisors to be activated once only. Daily measurements were taken directly from the oral cavity to record the rate of tooth movement of the experimental groups. Seven animals of each group were sacrificed at 3 days, 2 weeks and one month. Radiographic assessment was carried out at these intervals using Radio-Visio-Graphy (RVG), with its personal computer (PC) based version, to monitor the changes in the bone density mesial to each lower central incisor. The lower jaws were histologically treated to obtain mesiodistal sections of the lower incisors with their supporting structures and stained by H & E. Conclusion: Soft laser can enhance the rate of orthodontic tooth movement due to stimulation of bone remodeling.

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Key words: Orthodontic treatment, laser therapy

1.Introduction:

Orthodontic treatment is based upon the principle that if prolonged pressure is applied to a tooth, tooth movement will occur as the bone around the tooth remodels. The typical 2 to 3 years treatment period is burdensome for patients, so it is very important to accelerate alveolar bone remodeling during treatment to abbreviate the time required, Kawasaki and Shimizu (2000); Proffit(2007)

A long period of retention is necessary to prevent early relapse. Although the reason for the early relapse is not fully clear, bone regeneration after orthodontic treatment may affect the post treatment relapse. It would be potentially beneficial therefore to accelerate bone formation to prevent relapse and abbreviate the retention period, Saito and Shimizu(1997).

Orthodontic treatment involves the use and control of forces acting on the teeth and associated structures. An optimal orthodontic force intends to induce a maximal cellular response and to establish stability of the tissue. An unfavorable force does not result in a precise biologic response and may initiate adverse tissue reactions, Graber and Vanarsdall (2000).

A considerable number of studies based on human being illustrate the quantitative changes

occurring during orthodontic treatment, but the main evidence for the qualitative histological responses to orthodontic treatment comes from experimental studies on animals , Graber and Vanarsdall (2000).

Lasers can be divided into two groups, the so-called hard lasers, which are used for surgical application as cutting and vaporization of hard and soft tissues (e.g. CO₂, Nd: YAG lasers), Sinha and Gallagher(2003); Esen et al.,(2004). Moreover, the so-called soft lasers, which are used for biostimulation, analgesic effects and promoting wound healing (e.g. He-Ne and Diode laser , Qadri et al.,(2005)

The use of Ga-As diode laser as a soft laser has grown increasingly during the last 10 years. This kind of laser is known to have a high depth of penetration in comparison with other types and thus offers the clinician a penetrative tool of great efficiency, Nissan et al., (2006)..

The effect of low energy laser on the alveolar bone after tooth extraction showed increase in the deposition of bone. Radiological analysis after tooth extraction demonstrates that low intensity laser can activate repair of damaged bone tissue in patients, Nagazawa et al.,(1991). In addition, low power laser irradiation significantly increased the number of viable osteocytes in the irradiated bone by a positive

effect on bone matrix production to produce highly reactive and vital implant bone tissue, Dortbudak et al.,(2002). Moreover, it is effective on the bone healing process in artificially created osseous cavities by affecting calcium transport during new bone formation, Nissan et al.,(2006)..

Sun et al.(2001), reported that the irradiation of low energy laser promotes tooth movement and remodeling of alveolar bone in rabbits. In addition, Miloro et al.,(2007)reported that low level laser therapy (LLLT) accelerates the process of bone regeneration during the consolidation phase after distraction osteogenesis. The adjunctive use of LLLT may allow a shortened period of consolidation and therefore permit earlier device removal, with the avoidance of morbidity associated with prolonged device retention.

Therefore, if laser irradiation can cause the acceleration of bone remodeling, it may also have great potential benefit in abbreviating the orthodontic treatment period .

This study was conducted in an attempt to evaluate the effect of low level laser therapy (LLLT) on alveolar bone remodeling and rate of tooth movement secondary to application of orthodontic force.

2.Material & Methods:

2.1.Materials:

2.1.1.Subjects:

Forty two male Guinea pigs were used in this experiment. They were collected at one week age and were allowed to grow at the same conditions of good ventilation, adequate stable diet, temperature and humidity. The average age of the animals was five weeks and their average body weight was 260 grams \pm 20 grams at the beginning of the experiment.

The animals were grouped randomly, seven in a cage, so that at the time of irradiation, the animals of each group could be selected from different cages to eliminate the effect of cage environmental variants. They were supplied with a daily maintenance diet which was almost stable in both quality and quantity to keep their body growth and functions almost constant throughout the experiment.

The animals were divided into two groups (each group contains 21 animals). One group (group 1) received soft laser irradiation at the treatment sites and the other group (group 2) was non-irradiated as a control group.

The orthodontic appliances were constructed so that each appliance was formed of two main parts two bands & wire in the form of a vertical loop with a

helical. An eyelet was welded on the middle part of the labial aspect of each band. These eyelets were the attachment components of the appliances, El-Dakroury(1998).

2.1.2.Drugs:

Intramuscular injection of a mixture of Xylazine (10 mg/kg b.wt.) and Ketamine (87 mg/kg b.wt.) was used for anesthesia, Kandil(1995).

2.2.Methods:

2.2.1. Experimental design

After anaesthetization, glass ionomer cement was used for cementation of the orthodontic appliance on the lower incisors of the animal (Fig.1). The orthodontic device was activated once only at the beginning of the experiment with no further activation during the treatment period, which lasted for thirty days.



Fig. (1): The orthodontic appliance in place
The first group was received laser irradiation by the Gallium- Arsenide laser system (Ora-laser-ORALIA Dental Products Ltd., Weiherstraße 20, D-78465 Konstanz-Dettingen / Germany).

It is a semi-conductor low level laser therapy(LLLT), with a wavelength 904 nm (Infrared); it was pre-adjusted to deliver a laser beam with an output power of 30 mW, and a frequency of 9999 Hz for 3 minutes daily for two weeks starting from the day of activation of the orthodontic appliance.

The surface area of the probe covers the whole target area of the lower incisors (from the tip of the interdental papilla to the depth of the gingival sulcus, and one millimetre distal to the roots of both lower incisors). The applicator probe was moving in a continuous slow circular motion to assure full exposure of the target surface to the beam.

Seven animals from each group were sacrificed at three days, two weeks and one month intervals from the date of beginning of orthodontic appliance activation. Each animal was anesthetized by intramuscular injection of a mixture of Xylazine (12 mg/kg body weight) and Ketamine (80 mg/kg body

weight). While the animal was under deep anesthesia, a lethal dose of ketamine chlorhydrate was used, Kandil(1995).

2.2.2. Assessment of the Rate of Tooth Movement:

During the experimental period, the amount of tooth movement was measured directly from the oral cavity of the animals using a Vernier caliper. The measurement were taken daily throughout the study period. During the measurement the end of the caliper were in contact with the opposing upper mesial points of the bands around the lower incisors.

2.2.3. Assessment of the Bone Density:

Radiographic assessment was done, after scarification, using Radio Visio Graphy (RVG) (Dür Vistaray system, manufactured by Dür Dental Gm pH and Co. Germany) with its personal computer (PC) base version. The x-ray generator was Orix-65 dental unit (65 kv, 8 mA) (Orix- 65 mobile x-ray machine, with digital x-ray control palm time 100, manufactured by ARDET srl, Italy) with a computer controlled timer, electric digital control device, and centesimal time regulation ranged from 0.01 to 2.99 seconds. In this study the time of exposure was 0.05 second.

The mandible of the animal was put in contact with the sensor and the inferior border of the mandible is parallel to the sensor. The distance between the end of the long cone (16 inch) and the sensor was fixed to 5 cm and the cone was kept perpendicular to the sensor all the time. The read out starts automatically, the image was displayed gradually on the computer screen, when the read out was completed; the newly read image was stored.

2.2.4. Measurement of bone density

The computer program, with an appropriate software (Dür DBS Win image processing software, manufactured by DÜr Dental Gm pH and Co. Germany) for image processing and manipulation, was used to evaluate the bone density at the mesial sides of both right and left lower central incisors. Two successive straight lines were drawn 0.5 mm apart and parallel to the mesial surface of each root, then the density were measured at three different and fixed points on each line (at 3,6 and 12mm) then the means were calculated and statistically analyzed, Salah et al.,(2000).

By assigning the value (0) to black and (256 to white, the mean gray value in each region of interest was calculated. Areas of bone loss represented as (darker areas), while areas of bone gain represented as (lighter areas), Yokota et al.,(1994). These data

were used for comparing the bone density between irradiated and non-irradiated groups.

Obtained data were presented as mean±SD and ranges. Results were analyzed using paired Wilcoxon test (Z-test). Statistical analysis was conducted using the SPSS (Version 10, 2002) for Windows statistical package. P value <0.05 was considered statistically significant.

2.2.5. Histopathological Assessment:

The mandible was removed and the soft tissue covering it was removed. Each specimen was fixed in 10% neutral buffered formalin for not more than 48 hours. After fixation, assessment of bone density was done, and then the specimens were decalcified in 20% ethylenediamine-tetra-acetic acid (EDTA) for 6-8 weeks. Natural EDTA decalcifying solution consisted of EDTA (di-sodium salt) 250 g. dissolved in distilled water 1750 cm³. The solution was adjusted to pH 7 by the addition of about 26 g. sodium hydroxide. A volume of 150 times that of the tissue was renewed every 5-7 days during the decalcification process.

The specimens were prepared for haematoxylin and eosin (H&E), histochemical examination to evaluate the process of bone remodeling and the cellular activities in bone and PDL at the cervical one half of the root

3.Results:

3.1.Clinical Findings:

The animals lost some of their body weight during the first two weeks then weight regain started during the third week and continued up to the end of the study period.

Clinically during the first 3 days of the study, the gingiva in all cases was of normal color and texture except for slight gingival inflammation in few animals in both groups. No bleeding tendency or gingival enlargement was noted in any of the study cases. During the period from 4th to 14th days, the gingiva was normal irradiated group. On the other hand, four animals in group V showed slight gingival inflammation. During the period from 15th to the 30th days, the gingiva was normal with no evidence of gingival bleeding, enlargement or inflammation in the irradiated group. While slight gingival inflammation was still detected in three animals in the non-irradiated group.

The rate of tooth movement was measured daily for the studied groups. The highest measurements throughout the study period were recorded in irradiated group than non- irradiated group. Group (1)

reached the maximum distance between the two incisors (10 mm) (as the device became inactive after reaching its maximum opening) on the 24th day, while the group (2) on the 29th day.

The mean distances during the first three days were 3.5 ± 1 mm for group (1), and 3 ± 0.5 mm for group. During the period of 4th – 14th, the mean distances were 5.86 ± 0.84 for group (1) and 4.86 ± 0.83 . For the period (15th – 30th days), the mean distance was 9.25 ± 0.84 for group (1) and 7.84 ± 1.2 mm for group.

Statistically, there was a non-significant difference ($P > 0.05$) between both groups during the three days period {table 1, Fig.2}. While during both 4-14 days and 15-30 days periods there was a significant difference ($P < 0.05$) between the irradiated group and the non –irradiated one{Table 2&3, Figs. 3&4}.

Table (1): Statistical analysis of mean distance (mm) estimated at 3 days in both groups.

	mean±S D (mm)	Statistical analysis	
		Z	P
Group (1)	3.5 ± 1	1.342	$P_1 > 0.05$
Group (2)	3 ± 0.5		

Fig (2): Mean ± (SD) of estimated distance in the studied groups during the 3 days period

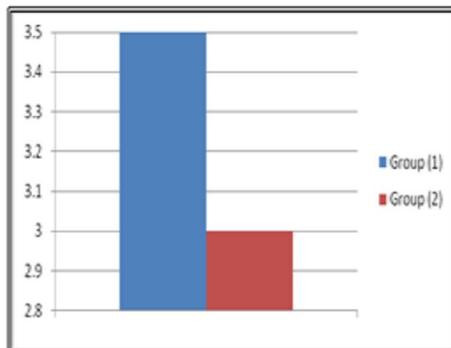


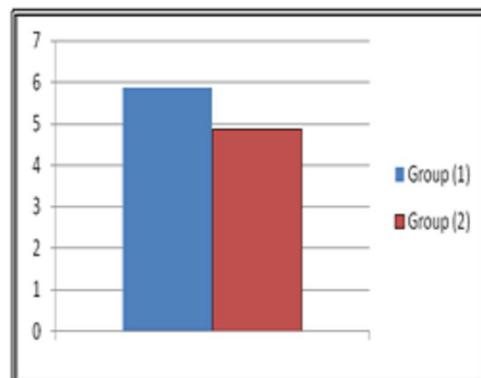
Table (2): Statistical analysis of mean distance (mm) estimated in the period of 4th -14th day in both groups.

	mean±SD (mm)	Statistical analysis	
		Z	p
Group (1)	5.86 ± 0.84	3.207	$P_1 < 0.05$
Group (2)	4.86 ± 0.83		

Table (3): Statistical analysis of mean distance (mm) estimated in the period of 15th -30th day in both groups.

	mean±SD (mm)	Statistical analysis	
		Z	p
Group (1)	9.25 ± 0.84	3.462	$P_1 < 0.05$
Group (2)	7.84 ± 1.2		

Fig (3): Mean ± (SD) of estimated distance in the studied groups during the period 4-14 days



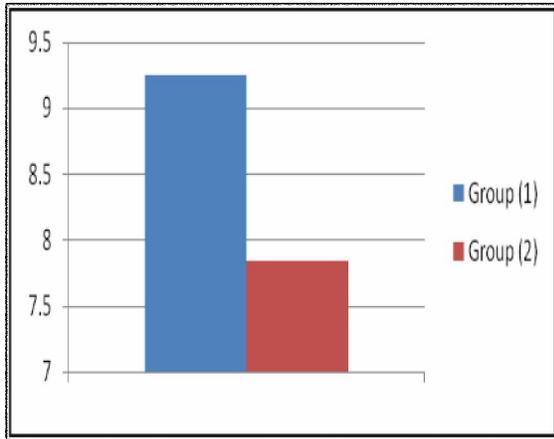


Fig (4): Mean ± (SD) of estimated distance in the studied groups during the period 15-30 days

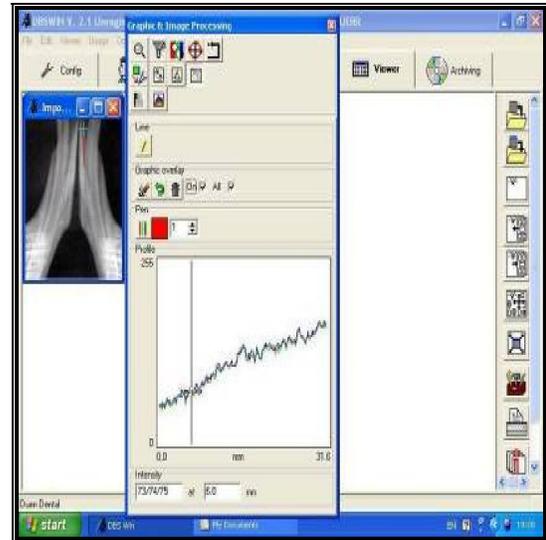


Fig. (6): RVG bone density measurements in group (2)

3.2. Assessment of bone Density:

The mean bone density was compared between the right and left incisors of both groups. For group (1), it was 100.5 ± 3.21 pixel/mm² and 95.6 ± 6.13 pixel/mm² respectively Fig. (5). for group (2), it was 90.5 ± 2.75 pixel/mm² and 90.4 ± 4.4 pixel/mm² respectively Fig. (6). Statistically, there was a non-significant difference ($P > 0.05$) of the bone density evaluated for either the right or left incisors between the both studied groups {Table 4, Fig. 7}.

Table (4): Statistical analysis of the mean bone density (pixel/mm²) between right and left incisors of each group.

	Rt incisor	Lt incisor	Statistical analysis	
	mean±SD (pixel/mm ²)	mean±SD (pixel/mm ²)	Z	p
Group (1)	100.5±3.21	95.6±6.13	0.099	>0.05
Group (2)	90.5±2.75	90.4±4.4	0.007	>0.05

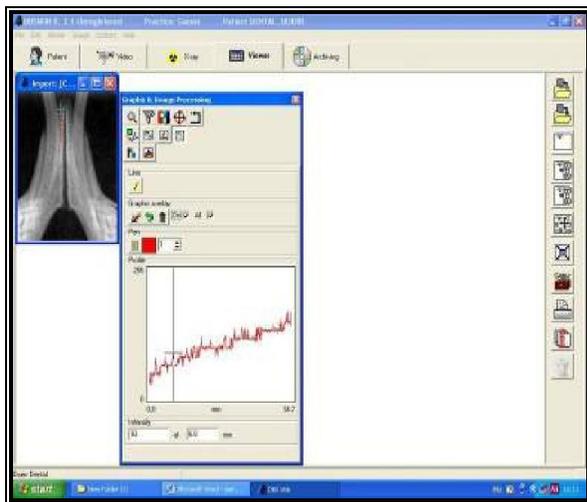


Fig. (5): RVG bone density measurements in group (1)

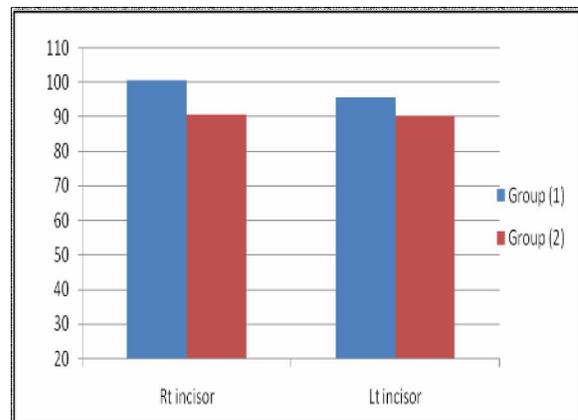


Fig (7): Mean ± (SD) of estimated bone density of both right and left incisors in the studied groups at the end of the study period.

The sum of the measurements of the bone density of both right and left incisors of each animal was used to calculate the mean bone density for each group. In group (1) the bone density was 99.6 ± 3.4 ; range: 95-104 pixel/mm². While, in group (2) it was 90.3 ± 2.72 ; range: 84 – 94 pixel/mm²; (Fig. 49). Statistically, there was a significant difference of bone density between both groups ($P < 0.05$). {Table 5, Fig. 8}.

Table (5): Mean bone density (Pixel/mm²) estimated in both groups

	mean \pm SD (pixel/mm ²)	Statistical analysis	
		Z	p
Group (1)	99.6 \pm 3.04	3.059	P ₁ <0.05
Group (2)	90.3 \pm 2.72		

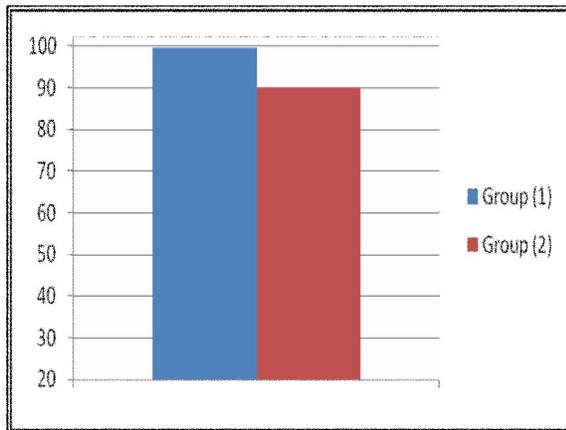


Fig. (8): Mean (\pm SD) of estimated bone density in the studied groups

3.3. Histological evaluation by using H&E stain:

The histological changes after orthodontic movement were mainly based upon changes shown in the non-irradiated group (2). The results were mainly detected in periodontal ligament (PDL) as regard its cellularity, continuity, vascularity and architecture. Alveolar bone changes were also observed as regard its bone cells, bone resorption and new bone formation. As a general, the tipping movement resulted in pressure and tension sites.

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3.3.1. Three days later:

For pressure sites:

In the non-irradiated group, the PDL showed hyalinization zone of collagen bundles adjacent to both tooth, and bone surfaces, with multiple edematous spaces and vacuolation. Degenerative changes were also observed. Narrow interstitial spaces with compressed blood vessels were prominent and located near the wall of alveolar bone. A few numbers of osteoclasts in their Howship's lacunae was evident. The bone surface was irregular and scalloped with few number of resorption foci. Fig. (9) While the irradiated group showed similar results to the non-irradiated one. The bone surfaces revealed increased number of osteoclasts. Multiple interstitial spaces encircling numerous compressed vessels were demonstrated Fig. (10).

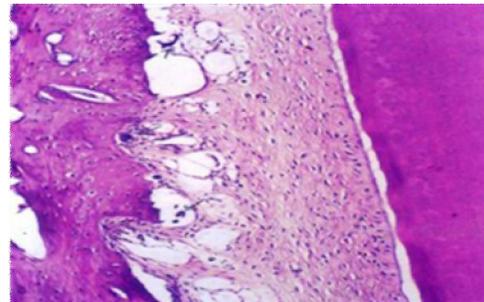


Fig. (9): Photomicrograph of the pressure site in group (2) at 3 days showing few numbers of osteoclasts. Note the multiple edematous spaces (H&E x 100).

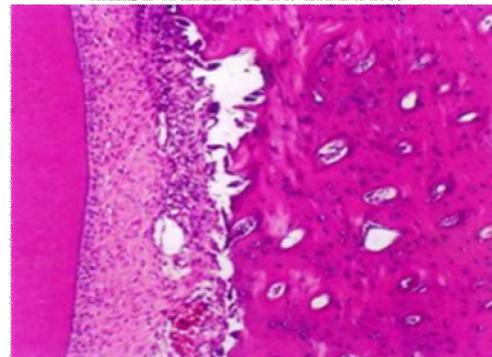


Fig. (10): Photomicrograph of the pressure site in group (1) at 3 days showing excessive osteoclasts activity (H&E, x 100).

3.3. 2. For tension Sites:

Non-irradiated group revealed over-stretching of PDL with prominent wavy course. The fibers became dense and elongated with irregular arrangement. Vasodilatation of thin walled vessels was obvious and located at the center of PDL. Normal bone architecture was noted Fig. (11). While *the irradiated group*, showed more pronounced over stretching of PDL than found in group V. In addition, evidence of laid down osteoid tissue was detected in the irradiated groups. Numerous proliferations of mononuclear cells (osteoblasts & fibroblasts) were detected near to root and bone surfaces Fig. (12).

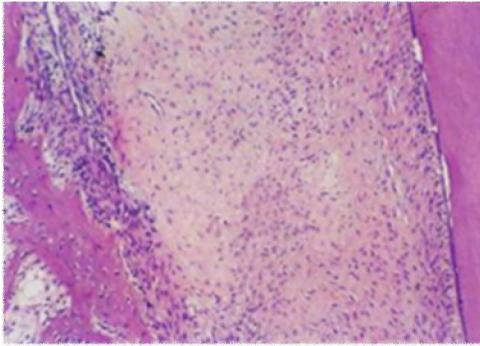


Fig. (11): Photomicrograph of the tension side in group(2) at three days showing widening of the PDL with focal degeneration (H. & E. x 100).

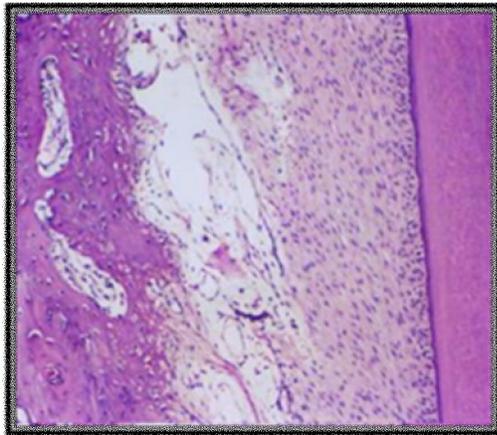


Fig. (12): Photomicrograph of the tension site of group(1) at three days showing over stretching of PDL with prominent degenerative changes (H. & E x 100).

3.3. 3. Two weeks later:

(For pressure sites):

Non-irradiated group, revealed a PDL hyalinization which was similar to the previous

period. Increased osteoclasts number along the bone surface was detected. Areas of degeneration were persistent in the vicinity of resorbed bone Fig. (13). While the irradiated group showed narrowing of the PDL space and evidence of periodontal reorganization especially with group (IV) and to a lesser extent in remaining groups. Increased mononuclear cell proliferation was detected with persistence of degenerative remnants with a higher intensity in addition to increased osteoid tissue formation. With the appearance of few wide reversal lines than that found in non-irradiated group Fig. (14).

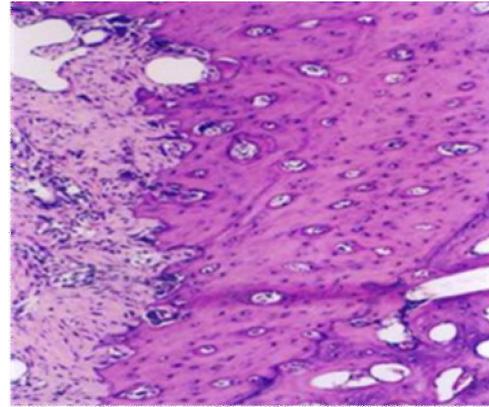


Fig. (13): Photomicrograph of the pressure site of the group(2) at two weeks showing increased osteoclast activity. Note the multiple interstitial spaces (H. & E. x 100).

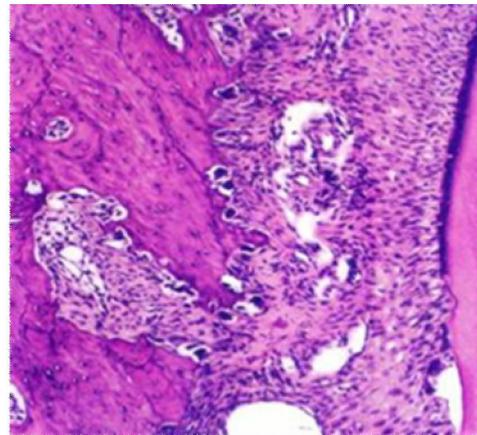


Fig. (14): Photomicrograph of the pressure site of group (1) at two weeks. Note the increased number of osteoclast(H. & E. x 100).

3.3.4. For tension sites:

The *non-irradiated group* revealed increased osteoid deposition than the previous interval with the appearance of few number of reversal lines. Numerous thin-walled dilated vessels were also prominent Fig. (15). While the *irradiated group* revealed similar results but with the appearance of numerous deep reversal lines. Vasodilatation was more prominent. The bone surface revealed a highly cellular surface with increased mononuclear cell proliferation opposite to the bone surface. It was also seen adjacent to the root surface in the form of cementoblastic proliferation Fig. (16).

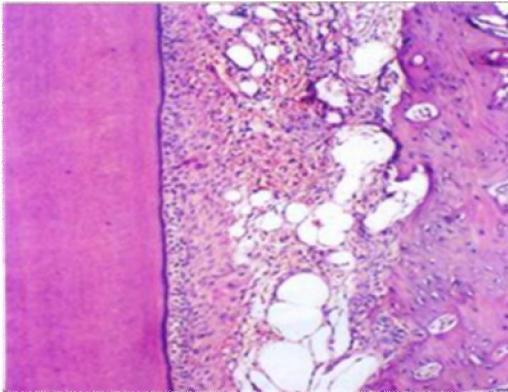


Fig. (15): Photomicrograph of the tension site of group (2) at two weeks showing evidence of osteoid deposition. Note the numerous thin walled vasculatures (H. & E. x 100).

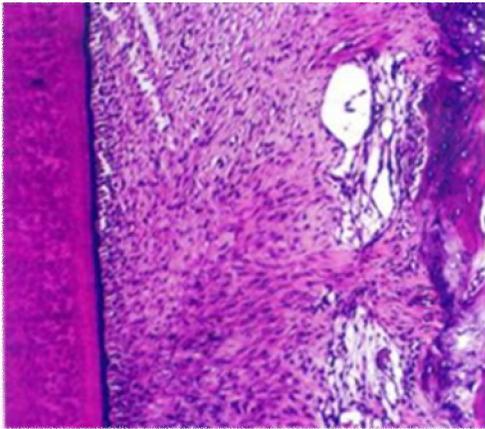


Fig. (16): Photomicrograph of the tension site of group (1) at two weeks showing evidence of PDL re-organization with prominent mononuclear cell proliferation (H. & E. x 100).

3.3.5. One month later:**For pressure sites:**

The *non-irradiated group* showed a minor evidence of PDL reorganization with persistence of necrotic remnants. Osteoid tissue with numerous wide resting lines was detected. Mononuclear proliferation was highly manifested Fig. (17). Alveolar bone resorption was still active and the newly formed bone was few, with thin and immature trabeculae. While the irradiated groups showed more evidence of PDL reorganization, more new bone formation with thick and mature trabeculae and smooth regular bone surface Fig. (18).

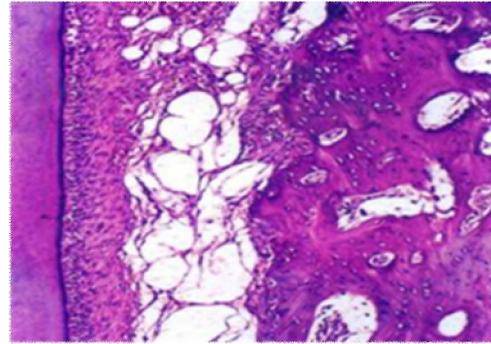


Fig. (17): Photomicrograph of the pressure site of group (2) at one month showing a minor evidence of PDL reorganization. Note the persistence of multiple interstitial spaces and the new laid down osteoid (H. & E. x 100).

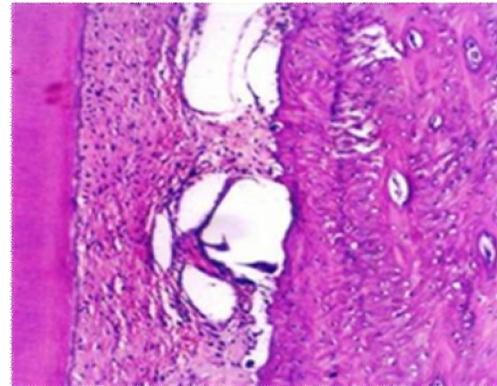


Fig. (18): Photomicrograph of the pressure site of group (1) at one month showing few numbers of osteoclasts (H. & E. x 100).

3.3.6. For the Tension Sites:

Non-irradiated group showed fibrous condensation with numerous dilated capillaries. Some areas of PDL were still stretched. Precementum was focally calcified and some uncalcified cementum still persists

Fig. (19). While the irradiated group showed highly detectable reorganization of PDL and to a lesser extent for the remaining groups. Besides increased incidence of new bone tissue with multiple deep reversal lines, the newly formed bone had thick and mature trabeculae. Cementoblasts and precementum were increased. The bone surface showed highly cellular surface and osteoblastic proliferation Fig. (20).

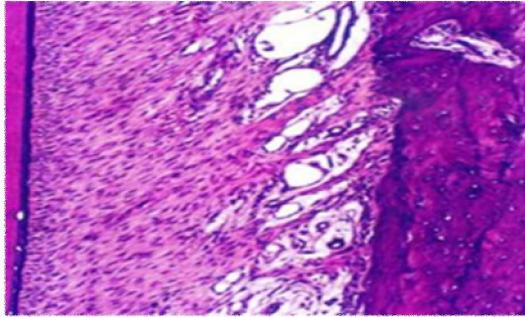


Fig. (19): Photomicrograph of the tension side of group (2) at one month showing evidence of PDL reattachment. Note, multiple dilated capillaries (H. & E. x 100).

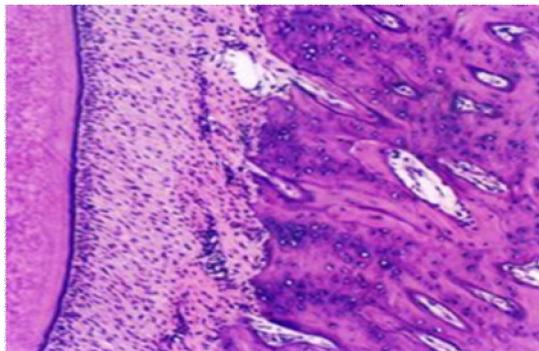


Fig. (20): Photomicrograph of the tension side of group (1) at one month showing increased cementoblastic layer, deep reversal lines and PDL reorganization (H. & E. x 100).

4. Discussion:

Orthodontic tooth movement is dependent on the ability of periodontal cells to react to mechanical stimuli. The most prominent features are the remodeling of the periodontal ligament and the resorption and deposition of alveolar bone, Ren et al.,(2005).

The orthodontic force is the promoting factor of alveolar bone remodeling. The force should be as slight as possible to prevent collateral effects such as bone necrosis or root resorption. On the other hand, accelerating the teeth movement is desirable, because

the treatment duration, frequently months or even years, is considered very long, Cruz et al.,(2004).

Literatures show some methods to stimulate bone remodeling such as, drug injections like Prostaglandin, Yamasaki(1983) and osteocalcin. Kobayashiet al.,(1998), electric stimulation, Spadaro(1997) and ultrasound application are other methods, Hadjiargyrou et al., (1998). These methods could be associated with discomfort and pain, Kawasaki and Shimizu(2000) or need sophisticated apparatus and demands applications for a long term to achieve its therapeutic effects, Roberts et al.,(2006).

Recently, low level laser therapy (LLLT), a non-invasive and simple method, was reported to be able to accelerate tooth movement in animals with formation of better quality bone, and augmented production of differentiated osteoclasts, Kawasaki and Shimizu (2000); Youssef et al.,(2008).

Laser energy, when deposited on tissues, causes reactions of a physiological nature. In the organism, the interaction of low level radiation constitutes the energetic incorporation contained in the laser light beam on the radiated tissues. The consequences of these interactions are: 1) primary effects, subdivided into biochemical, bioelectrical and bioenergetics; 2) secondary effects that stimulate the microcirculation and cellular tropism; 3) therapeutic effects, which are analgesic, anti-edematous and healing results, Moreira et al.,(2004); Silveira et al.,(2007).

The amount of the force applied during orthodontic treatment affects the repair capacity; Steigman et al.,(1993). The fixed orthodontic appliance used in this study was designed to produce a distal tipping movement of the incisors by applying the same amount of force with all animals. This is why a moderate force of 90 gm was used in this study to avoid the effect of heavy force on the repair capacity, El-Namarawey(1986).

The rates of tooth movement were high especially during the second (4th-14th days) and third (15th-30th) periods of the study in group (1) compared to group (2). This is in accordance with Cruz et al. (18) who concluded that LLLT does accelerate human teeth movement and could therefore considerably shorten the whole treatment duration. By the end of the study period, all animals in reached the maximum interdental distance. This was due to cessation of the orthodontic force secondary to loss of the springing action of the orthodontic device by reaching the maximum distance between the two ends of the loop arms. This occurred earlier in group (1) followed by group (2). A clinical observation of value is the fewer

occurrences of the gingival inflammation and swelling in the irradiated group compared to the non-irradiated one. This was in accordance with Honmura et al.,(1996) who reported that low power infrared irradiation on affected parts has an anti-inflammatory effect on acute and chronic inflammations.

In the present study, radiographic analysis was carried out for evaluation of bone density using direct digital system that has many advantages, among which, ability of image adjustment and manipulation, possibility of Image storage and the stored images can be used almost instantaneously, Topback et al.,(1999). Bone density at the tension sites was evaluated in this study. Statistically, there was a significant difference of bone density between irradiated and non-irradiated groups.

These results could be explained on lights of the results of Saito and Shimi(1997) who reported that LLLT significantly stimulated the number of bone nodules in a laser dose dependent manner. Also, Nicolau et al.,(2003) concluded that LLLT increased the osteoblasts activity and mineralization apposition rate during healing of bone defects in rats. Moreover, Khadra et al.,(2004) reported that LLLT stimulated the deposition of calcium, phosphorus, and insoluble proteins in rat calvarial bone defects.

The mechanisms by which laser irradiation can stimulate bone formation are not well understood but may be multifactorial and include osteogenic cell proliferation and differentiation, mitochondrial respiration, and ATP synthesis, in addition to promotion of angiogenesis and healing acceleration, Maegawa et al.,(2000); Khadra(2005).

By the end of the study period (30 days), highly detectable reorganization of the PDL, besides increased incidence of new bone tissue with multiple deep reversal lines and mature trabeculae in addition to osteoblastic proliferation were noted. The cementoblasts and precementum were increased. These histological features were more prominent in the irradiated group than the non-irradiated one.

The histological (H&E) results of the present study were in harmony with the clinical results. They explained the higher rate of tooth movement in the irradiated group compared to the non-irradiated one according to the fact that the speed of tooth movement is greatly dependent on the speed of bone remodelling, Kawasaki and Shimizu(2000); Youssef et al.,(2008)

In the current work, there was an agreement between clinical, bone density and histological findings and the statistical analysis of this experimental study.

In conclusion, low-level (Ga-Al-As) diode laser irradiation stimulated tooth movement accompanied with an acceleration of collagen formation and alveolar bone remodeling, as indicated by increases in the number and activity of both osteoclasts and osteoblasts in PDL and mineralized bone formation.

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Nucleotide variations of 16S rRNA gene of VacA positive *Helicobacter pylori* strains isolated from human Gastric Biopsies in Saudi Arabia

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ABSTRACT: Three isolates of *Helicobacter pylori* (*H. pylori*) were originally isolated from gastric biopsies taken from patients complaining of gastric disorders in Makkah City, Saudi Arabia. The isolates that previously revealed to be vaculating cytotoxin A positive were identified by 16S rRNA gene as *H. pylori* using a primer pair designed from the similar sequences within consensus regions of GenBank *H. pylori* to amplify the 163 bp fragment. Sequence alignments of 16S rRNA gene were performed and total numbers of 46, 55 and 40 nucleotide positional differences with base-pair substitutions were identified for these isolates compared to GenBank strains of *H. pylori*. Phylogenetic analyses based on 16S rRNA gene sequences showed that the three *H. pylori* strains formed a phylogenetically distinct group, separate from all other species of *H. pylori*. The three isolates were hence coined as *H. pylori* Milyani-1, -2 and -3 at GenBank database under the accession numbers HQ877021, HQ877022 and HQ877023, respectively. The obtained results evidently indicated a large diversity with unique characteristics of the three Saudi Arabian *H. pylori* strains from all the other established strains.

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Key words: Accessions HQ877021, HQ877022 and HQ877023, *Helicobacter pylori*, isolates, 16S rRNA gene, variations.

1. INTRODUCTION

Helicobacter pylori is a Gram-negative, microaerophilic, motile bacterium, that has been implicated in the aetiology of most gastritis, duodenal ulcers and is associated with lymphoproliferative disorders as well as gastric carcinoma. Some evidence also suggests that it is a possible factor in the development of cardiovascular disease (Cover and Blaser 1992; Aceti *et al.* 2004).

At the discovery of *H. pylori*, identification was carried out by morphological, biochemical and physiological studies, in addition to histological and serological investigations (Lee and Megraud, 1996). However, by the emergence of the new technology of polymerase chain reaction (PCR), researchers started to detect *H. pylori* using PCR, 16S rRNA gene, ureA and cagA genes (Clayton *et al.*, 1992, Twing *et al.* 2011). The sequence of a fragment of the 16S rRNA gene was determined by Khan *et al.* (2000) for ten strains of *H. pylori* to examine the contribution of point mutation within a conserved gene. There were few differences between the sequences from the

various strains and it was concluded that such differences were not the most important source of diversity. Monstein *et al.* (2001) used real-time DNA sequence analysis of *H. pylori* 16S rRNA gene fragments by pyro-sequencing for rapid molecular identification and

sub-typing of clinical isolates. The latter experiment showed that subtle DNA sequence variation occurs sufficiently often in the 16S rRNA variable V1 and V3 regions of *H. pylori* and the authors concluded that their findings can provide a consistent system for sub-typing. On the other hand, Trieber and Taylor (2002) identified several unique sequence variations in the 16S rRNA genes of *H. pylori* strain 26695, and these have been placed on a secondary structure model of the *H. pylori* 16S rRNA. Moreover, natural transformation with the 16S rRNA genes from *H. pylori* resistant strains conferred tetracycline resistance on susceptible strains. Furthermore, it has now been established that using PCR of 16S rRNA gene is considered as a powerful tool for identification of different types of

micro-organisms. It has also become the primary method for determining prokaryotic phylogeny and is currently the basis for prokaryotic systematic (Monsttein *et al.* 2000, Dewhirst *et al.* 2005).

The aim of the present study was to identify three new *H. pylori* isolates obtained from three male patients complaining of gastric disorders at Makkah Almokarama City, Saudi Arabia, based on the variation analysis of 16S rRNA gene sequences.

2. MATERIALS AND METHODS

2.1. Materials:

The present molecular study was performed in Genetics and Cytology Dept., National Research Centre (NRC), Cairo, Egypt.

2.1.1. Clinical specimens:

Three gastric biopsies obtained from three male patients complaining of chronic active gastritis were provided by Gastroenterology-endoscopy Consultant at Al-Noor Specialist Hospital at Makkah Almokarama City, Saudi Arabia.

2.1.2. Specific primers for 16S rRNA gene

Ten NCBI-different accessions (DQ059083, DQ059082, U01332, U01331, U01330, U01329, U01328, AJ310144, AJ310143 and HPU00679) of *H. pylori* 16S rRNA gene were multiple alignments to design a pair of primers; forward 5-GTGTGGGAGAGGTAGGTGGA-3 and reverse 5-GTTTAGGGCGTGGACTACCA-3 with a product size of 163 bp.

2.2. Methods:

2.2.1. Isolation and identification:

The gastric biopsies were cultured and incubated under microaerophilic conditions on Blood and Chocolate agar at 37° C for five days. Culture and Identification was carried out according to Milyani and Barhameen (2004).

2.2.2. DNA extraction and PCR amplification of 16S rRNA gene

DNA extraction was performed using the Wizard® SV kit (Promega, Madison, USA). PCR-amplification reaction was used according to Williams *et al.* (1990) in a final volume of 25 µl containing 10X PCR buffer (10 mM Tris-HCl, 50

mM MgCl₂, 2 mM dNTPs, 10 mM of each forward and reverse primers, 50 ng of template DNA and 5 U of *Taq* polymerase (Promega, USA). Reactions were performed in a thermocycler (Biometra, GmbH, Germany) and PCR was performed as one cycle of 94°C for 3 min (denaturation), 40 cycles of 94°C for 30 sec, 36°C for 1 min and 72°C for 1 min (annealing) and with a final extension of 5 min at 72°C. PCR amplified product was analyzed using 1.2% agarose gel electrophoresis in 1X TBE buffer by staining with 5 µg/µl ethidium bromide and visualized under UV light. The size of the 16S rRNA fragment of 163 bp was estimated based on a 100 bp DNA ladder (Bioron, Germany).

2.2.3. 16S rRNA gene purification, sequencing and analysis

PCR product of 163 bp was purified with the QIA quick PCR Purification Kit (Qiagen GmbH, Germany) according to the manufacturer's instructions. DNA was eluted in 20 µl of sterile water. The 16S rRNA fragment was sequenced on an Applied Biosystems automatic sequencer (ABI PRISM® 1200 DNA Sequencer, Bioron GmbH, Germany).

Sequences were compared with sequences of representatives of the most related *H. pylori* strains deposited in GenBank and sequencing-genome databases by using the BLAST search (<http://www.ncbi.nlm.nih.gov/blast>). Analysis was performed using Geneious Pro 4.5.4 program. A phylogenetic tree was supported from 500 bootstrap replicates and a dendrogram was constructed using multiple alignment of the 16S rRNA from *H. pylori* isolates and strains

3. RESULTS

The colonies obtained from culturing the three gastric biopsies showed typical cellular morphology of *H. pylori* in addition to motility and to their vigorous positivity to urease, oxidase and catalase.

3.1. PCR amplification of 16S rRNA in *Helicobacter pylori* isolates

PCR amplifications of the three *H. pylori* isolates revealed the fragments with expected sizes of 163 bp that represented the 16S rRNA gene (Fig. 1).

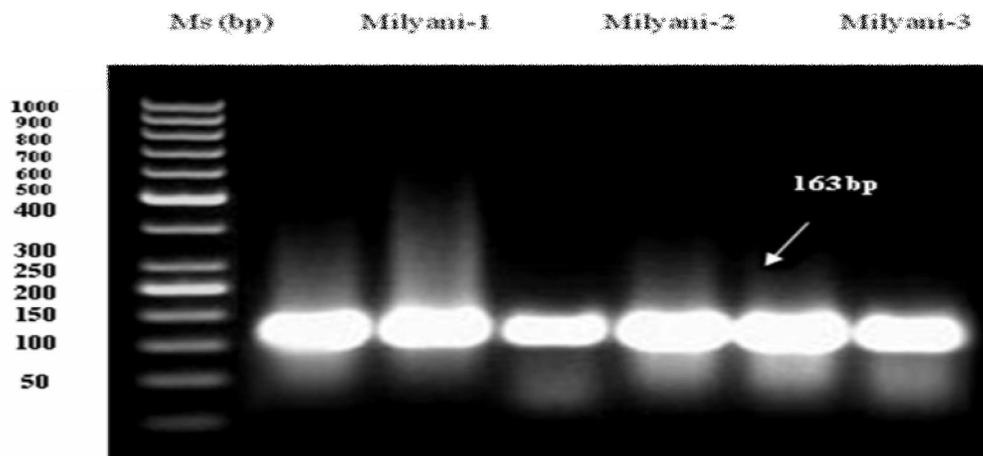


Fig. 1. PCR amplified products of 16S rRNA gene of the three *H. pylori* isolates using designed primer with 163 bp. M= DNA ladder with 100 bp

3.2. Sequence analysis of PCR-amplified 16S rRNA of the *H. pylori* isolates

A 163 bp nucleotide sequence of the partial 16S rRNA gene from the three *H. pylori* isolates were aligned and compared in the GenBank using the BLAST search. A total of 121 to 129 16S ribosomal RNA gene partial sequences from different accessions of *H. pylori* included different strains, 9 isolates and one clone were identified **Table (1)**. Blast alignment revealed several accessions of *H. pylori* scored 99% maximum identity for Milyani-1 and 98% maximum identity for Milyani-2 and Milyani-3, except strain DA (AY366422) with 96%.

Sequence alignments of the 16S rRNA gene of the *H. pylori* isolates (HQ877021, HQ877021 and HQ877021, respectively) compared with *H. pylori* GenBank strains and isolates revealed positional differences in nucleotide sequences and base-pair substitutions between the three isolates and the numerous isolates and strains (**Fig. 2**).

The accession HQ877021 with a fragment size 163 bp (isolate Milyani-1) showed a total number of 46 nucleotide positional differences with base-pair substitutions, whereas the highest number (6) of positional differences was cytosine (C) found that changed to Guanine (G), followed by (G) to Adenine (A) in 5 positional differences and five from Thymine (T) to (A) in all other GenBank isolates and strains as shown in **Table 2**. A single base change or

a mixed base (more than one nucleotide determined at a single position) is considered as a new 16S type. Four other nucleotide positional differences were obtained from A' G, C' A and G' T. Moreover, three of four nucleotide positional differences were obtained from (...) with no nucleotide base to G, T, A and one from (...) to C. One positional difference at nucleotide number 819 was detected from C to (...).

The accession HQ877022 with a fragment size 163 bp (isolate Milyani-2) showed a total number of 55 nucleotide positional differences with base-pair substitutions, whereas the highest number (7) of positional differences was adenine (A) found in HQ877023 that changed to thymine (T) in all other GenBank isolates and strains as shown in **Table (2)**. Six nucleotide positional differences were obtained from C' A, C' G and G' A and one with five positional differences from A' G. Moreover, three of four nucleotide positional differences were obtained from () with no nucleotide base to G, T, A and one from () to C. One positional difference at nucleotide number 819 was detected from A to ().

The accession HQ877023 with a fragment size 163 bp (isolate Milyani-3) showed a total number of 40 nucleotide positional differences

with base-pair substitutions, whereas the highest number (4) of positional differences was adenine (A) found in HQ877023 that changed to thymine (T) in all other Gene Bank isolates and strains as shown in Table (2). Three nucleotide positional differences were obtained from A(C and C(T and four with two positional differences from A(G, C(G, G(A and T(A. Moreover, 7, 6, 5 and 3 nucleotide positional differences were obtained from () with no nucleotide base and changed to G, T, A and C, respectively. One positional difference at nucleotide number 819 was detected from A to ().

Consequently, the overall total number of nucleotide positions of the three isolates was 141 and the highest changes in nucleotide positions were 14 from C' G, followed by 13 from A' T and G' A. However, the lowest changes were two from T' C and three from T' G with no change was obtained from G' C (**Table 2**).

Table 1. Blast search of 16S rRNA gene sequence identity between the three *H. pylori* isolates (Milyani-1, -2 and -3) and GenBank sequences.

Accession	Isolates	Clone	Accession	Strains	Accession	Strains
GU165836		ISMA-03-DP	GQ403476	C114	GQ403465	M57
AF512997	GB-38		GQ403474	C74	GQ403464	C56
AF214518	GB-16		GQ403473	M74	GQ403463	M56
AF214517	GB-9		GQ403472	C64	GQ403460	C48
AF214516	IHD-32		GQ403471	M64	GQ403459	M48
AF214509	WE64a		GQ403470	C59	GQ403454	C38
HM046432	WG56		GQ403469	M59	GQ403453	M38
HM046431	C51		GQ403468	C58	GQ403452	C35
AY394476	IHD-11		GQ403467	M58	GQ403451	M35
AF214508	MDA-1397		GQ403466	C57	GQ403450	C34
			GQ403449	M34	AY364437	LPB582-99
			GQ403444	C26	AY304571	LPB-64B
			GQ403443	M26	AY304570	LPB-3B
			GQ403438	C23	AY304569	LPB-1B
			GQ403437	M23	AY304551	LPB-5V
			GQ403436	C22	AY456638	SS1
			GQ403435	M22	AF297631	SA-4
			GQ403434	C20	AF297630	SA-3
			GQ403433	M20	AY062898	108
			GQ403432	C19	AY155586	1200
			GQ403431	M19	AF535197	Lit76
			HM243135	CD4	AF535196	Lit69
			HM099656	407D5	AF535195	Sal10
			FJ788641	08561-160209	AF535194	Sal05
			FJ788640	311A-160209	DQ059083	B
			AY593991	LPB36-03	DQ059082	A
			AY593990	LPB05-02	AY366424	PA
			AY593988	LPB258-01	AY366423	MB
			AY593987	LPB638-99	AY366421	SS1
			AY593986	LPB581-99	AJ310144	BO418
			AY364439	LPB427-01	AJ310143	BO417
			AY364438	LPB473-00	AY366422	DA

	601	700
Milyani-1	TGCT CTAG-AGGAT ACTCATTGCG AAGGCGACCT	
Milyani-2	---A AGAA-GGAAT ACTCATTGCG AAGGCGACCT	
Milyani-3	---- CAAGTAGGAT ACTCATTGCG AAGGCGACCT	
AF512997	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AY394476	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
HM046432	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
HM046431	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AY304571	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AF214518	TGAAACTACT AT-CTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AF214517	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AF214516	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AF214509	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
AF214508	TGAAACTACT ATTCTAGAGT GTGGGAGAGG TAGGTGGAAT TCTTGGTGTG GGGGTAAAAAT CCGTAGAGAT CAAGAGGAAT ACTCATTGCG AAGGCGACCT	
	701	800
Milyani-1	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CAGTG--- -- ----TGTGGC	
Milyani-2	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CAGTG--- -- ----TG-GCC	
Milyani-3	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CAGTG--- -- ----TGTGG	
AF512997	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AY394476	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
HM046432	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
HM046431	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AY304571	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AF214518	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AF214517	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AF214516	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AF214509	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
AF214508	GCTGGAACAT TACTGACGCT GATTGCCGA AAGCGTGGGG AGCAAACAGG ATTAGATACC CTGGTAGTCC ACGCCCTAAA CGATGGATGC TAGTTGTTGG	
	801	843
Milyani-1	GACTCGTGAG AACCCCCCT CACCACCAG TCGAGTGTTC CAT	
Milyani-2	ACAACACTTA CCCCCCAA CCCCCCAC ACGTGTGGGT TGA	
Milyani-3	TG----TTGC CACCACACAT A----GCCA AAGCGAAAAC CAACCACAA C	
AF512997	AGGGCTTAGT CTCTCCAG-T AATGCAGCTA ACGCATTAA CATCCCGCT GGGGAGTACG GTCGCAAGAT TAAAACCTAA AGGAATAGAC GGGGACCCGC	

			803 806 804 808 810 820 829 843	815 800 807 817 802 812 821 818 814 822 824 823 826 827 830	835 837 838 839 842	841 809 834 840		819
Total number of nucleotide positions = (55)			(13)	(16)	(8)	(4)	13	1
HQ877023	Milyani-3	Change at nucleotide positions:	676 782 812 808 815 836 832 837 843	818 810 840 814 829	835	675 801	668 670 669 790 793 794 787 789 790 792 786 788 803 804 806 822 805 824 823 826 825	819
Total number of nucleotide positions = (40)			(9)	(5)	(2)	(2)	21	1
Overall total number of nucleotide positions = 141			6 11 13	10 14 9	13 6 0	7 2 3	5 14 13 12	1 0 0 2
			30	33	19	12	44	3

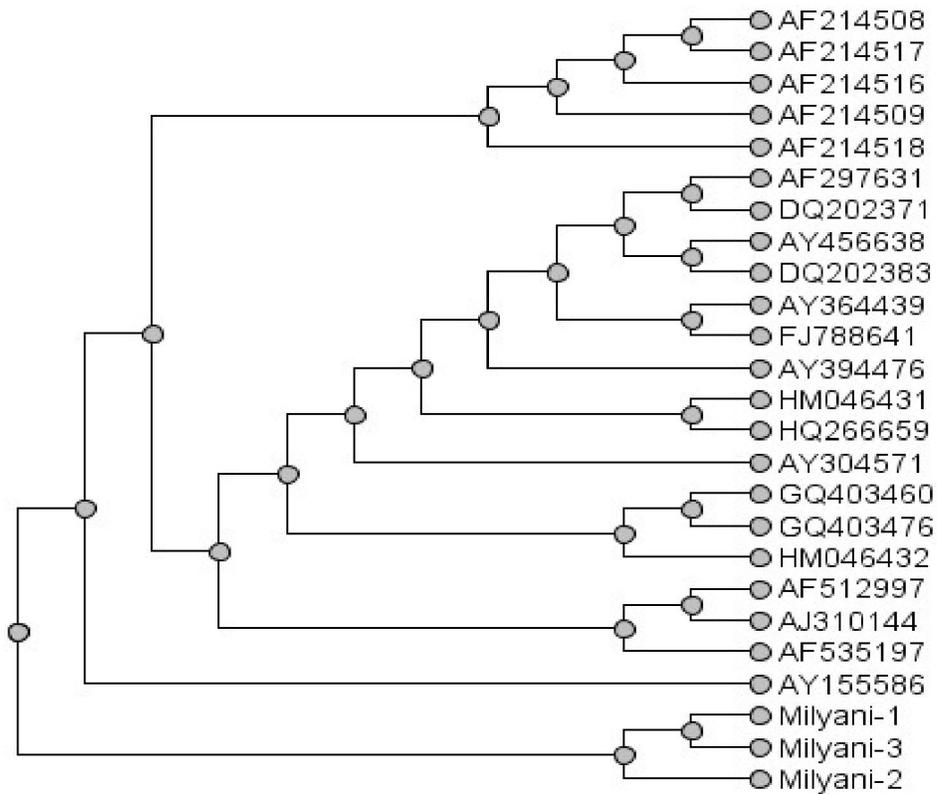


Fig. 3. Phylogenetic relationships between the three *H. pylori* isolates (Milyani-1, -2 and -3) other GenBank related strains, based on 16S ribosomal RNA gene.

The phylogenetic tree represented the relationship between the three *H. pylori* strains (Milyani-1, Milyani-2 and Milyani-3) with their accession numbers (HQ877021, HQ877022 and HQ877023, respectively) and all described *H. pylori* related strains obtained from Gene Bank based on the 16S ribosomal RNA gene are shown in **Fig. 3**. The dendrogram divided all Gene Bank strains into two clusters; one contained the three *H. pylori* strains and the second cluster comprised all GenBank strains. The three strains were divided into two sub-clusters, whereas Milyani-1 and Milyani-3 were linked together and separate from Milyani-2. In general, each of the three local strains formed a phylogenetically distinct cluster, separate from all other species.

4. Discussion

The traditional identification of bacteria in the clinical setting is based on phenotypic characteristics and biochemical tests which is generally not as accurate as identification based on molecular methods. Comparison of the bacterial 16S rRNA gene sequence has emerged as a preferred genetic technique since 16S rRNA gene sequence analysis can identify poorly described, rarely isolated and unculturable bacteria (**Clarridge 2004; Smuts and Lastovica, 2011**). In the present study, the three strains of *H. pylori*; Milyani-1, -2 and -3 isolated from gastric biopsies of patients in Makkah City, Saudi Arabia revealed variations in 16S rRNA sequence in positional differences with base-pair substitutions compared to Gene Bank *H. pylori* strains. On the other hand, each of the three strains displayed a unique phylogenetic cluster and evidently demonstrated a large diversity from all the other isolates and strains established around the world. This is in accordance with **Taylor et al. (1992)** who demonstrated that the genome patterns of *H. pylori* are so diverse that almost no two strains from different patients appear related. In addition, **Trieber and Taylor (2002)** identified several unique sequence variations in the 16S rRNA genes of *H. pylori* strain 26695. However, the obtained variations among the three strains under study and the enormous genomic diversity among other *H. pylori* strains is so far not understood. Nevertheless, it might be related to restriction and modification which could change restriction sites, point mutations in certain genes and different positions of genes on *H. pylori*

maps within the approximate 1.7-kb genome (**Taylor 1996**). Furthermore, allelic diversity is so high that almost every unrelated isolate of *H. pylori* has a unique sequence when a fragment of several hundred base pairs is sequenced from housekeeping or virulence genes (**Falush et al. 2003**). Others also believe that this allelic diversity is the result of the combination of a high (mutator-type) mutation rate, a high frequency of recombination between strains during mixed colonization and the ability of *H. pylori* to integrate unusually small pieces of exogenous DNA into its chromosome (**Kraft et al. 2006**). Consequently, the 16S rRNA of the three *H. pylori* strains are very polymorphic and confirm the conclusion that the three *H. pylori* are unique strains and each of them displayed a unique phylogenetic cluster and evidently indicated a large diversity from all the other isolates and from the established strains in different geographical parts of the world. Moreover, it is well known now, that 16S rRNA PCR test gives 100% specificity and sensitivity (**Moyaert et al. 2008**), thus sequencing and the phylogenetic analysis of the 16S rRNA are often utilized to identify new isolates (**Smuts and Lastovica 2011**).

It should be noticed that at the present study, the 163 bp fragment of 16S rRNA gene of the three *H. pylori* strains were delivered to Gene Bank/NCBI database according to the expected size of the designed primer pair and to their appearance on the agarose gel electrophoresis (Fig. 1). However, the size of the three fragments were finally reduced by the Gene Bank and submitted as 111 bp. This reduction in fragment size normally occurs when extraction of the fragments is from genomic DNA and not from sub-cloning experiment.

Finally, a future challenge is to translate information from 16S rRNA gene sequencing into convenient biochemical testing schemes, making the accuracy of the genotypic identification available to the smaller and routine clinical microbiology laboratories (**Clarridge 2004**). Above all, the obvious variations seen in the new three *H. pylori* strains may indicate differences in virulence factors, biochemical characteristics, antibiotic different patterns and the outcome of the clinical picture. In addition, these variations could be used in the future as new markers for virulence factors, diagnostic, therapeutic purposes for *H. pylori* different diseases and for further studies that would give answers to many question marks about the source, real route of

transmission, recurrence of *H. pylori* infection and the role of coccoid forms of *H. pylori* in pathogenesis.

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Disk-Rim flywheel of minimum weight

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Abstract: In this article the disk-rim flywheel is suggested for light weight. The mass of the flywheel is minimized subject to constraints of required moment of inertia and admissible stresses. The theory of the rotating disks of uniform thickness and density is applied to each the disk and the rim independently with suitable matching condition at the junction. Suitable boundary conditions on the centrifugal stresses are applied and the dimensional ratios are obtained for minimum weight. It is proved that the required design is very close to the disk with uniform thickness.

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Keywords: Disk-Rim; flywheel; minimum angular speeds; moment of inertia; radial and tangential stresses.

Introduction

Fluctuating power and/or load machines are equipped with a flywheel to store kinetic energy upon rotation. Strokes of large power increase the wheel rotation whereas this increased speed is reduced in strokes of low energy. If the energy fluctuation each cycle is ΔE , ω_{\max} and ω_{\min} are the maximum and minimum angular speeds; then
$$\Delta E = \frac{1}{2} I (\omega_{\max}^2 - \omega_{\min}^2)$$
. Here I is the mass moment of inertia of the flywheel about the axis of rotation. If the difference $\omega_{\max}^2 - \omega_{\min}^2$ is required not to exceed a given value in a certain application, the value of I is then fixed. Flywheels are then designed to ensure this value. Upon deciding the material of the flywheel the dimensions are determined accordingly. Usually the materials used are cast iron and steels.

The value of the maximum speed ω_{\max} is of primary importance in the design of the flywheels because higher speeds result in higher centrifugal stresses which should not exceed the admissible values of the flywheel material. This will be discussed later in detail. As modern designs require light weight, the design parameters are chosen according to ensure minimum weights with inertia and stresses are prescribed as constraints. As the moment of inertia of a mass element about a given axis is proportional to the square of the distance between the element and the axis, smaller mass at a large distance is more preferable than larger mass at small distances from the point of view of minimum weight. However in bodies of revolution larger distances imply larger circumference and areas. The two factors must be investigated properly the rim-

disk wheel is suggested to ensure this. Figure (1) shows a schematic of disk-rim flywheel considered.

We should indicate that the flywheel is fitted with a hub around the axis of rotation for mounting the shaft. This hub serves as a reinforcement of the disc and dropping it in the calculation will be an approximation in the safe side.

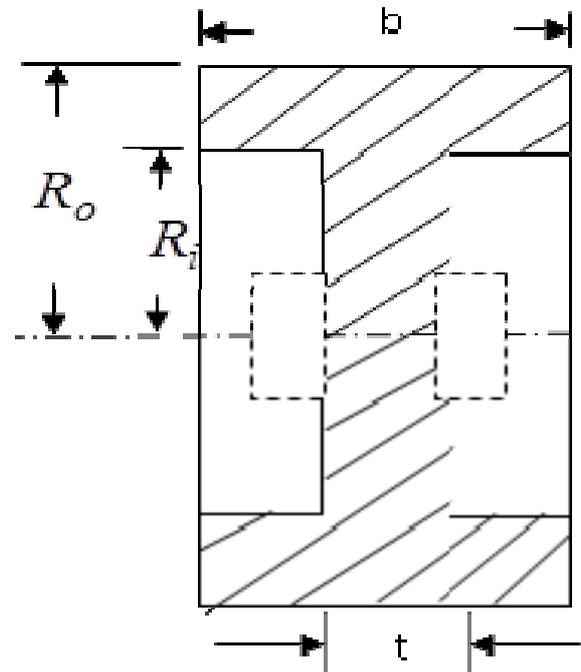


Figure 1

The mass M of the flywheel is given by

$$\frac{Mg}{\pi\gamma} = R_i^2 t \left[1 + y(x^2 - 1) \right] \quad (1)$$

Here;

- g acceleration of gravity
- γ specific weight of flywheel material.
- R_i disk radius
- t disk thickness

$$x = \frac{R_0}{R_i}; \quad R_0 \text{ outer radius of rim}$$

$$y = \frac{b}{t}, \quad b \text{ width of rim}$$

Also, the moment of inertia I is given by

$$\frac{2I}{\pi\gamma} = R_i^4 t \left[1 + y(x^4 - 1) \right] \quad (2)$$

Different aspects of flywheel design are investigated by several authors along with other rotating disk machine elements. You et. al.[1] made numerical analysis of elastic plastic rotating disks with arbitrary variable thickness and density; the governing equation is derived from the basic equations of rotating disks and solved using the Runge-Kutta Algorithm. Also, Sterner et. al.[2] developed a unified numerical approach for the analysis of rotating disks including turbine rotors. The problem of stresses in linearly hardening rotating solid disks of variable thickness is discussed by Orcan and Eraslan[3], analytically flywheels with friction used for optimal control of damping are studied by EL-Gohary [4]. The problem of robust stabilization and robust output feedback stabilization of the angular velocity of a rigid body are tackled by Astofi A. [5,6], the problem of rotating anisotropic disk of uniform strength is investigated by Jain et al.[7]. Callioglu [8] made an analysis of the stresses in an orthotropic rotating disk under thermal loading. The problem of limit angular velocities of variable thickness rotating disks is solved by Eraslan et al. [9].

Formulation and Solution:

Consider the disk-rim flywheel whose cross-section is shown in figure (1). The flywheel is rotating around its axis of symmetry at an angular speed ω , the radial and tangential stresses σ_r and σ_θ respectively are given by [10]:

$$\sigma_r = \frac{A}{2} - \frac{3+\nu}{8} \frac{\gamma \omega^2}{g} r^2 + \frac{B}{r^2} \quad (3)$$

$$\text{And } \sigma_\theta = \frac{A}{2} - \frac{1+3\nu}{8} \frac{\gamma \omega^2}{g} r^2 + \frac{B}{r^2} \quad (4)$$

here ν is the Poisson's ratio of the material A and B are arbitrary constants to be determined from the boundary conditions imposed on both the disk and the rim.

Stresses in the disk:

The disk of Radius R_i and thickness t includes the centre line $r=0$. For bounded values of stresses the constant B must be chosen zero and the resulting stresses in the disk are reduced to:

$$\sigma_r|_{disk} = \frac{A}{2} - \frac{3+\nu}{8} \frac{\gamma \omega^2}{g} r^2 \quad (5)$$

$$\text{And } \sigma_\theta|_{disk} = \frac{A}{2} - \frac{1+3\nu}{8} \frac{\gamma \omega^2}{g} r^2 \quad (6)$$

the maximum value of this stresses occur at the centre line and are equal to the yet undetermined arbitrary constants $\frac{A}{2}$ to be determined from the

boundary condition at $r=R_i$ where the disk and the rim join together. This condition is imposed by the centrifugal force on the rim transmitted to the edge of the disk as radial stresses $\sigma_r|_{R_i}$. The total centrifugal force on the rim is given by $M_{rim} \omega^2 \bar{R}_{rim}$ where M_{rim} is the mass of the rim and \bar{R}_{rim} is the mean radius of the rim. We

$$\text{have } M_{rim} = \frac{\gamma}{g} \pi b (R_0^2 - R_i^2) \quad \text{and}$$

$$\bar{R}_{rim} = \frac{1}{2} (R_i + R_0).$$

The area over which this force is uniformly distributed is the contact area between the disk and the rim $2\pi R_i t$. The resulting radial stress on the disk edge σ_r radial $|_{R_i}$ is given by:

$$\frac{1}{4} \frac{\gamma \omega^2}{g} R_i^2 y (x^2 - 1) (x + 1), \quad x \text{ and } y$$

are defined before, substituting this value in equation (5) for $r=R_i$ gives

$$\frac{A}{2} = \sigma_{r \text{ diskmax}} = \sigma_{\theta \text{ diskmax}} = \frac{\gamma \omega^2}{g} R_i^2 \left[\frac{3+\nu}{8} + \frac{1}{4} y (x^2 - 1)(x+1) \right] \quad (7)$$

this value should be equal to the admissible stress of the material σ for safe design. Accordingly, the second constraint on design is given by:

$$\frac{\sigma g}{\gamma \omega^2} = R_i^2 \left[\frac{3+\nu}{8} + \frac{1}{4} y (x^2 - 1)(x+1) \right] \quad (8)$$

the first constraint is that the moment of inertia is given by equation (2).

Stresses in the rim

In the rim, the centre line $r=0$ is not included and the arbitrary constant B can not be dropped. Accordingly, the stress distribution on the rim is given by equations (3) and (4). A relation between the values of the constants A and B in the rim can be obtained by applying the condition $\sigma_{r \text{ rim}}|_{R_0} = 0$ since the edge R_0 of the rim is free from external radial stresses. In terms of the constant A - not yet determined the expressions of the stresses in the rim are:

$$\sigma_r = \frac{A}{2} \left(1 - \frac{R_0^2}{r^2} \right) + \frac{3+\nu}{8} \frac{\gamma \omega^2}{g} \left(\frac{R_0^4}{r^2} - r^2 \right) \quad (9)$$

$$\sigma_{\theta} = \frac{A}{2} \left(1 - \frac{R_0^2}{r^2} \right) + \frac{\gamma \omega^2}{g} \left(\frac{3+\nu}{8} \frac{R_0^4}{r^2} - \frac{1+3\nu}{8} r^2 \right) \quad (10)$$

The value of the constant $\frac{A}{2}$ is determined from the value of centrifugal force on the rim divided by the area of the rim at the edge giving

$$\sigma_{r \text{ rim}}|_{R_i} = \frac{\gamma \omega^2}{4g} R_i^2 (x^2 - 1)(x+1) \quad (11)$$

Equations (9) and (11) give:

$$\frac{A}{2} = \frac{\gamma \omega^2}{g} R_i^2 \left[\frac{3+\nu}{8} (x^2 + 1) - \frac{1}{4} (x+1) \right] \quad (12)$$

Using equation (12) in equations (9) & (10) give:

$$\sigma_{r \text{ rim}} = \frac{\gamma \omega^2}{g} R_i^2 \left[\frac{3+\nu}{8} (x^2 + 1) - \frac{1}{4} (x+1) \right] \left[1 - \frac{R_0^2}{r^2} \right] + \frac{\gamma \omega^2}{g} \frac{3+\nu}{8} \left(\frac{R_0^4}{r^2} - r^2 \right) \quad (13)$$

$$\sigma_{\theta \text{ rim}} = \frac{\gamma \omega^2}{g} R_i^2 \left[\frac{1}{4} (x+1) \left(1 - x^2 \frac{R_0^2}{r^2} \right) + \frac{3+\nu}{8} (x^2 + 1) \left(x^2 \frac{R_0^2}{r^2} - 1 \right) - \frac{1+3\nu}{8} \frac{r^2}{R_i^2} \right] \quad (14)$$

Investigation of equation (14) for maximum shows that the maximum occurs for

$$\left(\frac{r}{R_i} \right)^4 = \frac{2(x+1) - (3+\nu)(x^2 - 1)}{1+3\nu} x^2$$

for $x \geq 1$ this gives negative r and therefore rejected. The accepted value for maximum $\sigma_{\theta \text{ rim}}$ occurs at $r = R_i$ and this gives the third constraint on the minimization of the flywheel mass as:

$$\frac{\sigma g}{\gamma \omega^2} = R_i^2 \left[\frac{1}{4} (1-x^2)(x+1) + \frac{3+\nu}{8} (x^4 - 1) - \frac{1+3\nu}{8} \right] \quad (15)$$

Equations (8) and (15) give

$$y = \frac{\frac{3+\nu}{8} (x^4 - 2) - \frac{1}{4} (x^2 - 1)(x+1) - \frac{1+3\nu}{8}}{(x^2 - 1)(x+1)} \quad (16)$$

$$\text{and } R_i^2 = \frac{\sigma g}{\gamma \omega^2} \frac{1}{\frac{3+\nu}{8} + \frac{1}{4} (x^2 - 1)(x+1)y} \quad (17)$$

where y is given in terms of x in equation (16). Having determined R_i^4 and y as functions of x , the x dependence of t is given by :

$$t = \frac{2 I \gamma g \omega^4}{\pi \sigma^2} \frac{\left[\frac{3+\nu}{8}(x^4-1) - \frac{1}{4}(x^2-1)(x+1) - \frac{1+3\nu}{8} \right]^2}{1 + \frac{x^2+1}{x+1} \left[\frac{3+\nu}{8}(x^4-2) - \frac{1}{4}(x^2-1)(x+1) - \frac{1+3\nu}{8} \right]} \quad (18)$$

Inserting values of R_i^2 , t and y as a function of x in equation (1), we require to minimize the function:

$$\frac{\left[\frac{3+\nu}{8}(x^4-1) - \frac{1}{4}(x^2-1)(x+1) - \frac{1+3\nu}{8} \right] \times \left(1 + \frac{1}{x+1} \left[\frac{3+\nu}{8}(x^4-2) - \frac{1}{4}(x^2-1)(x+1) - \frac{1+3\nu}{8} \right] \right)}{1 + \frac{x^2+1}{x+1} \left[\frac{3+\nu}{8}(x^4-2) - \frac{1}{4}(x^2-1)(x+1) - \frac{1+3\nu}{8} \right]} \quad (19)$$

The minimum for $\nu=0.3$ is found to be very close to $x=4$ where

$$y = 1.144, \quad R_i = 0.11 \sqrt{\frac{\sigma g}{\gamma \omega^2}},$$

$$t = (24.3) \left(\frac{2}{\pi} \right) \frac{I \gamma \omega^4}{g \sigma^2}, \quad M = 5.16 \left(\frac{2}{\pi} \right) \frac{I \gamma \omega^2}{g \sigma^2},$$

$$R_0 = 0.44 \sqrt{\frac{\sigma g}{\gamma \omega^2}} \quad \text{and} \quad b = (27.8) \left(\frac{2}{\pi} \right) \frac{I \gamma \omega^4}{g \sigma^2}$$

Conclusion:

The result of this analysis is remarkable; the width of the rim is approximately equal to the thickness of the disk. Besides most of the side area of the flywheel is spanned by the width of the rim the flywheel tends to be close to the uniform disk of constant thickness. This is for minimum weight. It became obvious that wide rims are used in rim flywheels when the disk is replaced by a set of long arms joining it to the hub.

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Genetic variability and path coefficient analysis in sweet basil for oil yield and its components under organic agriculture conditions

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Abstract: Data for variability, heritability, genetic advance and path coefficient analysis for oil yield and related characters were conducted on 15 genotypes of sweet basil at two seasons in complete randomized block design. The results revealed that analysis of variance showed highly significant differences among genotypes in studied characters. Ranges of herb dry yield (HDY) (68.40 – 86.30 gm.), oil content (2.30-2.90 ml.) and oil yield (1.22-2.24 ml.) were obtained. Overall, the highest values of genotypic coefficients of variation (G.C.V %), genetic advance (GA%), and broad sense heritability (h^2b) were obtained for stem dry weight (SDW), linear growth (LG), herb dry weight (HDW) and leaf dry weight (LDW). Path coefficient analysis for oil yield exhibited variation from season to other and slight variation was found among cuts. The highest direct effects on oil yield were observed for herb dry yield followed by stem dry weight and essential oil content; hence, the study reflected the importance of herb dry yield and essential oil content as selection criteria for improvement of oil yield in sweet basil.

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Keywords: Genetic variability; Path coefficient; Sweet basil; Organic agriculture

1. Introduction

The genus *Ocimum* L. (*Lamiaceae*), collectively called basil comprises 30-160 annual and perennial herbs and shrubs native to tropical and subtropical regions of Asia, Africa and Center & South America, Paton 1996.

Sweet basil, *Ocimum basilicum* L., is well known for its numerous economical, medicinal and aromatic values (Simon *et al.*, 1990) and (Morales and Simon, 1996). Medicinally, it is useful in a variety of human and animal diseases treatment such malaria, colic, vomiting, common cold, cough and skin diseases, (Bhattacharier, 1998). The importance of basil is increasing and has promising future in Egypt, especially, when cultivated in new reclaimed soil under organic agriculture conditions (Abd-El Raouf 2001, and Aboud *et al.*, 2006). Genetic improvement in aromatic plants for quantitative characters is helpful for determination of yield components to improve oil yield through selection of genotypes from population Kazmferezak, *et al.*, 2001 and Seidkr-Ozykowska *et al.*, 2001.

Genetic parameters estimating (PCV, GCV, h^2b and GA) are important to determined genetic variability among selected genotypes of different species of basil, De Masi *et al.*, 2005 and Nurzynska-Wierdak 2007.

Oil yield is a quantitative trait and highly influenced by many genetic factors and environmental fluctuation. In a plant breeding program, direct selection for yield as such can be misleading. Path coefficients provide a better understanding of association of different characters with yield. (Singh, 1990; Singh *et al.*, 1998 and Yadav, 2007).

The objectives of this study are to determine the variation and genetic interrelationships among herb yield components of basil using genetic parameters and path coefficient analysis.

2. Materials and Methods

The present study was carried out during two successive growth seasons of 2009 and 2010 at the farm of South Tahrir Agric. Company, El-Bohira governorate. Fifteen sweet basil genotypes seeds (variety Grand Verde) selected and sown in bed on 25 March in both seasons.

35 days later from planting, seedlings were transplanted into field in 1 May 2009 and 2010. All plants were fertilized at rate of 35m³/ fed by organic manure without any chemical nutrient addition. The plants were harvested 2 times (Cuts) during July and September in both seasons. Data recorded on of the 15 genotypes from each replicate in both cuts for seven growth herb characters included: Linear

growth (LG), Number of primary branches (NPB), Leaves dry weight (LDW), stem dry weight (SDW), Herb dry weight (HDW), Essential oil content % (EOC) and Essential oil yield (EOY).

A complete randomized block design with three replications was used in the experiment, the general statistical procedures was practiced according to Steel and Torrie, (1980). Analysis of variance (ANOVA) and broad sense heritability (h^2b) were generally assigned for the data of each season according to Robinson *et al* (1951). The phenotypic coefficient of variation (PCV %) were computed according to Burton and Dorane (1953). The expected genetic advance from selection (ΔGA %) was computed according to Johanson *et al*, (1955). Path coefficient analysis was performed as illustrated by Singh and Chaudhary (1979), to partition correlation between the characters studied into direct and indirect effects.

Essential oil content in air dried herb was extracted and determined on basis of volume / weight X 100. (Guenther (1972) Oil yield was calculated from multiplication of leaves dry weight gm. /plant X essential oil % content.

3. Results

Genetic variations

The variations displayed by the seven characters studied in sweet basil at two successive seasons in the two cuts among fifteen genotypes are shown in table (1). Genotypes differed significantly in all studied characters. The highest coefficients of variation ranged from 15-20 % and shown by stem dry weight SDW, oil yield EOY, and oil content EOC at the two seasons, (Tables 2 and 3). Data presented in Tables 3 and 4 indicated the narrow range in essential oil yield EOY (2.30-2.90) in both seasons, cuts and also in NPB (13.80-17.602), LDW (35.14-41.17) and stem dry weight SDW (20.80-27.13) respectively. While in case of linear growth LG, wide ranges were observed in both seasons and cuts. The phenotypic coefficient of variation PCV, genotypic coefficient of variation GCV estimates, broad-sense heritability (h^2b) and genetic advance GA are also shown in tables (2) and (3). The PCV was generally higher than the GCV for all the characters, but in many cases, the values of PCV and GCV differed only slightly. PCV and GCV ranged from (5.638-21.347) and (5.092-17.578) in both seasons and cuts. The heritability estimates ranges from 81.66% to 97.50% for LDW and SDW at first season in both cuts respectively. While in the second season it was ranged from 86.37 to 97.14% for HDW and EOC. High heritability estimates were also shown for other characters in both seasons and cuts. The expected genetic advance, expressed on a percentage of the

mean, varied from (4.159) in the 2nd cut to (10.313) in the 1st cut for SDW and LG respectively in the second season. Genetic advance was the highest in LG (11.99) and lowest value in NPB (1.35) at the first season.

Path coefficient analysis

The direct and indirect effects of the seven herb growth characters and oil yield are presented in Tables (4) and (5) at two seasons over two cuts. The direct effect of (LG) Linear growth was negative and moderate (-0.3122) in the 2nd season at the first cut but it was low for linear growth was (-0.1015) at the first season on the first cut. Low positive value was observed in the 2nd cut (0.0247) at the first season. The lowest values for linear growth showed in case of indirect effects were of (LG) via LDW at both seasons. High and moderate indirect effects were observed for (LG) via HDW (0.51531, 0.3772) and (0.2505; 0.3168) at first and second cuts of both seasons.

Comparing the results of path coefficient analysis for (NPB), the direct effect was negative in all cuts with small values except in case of first cut at second season (0.0303) it was positive.

High indirect effect was observed in (NPB) via EOC (0.6567) at second cut in the first season, but in other cuts in both seasons, moderate values (0.3824), (0.3086) and (0.244) were observed in this characters via EOC at first, first and second cuts respectively in both seasons. The lowest values of (NBP) via LDW (0.0003) at second season in second cut indirectly. The remaining indirect effects for this trait were ranged from low to very low values in both seasons Leaf dry weight (LDW) revealed that high indirect effect (0.5962) on oil yield via EOC at the second cut on the first season. The direct effect of (LDW) (-0.0748), (-0.1121) at first season were negative with low values in case of first and second cuts except in first cut at second season, positive affect was recorded (0.1381). The lowest values of (LDW) (0.0006) (0.0088) were estimated through LG and NPB in both cuts and seasons.

The direct effect of (SDW) ranged from very low positive (0.0051), (0.0310) to low negative values (-0.0348, -0.0412) at second and first cuts for both seasons. High to moderate indirect effects were detected through HDW (0.6503), (0.4246) and (0.4331) , (0.3486) at first and second cuts in both seasons, for (SDW) the indirect effect via EOC was moderate positive value in the first season (0.1801), (0.2011) at first and second cuts respectively. On the other hand negative low values were observed at second season in both cuts, via LDW (-0.0245) (-0.0341) indirectly. The (HDW) had the highest positive direct effect on oil yield on both seasons and

cults (0.6925) vs. (0.5806) and (0.5001) vs. ((0.4363) first cut and second cut on both seasons respectively. moderate values via EOC at the first and second seasons on both cults except in case of indirect effect of this trait (HDW) through the same character which was very low value (0.0.0008).

Essential oil content (EOC) showed the highest direct effects on oil yield in the both seasons. The values of direct effects were (0.9033) followed

The indirect effects of (HDW) were positive by (0.8404), (0.7793) and (0.5507) in second and first cuts in both seasons respectively. The indirect effects of (EOC) were ranged from low positive values to very low negative through each of HDW and LDW, Tables 4 and 5.

Table 1. Mean squares of seven characters studied in two cuts and two successive seasons of fifteen basil genotypes.

		Characters						
Seasons	Cuts	LG	LDW	NBP	SDW	HDw	EOC	EOY
First season	1 st cut	128.972**	1.193**	12.386	45.339**	92.645**	0.313**	0.181**
	2 nd cut	214.038**	2.924**	12.751**	10.302**	84.107**	0.208**	0.199**
Second season	1 st cut	150.100**	3.344**	28.713**	72.430**	132.921**	0.411**	0.378**
	2 nd cut	150.100**	4.646**	34.539**	25.426**	67.190**	0.216**	0.191**

*P < 0.05; **P < 0.01; ***P < 0.001

Linear growth (LG), Number of primary branches (NPB), Leaves dry weight (LDW), stem dry weight (SDW), Herb dry weight (HDW), Essential oil content % (EOC) and Essential oil yield (EOY).

Table 2. Mean, range, coefficient of variation, phenotypic coefficient of variation, genotypic coefficient of variation, broad sense heritability and expected genetic advance for seven characters in two cuts, of fifteen basil genotypes in the first season.

Characters	Cuts	Mean ±S.E.	Range (R)	Coefficient of variation C.V%	Phenotypic of variation P.C.V%	Genotypic of variation G.C.V%	Heritability h ² b %	Genetic advance GA%
LG	I	76.82±1.530	65.70-86.20	8.535	8.765	4.418	92.25	9.228
	II	84.52±1.68	70.14-98.50	9.993	10.192	9.895	94.24	11.99
NPB	I	11.50±0.258	10.40-12.50	5.483	5.831	5.301	82.66	0.0845
	II	15.49±0.307	14.80-17.20	6.373	6.676	6.217	86.72	1.352
LDW	I	27.40±0.546	24.62-31.16	7.421	7.679	7.280	89.88	2.827
	II	39.03±0.770	35.14-41.17	5.282	5.638	5.95	81.66	2.746
SDW	I	24.97±0.505	20.12-31.16	15.573	12.698	15.502	97.50	5.603
	II	28.38±0.466	20.80-27.13	7.926	6.733	6.425	91.07	2.594
HDW	I	62.83±1.257	55.67-74.15	8.854	9.124	8.702	90.96	7.838
	II	76.42±1.517	68.40-86.30	6.928	7.207	6.785	88.62	7.322
EOC	I	2.60±0.053	2.30-2.90	12.420	12.581	12.344	96.26	0.463
	II	2.35±0.047	1.80-2.80	11.124	11.365	11.120	95.79	0.373
EOY	I	1.63±0.032	1.32-2.15	15.041	15.235	14.685	96.76	0.354
	II	1.80±0.037	1.51-2.07	14.296	14.452	14.236	97.04	0.370

Linear Growth (LG), Number of Primary Branches (NPB), Leaves Dry Weight (LDW), Stem Dry Weight (SDW), Herb Dry Weight (HDW), Essential Oil Content % (EOC) and Essential Oil Yield (EOY).

Table 3. Mean, range, coefficient of variation, phenotypic coefficient of variation, genotypic coefficient of variation, broad sense heritability and expected genetic advance for seven characters in two cuts of fifteen basil genotypes at the second season.

Characters	Cuts	Mean \pm S.E.	Range (R)	Coefficient of variation C.V%	Phenotypic of variation P.C.V%	Genotypic of variation G.C.V%	Heritability h^2b %	Genetic advance GA%
LG	I	81.93 \pm 1.76	69.80-92.40	8.634	8.857	8.520	92.52	9.968
	II	86.81 \pm 1.83	77.40-96.18	8.447	8.679	8.329	92.09	10.313
NPB	I	10.75 \pm 0.264	8.70-12.20	9.844	10.022	9.719	94.06	1.499
	II	15.54 \pm 0.310	13.80-17.80	8.00	8.254	7.882	91.19	1.742
LDW	I	31.09 \pm 0.772	26.14-36.12	9.950	10.148	9.850	94.23	4.394
	II	40.0 \pm 0.158	32.17-45.14	8.480	8.705	8.369	92.24	4.779
SDW	I	27.86 \pm 1.23	18.24-31.14	17.64	20.880	17.578	98.04	7.098
	II	30.84 \pm 0.726	22.14-33.20	11.27	9.585	9.366	95.47	4.159
HDW	I	65.92 \pm 1.66	53.14-78.13	10.09	10.293	9.998	94.35	9.460
	II	75.53 \pm 1.180	96.58-85.92	5.27	6.571	6.107	86.37	6.469
EOC	I	2.45 \pm 0.092	1.90-3.00	15.084	15.254	15.034	97.14	0.533
	II	2.43 \pm 0.067	1.90-2.80	11.064	11.245	10.939	94.64	0.383
EOY	I	1.67 \pm 0.089	1.22-2.29	21.238	21.367	21.199	98.92	0.514
	II	1.84 \pm 0.063	1.36-2.23	13.750	13.856	13.641	96.92	0.363

Linear growth (**LG**), Number of primary branches (**NPB**), Leaves dry weight (**LDW**), stem dry weight (**SDW**), Herb dry weight (**HDW**), Essential oil content % (**EOC**) and Essential oil yield (**EOY**).

Table 4. Path coefficient values estimate for oil yield and other seven characters in two cuts in the first season of basil genotypes.

Pathway of association	Values estimated in	
	1 st cut	2 nd cut
<u>1-Oil yield vs Linear growth</u>		
Direct effect	-0.1015	0.0247
Indirect effect via (X2)	0.0368	-0.0151
Indirect effect via (X3)	0.0004	-0.0026
Indirect effect via (X4)	-0.0245	0.0062
Indirect effect via (X5)	-0.5153	0.2505
Indirect effect via (X6)	-0.1748	-0.1382
Total effect	0.2517	0.1255
<u>2- Oil yield vs Number of primary branches</u>		
Direct effect	-0.0841	-0.1008
Indirect effect via (X1)	0.0443	0.0037
Indirect effect via (X3)	0.0079	-0.0257
Indirect effect via (X4)	0.0110	0.0032
Indirect effect via (X5)	-0.2119	0.1540
Indirect effect via (X6)	-0.3824	0.6567
Total effect	0.1338	0.6912
<u>3- Oil yield vs Leaf dry weight</u>		
Direct effect	-0.0748	-0.1121
Indirect effect via (X1)	0.0006	0.0006
Indirect effect via (X2)	-0.0089	-0.0231
Indirect effect via (X4)	-0.0114	0.0028
Indirect effect via (X5)	-0.3414	0.1655
Indirect effect via (X6)	0.2244	0.5962
Total effect	0.4713	0.6299

Table 4. Continue.

Pathway of association	Values estimated in	
	1 st cut	2 nd cut
<u>4 Oil yield vs Stem dry weight</u>		
Direct effect	-0.0348	0.0091
Indirect effect via (X1)	-0.0713	0.0167
Indirect effect via (X2)	0.0267	-0.0351
Indirect effect via (X3)	-0.0245	-0.0341
Indirect effect via (X5)	-0.6503	0.4246
Indirect effect via (X6)	-0.0513	0.1743
Total effect	0.4951	0.5556
<u>5- Oil yield vs Herb dry weight</u>		
Direct effect	0.6925	0.5001
Indirect effect via (X1)	-0.0755	0.0124
Indirect effect via (X3)	0.0257	-0.0310
Indirect effect via (X4)	-0.0369	-0.0371
Indirect effect via (X5)	0.0327	0.0078
Indirect effect via (X6)	0.0008	0.2105
Total effect	0.5741	0.6625
<u>6- Oil yield vs Essential oil content</u>		
Direct effect	0.8404	0.9033
Indirect effect via (X1)	0.0211	-0.0038
Indirect effect via (X2)	-0.383	-0.0733
Indirect effect via (X3)	-0.0200	-0.0740
Indirect effect via (X4)	0.0021	0.0018
Indirect effect via (X5)	0.0007	0.1165
Total effect	0.8061	0.8706

Table 5. Path coefficient values estimate for oil yield and other characters in two cuts in the second season of basil genotypes.

Pathway of association	Values estimated in	
	1 st cut	2 nd cut
<u>1- Oil yield vs Linear growth</u>		
Direct effect	-0.3122	-0.0095
Indirect effect via (X2)	-0.0116	-0.0048
Indirect effect via (X3)	-0.0105	-0.0036
Indirect effect via (X4)	-0.188	0.0167
Indirect effect via (X5)	-0.3379	0.3168
Indirect effect via (X6)	-0.1355	-0.1262
Total effect	-0.1506	0.1893
<u>2- Oil yield vs Number of primary branches</u>		
Direct effect	0.0303	-0.0188
Indirect effect via (X1)	0.1196	-0.0024
Indirect effect via (X3)	0.0402	0.0003
Indirect effect via (X4)	0.0126	0.0001
Indirect effect via (X5)	-0.1510	0.0681
Indirect effect via (X6)	0.2544	0.3086
Total effect	0.3062	0.3558
<u>3- Oil yield vs Leaf dry weight</u>		
Direct effect	0.1381	-0.0080
Indirect effect via (X1)	0.0237	-0.0043
Indirect effect via (X2)	0.0088	0.0006
Indirect effect via (X4)	0.0037	0.0132
Indirect effect via (X5)	0.1840	0.2893
Indirect effect via (X6)	0.2319	-0.0764
Total effect	0.5909	0.2145

Table 5. Continue.

Pathway of association	Values estimated in	
	1 st cut	2 nd cut
4- Oil yield vs. Stem dry weight		
Direct effect	- 0.0412	0.0310
Indirect effect via (X1)	-0.1423	-0.0051
Indirect effect via (X2)	-0.0093	-0.0001
Indirect effect via (X3)	-0.126	-0.0034
Indirect effect via (X5)	-0.4331	0.3486
Indirect effect via (X6)	-0.2087	0.0990
Total effect	0.4365	0.4700
5- Oil yield vs Herb dry weight		
Direct effect	0.5806	0.4363
Indirect effect via (X1)	-0.1817	-0.0069
Indirect effect via (X2)	-0.0079	-0.0029
Indirect effect via (X3)	0.0439	-0.0053
Indirect effect via (X4)	-0.03070	0.0248
Indirect effect via (X6)	0.1801	0.2011
Total effect	0.543	0.6470
6- Oil yield vs Essential oil content		
Direct effect	0.5507	0.7793
Indirect effect via (X1)	0.0768	0.0015
Indirect effect via (X2)	0.0140	-0.0074
Indirect effect via (X3)	0.0581	0.0008
Indirect effect via (X4)	-0.0156	0.0039
Indirect effect via (X5)	0.1899	0.1126
Total effect	0.8739	0.8907

4. Discussions

The breeding strategies are mainly oriented toward yield and oil yield in aromatic crops. The success of the breeding program depends on the variability of initial material, Fick and Miller, (1997). In order to apply on optimum breeding strategy for targeted quantities characters, genetic analysis of these traits, need to perform. (Has 1999, and Nistor *et al.*, 2005).

Analysis of variance showed that genotypes of basil differed significantly among themselves for all studied characters in both seasons. The presence of wide variations among genotypes indicated that these traits were governed by additive genes with low environmental effects. Similar results were obtained by Aboud, 2006.

The results of ranges of studied characters showed narrow ranges in essential oil content, oil yield, No. of primary branches and leaf dry weight but in case of linear growth (LG) wide range between means of genotypes are observed in generations and cuts. The wide range of this trait could be due to the large sample size of population, therefore, the higher proportion of phenotypic variance observed on this trait Miller *et al* (1957). From (P.C.V) and (G.C.V) estimates, for studied characters, suggested that,

(PCV) was generally higher than (GCV) for all characters except in some traits, (PCV) and (GCV) differed slightly. The highest values of (P.C.V) and (PCV) were obtained for stem dry weight, oil content, oil yield and linear growth (LG) in both seasons. Genotypic coefficient of variation (GCV) indicates the genetic variability with heritability estimates would give best indication for the amount of gain due to selection Johanson *et al* (1955). Heritability estimates were high for most studied characters. Highest broad sense heritability values for stem dry weight (SDW) and herb dry weight (HDW) indicated that selection for these characters under organic agriculture conditions may be effective in breeding programs. Similar results are accordance with results of Singh, (1990), and Ibrahim, (2006).

The expected genetic advance (GA) ranged from 4.159 to 10.313 in stem dry weight (SDW) and linear growth (LG) respectively in both seasons. Genetic advance (GA) and broad sense heritability (h^2_b) estimates (Table 2 and 3) showed higher values by (LG), (SDW), (HDW) and oil content (EOC) that due to additive gene effect, therefore selection for these traits could predict the performance of the progenies. Blank *et al* (2004). Beside coefficient of variability and heritability, it is important to know the

relationships between the yield component and oil yield by the path coefficient analysis Dewey and Lu (1959).

Path coefficient analysis of herb growth characters with oil yield in two cuts and two seasons was partitioned into direct and indirect effects (Tables 2, 3). The results revealed that herb dry weight (HDW) had maximum direct effect on oil yield followed by oil content and leaf dry weight. These results are in agreement with Baslma (2008), and Mijic *et al.*, (2009). The direct effect of linear growth (LG), No. of primary branches (NPB), leaf dry weight (LDW) and stem dry weight (SDW), on oil yield had negative effects and ranged from moderate to low values in both seasons which suggested that the selection for these traits indirectly may be less effective on oil yield. The indirect effects through studied characters with oil yield were fluctuated from negative or positive and ranged from moderate, low and very low in both seasons.

5. Conclusion

In conclusion, the results obtained in this study revealed that (PCV), (GCV), (h^2b) and (GA %) had the highest values in case of (HDW), (SDW), (LDW) and (LG), respectively. The lowest values of these items were observed in (EOC), (EOY) and (NPB). The highest values of direct effects of path coefficient are shown in herb dry weight (HDW) and oil content (EOC). The indirect effects of oil yield through linear growth (LG) and stem dry weight (SDW) via (HDW) were high positive effect. Similar results were observed in (NPB) via (EOC) and (LDW) via (HDW). The strong direct effects on oil yield for above characters indicated that these traits can be used as selection criteria for increasing oil yield. The influence of other studied characters covered by the indirect effects on oil yield.

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Antihepatotoxic Effects Of *Ficus Vogelii* Ethanol Leaf Extract On The Liver Function Indices Of CCl₄ – Induced Hepatotoxicity In Rats.

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ABSTRACT: This study was conducted to evaluate the anti-hepatotoxic effect of intraperitoneal administration of ethanol extract of *Ficus vogeli* (600mg/kg) in CCl₄-induced hepatotoxicity in male albino rats. Phytochemically, the leaf extract contains tannin, alkaloid, flavonoid, carbohydrates, protein, saponin, steroids, terpenoids, fats and oil. The administration of the *Ficus vogelii* extract was at one phase of the experiment according to the body weight of the test animals. The ethanol extracts of *Ficus vogelii* significantly reduced ($p < 0.05$) the level of activity of the hepatic enzyme markers in the serum (Alanine amino transferase (ALT), Aspartate amino transferase (AST), alkaline phosphate (ALP) and total bilirubin) which occurred due to induced oxidative stress. Relative to the control group, treatment with CCl₄ significantly raised the levels of ALT, ASP, AST and total bilirubin in the serum. The animals that received *Ficus vogelii* showed not only reduced hepatocellular degeneration but also of hepatocellular regeneration when compared to the liver of those exposed to CCl₄ alone. Thus the histopathological studies also supported the anti-hepatotoxic action of the ethanol extract of *Ficus vogelii*. The results of this study clearly indicate that *Ficus vogelii* ethanol extract has a potent anti-hepatotoxicity action against carbon tetrachloride induced liver damage in rats.

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Keywords: *Ficus vogeli*; Hepatotoxicity; Carbon tetrachloride; Liver Function Tests

INTRODUCTION

Liver plays a vital role in regulating various physiological processes such as secretion, storage and metabolism. It detoxifies toxic substances and drugs absorbed in the body from the intestine which expose it to harmful substances that lead to the damage of the liver. Liver disease remains one of the major health problems and is quite challenging to the health care professionals including the pharmaceutical industry and drug regulatory agencies.

In addition, hepatic viral infections (hepatitis, A, B, C and D e.t.c) and the microbial infections of *Entamoeba histolytica* aids in hepatocellular damage. Globally, plant based drugs like *Silybium marimum*, *Picorrhiza kurna*, *Phyllanthus embalica* and *Phyllanthus amarus* are experimentally proven and successfully used in the clinical treatment of liver disorder (Thyagarajan *et al.*, 2002) These herbal drugs are rich in antioxidants which aid to cure liver diseases and they are widely prescribed in this modern age. It is therefore very important to provide scientific prove to justify the various medicinal uses of herbs.

The body cells and tissues identify almost all drugs or substances as non-self (i.e. xenobiotics) thereby subjecting them to various chemical processes (i.e. metabolism) to make them suitable for elimination. Almost all the tissue in the body has the ability to metabolize chemicals but the smooth endoplasmic

reticulum in liver is the principal metabolic agent for both endogenous and exogenous substances. This exposes it to drug induced injury.

Many factors aid in the induction of hepatotoxicity. They include the following; age, nutritional status, gender, duration and dosage of drugs, ethnicity and race. Certain chemicals and drugs that induce liver damage are Carbon tetrachloride, Chloropromazine, Carbamazepine, Oral Contraceptive pills and tetracycline.

CCl₄ was formerly used as fire extinguisher and as a precursor for refrigerants but its applicability declined due to its severe adverse effect. It is among the most potent hepatotoxins. Under high temperature, it forms poisonous phosgene. It is synthesized from methane as shown in Fig. 1 below.

Ficus belong to the family of Moraceae. It is a genus of about 800 species and collectively known as Figs. It was indicated that *Ficus* is a relatively ancient species being about 60million years old. The fruits of most *Ficus* are edible while some are used as food resources for wild-life. Most culture uses *Ficus* as an object of worship while some use it for medicinal purposes.

The study aims at investigating into the effect of ethanol extract of *Ficus vogelii* on the liver of rats intoxicated with CCl₄.

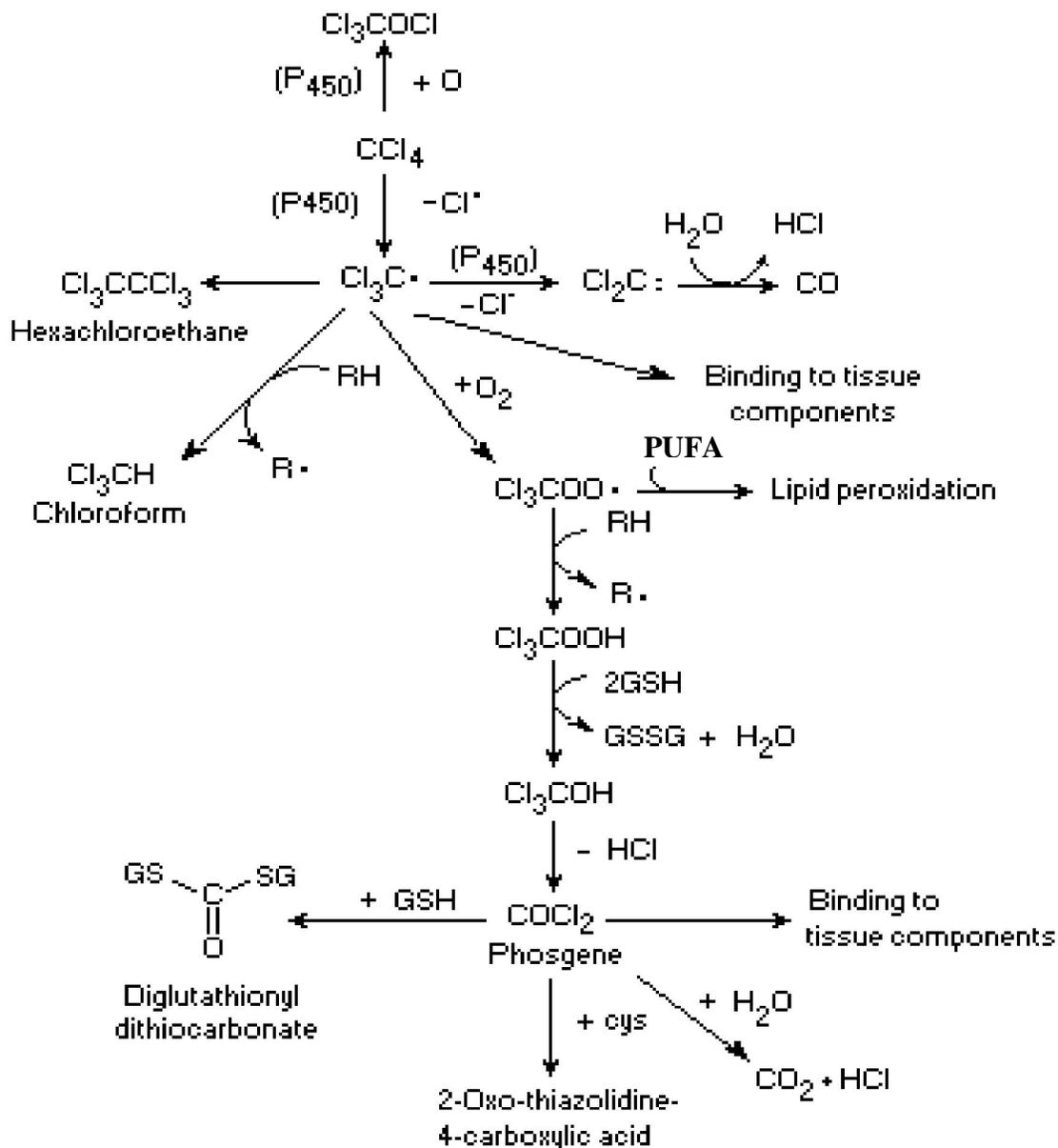


Fig. 1: Biotransformation of carbon tetrachloride
 (From Harris and Anders, 1981; Anders and Jakobson, 1985; McGregor and Lang, 1996)

MATERIALS AND METHODS

Animals. Twenty (20) albino rats and nine mice were obtained from the Animal House of Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Nigeria.

Plant Materials. The leaves of *Ficus vogelii* were used for this study. They were collected in the forest within Nsukka environ by a botanist at Botany Department, University of Nigeria, Nsukka on the 5th of May, 2008.

The freshly collected leaves of *Ficus vogelii* were chopped into pieces and dried for two weeks at room temperature. The dried leaves were weighed and 50g was defatted using petroleum ether (60 – 80°C) in a chamber.

Preparation of Plant Extract. The defatted leaves were macerated for two days using 1,200ml of 70% ethanol as the solvent. The filtrate obtained was concentrated using a rotary evaporator to remove the

ethanol content and kept in an oven at 40°C to remove the water content of the extract to obtain a semi-solid extract and dark brown viscous residue. The extract was subjected to phytochemical analysis for the presence of alkaloids, saponins, reducing sugars, oils, resins, fat, emulsion, and steroids using the method described by Harborne (1973).

Concentration of Extract. The extract was concentrated using the rotary evaporate to remove the ethanolic content of the extract and also the laboratory bench oven at 40°C to remove any trace ethanol and water content of the extract. A watch glass was weighed and 2ml of the extract was poured into it and weighed again. The extract with the watch glass was reweighed until a constant weight is achieved.

Determination of Yield of Plant. A quantity of the air dried chopped *Ficus vogelii* leave was packed into the soxhlet extractor. The weight of the evaporated extract was calculated using the formula:

$$\frac{\text{Weight (g) of Evaporated Extract}}{\text{Weight (g) of Packed Ficus vogelii}} \times 100$$

Preparation of Working Materials

- Normal saline:** 0.9g of NaCl was dissolved in 100ml of distilled water.
- Five percent ethanol in normal saline** was prepared and used as the vehicle in dissolving the extract. The 5% ethanol was gotten by measuring 5ml of 96% ethanol into a 250ml beaker and 95ml of distilled water was added to give a 100ml solution.
- Stock Solution:** A quantity, 0.4g of extract of *Ficus vogelii* was dissolved in 5ml of normal saline to give 400mg in 5ml of solution (80mg/ml). 1ml of the stock solution was added to another test tube and 4ml of normal saline was added to make it 5ml solution containing 80mg/5ml which is 16mg/ml.
- CCl₄ Model for Evaluation of anti-hepatotoxic activity:** The CCl₄ model described by Rojikind (Rojikind 1973) was used for scheduling the dose regimen. 1.5ml/kg i.p. of CCl₄ diluted in olive oil (1:3) was employed for inducing liver toxicity.

Experimental Design

Twelve albino rats were used for this study with three rats each in groups of four.

Group One: The rat weighing (173.8g 162.0g & 171.4g) was used for this group. This group was administered intraperitoneally at the dose of 1.5ml/kg b.

w. of the carbon tetrachloride before the extract at the dose of 600mg/kg b. w.

Group Two: The rats weighing (159.7g, 155.6g & 159.0g) were used for this group. This group was administered intraperitoneally at the dose of 1.5ml/kg b.w. with the toxicant (carbon tetrachloride).

Group Three: The rat weighing (153.0g, 155.6g & 157.1g) was used for this group. This group were administered intraperitoneally at the dose of 5ml/kg b.w. of the vehicle (olive oil) together with water and fed.

Group Four: The rats weighing (145.6g 147.7g & 147.0g) was used for this group. This group were given the normal fed and water *li bidum*.

Determination of Serum Glutamate Pyruvate Transaminase (SGPT) or Alanine Amino Transaminase (ALT).

The colorimetric method for *in-vitro* determination of SGPT/ALT in serum was done using a Quimica Clinica Applicada test kit (Reitman, et al; 1957). Here, 0.5ml of Reagent A was put in a test tube and incubated for 5minutes at 37°C. 0.1ml of serum sample was added to the incubated sample and incubated again for 30minutes at 37°C. The standards were prepared as follows:

- Tube 1—0.1ml deionized water + 0.5ml Reagent A
- Tube II—0.1ml deionized water + 0.45ml Reagent A + 0.05ml of standard.
- Tube III—0.1ml deionized water + 0.40ml Reagent A + 0.10ml of standard
- Tube IV—0.1ml deionized water + 0.35ml Reagent A + 0.15ml of standard
- Tube V—0.1ml deionized water + 0.30ml Reagent A + 0.20ml of standard

Next, 0.5ml of colour developer (Reagent B) was added to sample tubes and the standards, allowed to stand for 20minutes at room temperature. 0.5ml of NaOH working solution (diluted Reagent C) was added and allowed to stand for 15minutes at room temperature. The transmittance of the samples and the standard were read at 505nm against deionized water blank. The mixture is stable for up to an hour. The SGPT/ALT activity/values of the samples were gotten by interpolating the transmittance obtained for the samples in the calibration curve made from the standards. The results were express in SI units (International units per liters (IU/L)).

Determination of Serum Glutamic Oxaloacetic Transaminase (SGOT) or Aspartate Amino Transferase (AST).

The colorimetric method for *in-vitro* determination of SGOT/AST in serum was done using a Quimica Clinica Applicada test kit (Reitman, et al;

1957). Here, 0.5ml of Reagent A was put in a test tube and incubated for 5minutes at 37°C. 0.1ml of serum sample was added to the incubated sample and incubated again for 60minutes at 37°C. The standards were prepared as follows:

- Tube I—0.1ml deionized water + 0.5ml Reagent A
- Tube II—0.1ml deionized water + 0.45ml Reagent A + 0.05ml of standard.
- Tube III—0.1ml deionized water + 0.40ml Reagent A + 0.10ml of standard
- Tube IV—0.1ml deionized water + 0.35ml Reagent A + 0.15ml of standard
- Tube V--0.1ml deionized water + 0.30ml Reagent A + 0.20ml of standard

Next, 0.5ml of colour developer (Reagent B) was added to sample tubes and the standards, allowed to stand for 20minutes at room temperature. 0.5ml of NaOH working solution (diluted Reagent C) was added and allowed to stand for 15minutes at room temperature. The transmittance of the samples and the standard were read at 505nm against deionized water blank. The mixture is stable for up to an hour. The SGOT/AST activity/values of the samples were gotten by interpolating the transmittance obtained for the samples in the calibration curve made from the standards. The results were express in SI units (International units per liters (IU/L)).

Determination of Serum Alkaline Phosphatase

The phenolphthalein monophosphate method for the *in vitro* determination of alkaline phosphatase in serum using Quimica Clinca Applicada test kit. Here, the colour developer was prepared by adding one vial of colour developer salt to 250ml of de-ionized water. 1.0ml of deionised water was added to a clean test tube and a drop of chromogenic substrate was added also, mixed and incubated at 37°C for 5minutes. 0.1ml of serum sample was added to the test tube, mixed and incubated at 37°C for 20minutes. 5ml of colour developer was added. The absorbance was read against a water blank at wavelength 550nm. For the standard, 1ml of water was added to a test tube and a drop of the chromogenic substrate, mixed and incubated at 37°C for 20minutes before the addition of 5ml of colour developer and the absorbance was read at 550nm. The result was express in SI unit (IU/L)

Determination of Serum Bilirubin

The *in vitro* determination of total bilirubin in serum was done using Quimica Clinica Applicada bilirubin test kit (Doumas *et al.*, 1973). In this case, 0.2ml of sulphuric acid solution (Reagent A) was poured into a test tube and a drop of sodium nitrite (Reagent D) and 1ml of caffeine solution (Reagent B) were added with 0.05ml of serum sample. The contents

were mixed and allowed to stand for 10minutes at room temperature. Lastly, 1ml of tartarate solution (Reagent C) was added, mixed and allowed to stand for 5minutes at room temperature. The absorbance was read at 578nm against the blank content. The result was expressed in SI unit (mg/dl).

Statistical Analysis

The values were expressed as mean \pm SEM (Standard Error Measure). The statistical analysis was carried out by one way analysis of variance (ANOVA). The Pearson value ($p < 0.05$) were considered significant. Biochemical parameter results are presented in the Tables and Figures respectively. The descriptive statistics for total bilirubin, liver enzymes and lipid profile were analyzed using SPSS.

RESULTS

Effect on the Serum Glutamate pyruvate Transferase (SGPT) or Alanine aminotransaminase (ALT)

Significant difference ($P < 0.05$) exists in comparing group II with groups I, III, IV, and V. Non-significant difference ($P > 0.05$) exists in comparing groups I with groups III, IV, and V. This graph showed a significant increase in group II when compared with other groups.

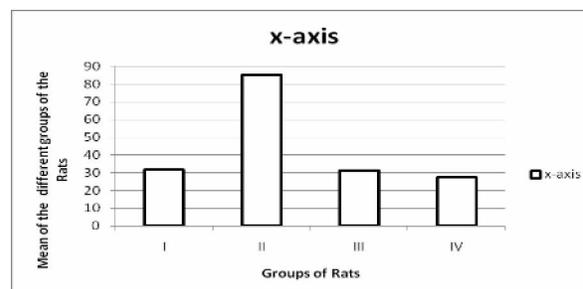


Fig. 1: The effect of *Ficus vogelii* on Alanine aminotransferase (ALT) or SGPT.

Effect on the Serum Glutamate Oxalo-acetate Transferase (SGOT) or Asparate aminotranferase (AST):

Fig. 2 shows that significant difference ($P < 0.05$) exists in comparing group II with groups I, III, IV, and V. Non-significant difference ($P > 0.05$) exists in comparing groups I with groups III, IV, and V. The graph (Fig. 2) shows a significant increase ($P < 0.05$) in group II when compared with other groups.

Effect on the Serum Alkaline Phosphatase (ALP):

Significant difference ($P < 0.05$) exists as shown in Fig. 3 in comparing group II with groups I, III, IV, and V. Non-significant difference ($P > 0.05$)

exists in comparing group I with groups III, IV, and V. Fig. 3 below shows a significant increase ($P < 0.05$) in group II when compared with other groups.

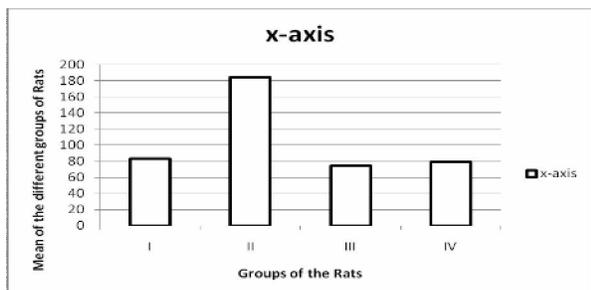


Fig.2 Effect of *Ficus vogelii* on Aspartate aminotransferase (AST) or SGOT

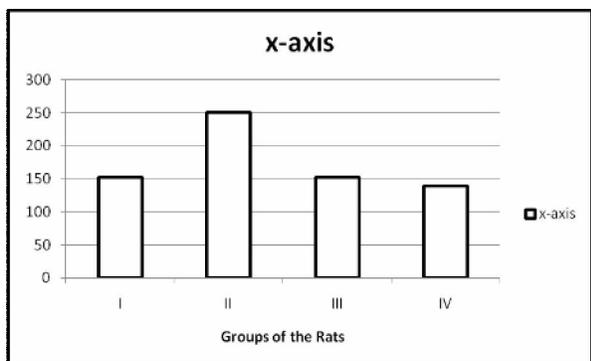


Fig. 3 Effect of *Ficus vogelii* on Alkaline Phosphatase (ALP)

Effect on the serum Total Bilirubin:

In Fig. 4, significant difference ($P < 0.05$) exists in comparing group II (the toxicant) with group I (the toxicant + 600mg/kg b. w. of Ext.), group III (5ml/kg b. w. of olive oil), group IV (600mg/kg b. w. of Ext. + the toxicant) and group V (control) and vice versa. Non-significant difference ($P > 0.05$) exists in comparing group I with group III, group IV, and group V; group III with group I, group IV and group V; group IV with group I, group III, and group V and the group V with group I, group III and group IV.

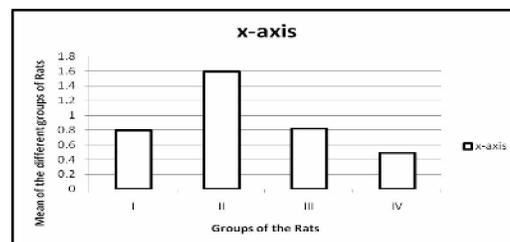


Fig. 4 The Effect of *Ficus vogelii* on the Total bilirubin

Table 1: Effect of *Ficus vogelii* on the Serum levels of AST,ALT, ALP and bilirubin of rats induced with CCl_4

GROUPS	TREATMENTS	AST(U/L)	ALP(U/L)	ALT(U/L)	Bilirubin
I	CCl_4 (1.5ml/kg i.p.)+600mg/kg i.p of Ext.	82.8500±13.4	152.5867±14.2	31.800±12.4	0.7933±1.1
II	CCl_4 (1.5ml/kg i.p.)	184.3600±17.2	250.3533±27.8	85.3500±10.5	1.6433±0.1
III	5ml/kg(1:3) of olive oil	74.2467±6.8	152.9400±17.7	31.22633±6.2	0.8200±3.8
IV	Control	78.9267±16.9	139.4100±59.3	27.4400±21.5	0.5767±0.2

DISCUSSION

By nature, the liver possesses regenerative capacity and this should be considered in the experimental design by including a toxic control. The elevation in the serum marker analysis namely AST, ALT and ALP is one of the causes of hepatotoxicity of CCl_4 (Kaplowitz *et al.*, 1986). The liver function test studies demonstrate that CCl_4 (compared to normal) induces degeneration in hepatocytes. Following the spectrophotometric reading, increase in the liver enzyme induced by CCl_4 was remarkably reduced by the administration of the extract obtained from *Ficus vogelii* which is in good agreement with the histopathological result. This may be attributed to the recovery of the liver damage induced by CCl_4 .

The hepatotoxicity effect of CCl_4 is largely due to its active metabolite "Trichloromethyl radical (Srivastava *et al.*, 1990), which binds to the macromolecule and induce peroxidative degradation of membrane lipids of endoplasmic reticulum rich in polyunsaturated fatty acids (Sengottuvelu *et al.*, 2007). The tichloromethyl radical also causes functional and morphological changes in the cell membrane. The hepatic cells are involved in a variety of metabolic activities. They consist of higher concentration of AST and ALT in the cytoplasm and AST in particular exist in mitochondria (Kumar *et al.*, 2007). Due to the damage caused to hepatic cells, the leakage of the membrane will lead to increase in levels of hepatospecific enzyme in serum. The elevated serum

enzyme levels like AST and ALT are indicative of cellular leakage and functional integrity of cell membrane in liver. The antihepatotoxicity of a drug can be evaluated by its capacity to cure the injuries or to restore the normal hepatic physiology by regeneration mechanisms, which have been induced by a hepatotoxin. This study has, therefore, shown that ethanol extract of *F. vogelii* contain an antioxidant effect that leads to its hepatocurative effect.

The results of this study indicate that the ethanol extract of *F. vogelii* could protect liver against CCl₄ induced hepatotoxicity. The component of the plant that is responsible for this effect was not investigated though the phytochemical analysis indicate the presence of alkaloids, flavonoids, carbohydrates, protein, saponins, tannins, Fats and oil, steroids and terpenoids. Most of this anti-oxidant is known to have anti-inflammatory property while most of them aid in the regeneration of a damaged liver (Kumar *et al.*, 2007). In order to elucidate the mechanism by which *Ficus vogelii* extract component exhibit the anti-hepatotoxicity effect which was demonstrated in this study, further studies with the isolated components will follow to indicate the component of the leaf that has the antihepatotoxic activity.

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Power Purchasing Agreements in Modern Power System

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Abstract: Power Purchasing Agreements (PPAs) are the recent contracts between Generation Companies (GENCOs) and Independent System Operator (ISO). After restructuring in power system, lack of motivations for Independent Power Producers (IPPs) to partnership in power generation and long term maintaining energy have affect the long horizon expansion planning. In this area, long term contracts can help the market entities to hedging their risks in satisfying the future demands and ensuring the return of their investment cost. From an IPP point of view, clarifying the rate of return of investment has an important role in his financial decision making. In competitive power market, each GENCO would offer in the market and some of them could exercise market power in power market. One of the proposed ways to controlling the market power is PPA. In this paper the PPA and some proposed PPAs are introduced and clarifying the weak and strong point of the PPAs are presented.

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Keywords: Power Purchase Agreements, Independent System Operator, Independent Power Producer, Renewable Energy.

1. Introduction

Power Purchase Agreements are contracts between two parties, one who generates electricity for the purpose of sale (the seller) and one who is looking to purchase electricity (the buyer). There are various forms of Power Purchase Agreements; these are differentiated by the source of energy harnessed (solar, wind, etc.). Financing for the project is delineated in the contract, which also specifies relevant dates of the project coming into effect, when the project will begin commercial operation, and a termination date for which the contract may be renewed or abandoned. All sales of electricity are metered to provide both seller and buyer with the most accurate information about the amount of electricity generated and bought. Rates for electricity are agreed upon in the contract between both parties to provide an economic incentive to being a Power Purchase Agreement (wikipedia, 2011).

A Power Purchase Agreement is a legal contract between an electricity generator (provider) and a power purchaser (buyer). Contractual terms may last anywhere between 15 and 20 years, (Javadi et., al, 2011) and during this time the power purchaser buys energy, and sometimes also capacity and/or ancillary services, from the electricity generator. Such agreements play a key role in the financing of independently owned (i.e. not owned by a utility) electricity generating assets. The seller under the PPA is typically an Independent Power Producer (IPP). Energy sales by regulated utilities are typically highly regulated by local or state government, so that no PPA is required or appropriate. Commercial PPA providers can enable

businesses, schools, governments, and utilities to benefit from predictable, renewable energy (Gunther, 2007).

Under a PPA, the seller is often the developer and owner of the technology that generates electricity. The seller may also be someone who buys electricity from another supplier for resale. Under these circumstances, another PPA may be established but will usually contain similar contractual agreements as already proclaimed in the original PPA, with the exception of some pricing mechanisms that would be redefined (Eriksson and Holmes, 2010).

Under a PPA, the buyer is often a utility company that purchases the electricity generated from the seller. In some circumstances, a company may be trying to meet renewable-energy portfolio standards and would be considered a retail purchaser. Under this condition, the retail purchaser may resell the electricity to another entity under a new PPA. Typically, a PPA is established between the primary seller and a utility company who is regulated to buy the electricity (Eriksson and Holmes, 2010).

2. Renewable Power Purchasing Agreements

There are regulatory concerns associated with the implementation of renewable technologies and the agreement on contracts for producing and purchasing power. The Federal Energy Regulatory Commission (FERC) determines which facilities are considered to be exempt wholesale generators or qualifying facilities and are applicable for PPAs under the Energy Policy Act of 2005 (FERC, 2005).

There are different types of PPAs according to the type of renewable technology utilized in the

electricity generation process. The two most prolific PPAs utilized today are solar PPAs and wind PPAs [solar and wind PPA]. Other PPAs will be made commercially available once the technology utilized is established.

In the United States, the Solar Power Purchase Agreement (SPPA) depends heavily on the existence of the solar investment tax credit, which was extended for eight years under the Emergency Economic Stabilization Act of 2008. The SPPA relies on financing partners with a "tax appetite," profits that are subject to taxation, who can benefit from the federal tax credit. Typically, the investor and the solar services provider create a special purpose entity that owns the solar equipment. The solar services provider finances, designs, installs, monitors, and maintains the project (EPA, 2011). As a result, solar installations are easier for customers to afford because they do not have to pay upfront costs for equipment and installation. Instead, customers pay only for the electricity the system generates (EPA, 2011). With the passage of the American Recovery and Reinvestment Act of 2009 the solar investment tax credit can be combined with tax exempt financing, significantly reducing the capital required to develop a solar project.

Wind Power Purchase Agreements (WPPAs) are not found quite as prolifically as their solar counterparts, but they do exist (Eriksson and Holmes, 2010).

Wasatch Wind in Wyoming entered into a twenty year WPPA with PacifiCorp in July 2010; Wasatch Wind will produce wind power in its newly developed Pioneer Wind Park, and PacifiCorp will purchase it (DOE/EE, 2011).

Current law restricts most of the Federal government of the United States from entering into a contract longer than ten years. PPA contracts, particularly for larger systems, need at least a 20 year term (Bolinger, 2009). In 2009, the United States Senate Committee on Energy and Natural Resources passed S. 1462, which among other things would have allowed federal agencies to enter into power purchase agreements for renewable energy for up to 30 years. However, the United States Department of Defense has a separate authority to enter into energy contracts for as long as 30 years. Using this authority, the United States Navy recently signed a renewable energy project for Marine Corps Air Station Miramar. All agencies of the US Government are exploring methods to achieve the renewable energy requirements set forth by law (James, 2008). Nellis Air Force Base demonstrates the long term consequences of such an agreement. Completed in 2007, the Nellis Solar Power Plant generates 30 million kilowatt-hours of electricity per year—

equivalent to a quarter of the total power used at the 12,000-person base. This arrangement allows Nellis to annually avoid 22,000 tons of carbon dioxide emissions while at the same time save the Air Force over \$1 million dollars in electricity costs a year.

Other PPAs will become commercially available once the technology has been established and the market exists for such contractual agreements to be effective. Geothermal PPAs are being explored; their difference from wind and solar PPAs is that the actual gathering of energy would require much more active monitoring and servicing (Stoel, 2010)

The PPA is often regarded as the central document in the development of independent electricity generating assets (power plants), and is a key to obtaining project financing for the project. Under the PPA model, the PPA provider would secure funding for the project, maintain and monitor the energy production, and sell the electricity to the host at a contractual price for the term of the contract. The term of a PPA generally lasts between 5 and 25 years. In some renewable energy contracts, the host has the option to purchase the generating equipment from the PPA provider at the end of the term, may renew the contract with different terms, or can request that the equipment be removed. One of the key benefits of the PPA is that by clearly defining the output of the generating assets (such as a solar electric system) and the credit of its associated revenue streams, a PPA can be used by the PPA provider to raise non-recourse financing from a bank (Javadi and Javadinasab, 2011) or other financing counterparty. Figure 1 shows the financial and power flows among the consumer, system owner, and the utility. (Boylston, 2008)

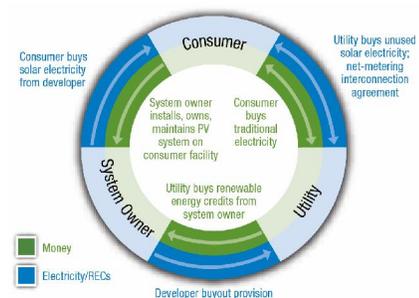


Fig. 1 Contracts and Cash Flow in Third-Party Ownership/PPA Model (Source: NREL)

Because a Power Purchase Agreement or Energy Service Agreement is at the "heart" and underlying foundation of recent projects, it can help the business with the selection and oversight of PPA's and ESA's. The projects range in size from as small as 1-2 MW to well over 100 MW. It means that the project development process may include;

- Engineering (including engineering & economic feasibility studies, project
- Design, air quality and site permitting requirements, etc.)
- Procurement
- Construction and Project Management
- Project Commissioning
- Project Funding/Financing
- Power Purchase Agreements
- Long-Term Service Agreements

In conjunction with strategic partners, the committee is able to receive bonding for projects exceeding \$100 million in value. In such cases the committee is able to secure funding for power projects that exceed 100 MW.

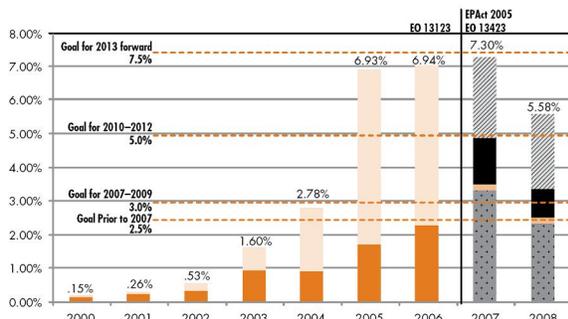


Fig. 2 Renewable Power Purchases by Federal Agencies (DOE/FEMP)

A Power Purchase Agreement is also "behind" almost every power plant. A PPA is a contract involving the generation and sales of electricity – which is normally developed between the owner of a power plant generating the electricity, and the buyer of the electricity. PPA's can be quite lengthy agreements that may exceed 100 pages in length and take several months to even years to finalize.

The basic information contained in a Power Purchase Agreement includes the following items:

Definitions

- Purchase and Sale of Contracted Capacity and Energy (such as steam, hot water and/or chilled water in the case of co-generation and tri-generation plants)
- Operation of the Power Plant
- Financing of the Power Plant
- Guarantees of Performance
- Penalties
- Payments
- Force Majeure
- Default and Early Termination

- Miscellaneous

PPAs allow Federal agencies to fund on-site renewable energy projects with no up-front capital costs incurred.

With a PPA, a developer installs a renewable energy system on agency property under an agreement that the agency will purchase the power generated by the system. The agency pays for the system through these power payments over the life of the contract. After installation, the developer owns, operates, and maintains the system for the life of the contract (Logan, 2009).

Power purchase agreements feature a variety of benefits and considerations for Federal agencies, including:

Benefits:

- No up-front capital costs
- Ability to monetize tax incentives
- Typically a known, long-term energy price
- No operations and maintenance responsibilities
- Minimal risk to the agency

Considerations:

- Federal sector experience with PPAs is still growing
- Contract term limitations
- Inherent transaction costs
- Challenges with site access contracts and concerns

3. Power Purchasing Agreements Policies

Federal Energy Management Programs (FEMP) FEMP developed an introductory guide to PPAs for Federal on-site renewable projects. FEMP outlines the power purchase agreement process in its Alternative Finance Options (AFO). An on-demand recording of the training is available. Dates and times of upcoming training sessions are posted to the FEMP events calendar. An updated version of the PPA portion of this presentation is available, featuring typical PPA processes, benefits, challenges, and several case studies. Several PPA sample documents are available. Available resources include sample requests for proposal, contracts, land use agreements, case studies, and more (Logan et al., 2009).

3.1 High-Level Project Plan for Solar PV with PPA Financing

Implementing power purchase agreements involves many facets of an organization: decision maker, energy manager, facilities manager,

contracting officer, attorney, budget official, real estate manager, environmental and safety experts, and potentially others (Shah 2009). While it is understood that some employees may hold several of these roles, it is important that all skill sets are engaged early in the process. Execution of a PPA requires the following project coordination efforts, although some may be concurrent.

Step 1. Identify Potential Locations

Identify approximate area available for PV installation including any potential shading. The areas may be either on rooftops or on the ground. A general guideline for solar installations is 5–10 watts (W) per square foot of usable rooftop or other space. In the planning stages, it is useful to create a list that contains site plans and to use Google Earth software to capture photos of the proposed sites (Pechman 2008). In addition, it is helpful to identify current electricity costs. Estimating System Size (this page) discusses the online tools used to evaluate system performance for U.S. buildings.

Step 2. Issue a Request for Proposal (RFP) to Competitively Select a Developer

If the aggregated sites are 500 kW or more in electricity demand, then the request for proposal (RFP) process will likely be the best way to proceed. If the aggregate demand is significantly less, then it may not receive sufficient response rates from developers or it may receive responses with expensive electricity pricing. For smaller sites, government entities should either:

- 1- seek to aggregate multiple sites into a single RFP

or

- 2- Contact developers directly to receive bids without a formal RFP process (if legally permissible within the jurisdiction).

Links to sample RFP documents (and other useful documents) can be found at the end of this fact sheet. The materials generated in Step 1 should be included in the RFP along with any language or requirements for the contract. In addition, the logistical information that bidders may require creating their proposals (described later) should be included. It is also worthwhile to create a process for site visits. Renewable industry associations can help identify Web sites that accept RFPs. Each bidder will respond with an initial proposal including a term sheet specifying estimated output, pricing terms, ownership of environmental attributes (i.e., RECs) and any perceived engineering issues.

Step 3. Contract Development

After a winning bid is selected, the contracts must be negotiated. This is a time-sensitive process. In addition to the PPA between the government agency and the system owner, there will be a lease or easement specifying terms for access to the property (both for construction and maintenance). REC sales may be included in the PPA or as an annex to it (see Page 6 for details on RECs).

Step 4. Permitting and Rebate Processing

The system owner (developer) will usually be responsible for filing permits and rebates in a timely manner. However, the government agency should note filing deadlines for state-level incentives because there may be limited windows or auction processes.

Step 5. Project Design, Procurement, Construction, and Commissioning

The developer will complete a detailed design based on the term sheet and more precise measurements; it will then procure, install, and commission the solar PV equipment. The commissioning step certifies interconnection with the utility and permits system startup. Once again, this needs to be done within the timing determined by the state incentives. Failure to meet the deadlines may result in forfeiture of benefits, which will likely change the electricity price to the government agency in the contract. The PPA should firmly establish realistic developer responsibilities along with a process for determining monetary damages for failure to perform (Logan et al., 2009).

4. Investment Setting in Utility and Market Environments

In traditional utility environments there are two types of projects, utility construction and independent construction. Utility construction refers to a project in which the power plant is owned and operated by the utility. Before construction, projects must be approved by the state utility commission. The approval process includes a provision for the utility to finance the debt and equity of the project through customer rates.

Independent construction refers to projects in which a new power plant is owned and operated by an independent power producer (IPP). Before construction a power purchasing agreement (PPA) is signed between the producer and the utility; the PPA is subject to the approval of the state utility commission. There are many possible structures for the PPA, but the essence is that the utility provides a guaranteed payment to the producer in exchange for agreed-upon power production and capacity.

Along with approval for the PPA, the state utility commission provides a mechanism for cost recovery to the utility through customer rates. The common feature of both of these mechanisms is cost recovery through regulated rates. Furthermore, the recovery mechanism is set in place over the lifetime of the project. Banks find this feature very attractive and readily provide financing for such projects.

In nontraditional markets, neither retailers nor power producers are able to demonstrate regulated cost recovery to banks. Banks are less willing to finance projects that don't have cost recovery mechanisms than projects that are backed by a cost recovery mechanism. In a nontraditional market, the only agent that can provide regulatory assurances is the ISO. This presents a bit of a quagmire for federal and local authorities wishing to develop free markets. To ensure financing for new construction, regulatory agencies must provide the ISO with the authority to enter PPAs so that cost recovery can be ensured. Absent such authorization, financing for new construction may be difficult to arrange and the state cannot ensure reliability of supply. Of course, providing such authorization restores a regulated environment, with the ISO assuming the role of the traditional utility. There is tension between the desire to develop free markets and the desire to regulate reliability. Organizing long term planning activities is difficult in this environment. (Mazer, 2007)

4.1. Power Purchase Agreements in Long-Term Horizon

The investment and development communities have learned a hard lesson from losses on projects built between 2000 and 2003. Currently in the United States, IPPs and their financial backers seek to construct projects with revenue guarantees by contracting with a suitable counterparty. The most common counterparty is a utility.

Another potential counterparty may be the ISO. These are the only two counterparties who can pass the risk of long-term contracts through the regulatory arena and ensure cost recovery by a regulated rate mechanism. There are several possibilities for structuring contracts. In this section, we present commonly negotiated contract types and categorize the contract terms. Then we provide a series of issues that the counterparties must agree upon before finalizing contracts. Afterwards we discuss the pricing and valuation of contracts.

There are various ways to structure payments. For fixed-quantity contracts only, the owner may charge the counterparty a fixed payment stream of dollars per MWh.

Since the dispatch quantity is fully established within the contract terms, the full payment is also established at the time of the contract's signing. Typically, payments are made on a monthly basis. Most contracts have both fixed and variable components to the payment. The fixed component is referred to as the capacity payment, and the variable component is referred to as the energy payment. Whereas the capacity payment described in the preceding sections is a hypothetical value, in this situation it is an actual contractual payment. Often the contracts are structured so that the energy payment covers the costs of energy production, (fuel, maintenance, and operations), while the capacity payment covers the cost of construction.

5. Conclusion

In this paper the Power Purchasing Agreements presented. The importance of these contracts in restructured power system is illustrated. Below are several ways to structure the energy payment:

- Indexed to power price. The energy payment may be set at the settlement price of a designated market. This requires the availability of a price that is published in a forum acceptable to both the owner and the counterparty. An ISO index is an example. Another example is a daily price that is published in an industry-wide accepted publication.
- Indexed to gas price. The energy payment may be indexed to the settlement price of a designated gas market. Once again, an acceptable published price must be available. There is a contractual heat rate that converts the \$/MMBTU charge of the gas index into a \$/MWh charge for the energy. The owner often sets the contractual heat rate at a level that allows the owner to recover all variable energy costs and is accordingly often higher than the actual operating heat rate of the plant.
- Indexed to coal. Another possibility is for the variable component to be indexed to a different fuel such as coal with a contractual heat rate.
- Determined by guaranteed operational costs. The energy payment may be made in the form of a variable heat rate in accordance with agreed-upon operating characteristics applied to an indexed fuel price. This provides the fuel payment. In addition to the fuel payment there are additional variable operations and maintenance charges along with start-up charges.

- Lessee provides fuel and pays guaranteed operational costs. Under this arrangement the lessee independently arranges for fuel shipments to the plant and pays all of the fuel costs of the dispatch. However, the owner provides a guaranteed efficiency in the form of a variable heat rate. If the actual fuel burn exceeds the contractually guaranteed fuel burn as determined by the contractual heat rate, the owner must reimburse the lessee for the additional fuel cost. Variable operations and maintenance costs along with start-up costs are charged to the lessee at a set cost.
- Lessee provides fuel and pays actual fuel costs along with set Variable Operation and Maintenance (VOM) and start-up costs. Under this arrangement, the lessee independently arranges for fuel shipments to the plant and pays all of the fuel costs. Additionally, the owner charges variable operations and maintenance costs along with start-up costs.

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Evaluation of Some Growth Parameters and Chemical Composition of *In Vitro* Grown Seedlings of *Rumex vesicarius* L. (Polygonaceae).

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Abstract: The aim of this research is to evaluate differences in growth and chemical composition of *in vitro* grown seedlings (10, 20 and 30 days old) of *Rumex vesicarius* L. (Polygonaceae) on either solidified MS medium or agar. Percentage of germination increased with time from 2 days till 16 days in case of seedlings grown on MS medium, and 10 days in case of seedlings grown on agar. Variations in seedlings length at 10, 20 and 30 days were non significant. Seedlings grown on agar were longer than seedlings grown on MS medium. Shoot: root ratio (%) decreased with time from 10 to 30 days, shoot: root ratio of seedlings grown on agar was less than these of seedlings grown on MS medium. Variation in shoot: root ratio of seedlings grown on either solidified MS medium or agar was highly significant. Fresh and dry weights of these seedlings increased with time in 10, 20 and 30 days old seedlings. Variations were highly significant in both fresh and dry weights. Fresh and dry weights of seedlings grown on MS medium were higher than seedlings grown on agar. Phytochemical screening of 10, 20 and 30 days old seedlings showed variations in the presence and / or amount of some biologically active constituents under investigation such as: flavonoids, saponins, alkaloids and tannins, chlorides and Sulphates, these variations indicated that, the formation of these active constituents is positively or negatively related to time. Regarding total phenolics, of seedlings grown on MS medium, 20 days old seedlings had the maximum concentration (3.833 ± 0.334 mg GAE_s/g F.W.), followed by 10 days old seedlings (1.910 ± 0.334 mg GAE_s/g F.W.), while 30 days old seedlings were found to contain the least amount of phenolics (1.167 ± 0.334 mg GAE_s/g F.W.). Variations in the amount of total phenolics within different seedlings were non significant. Seedlings grown on agar contained low amount of phenolics till 30 days old, compared with seedlings grown on MS medium. Total flavonoids were determined also, highly significant variations were found between 10, 20 and 30 days old seedlings grown on either MS medium or agar. The maximum amount of total flavonoids was found to be in 10 days old seedlings grown on agar (106.350 ± 3.849 µg/g F.W.); flavonoidal contents were negatively related to time. In wild young plantlets of *Rumex vesicarius* L. at vegetative stage, total phenolics were found to be lower than *in vitro* grown seedlings. Plantlets roots were found to be the richest organ (1.695 ± 0.178 mg GAE_s/g F.W.), however roots contains about less than half amounts found in *in vitro* grown seedlings on MS medium at 20 days old (3.833 ± 0.334 mg GAE_s/g F.W.). Wild young plantlets were rich in flavonoids. There were highly significant variations between plantlets parts. Leaves were found to contain the highest amount of flavonoids (2835.000 ± 305.757 µg/g F.W.).

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Keywords: *Rumex vesicarius* L. - total phenolics - total flavonoids - phytochemical screening - *in vitro* grown seedlings.

Abbreviations:

GAE : Gallic Acid Equivalent.

HPLC: High Performance Liquid Chromatography.

µg/g, mg/g and mg : microgram/ gram, milligram/gram and milligram respectively.

D.W. : Dry Weight.

F.W. : Fresh Weight.

1. Introduction

Rumex vesicarius L. is a wild edible plant used as a sorrel and collected in spring time and eaten fresh (Batanouny, K.H., 1999), or cooked (Al-Quran, 2009). It was considered as a dietary complementary plant, since this plant is a rich source of β carotenes (Bélanger *et al.*, 2010).

Rumex vesicarius L. has many important medicinal uses, the plant is stimulant, tonic, and acts as aphrodisiac agent (Gopal *et al.*, 2008).

The medicinal importance of this plant is a reflection to its chemical composition since the plant contains many bioactive substances such as flavonoids (vitexin, isovitexin, orientin and isorientin). The plant also is

rich in anthraquinones particularly in roots (emodin and chrysophanol). The plant also contains carotenoids, vitamins (especially vitamin C), proteins, lipids and organic acids. This plant is a good source of minerals such as; K, Na, Ca, Mg, Fe, Mn and Cu (Saleh, 1993; Al-Rumaih *et al.*, 2002; Alfawaz, 2006; Filho *et al.*, 2008).

The previously mentioned bioactive phytochemicals (such as polyphenols, flavonoids, carotenoids, tocopherols and ascorbic acid) have a role as antioxidant and detoxifying agents. The intake of dietary antioxidant phytochemicals like carotenoids, phenolic compounds and flavonoids leads to protection against non-communicable diseases i.e. cancer, cardiovascular diseases and cataract. Phenolics and flavonoids were very important biologically active constituents, since they considered to be anticancer, antioxidant and antimicrobial agents etc., (Rao, 2003; Alberto *et al.*, 2006; Matkowski, 2008; Abd Ghafar *et al.*, 2010 ; Imran *et al.*, 2011).

The main aim of this study is to evaluate differences in seedlings growth parameters as manifested by seedling length, shoot : root ratio, fresh and dry weights and chemical composition (particularly, total phenolics and total anthraquinones) of *in vitro* grown seedlings of *Rumex vesicarius* L. (Polygonaceae) at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar. Wild young plantlets were also studied for their chemical composition.

2. Materials and Methods

Plant material:

Seeds of *Rumex vesicarius* L. were obtained from plant samples collected during August 2010 at the ripening fruiting stage. Wild young plantlets at the vegetative stage of growth (February 2011) were collected from 60 km, Quatamia- Ain Sokhna desert road, Egypt. Plant specimens were botanically identified and authenticated by comparing with herbarium specimens, and the identified plant specimen was deposited in the herbarium of Botany and Microbiology Department, Faculty of Science, Helwan University, Helwan, Egypt (Number:1057). All experimental studies were carried out in Prof. Dr. / Hisham Afifi Lab., Plant Physiology Unit, Botany Department and Central Services Lab., National Research Centre, Giza, Egypt.

In vitro germination of seeds:

Seeds were surface sterilized by immersion in 70 % ethanol for 30-60 seconds, then soaked in 20% of commercial Clorox for 15-20 minutes, then washed 3 times with sterile double distilled water. Sterilized seeds were aseptically transferred to either 1% (w/v) agar in double distilled water or hormone free MS medium (Murashige and Skoog, 1962) supplemented with 1% agar, then incubated at 25± 2°C in light (16

hours). Percentage of germination was determined every 2 days till 30 days. Seedlings of 10, 20 and 30 days old were collected and growth parameters estimated (seedling lengths "cm", fresh and dry weights "mg". Replicates = 300 seeds for determination of germination percentage and 30 seedlings for determination of growth parameters except shoot: root ratio (3 seedlings).

Chemical examination of *in vitro* grown seedlings and early vegetative wild plantlets:

1- Preliminary phytochemical screening:

Preliminary phytochemical screening of *in vitro* grown seedlings at different stages of growth (10, 20 and 30 days old) on either solidified MS medium or agar and early vegetative wild plantlets was carried out as follows: Flavonoids (Mabry *et al.*, 1970); Anthraquinones (Farnsworth *et al.*, 1969); Tannins (Trease and Evans, 1978); Alkaloids (Shellard, 1957); Saponins (Hungund and Pathak, 1971); Carbohydrates and / or Glycosides (Stank *et al.*, 1963); Irodoids (Weiffering, 1966); Coumarins (Feigl, 1960); Chlorides and Sulphates (Islam *et al.*, 1993); Sterols and / or Triterpenes (Claus, 1967 and Schmidt, 1964) and Cardiac glycosides (Balbaa *et al.*, 1981).

2- Determination of total phenolics and total flavonoids:

a- Assay for total phenolics:

Total phenolics were estimated according to Gursoy *et al.*, (2009), involving Folin-Ciocalteu reagent and Gallic acid as standard. 1 ml of each extract of either *in vitro* grown seedlings at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar and early vegetative wild plantlets contained 150 mg F.W.. Each sample was done in triplicate. Concentrations of phenolic compounds were calculated according to the following equation that was obtained from the standard Gallic acid graph.

$$\text{Absorbance} = 0.0167 \text{ Gallic acid } (\mu\text{g}) + 0.017 \text{ (R}^2\text{: 0.99)}$$

b- Assay for total flavonoids:

Total flavonoids were determined using the method of Gursoy *et al.*, (2009). 1 ml of each extract of either *in vitro* grown seedlings at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar and early vegetative wild plantlets contained 150 mg F.W.. Each sample was done in triplicate. Concentrations of flavonoid contents were calculated according to the following equation that was obtained from the standard Quercetin graph:

$$\text{Absorbance} = 0.0228 \text{ Quercetin } (\mu\text{g}) - 0.0045 \text{ (R}^2\text{: 0.9979)}$$

Statistical analysis:

Statistical analysis was done using Fisher analysis of variance methodology. A least significant difference test was applied at 5% and 1% probability level to determine differences among treatment means (Steel and Torrie, 1984). The MSTAT computerized package

program was subjected to the regular statistical analysis of variance (Nissen *et al.*, 1985).

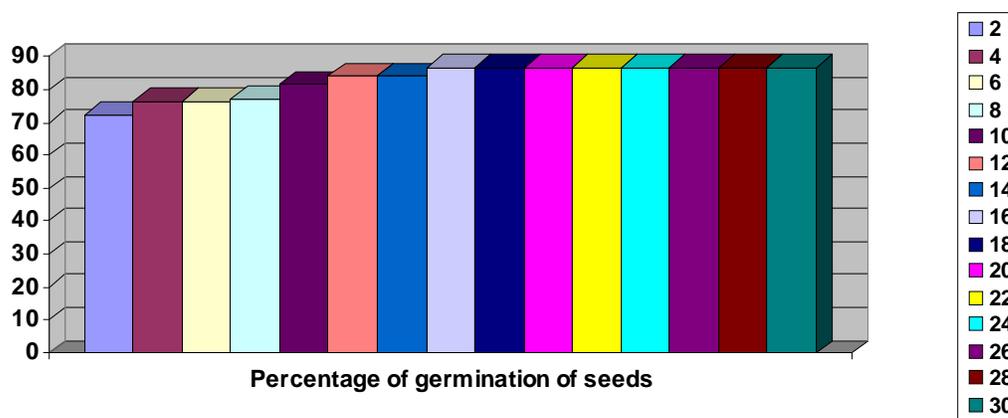
3. Results and Discussion:

***In vitro* germination of seeds of *Rumex vesicarius* L.:**

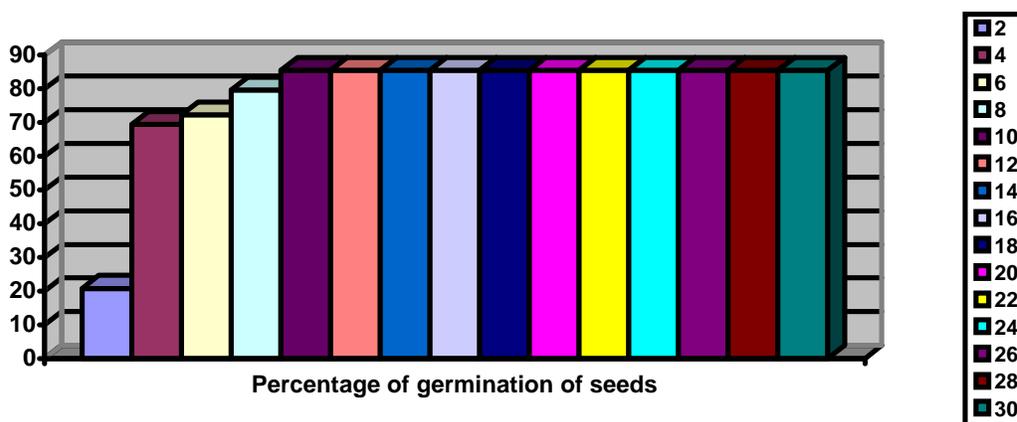
Percentage of *in vitro* germination of *Rumex vesicarius* L. seeds (Figure:1.a) increased gradually with time from 2 days (72.333%), till 16 days (86.833%), then no change occurred in % of

germination till 30 days in case of seeds germinated on solidified MS medium.

Regarding seeds germinated on agar, percentage of *in vitro* germination of seeds (Figure:1.b) increased gradually with time from 2 days (20.755%), till 10 days (85.535%), then no change occurred in % of germination till 30 days.



a) MS medium



b) Agar alone

Figure (1): *In vitro* germination of seeds of *Rumex vesicarius* L. on either solidified MS medium or agar during 30 days.

***In vitro* grown seedlings growth:**

Data in Table : 1 showed seedling length, shoot: root ratio and fresh and dry weights at 10, 20 and 30 days old seedling grown on either solidified MS medium or agar.

Length of seedlings grown on agar (7.080 ± 0.587 , 10.130 ± 0.587 and 11.180 ± 0.587 cm at 10, 20 and 30

days old respectively) was higher than that of seedlings grown on MS medium (3.960 ± 0.587 , 5.890 ± 0.587 and 6.130 ± 0.587 cm at 10, 20 and 30 days old respectively), this may be because seedlings tried to get more nutrients from this poor media (agar) by increasing roots length as absorbing organs, variation in length between seedlings grown on MS medium and

agar may be due to other factors such as gelling strengths of MS medium and agar and porosity of MS medium and agar particles etc.,. There were non significant differences in seedlings length grown either on solidified MS medium or agar.

Shoot: root ratio decreased with time from 10 to 30 days. Shoot: root ratio of seedlings grown on agar (50.000 ± 11.742 , 36.500 ± 11.742 and 33.333 ± 11.742 at 10, 20 and 30 days old respectively) was less than that of seedlings grown on MS medium (66.667 ± 11.742 , 61.111 ± 11.742 and 50.000 ± 11.742 at 10, 20 and 30 days old respectively). Variation in shoot: root

ratio of seedlings grown on either solidified MS medium or agar was highly significant.

Fresh and dry weights increased with time in 10, 20 and 30 days old seedlings. Both fresh and dry weights of seedling were more in case of seedling grown on solidified MS medium (They reached 382.200 ± 18.970 and 66.700 ± 2.882 mg respectively) than those grown on agar (118.000 ± 18.970 and 23.600 ± 2.882 mg respectively). Variations were highly significant in case of fresh and dry weights of seedlings grown on either solidified MS medium or agar.

Table (1): Seedling length, shoot: root ratio (%), fresh and dry weights of *in vitro* grown seedlings of *Rumex vesicarius* L. (Polygonaceae) at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar.

<i>In vitro</i> grown seedlings	Seedling length (cm)	Shoot: root ratio (%)	Fresh weight (mg)	Dry weight (mg)
a) MS medium				
10 days	3.960±0.587	66.667 ± 11.742	245.000±18.970	38.800±2.882
20 days	5.890±0.587	61.111 ± 11.742	331.200±18.970	49.500±2.882
30 days	6.130±0.587	50.000 ± 11.742	382.200±18.970	66.700±2.882
b) Agar				
10 days	7.080±0.587	50.000 ± 11.742	106.000±18.970	21.200±2.882
20 days	10.130±0.587	36.500 ± 11.742	115.500±18.970	23.100±2.882
30 days	11.180±0.587	33.333 ± 11.742	118.000±18.970	23.600±2.882
L.S.D. (0.05)	1.627	36.184	53.660	8.152
L.S.D. (0.01)	2.138	50.730	71.360	10.842

Preliminary phytochemical screening of *in vitro* grown seedlings and early vegetative wild plantlets:

Phytochemical screening of 10, 20 and 30 days old seedlings (Table: 2 a) showed variations in the presence and / or amount of some biologically active constituents under investigation, in this regard, seedlings grown on MS medium were found to contain Sulphates in amounts increased with time, chlorides increased then decreased with age, flavonoids, alkaloids and tannins decreased with age then increased again. Saponins were formed between 10 and 20 days then increased with time, coumarins, sterols, carbohydrates and / or glycosides amounts did not change with time.

Seedlings grown on agar were found to contain all substances under investigation in lower amounts than those grown on MS medium except flavonoids and carbohydrates and / or glycosides. Seedlings grown on both MS medium and agar were devoid of cardiac glycosides, irodoids, anthraquinones and sublimable substances, since they were not formed till 30 days.

These variations indicated that the formation of biologically active constituents is

positively or negatively related to seedlings age and composition of growing nutrient media.

It was found also that, all plant parts of early vegetative wild plantlets of *Rumex vesicarius* L. (Table: 2 b) were rich in majority of active constituents under investigation, plantlets organs varied in the amount of these biologically active substances.

However, these plantlets were rich source of these active constituents; it is considered a limited source for two reasons:

1- Duration of vegetative stage of this plant is about one month then amounts of active constituents decreased when the plant turned to other developmental stages

2- Over collection of these young plantlets changed the ecological status of the plant gradually to being rare, taking in consideration that these plantlets are found normally in little numbers in the desert.

These results agreed with Mostafa *et al.*, 2011, since they found that, all plant parts of *Rumex vesicarius* L. at flowering and fruiting stages were rich in flavonoids, anthraquinones, alkaloids, tannins, sterols and / or triterpenoids, carbohydrates and/or glycosides, chlorides and sulphates and sublimable substances . There were variations in the presence and /

or amount of some biologically active constituents under investigation within different plant parts.

Table (2a): Preliminary phytochemical screening of *in vitro* grown seedlings of *Rumex vesicarius* L. (Polygonaceae) at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar.

	10 days old seedlings		20 days old seedlings		30 days old seedlings	
	MS medium	Agar	MS medium	Agar	MS medium	Agar
1-Carbohydrates and / or Glycosides	+	++	+	++	+	+
2- Saponins	-	-	+	+	++	+
3- Tannins	++	+	+	+	++	+
4- Sterols and / or Triterpenoids	+	+	+	+	+	+
5- Alkaloids	++	-	+	-	++	-
6- Cardiac glycosides	-	-	-	-	-	-
7- Flavonoids	++	++	+	++	+	++
8- Anthraquinones	-	-	-	-	-	-
9- Coumarins	+	+	+	+	+	+
10- Irodoids	-	-	-	-	-	-
11-a-Chlorides	+	+	++	+	+	++
11-b-Sulphates	+	-	++	+	++	++
12- Sublimation	-	-	-	-	-	-

- = Active ingredients under investigation were not found. + = Weak to moderate amounts of active ingredients under investigation. ++ = High amounts of active ingredients under investigation.

Table (2b): Preliminary phytochemical screening of different plant parts of early vegetative wild plantlets of *Rumex vesicarius* L.. (Polygonaceae) .

	Roots	Stems	Leaves	Whole plant parts
1-Carbohydrates and / or Glycosides	++	++	++	++
2- Saponins	++	+	++	++
3- Tannins	++	+	++	++
4- Sterols and / or Triterpenoids	+	+	++	++
5- Alkaloids	++	+	++	+
6- Cardiac glycosides	+	+	+	+
7- Flavonoids	+	++	++	++
8- Anthraquinones	++	++	+	++
9- Coumarins	+	+	+	+
10- Irodoids	+	++	++	++
11-a-Chlorides	++	++	++	++
11-b-Sulphates	++	++	++	++
12- Sublimation	++	++	+	++

Total phenolics and total flavonoids of *in vitro* grown seedlings and early vegetative wild plantlets:

Phenolics and flavonoids are important biologically active constituents, since they are

considered to be anticancer, antioxidant and antimicrobial agents etc., (Alberto *et al.*, 2006; Abd Ghafar *et al.*, 2010 ; Imran *et al.*, 2011).

Results of total phenolics (Table: 3a) revealed that, in case of seedlings grown on MS medium, the maximum amount of total phenolics was found to be in 20 days old seedlings (3.833 ± 0.334 mg GAEs/g F.W.), followed by 10 days old seedlings (1.910 ± 0.334 mg GAEs/g F.W.), while 30 days old seedlings were found to contain the least amount of phenolics (1.167 ± 0.334 mg GAEs/g F.W.).

This means that, there were nearly a duplication in the amount of total phenolics occurred in seedlings from 10 to 20 days, then a decline in the amount of total phenolics occurred again.

Regarding seedlings grown on agar it was found that, they contain low amounts of phenolic contents till 30 days old seedlings.

Variation in the amount of total phenolics within different seedlings grown on either MS medium or agar was non significant.

These results agreed with Mostafa *et al.*, (2011), since they found that, all plant parts were rich in phenolics, particularly fruits (15.633 mg GAE_s/g F.W.), while whole plant was found to contain 10.417 ± 0.320 mg GAE_s/g F.W..

Results of total flavonoids in seedlings growing on MS medium (Table: 3a) showed that, the maximum amount of total flavonoids was found to be in 10 days old seedlings (42.930 ± 3.849 µg/g F.W.), followed by 30 days old seedlings (37.868 ± 3.849 µg/g F.W.), while 20 days old seedlings were found to contain the least amount of flavonoids (34.993 ± 3.849 µg/g F.W.).

This may be explained physiologically on the basis that flavonoids is one of stress signs, so when seedlings at the first stage of formation and growth were under stress, so total flavonoids increased, and this followed by a decrease in total flavonoids of 20 days old seedlings, this may be due to that the stress may be reduced with further growth of seedlings, this decrease in total flavonoids is followed by increase in 30 days old seedlings, because plantlets may undergone further stress under growth and formation of leaves, other organs and more differentiation was occurred, so total flavonoids increased again as a sign of this stress, another reason for this increase may be also depletion of nutrient contents in the MS medium.

Regarding seedlings grown on agar, it was found that, flavonoidal content decreased with increasing seedling ages from 10 to 30 days, flavonoidal content of these seedlings was double of those found in seedlings grown on MS medium.

There were highly significant variations between 10, 20 and 30 days old seedlings grown on either MS medium or agar.

Total flavonoids content was higher than that in whole plant parts of wild samples, since Mostafa *et al.*, (2011) found that, whole plant parts collected from

desert during flowering stage contain 11.223 ± 1.850 µg/g F.W. only, at all cases seedling growing on either solidified MS medium or agar produced flavonoids (4-10 folds respectively) more than whole plant in the flowering stage.

Results of this research agreed with results of Astrid Kännaste, 2008, who found that age is an effective factor on the formation of phenolic volatile compounds (such as terpenoids; -pinene, camphene, -pinene, myrcene, -phellandrene, terpinolene and limonene etc...) in newly planted conifer seedlings in deforestation areas, thus small ("mini") seedlings, planted at the age of 7-10 weeks, are gnawed less by pine weevils than the larger, conventionally planted seedlings. So, it has been proposed that planting young conifer seedlings in clear-cut areas may reduce the damage caused by pine weevils.

Concerning total phenolics, early vegetative wild plantlets of *Rumex vesicarius* L.(Table : 3b) were found to contain lower amounts than *in vitro* grown seedlings. Plantlets roots were found to be the richest organ in plantlets in this regard (1.695 ± 0.178 mg GAE_s/g F.W.), however roots contains about less than half amounts found in *in vitro* grown seedlings on MS medium at 20 days old (3.833 ± 0.334 mg GAE_s/g F.W.). There were non significant variations between plantlets parts in this regard.

It was found that, early vegetative wild plantlets of *Rumex vesicarius* L.(Table : 3b) were rich in flavonoids. There were highly significant variations between plantlets parts. In this regard, leaves were found to contain the highest amount of flavonoids (2835.00 ± 305.757 µg/g F.W.), followed by whole plant parts (1986.000 ± 305.757 µg/g F.W.).

To conclude, chemical composition of seedlings varied according to seedlings age and composition of growing nutrient media. Seedlings grown on MS medium at 20 days old were a rich source of phenolics (3.833 ± 0.334 mg GAE_s/g F.W.), these seedlings contained more than double the amount of phenolics found in roots (as the richest organ in the plantlet) of early vegetative wild plantlets of *Rumex vesicarius* L. (1.695 ± 0.178 mg GAE_s/g F.W.). Seedlings grown on agar at 10 days old and leaves (as the richest organ in the plantlet) of early vegetative wild plantlets of *Rumex vesicarius* L. were rich source of flavonoids (106.350 ± 3.849 µg/g F.W. and 2835.000 ± 305.757 respectively).

Finally, seedlings grown on MS medium at 20 days old (Photo: 1) were a rich source of phenolics, while seedlings grown on agar at 10 days old and leaves of early vegetative wild plantlets of *Rumex vesicarius* L. were a rich source of flavonoids (Photos: 2 and 3).

Table (3a): Total phenolics, total flavonoids of *in vitro* grown seedlings of *Rumex vesicarius* L. (Polygonaceae) at different stages of growth (10, 20 and 30 days) on either solidified MS medium or agar.

<i>In vitro</i> grown seedlings	Total phenolics (mg GAE _s /g F.W.)		Total flavonoids (µg/g F.W.)	
	MS medium	Agar	MS medium	Agar
10 days old	1.910±0.334	0.074±0.334	42.930±3.849	106.350±3.849
20 days old	3.833±0.334	0.115±0.334	34.993±3.849	86.040±3.849
30 days old	1.167±0.334	0.130±0.334	37.868±3.849	76.460±3.849
L.S.D. (0.05)	1.029		11.861	
L.S.D. (0.01)	1.443		16.629	

Table (3b): Total phenolics and total flavonoids of different plant parts of early vegetative wild plantlets of *Rumex vesicarius* L.

Plant organs	Total phenolics (mg GAEs/g F.W.)	Total flavonoids (µg/g F.W.)
Leaves	0.405± 0.178	2835.000 ± 305.757
Stems	0.340± 0.178	545.000 ± 305.757
Roots	1.695± 0.178	458.000 ± 305.757
Whole plant parts	0.386± 0.178	1986.000 ± 305.757
L.S.D. (0.05)	0.580	997.127
L.S.D. (0.01)	0.845	1450.720



Photo (1): Seedlings grown on MS medium at 20 days old as a rich source of phenolics.



Photo (2): Seedlings grown on agar at 10 days old as a rich source of flavonoids.



Photo (3): Early vegetative wild plantlets of *Rumex vesicarius* L. as a rich source of flavonoids.

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The importance of indigenous knowledge in agricultural development

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Abstract: Different definitions were presented about indigenous knowledge by experts that each of them present their idea about this knowledge from their viewpoint. Each of them emphasis on a special aspect of indigenous knowledge according to their viewpoint. Oxford vocabulary define the word indigenous knowledge such this" it is created naturally in a region which is related to the people of that region. Indigenous knowledge is a knowledge that has been grown in a long time and has transferred from one generation to other generation in hereditary form . Williams and Molina have defined indigenous knowledge such this: indigenous knowledge is the learning methods, understanding and attitude to the world which is the result of experience and solving problems according to test and error by the people who are active and have used their available resources on its suitable time. Chambers with emphasizing on people's role in development process, believed that the phrase rural people's knowledge is more sensible than the other phrase such ethnic ecology, ethnographic knowledge, ethnic classification. He also believed that indigenous knowledge is a knowledge that is created naturally and is emanated from geographical circle.

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Keywords: Indigenous knowledge, rural women

Introduction:

Agriculture part is bearing the most damage in this rapid industrialization process. Absolving old and compatible ways in agriculture part and replacing and using of implant, harvest patterns without any proportions with environment has caused decrease of production efficiency, soil erosion and hard destruction of environment during a long time. Finally, at the end of the 20th century decades, some solutions were suggested to solve these inconsistencies and problems. So the importance of native knowledge and effort in compilation of that with modern knowledge were considered and it was tried to make general and stable view in relation with environment and the way of living through this way (popzan, 2002).

On the other hand, the colonist countries attention to industrial productions and agriculture policies has caused to promote industrial and single product agriculture which will influence the native farmer's knowledge about different productions and will make it inconspicuous. Also, colonized plans and imported extension programs have intensified the alienation of native knowledge (Nowroozi and Alagha, 2000). In the middle of 1980 decade, there was a new view" giving priority to farmer" that increased the attention to native knowledge. This view that emphasized on "listen people and learn of them" emphasized on people's active communion on developing and searching process. Before using of this way, understanding rural society's culture was in another way and it was thought that rural people have failed

in economic, politic, innovation and its transfer, creation of knowledge and using of that in rural societies. Before representation of this attitude "giving priority to farmer", it was thought that development need in other people management who are not living on that village. But in this way, we look rural people as the one who are able to solve their problems with relying on their knowledge and experience (Eshraghi, 2000).

Indigenous agriculture is base on farmer's cooperation with nature. Sustainable agriculture that inspired by indigenous systems would rectify most of deficiencies of modern agriculture. Indigenous agriculture systems is production of centuries of cultural and subsistence revolution. These systems are collections of farmer's experiences that haven't enjoy sources except inputs, capital and indigenous knowledge. And consequently they accessed to such sustainable agriculture that just is dependent on using restricted local resources and existing humane and animal power. At indigenous agriculture, culture diversity and frequency would minimize possibility of loss crops in spite of simple technology. These systems despite of limitation of sources enjoy merits of sponsors traditions and intelligent methods of using animals, fields, and compatible crop species. Thus ecological agriculture scholars consider these systems as unique samples to determine sustainability standards in agricultures activities (Penny, 2001).

This knowledge would rise at different fields such as language, botanical and zoology and also skills and manual and agriculture professions that all are

product of human efforts in his environment. This information contain best, useful and consistent collocation of exploiting methods and living in special environment which be transmitted through verbal and empirical way from one generation to another (Smita, 2003).

unlike development that is dependent on using maximum of natural sources in order to current generation's access to maximum economic growth and income , sustainable development insists on supplying current generation's needs without jeopardizing next generation's facilities for supplying their needs. Policy making is impossible and unacceptable with no program that leads to starvation, poverty, social inequality and environment pollution at cities and villages and finally to ecologic devastation. In contrast, kind of development is acceptable that leads to continues improvement of life quality for all global society and next generations. Accessing to this goal is possible just through protecting natural sources and sustainable use of these sources.

Accessing to indigenous knowledge would enforce primary foundation of sustainable development. On the on hand, indigenous knowledge is production of empirical learning process and at the other hand is test and error of few thousand years of one society in relation to its environment. It is obvious that this knowledge represents human's interaction with nature and displays features of climate and specifications of vegetarian and animal nature of one region and more important , it displays their interactions with human(Kolawopole, 2001).

By possessing this valuable information it is possible to predict its component relations , and it is possible to use of its latent power intelligently so that both balance be preserved and also human's needs be supplied.

At the other hand furthermore valuable latent information in indigenous knowledge, villager's epistemology would enforce relation between experts and local men. This issue is possible through deep analyzing of indigenous knowledge and familiarizing with local people's attitudes and epistemology and through that raft between men and experts would be restored. Everything is inter-related at village and intelligent rural people by considering accessible things in nature or easily is obtainable, would supply their needs (Box, 1999).

Broaching indigenous knowledge issue in order to presenting new approaches was reinforces in current decade which insists on human-oriented developing and sustaining. In this attitude, development process, environmental, social and cultural considerations, was considered important in addition to economic interests. Principle of sustainable development can be

summarized so that development should be consistent with desired society from aspects of sustainable environment, fair social aspect, and from economic efficiency and cultural viewpoint. Considering people's indigenous knowledge was emphasized directly or indirectly as one of the development needs, at most of forty principles of sustainable development charter. Considering indigenous knowledge means accepting variation principle and describes that all people share and participate at variation and culture richness and they create common human's heritage. Sustainable development would not be able to be success without identifying people's indigenous knowledge, role and its position and also without protecting knowledge and indigenous people's rights, because indigenous knowledge has most consistency with principle of sustainable development (Karami and Moradi, 2003). Necessity of attention to indigenous knowledge was appeared more due to failure of common development samples, especially at rural development, and being attracted to it to help formal knowledge was identified very critical. At the context of cooperative approach as new approach that is base on paradigms which forms concepts of development, focus on new revolution is emergence of new proficiency that is called indigenous knowledge. Cooperative approach is seeking to systematic use of indigenous knowledge at related researches to technologic actions.

According to different definitions of indigenous knowledge, it is possible to count it as part of unique culture of each ecosystem or country and that is knowledge and findings which obtained through experience in order to be consistent with certain ecosystem conditions, and changed as part of social and productive culture of that society over time. This acknowledges, represent compatibility methods with nature and establishing reasonable relationship between human and his environment. And has complete harmony with principle of sustainable development, form this viewpoint (Burger, 1997).

Characters of indigenous knowledge :

The characters of indigenous knowledge like the definition of this knowledge are presented by experts in different ways which we will explain about them as follow:

1- it is based on experience:

Indigenous knowledge is the result of people's experience during many centuries.

2- it was tested during centuries by working on it.

3- it is compatible with indigenous environment and culture:

Indigenous knowledge was created through native societies and it was formed according to their needs

and during time the things which were not compatible with indigenous environment were omitted, so what was remained was compatible with the environment and culture of that society (Amiri Ardekani and 2003).

4- it is dynamic and is changing:

Simultaneously with changing indigenous culture, the indigenous knowledge was changing too.

5- the knowledge of rural people was not technical:

This knowledge was consisted of rural people's wishes, values and preferences.

6- the rural people's knowledge is not statistic:

This knowledge was formed according to people's culture, social and economic history. The history which was written by these rural people shows that their manner and activities were efficient in changing of their conditions.

7- rural people's knowledge is not enough.

Maybe the rural people are knowledgeable but they like to know more and more. Because they want to be powerful in their discussions with political, economical and social forces who made these people poverty before give them technology (Zare and Yaghoubi, 2003).

8- rural people's knowledge has root on their political economy and is more important in political field.

The advantages that rural people can get from indigenous knowledge are the knowledge that is created and released locally and is on their authority and also depends on main factors in regional politic economy (land distribution, marketing relations, and vertical links and ...). So improvement of their livelihoods depends on interferences which were made to pervade on these main factors.

9- most of the rural people are public-oriented

Mostly, they have a little information about many things which is in contrast with academic educations. Specialist people in universities have deep knowledge in little fields (of course some of these native people are specialist too) (Razavi, 1999).

10- indigenous knowledge systems are holist:

Local people consider the other people's problems as their problems and try to solve these problems in a whole frame with using their knowledge.

11- indigenous knowledge systems combine the culture and religious believes.

Religious believes as a part of indigenous knowledge are not separated from technical knowledge and these believes effect on people' do and don't

12- indigenous knowledge systems prefer the less risk to most profit

Escaping of risk is important for native people, for example a native person usually keeps some goats for

possible cases such as disease of his children and he and he didn't expect any incomes of these cases.

Conclusion:

effort and national commitment and multi-dimensional support is very critical for recording, valuing, extending and exchanging this rich source and also preparing mechanism and practical strategy for synthesizing this knowledge with new knowledge and agricultural development programs.

Agricultural extension was identified as one powerful IT focused area, due to role variation at knowledge system and agriculture information at one hand and at the other hand due to its dependence on various exchanges among farmers, that can has great affect on rural society and developing agriculture. So that work and productions of farmers would increase by farmer's access and use of Internet and subsistence farmers at all over the world are at developing by gaining needed knowledge and information that during time would becoming as commercial producers. Transmitting from system-cycle source of agriculture to technology-cycle system of agriculture placed more responsibility on agricultural extension because agriculture extension system is as vital technology transfer crossing to farmers at one hand and as crossing for referring feedbacks, needs and agriculture issues, researchers and policy makers of market.

What that is obvious is that extending and researching agriculture can help to sustainability through close relation to farmers , attending to their experiences , gaining their information and logical understanding of agriculture activities , attending to their vital needs for doing "demand-base" researches and extension education efforts for developing agriculture , at process of improving agriculture development.

Finally native knowledge as a constant structure, with many years experience could attain a deep understanding and insight of the environment and ecologic exchanges. This knowledge is conveyed to next generation and the next conveyed it to their children. Native knowledge is on the verge of destruction like a curative prescription that has hidden a constant glamour on it. By dying each native person, the great treasury of knowledge will lay underground and these knowledge sources are destroying very speedily.

On the research which was done by Bozarjomhari (2004) with this title "analyzing native knowledge position on rural sustainable development". It was specified that although there are many differences between native and modern knowledge but they are not in contrast with each other, because they are each other's supplement and we can't be success when we

use them separately. According to new parameters in rural development, for solving rural problems, at the first we should use of native solutions and if it was not efficient, we can use and test external solutions.

Research findings which was done by Emadi and Amiri (2004) with this title " compilation of native and modern knowledge is necessary for reaching agriculture sustainable development" signify that The believe of educated people to native people and their knowledge " precondition for making them close" is called combination and compilation. Making evolution in modern system for attention to tentative knowledge is the main necessity for this compilation. Another necessity for this evolution is the researcher's attention to experimental accumulated wisdom and historical exploit by using qualitative and communion methods. Also applying compilation methods and making evolution among government, educational centers, farmers and peasant is the necessity and pre condition for combination of modern and native knowledge.

Research findings that was done by Karimi with this title " native knowledge in development process" signify that native knowledge was a essential element and important source for realization of sustainable development, poverty reduction, making local people capable and motivate them to participate in activities for agriculture and rural development, developing and product suitable technology, rural society's self-reliance and self sufficiency. For this reason all side's try, partnership and protection for record and registration, compatibility, distribution and promotion , exchange of this resources and also suitable and scientific guidelines for compilation of this knowledge with new knowledge and rural and agricultural development plans are needed.

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Decentralization in agricultural extension: implications and priorities

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Abstract: Over the past two decades many countries have undertaken to decentralize government functions and transfer authority and responsibilities from central to intermediate and local governments, and often to communities and the private sector. Decentralization is potentially important to agricultural knowledge and information systems, but decentralization is not an end in itself, and successful decentralization strategies must address three challenges—establishing a national framework for decentralization, developing subsector approaches, and enhancing capacities of various participants for coproduction of decentralized goods and services. Agricultural extension services are under increasing pressure to become more effective, more responsive to clients, and less costly to government. Decentralization is an increasingly common aspect of extension reforms. Field extension advisory services are well suited to decentralized approaches, but a comprehensive extension system requires a range of extension support services and programs, some of which (strategy formulation, training, monitoring and evaluation, specialized technical support) are often best carried out at the central level. The prime challenges in the traditional public extension systems enlisted as outdated, top-down, paternalistic, inflexible, subject to bureaucratic inefficiencies that results less ability to cope with the dynamic demands of modern day agriculture (World Bank, 2002; Obaa et al., 2005). In some countries the change is occurring with its natural pace but in many developing countries these have been accelerated by structural adjustment reforms.

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Introduction:

Agricultural extension increasingly has become defined as one or other of (apparently) differentiated activities of technology transfer or rural development. In many situations, the transfer of technology, heretofore considered the purview of public sector systems, has been reconceived. Such changes suggest a refocussing of paradigms for the delivery of public sector extension. In developed industrialized countries, which often provide models for extension service delivery elsewhere, the declining relative importance of agriculture for economic growth, the increasing education and affluence of smaller populations of rural producers, and the increasing use of externally purchased inputs have changed the nature of publicly funded extension services and led to a questioning of the means of delivery of extension services by governments. Agricultural extension is a non-formal type of education that provides advisory services by the use of educational approach in acquiring knowledge and skills to deal with the growing needs of global world. Diverse agricultural extension funding and delivery arrangements have been undertaken since the mid-1980s by governments worldwide in the name of "privatization." When agricultural extension is discussed, privatization is used in the broadest sense – of introducing or increasing private sector participation, which does

not necessarily imply a transfer of designated state-owned assets to the private sector.

Like other developing country Pakistan is also an agrarian country, whose economy is highly dependent on agriculture having 23% share to GDP (Government of Pakistan, 2005). But still the performance of agriculture sector at the farm level remains significantly below the potential and limited due to the weak institutional formwork in disseminating agricultural technology to the farmers (Farooq, 2005). Research scientists evolving new methods and technologies to meet the challenges of new era and the farming community also has a potential and courage to adopt but the third component i.e. agricultural extension, which serves as a technology transfer vehicle and play a significant role in increasing the productivity, farm incomes and ensure food security has been very much weak since independence (Luqman et al., 2004; Farooq, 2005). The extension services in the country have not been able to achieve their goals effectively, because of a number of bottlenecks. These include weak research-extension linkages, lack of adequate resources for on-farm demonstrations, poor mobility, inadequate research and training in extension methodology and lack of an effective system of continuing education for extension personnel at various levels (Sandhu, 1993). Among major filed crops wheat, rice, cotton and sugarcane accounts for 90.4% of the value added

in major crops and 37.1% of the value added in overall agriculture (Government of Pakistan, 2005). The low production of these crops depends upon a number of factors including ineffective and isolated agricultural extension system.

Decentralization as transfer of authority and responsibility for government functions from central government to intermediate and local governments, and often to communities and the private sector has become widespread over the 1980s and 1990s. Countries with diverse systems and traditions of government have pursued decentralization initiatives for many reasons, including especially the failure of government to meet expectations under centralized approaches to economic management and service approaches to organizing public administration. Though not yet widely applied to agricultural research and extension, decentralization strategies are potentially important to these agricultural knowledge and information systems. Decentralization is frequently viewed from one of two different perspectives (Johnson, 2000).

1. The democratic view emphasizes the aspect of empowering local people to control and direct their own public programs; and

2. The administrative view emphasizes the efficiency gains resulting from improved administration and effectiveness of public programs due to local control. Decentralization is generally expected to: encourage local financing and ownership of programs, result in more efficient and equitable allocation of government resources, provide incentives for production and service delivery, ensure lower-cost service delivery, build local capacity, and respond more effectively to local needs. (Khan, 2002).

For rural programs, decentralization offers hope for correcting the urban bias that results from the geographic dispersion of rural people, the difficulties for them to organize to promote their interests, and the discrimination against agriculture inherent in many country policy frameworks. Decentralization of agricultural extension and research seeks to increase user participation in technology programs and make programs more accountable to users. (Eicher, 2001). Enthusiasm for decentralization needs to be tempered with some caution. In small countries, decentralization may be unnecessary and in very large countries decentralization to the state or provincial level may still leave programs distant from user influence. Definitive evidence of the impact of decentralization is limited and not everyone benefits from any reform. Furthermore, decentralization does little to improve intraregional disparities, may bring oppressive elites into power, and can lead to greater inequalities in allocation of government resources.

Thus, decentralization has the potential to increase access to and cost of services, but specific targeting mechanisms and strong central oversight are needed to avoid inequities in service access and quality. (Farooq, 2005).

Decentralization:

Extension services differ from research in two important ways that affect their potential for decentralization. First, extension advisory services (field extension services) come in direct contact with clients and provide services that have a high private-goods content. These characteristics make field extension services a much better candidate for decentralization than research, which typically has a longer-term payoff. Local producers are more willing to commit resources to pay for effective extension services from which they realize immediate direct benefits. Still, there remains a need for other extension services to address “externalities”—environmental problems, food quality or safety concerns, or social equity issues (that is, special needs of small farmers)—that are in the public interest, but are not a priority for individual producers or decentralized institutions. This requires continued central support for extension. A second difference between research and extension is the scope and scale of programs. (Williamson, 2002).

Research institutions are generally smaller and more concentrated. Extension programs typically operate across the country, provide information on a wide range of technologies from various sources, and draw on traditional knowledge and farmer innovation to improve producer organization, management, production, and marketing functions. The broad demands on extension require strategies that incorporate a variety of approaches to providing services.

Despite the apparent suitability of extension service provision to be decentralized, they are often highly centralized. A World Bank study of 19 countries found that in the early 1990s 13 countries or regions showed almost no evidence of decentralization of extension services. Colombia, Jiangxi (China), the Philippines, and Nusa-Tenggara-Timor (Indonesia) were relatively highly decentralized, and Poland and Tunisia showed some decentralization. The study found that:

- When extension is decentralized there is a fairly good balance in fiscal, administrative, and political decentralization;
- Political decentralization (the role of elected officials) lags other elements of decentralization; and
- NGO involvement is moderate and farmer participation is significant in extension.

Underlying these conclusions was the fact that institutional development and civil society provide important support to decentralizing extension services. (FAO, 2001).

Deconcentration is intrinsic to extension services that are provided in dispersed fields and communities throughout a country. Cropping systems, markets, agroecological zones, and ethnic and cultural characteristics of farmers can vary widely within a country, and moving administration closer to field services can substantially improve program management through better understanding of local conditions. Administrative decentralization goes further by making extension programs directly responsible to local authorities. The challenge in any successful decentralization reform is that of maintaining overall program quality and coherence. Decentralized extension programs are limited if the decentralized administration lacks awareness of new technologies, sources of assistance, and extension methodologies. Although decentralized administrations can effectively integrate local institutions, organizations, and technologies into an extension system, major benefits from formal extension often come from integrating external knowledge into the local system. Lack of coordination between local administrations can be a problem. If many localities promote a single commodity, the result might be overproduction and low prices. Similarly, separate localities might finance the same feasibility studies, training programs, or extension materials. Implementing an integrated watershed or regional development plan might prove impossible if programs in each administrative region are completely independent. Other potential problems include the lack of career opportunities for extension staff in decentralized programs, and difficulties with monitoring and evaluation when local administrative units lack ability to compare targets, results, and achievements with other areas. (Khan, 2002).

Extension program quality depends fundamentally on good linkages with other programs—specialized training for extension agents and farmers, technical backstopping by subject matter specialists and information services, other extension services (mass media, fairs), and other development programs (credit programs, market development programs, input supply).

Some of these linkages can be maintained at the local level, but many require higher level coordination to ensure efficiency and quality support.

Government inability to sustain financial support for large extension systems has been a motivation for the many reforms that attempt to reduce public sector funding, introduce private financing, or eliminate

government programs that compete with the private sector. Typically, these strategies tend to decentralize extension financing. Although an objective of many decentralization reforms has been to reduce government expenditures, local governments generally have limited resources and limited ability to raise funds. Central governments therefore must usually continue financing for extension services through intergovernmental financial transfers (IGFTs), and must also finance the considerable costs of reform and local capacity development. This increases total financing requirements for extension, at least over the short term. Over the longer term, decentralizing extension services might reduce government financing requirements by: (1) increasing efficiencies through better oversight and greater flexibility in funding decisions and (2) increasing cofinancing by being more responsive, and demonstrating greater benefits, to users. Cofinancing grants (IGFTs) to local governments or farmer groups are an important element of fiscal decentralization, but they present two significant problems: (Chapman & Tripp, 2003).

- Many local organizations lack capacity to plan, manage, and evaluate extension programs and lack the contacts and financial management capacity to procure needed services; and
- Resource-rich farmers are better able to cofinance services and capture program benefits, even if program objectives are to assist weaker elements of rural society. Still, many new initiatives are using subgrants of various types for local subprojects, and future program design can draw on this experience. Decentralization programs must address these two problems. Training and orientation, program promotion, and support services are critical to enable target clients and local organizations to take over extension responsibilities under new decentralized systems. Later, as programs are implemented, a strong monitoring and evaluation system is needed to provide management with information necessary to understand who is benefiting from the program and what real impact it is having (Farooq, 2005).

Conclusion:

Decentralize extension services where possible, with emphasis on giving users control over program planning, implementation, and evaluation.

- Provide for adequate centralized support systems for decentralized extension services, especially support for training, subject matter specialists, and production of extension materials.
- Adapt strategies to local institutional environments to accommodate country legal frameworks, political traditions, administrative structures, and social and agroecological conditions. Extension strategies can

emphasize decentralization when there is already a strong political decentralization in the country, but should proceed cautiously when decentralization is not yet well established.

- Determine on a case-by-case basis whether decentralized services should be managed by local governments, community/producer organizations, or local governments in conjunction with producer/community organizations.

- Provide clear division of responsibilities between the different levels of government and other program participants.

- Develop procedures for policy formulation and priority setting in mixed systems to reconcile central government financing and policy objectives (poverty alleviation, food security, and environmental conservation) with local peoples' priorities that emerge from the decentralized program governance.

- Provide for needed fiscal transfers from central government to decentralized implementing agencies to finance decentralized extension services, recognizing that over the short term decentralization rarely reduces requirements for central government financing.

- Structure fiscal transfers to give users maximum influence over programs and to promote institutional pluralism in service provision. This empowers users and develops capacities in a range of public and private providers, such that the most competent institutions are able to provide the services.

- Provide for extensive planning, promotion of the rationale and principles behind reforms, and training in new operational procedures before launching decentralization reforms.

- Provide for needed investments in development of local capacity (local governments, executing agencies, community or producer groups), as such implementation capacity is critical to success of decentralization reforms.

- Establish effective systems to monitor and evaluate decentralized programs, and ensure that the data are available at all appropriate levels. Central monitoring should be sensitive to equity issues and the possibility of local elites capture of programs, thus excluding services to the poor or women.

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Using of E-learning in agricultural education

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Abstract: Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home. The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections. Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

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Keywords: E-learning, distance education

Introduction:

With a view to clarifying this issue can be paid in the best way to create a platform for developing data standards and access to a knowledge based society, what really can be. To achieve a clear and practical answer in this area before all the existing definitions and indicators mentioned placed.

When the standardization and the requirements for training by the third millennium will be talking, unconscious form, design and construction to provide context and use tools and indicators to teaching the principles of community-based knowledge to the mind is centered. . No doubt these requirements and identify the correct tools and proper utilization of their functions according to accelerate the development expected in the knowledge-based information society will be effective. Such concerns and problems that any country in its development plans in motion to the information becoming a knowledge based society means a society would be faced with the centrality of knowledge, Dealing with existing tools and how these tools are used.

Led the way when dealing with those massive training programs available to speak to the technological tools that we expect to occur that planners and decision makers that planners and decision makers of large structures, especially

university education according to the image Access to the development of community information are available on these tools are selected and used.

Massive wave of data produced in today's world it nicknamed the "information age" has all day and through various means of communication in the world will move on its size are added. Other hand, as we're not the world witnessed the development of the role of information communication devices transporting feedback fast and absorb the information around the world, we forget

Educational methods in distance learning:

Today, under the new system replaced the traditional systems of learning and learning week (ie tutoring methods, lectures) are:

- **Multimedia courses:**

These courses and widely used elements of image, communication, graphics and simulated components, animation and communication elements for guidance and tips, and talk back on course and curriculum issues are held.

- **Enhanced communication mechanisms:**

The mechanism of any texts simultaneously, and asynchronous audio-visual communications to protect you. This case allows students to practice on topics learned will give.

- Written test:

thus, question and test via a distributed communication network, are corrected and returned. These exams through video conferencing support and runs.

-Virtual Seminar:

thereby different groups of students in different geographical environments linked together makes.

- Collaborative virtual laboratories:

the laboratory of the Group's activities are supported. Workshops such as software engineering.

-Smart academic factors:

academic factors that inform intelligent, support and guidance students pay.

Key factors in the process of distance education:

the process of remote training, the following factors contribute:

- Students:

Regardless of educational content, role and main element in the learning process students are responsible.

- Coaches and Teachers:

Success depends on a lot of educational activities the ability, skills and knowledge are the coaches and professors.

- Facilitators of communication:

Facilitator bases, as the bridge between students and mentors are. Must base expectations of teachers and educational needs of students and service coordination and communication to create.

- Support staff:

One of the important pillars of any development of distance education programs, by development group finds. Operational support staff such as student registration, copy and distribute their resources, order textbooks, security and copyright, and are responsible for the report.

- Management:

The group decision makers, builders and judges are considered to be educational and should be considered among the factors above, establish the correct relationship formation.

**Advantages of E-Learning: Benefits of E-Learning
What are the e-Learning advantages and what are the disadvantages?**

This is an important question to consider before making a final decision whether to enroll online learning or not.

It is known that Online Education with its e-learning software tools offers a new experience but does it work for everyone?

This experience may not be for everyone, professionally and personally, however it does have its strong point, advantages, and unique feature worth knowing.

This article reviews and discusses the best features it provides -

E-Learning Benefits – E-Learning Advantages:**1. Accessibility**

Online classes are very attractive to some people because of their unprecedented accessibility: virtual classes in any online institution can be accessed from anywhere on the planet. The internet also allows much greater time flexibility, though it does not mean an absolute absence of submission and exam dates. For many, online education means – being able to study an advanced degree during breaks at work or at night from home.

2. Geographic diversity – Ease of accessibility

Many universities are renowned for their diversity. But online institutions create unprecedented possibilities in this area. The e-learning technology they use enables accessing classes online – It is possible for any person on the planet to study in any online course (and online school/university) without the need to travel and reside abroad. For this reason diversity can be far greater than in any traditional university.

3. Classroom Size and Manageability

Traditional education cannot afford to have very large classes, especially in advanced degrees. Then e-learning means and tools answer this need – Online education allows a greater number of students to be accepted to their desired courses since managing students online is easier.

4. Self-Paced Studies

The internet allows an unprecedented degree of freedom in pacing and spacing one's studies. This is a great appeal to those who like a lot of freedom and have learning rhythms which do not align with traditional campus life.

5. Learning tools and means

e-Learning offers different learning experience – It is a new technology based on standard means and tools such as – videos, e-books, online interactive means and activities. One may even select instructional material and work their own way/level to their degree.

6. Asynchronous Communication

Another advantage of e-learning methods is the use of asynchronous communication. Asynchronous communication is a communication through such online technology as email and online message boards.

Communicating online is easier for those who cannot express themselves face to face. It also allows time to

think before responding, which you do not really have in a classroom discussion.

7. Biased Interactions

There tends to be less bias online, because the setting is less direct and intimate. For many, this is another great plus.

Conclusion:

In the earlier days of distance learning, it was most common to see distance learning used for rural students who were at a distance from an educational institution. The student might watch a telecourse on a television stations, read texts, mail in assignments and then travel to the local college to take an exam. This model is still in use, but as the technology has become more sophisticated and the cost of distance learning dropped as equipment prices dropped, the use of distance education has increased.

High front-end costs prevented an early widespread adoption of electronically mediated learning. Distance learning has been aggressively adopted in many areas because it can meet specific educational needs. As the concept of accountability became accepted and laws required certain courses in high school in order for students to be admitted to state colleges, telecommunications was examined as a way to provide student access to the required courses. Many rural school districts could not afford the special teachers to conduct required courses. Distance education met this need by providing courses in schools where teachers were not available or were too costly to provide for a few students. It also fulfilled a need for teacher training and staff development in locations where experts and resources were difficult to obtain. These systems link learner communities with each other and bring a wide array of experts and information to the classroom.

The key to success in distance learning is the teacher. If the teacher is good, the technology can become almost transparent. No technology can overcome poor teaching which is actually exacerbated in distance education applications. When skilled teachers are involved, enthusiasm, expertise, and creative use of the media can enrich students beyond the four walls of their classroom.

Teachers need training in the system's technical aspects and in the educational applications of the technology. Areas for assistance include the amount of time needed to prepare and teach courses, how to establish and maintain effective communication with students, strategies for adding visual components to audio courses, ways to increase interaction between students and faculty, planning and management of organizational details, and strategies for group cohesion and student motivation.

The interchange of ideas requires different communication methods than in conventional

classrooms: information technologies are predominantly visual media, rather than the textual and auditory environment of the conventional classroom, the affective content of mediated messages is muted compared to face-to-face interaction, and complex cognitive content can be conveyed more readily in electronic form because multiple representations of material (e.g., animations, text, verbal descriptions, and visual images) can be presented to give learners many ways of understanding the fundamental concept.

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Social Capital and Human Development: A Meta-Analysis in Iran

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Abstract: This meta-analysis aims to assess the influence of social capital on the Human Development Index, Human Poverty Index, and Gender-related Development Index in Iran. The results reveal a positive and significant relationship between social capital and the human development index (HDI). The effect of social capital on the Human Poverty Index (HPI) was negative and significant. However, no significant relationship was found between social capital and the Gender-related Development Index (GDI).

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Keywords: Social Capital, Human Development Index, Human Poverty Index, Gender-related Development Index, Iran

1. Introduction

Poverty, education, and a healthy long life are among the most important issues facing human society, and social and economic development is the main solution that nations of the world have chosen to address such problems. New research has shown that social capital affects the process of development as well as the above-mentioned problems.

In recent decades, sociologists and economists have acknowledged that physical capital is not the only available and necessary kind of capital. Evidence indicates that human capital, natural capital, cultural capital and social capital also have an important role in human social life. Although social capital is recognized as a core concept of development, scholars have not given adequate attention to this concept in developing countries.

Moreover, previous research has shown that social capital is consistently and positively associated with many indicators of human development (Castiglione, Van Deth, & Wolleb, 2008; Häuberer, 2010; Norris, 2001, 2002). Social capital is fundamental to the concept of human development. Social capital involves economic development by facilitating transactions among individuals, households, and groups in developing countries (Bourdieu, 1983; Coleman, 1988; Fukuyama, 2001, 2002; Putnam, 1995; Woolcock, 1998; Woolcock & Narayan, 2000). Narayan and Pritchett (1997), and Grootaert (1999) have shown econometrically that the ownership of social capital has strong effects on improving household welfare and family economic status. Lisakka and Alanen (2006) and Nieminen (2008) identified the strong relationship between education and social capital. Alanen's research

(2006) findings revealed that an increase in trust and participation, which are two major elements of social capital, is associated with an increase in the level of education. Caplan and Choy (1992) established that people who participate in educational matters create and foster a social network, and, as a result, build social capital. In addition, many scholars have found a positive and statistically significant relationship between indicators of social capital and public health and life expectancy (Baum, 1999; Helliwell, 2006; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Marmot, Wilkinson, & Ovid Technologies, 1999; Pearce & Davey Smith, 2003). Furthermore, according to Sabatini (2007), bonding and bridging social capital impede human development whereas linking social capital promotes human development.

Therefore, it can be concluded that social capital has a proven relationship with income, education and life expectancy. These three dimensions are used by UNDP to create indicators such as HDI, HPI and GDI for the assessment of human development in different countries.

2. HDI, HPI and GDI

HDI measures a country's average achievements in three basic aspects of human development: a long and healthy life, Knowledge (as measured by the adult literacy rate) and a decent standard of living (as measured by GDP per capita). The breakthrough for the HDI was the creation of a single statistic to serve as a frame of reference for both social and economic development (UNDP, 2010).

The Human Poverty Index (HPI) is an indication of the standard of living in a country, also

presented by the UNDP. The HPI uses indicators of the most basic dimensions of deprivation: a short life, lack of basic education and lack of access to public and private resources (UNDP, 2010).

The Gender-related Development Index measures achievement in the same basic capabilities as the HDI does, but takes note of inequality in achievement between women and men. It aims to show the inequalities between men and women in the following areas: long and healthy life, knowledge, and a decent standard of living (UNDP, 2010).

3. Social Capital

Social capital is 'the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition' (Bourdieu, 1986). Social capital refers to connections among individuals, social networks and the norms of reciprocity and trustworthiness that arise from them. In that sense, social capital is closely related to what some have called civic virtue. Public and political participation, informal relationships, level of trust, public awareness, and rate of crime are the main indicators for the assessment of social capital (Putnam, 2000; Saadat, 2008).

4. Research Hypotheses

Based on the aforementioned, the hypotheses of the research are presented as follows:

H 1: There is a relationship between social capital and the Human Development Index in Iran.

H 2: There is a relationship between social capital and the Human Poverty Index in Iran.

H 3: There is a relationship between social capital and the Gender-related Development Index in Iran.

5. Methodology

This meta-analysis examines the effects of social capital on the three essential indicators, HDI, HPI and GDI, as presented by UNDP. We included four nationwide researches conducted in Iran: (a) level and distribution of social capital in Iran's provinces (Saadat, 2008), (b) ranking of Iran's provinces according to indicators of human development (Azar & Gholamrezayee, 2007), (c) reviewing status of Iran's provinces according to Human Development Index (Bakhtiari, Dehghani, & Majid, 2008), and (d) human development in Iran (Sadgi, Abdolahi Haghei, & abdolahzadeh, 2008). These researches provided detailed and accurate information concerning human development and social capital. We have provided a chart explaining the situation regarding the social capital and human

development indicators in each province of Iran. Then we employed SPSS software and tested the Pearson r Correlation Coefficient between variables to identify significant relationships.

6. Results

Table 1 shows that the highest rate of social capital (26.8948) was found in Golestan province, and the lowest rate of social capital was in Sistan province (12.4130). Sistan also has the lowest rate of Human Development Index (0.5820) and the highest rate of Human Poverty Index (0.3320). Tehran, in addition to the highest rate of Human Development Index (0.7780) and Gender-related Development Index (0.62), has the lowest rate of Human Poverty Index (0.0810). Zanzan Province, however, has the lowest rate of GDI (0.13).

Table 1: Distribution rate of social capital, HDI, HPI, and GDI in Provinces in Iran

Province	SC	HDI	HPI	GDI
Azarbaiejan Shargi	18.9643	.687	.206	.54
Azarbaiejan Gharbi	24.8260	.643	.220	.50
Ardabil	15.1714	.639	.223	.52
Esfahan	24.5156	.733	.128	.57
Ilam	14.8266	.708	.164	.54
Bushehr	20.6883	.720	.155	.44
Tehran	22.9292	.778	.081	.62
Charmahal Bakhtiari	23.7916	.681	.180	.50
Khorasan	25.5156	.684	.162	.54
Khuzestan	18.2747	.761	.143	.48
Zanzan	21.7227	.658	.197	.13
Semnan	13.1026	.740	.130	.50
Sistan-va-Balochestan	12.4130	.582	.332	.30
Fars	27.9292	.708	.137	.52
Qazvin	19.3091	.731	.142	.50
Qom	24.1364	.711	.141	.52
Kordestan	20.6883	.614	.242	.31
Kerman	21.7227	.713	.154	.54
Kermanshah	21.0331	.659	.186	.47
Kohgiluyeh Boyer Ahmad	13.0338	.676	.203	.45
Golestan	26.8948	.676	.162	.55
Gilan	24.4812	.709	.149	.60
Lorestan	18.2747	.676	.172	.46
Mazandaran	16.2058	.717	.143	.55
Markazi	23.1019	.734	.156	.48
Hormozgan	17.2403	.715	.200	.45
Hamadan	23.4468	.673	.172	.49
Yazd	26.8604	.740	.133	.56
Minimum	12.4130	.582	.081	.13
Maximum	27.9292	.778	.332	.62

Table 2 explains the distribution of social capital, HDI, HPI and GDI in three main categories. According to these results, 42.9 percent of provinces have high social capital, 32.1 percent are average and 25 percent have low social capital. Comparing the HDI makes it clear that 39.9 percent of provinces are

in the high rate of the index, 46.4 in the middle and 14.3 are in the low rate of the HDI index. Only 3.6 percent of provinces can be categorized as high rank when we assess HPI. More than half, 51.7 percent, of the provinces are in the low level of HPI and 39.3 are average. Finally, the results concerning GDI indicate that 78.6 percent of provinces are in the high GDI category. Table 2 also shows that 17.9 percent of provinces are average and only 3.6 percent are in the low category of the GDI indicator.

Table 2: Category Distribution rate of social capital, HDI, HPI, and GDI in Provinces in Iran

	SC		HDI		HPI		GDI	
	Fi	Pi	Fi	Pi	Fi	Pi	Fi	Pi
Low	7	25	4	14.3	16	57.1	1	3.6
Average	9	32.1	13	46.4	11	39.3	5	17.9
High	12	42.9	11	39.3	1	3.6	22	78.6

When we examined H1, as depicted in Table 3, we found a weak linear relationship between the social capital and Human Development Index ($r = .296$, $p \leq 0.05$). The positive correlation coefficient of 0.296 indicates that as the score of social capital increases, the rating for human development improves. Since the average score is 0.05 and $p \leq 0.05$, H1 is supported.

Table 3: Mean, Standard Deviation and Pearson Correlation between social capital, HDI, HPI, and GDI

	Descriptive Statistics		Correlation	
	Mean	Std.Deviation	Pearson Correlation	Sig. (1-tailed)
HDI	.69521	.04386	.296*	.038
HPI	.17189	.04679	-.619**	.000
GDI	.4868	.09918	.277	.077
SC	20.7535	4.46607		

Furthermore, Table 3 illustrates a strong relationship between social capital and the Human Poverty Index ($r = -.619$, $p \leq .01$). The negative correlation coefficient indicates that as social capital increases, the Human Poverty Index decreases sharply, and vice-versa. Since the average score is 0.01 and $p \leq 0.05$, the relationship is significant and H2 is supported.

Finally, based on the data presented in Table 3, there is no meaningful linear relationship between the social capital and Gender-related Development Index ($r = .277$, $p = .077$). Since the average score is 0.077 and $p > 0.05$, H3 is not supported.

7. Conclusion and Discussion

The results of this meta-analysis support the findings of other research concerning the positive and significant relationship between social capital and human development (Christoforou, 2010; Levitte, 2003; Deepa Narayan, 2002; Sabatini, 2007; Woolcock, 2002; Woolcock & Narayan, 2000), and the negative and significant relationship between social capital and human poverty (Bourdieu, 1983; Coleman, 1988; Fukuyama, 2001, 2002; Putnam, 1995; Sabatini, 2007; Woolcock, 1998; Woolcock & Narayan, 2000).

Furthermore, according to the Legatum Prosperity Index (2010), social capital in Iran is very weak (Iran ranked 106 among 110 countries), which could be the reason for the weakness of the relationship between social capital and the Human Development Index and the reason for the Failure of H3. Tajbakhsh (2005), Saadat (2008), and Alaghband (2006) indicated that the decline of social capital in recent years is the main obstacle for the human development process in Iran.

Another important fact uncovered by the result of this research is the severe inequality among the different provinces in Iran. Table 1 shows that Tehran, which is the capital of Iran, has the greatest proportion of human development and social capital and least poverty. However, a border province like Sistan faces a lack of proper human development, is challenged by poverty, and has very low social capital. It seems important for the Iranian government to stop focusing on Tehran and various other central provinces and consider the more distant and poorer areas of the country.

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The Influence of Life Skills with respect to Self-Help Approach on Relapse Prevention in Iranian Adolescents Opiate Addicts

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Abstract: This study explores the importance of three elements of life skills, i.e. problem solving, critical thinking and ability to abstinence, on drug use and its effects on the prevention of relapse among male adolescent opiate users in Kerman, Iran. Life skills are one of the important factors that affect the recovery of addicts and presuppose relapse among adolescents. The lack of life skills is an operative factor to relapse among adolescents. The development of life skill was recognized as a factor that could help the adolescents in their efforts to avoid relapse. Iran is in the process of developing options concerning drug abuse treatment for opiate and other drug dependent patients while nearly 60% of its population is under the age of 25 (Farjad, 2000). Scholars emphasize the critical role of life skills to prevent relapse in adolescents and highlight the lack of life skill as a factor leading to relapse among adolescents (Barr & Parrett, 2001; Gorski, 2001; Gouws, Kruger, & Burger, 2000; Mc Whirter, 2004; Van Niekerk & Prins, 2001). Focusing on this issue, this research explores a new examination area and finally reinforces the result of the previous relevant studies in its own contribution. In this research 226 adolescents between the ages of 13 to 20 in ten rehabilitation centers were selected to answer the self-administered questionnaire. Benefiting from Pearson Correlation analyses, the findings represent a significant moderate negative relationship between life skills and relapse ($r = -0.453$, $p < 0.01$), i.e. the lack of life skills significantly raises the risk of relapse among adolescents. The study proposes some suggestions in order to prevent relapse after treatment in adolescents.

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Keywords: Life skills, Opiate Addiction, Adolescents, Recovery Process, Relapse Prevention

1. Introduction

Nowadays, addiction as the most vicious phenomenon of the present century threatens life, economy and families and societies (Youth at the United Nations, 2006). In fact, drug addiction is a big social and personal problem which influences not only the mind and body of the addict but also the health of a society concerning social, economical, political and cultural issues (Farjad, 2000).

These days adolescent drug use is a problem all over the world (Mental Health Touches, 2006). The percentage of addiction among adolescents is increasing recently, that is drug using mostly starts during the second decade of one's life.

Iran is also no exception. Substances used among adolescents is widespread in Iranian communities, schools and families (Azizi, 2004). According to Azizi (2004), drug use among Iranian adolescents is increasing, and is related to a multitude of problems. In Iran, male adolescents are more at risk of drug use than female adolescents because females are more powerfully monitored by their parents (Ghahramanloo, 2000; Mohamadi, 2006). However, when this monitoring is weak, the probability that they will

become involved with deviant peers, and also their involvement with drugs rises (Ziaaddini, 2005).

Previous studies have shown that among male adolescent pupils aged 12 to 20, 51.5% had tried alcohol and 33.7% had tried opiate drug (Chen, Dormitzer, & Gutierrez, 2004; Wendy & Lenn, 2007). Male adolescents may be disturbed to a greater degree than female adolescents from their surrounding environment, resulting in adjustment problems such as use of drugs (Nagpal, 2009).

As drug abuse in adolescent is increasing, the demand for treatment of drug addicted adolescents is also increasing. In spite of the attempts during the recovery processes, almost 2/3 of opiate addicts return to drug in just less than one year (Kaplan, 1997). According to statistics 78 percent of adolescents relapsed after they stopped using drugs after six months (Gorski, 2001).

Drug addiction is a persistent relapsing disorder (O'Brien & McLellan, 1996; Yahyavi & Ronald, 2009). Due to the variety of consumed including alcohol, nicotine (tobacco), heroin and opium, relapse -as a complicated phenomenon- has become a common widespread issue (Hunt, Bamett, & Branch, 1971; Marlatt & Gordon, 1985). Such high relapse percentages among opiate addicts have also been

reported in Iran (Mohamadi, 2006; Momtazi, 2010; Saeed, 2000). Research has proved successful results of many different treatments; however, high relapse rates are still typical across all classes of drug abuse (Hunt et al., 1971; Marlatt & Gordon, 1985). Usually the recovery processes are not inclusive enough and confine themselves to mere physical attendance for the purpose of detoxification, neglecting the important factors such as life skills, social, cultural, economic, environmental and family factors. Since after detoxification the addicts return to their family and society, we cannot expect a perfect quit without considering these factors carefully (Ghorbanhosseini, 1990).

Life skill is one of the important factors that effects on addicts in recovery and presupposes relapse among adolescents. The lack of life skills is an effective factor to relapse among adolescents. Life skills have been defined by World Health Organization (1994) as “abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life”.

The literature emphasized on the importance of life skills as an important source in supporting addicted adolescents during recovery. Dodgen & Shea (2000) by regarding social learning theory suggested that life skills will maintain relapse prevention and a sober life. According to Westhuizen (2007) those addicts who do not have life skills to start a new life during their recovery, will return to drug again after treatment.

In a study on adolescents relapse prevention, Gorski (2001) argued that the focus only on the addiction without any attend to development of life skills can lead to relapse, and life skills cause the strength of addicted adolescents in recovery. Van Niekerk & Prins (2001) are holding the opinion that the development of life skills leads to empowerment on individuals and community levels. Furthermore, the literature recognized the following life skills as important factors to prevention relapse: stress management, problem-solving skills, decision-making skills, critical thinking, assertiveness training, communications skills, self-care, abilities to abstinence (Barr & Parrett, 2001; Fisher & Harrison, 2005; Gouws *et al.*, 2000; Velasquez *et al.*, 2001).

In Westhuizen's study (2007) time management and critical thinking are recognized as a life skill that has a very important role in relapse prevention of adolescents during recovery. According to him, an addict who is not equipped with life skills to start a new life when they are in recovery will return to using drugs after treatment. Based on social learning theory, Dodgen & Shea (2000) stated that life skills, inclusively: anger management, refusal skills, problem-solving and

relaxation will assist an addicted person to prevent a relapse and to conform to a sober life. Mc Whirter *et al.* (2004) warned that adolescents in recovery are located at risk before acquiring the necessary life skills.

The need for further research in this field and a more profound understanding of the drug abuse adolescents who have relapsed after treatment still exists. Thus, this study highlights the significance of the three elements of life skills, namely problem solving, critical thinking and ability to abstinence in preventing relapse among male adolescents in Kerman.

1. Methodology

This study is quantitative correlational and intends to investigate and find out the pattern of relationships between variables. For this, the data was collected from 226 opiate addicted male adolescents in Kerman, aged 13 to 20, who had referred to rehabilitation centers, and had at least once relapse. In order to select the respondents the random number generator software available at <http://www.random.org> was employed.

The method of data collection was self-administered questionnaires. It took about 20 minutes to complete each questionnaire. Demographic information was collected using a questionnaire of demographic data. Table 1 had showed the frequencies and percentages on respondents' background characteristics such as age, education level, and occupation status.

The second part included questions about key study variables (life skills).

The Myers and Brown scale contains 28 items: the first 12-items rated on seven point scale ranging from (1= Definitely would not do and think to 7= Definitely would do and think) and measured the ability of problem solving. After that there were 7-items to measure critical thinking and rated on seven point scales ranging from (1= Definitely would not do and think to 7= Definitely would do and think). Next, abstinence was focused on with 9 items rated on seven point Likert scale ranging from (1= Definitely would not do and think to 7= Definitely would do and think). The reliability of the scale in the previous research by Myers & Brown (1996) shows a correlation of 0.78. Reliability assessment of the life skill scale in the present study yielded an alpha coefficient of 0.81.

For data analysis, the two statistical procedures of descriptive and inferential statistics were used. The inferential statistics utilized in this study were Pearson Correlation Analyses. The Pearson Product-moment Correlation Coefficient was used to determine the magnitude or strength and direction of relationships between the independent variables (life skills: problem solving, critical thinking and ability to abstinence) and the dependent variable (relapse).

Table 1. Frequencies and Percentages of Respondents' Demographic Background

Characteristics	Number (n=226)	Percentage (%)
Age (n=226)		
13-14 years	20	8.8
15-16	39	17.3
17-18	83	36.8
19- 20 (Mean=17.5)	84	37.2
Level of Education		
Elementary	28	12.4
Secondary school	79	35
Associated degree	82	36.3
Bachelor	37	16.4
Occupation Status		
Unemployed	138	61.1
Employed	88	38.9
Parental Marital Status		
Live together	133	58.8
Divorced	51	22.6
Widow	18	8
Widower	24	10.6
Relapse		
Once	77	34.1
Twice	68	30.1
Third	29	12.8
More than three times	52	23
Income (Dollars)		
< 75000	164	72.7
> 75000	62	27.3

2. Results and Discussion

As table 1 indicates, the age of the adolescents ranged from 13 to 20 years old. Their mean age was 17.5. The Majority of the respondents (37.2%) belonged to the age group of 19 to 20. In term of education, the largest part of the samples in this study had an associated degree that comprised 36.3% of the whole subjects. Also regarding occupation, 61.1% of the adolescents were unemployed and 38.9% employed. Table 1 also illustrates that the largest part of the samples in this study (58.8%) were adolescents whose parents live together. 72.7% of the respondents' monthly income or spending money was between (0-75,000 Dollars). Based on the classification of income in Iran, this means that most of the respondents were in the low-income group.

Pearson correlations between life skills and relapse shows that relapse is correlated with life skills (problem solving, critical thinking and ability to abstinence). Taking the data analysis into account, it is specified that Pearson Correlations between life skills and relapse of respondents is -0.453 in rank order and with p-value is 0.000 in rank order which is less than = 0.01 significance value. Table 2 confirms a significant negative correlation between life skills (problem solving, critical thinking and ability to

abstinence) and relapse ($r = -0.453, p < 0.01$). A negative relationship in the correlation indicates a decrease in the independent variables in spite of an increase in the independent variables. In other words, whenever a person is not well-trained with life skills, he would most probably find himself in relapse situation again.

Table 2. Pearson Correlation Tests between Life Skills and Relapse

		Relapse	Life skills
Relapse	Pearson Correlation	1	-0.453*
	Sig. (2-tailed)		0.000
	N	226	226
Life Skills	Pearson Correlation	-0.453*	1
	Sig. (2-tailed)	0.000	
	N	226	226

*Correlation is significant at the 0.01 level.

In this study life skills were identified as efficient factors of relapse in addicted adolescents. Based on the results of the present research in Kerman, the adolescents are not equipped with life skills and need

to be trained while being treatment. In addition, life skills training in schools and the status of family education have not been mentioned as part of the relapse prevention in Kerman which in turn caused 90% of addicts to have relapse after detoxification. In Iran the recovery processes are not usually completed and are basically restricted to the physical dimensions of detoxification; i.e. life skill training is ignored. The development of life skills was recognized as a factor that could help the adolescents in their efforts to avoid relapse.

Iran is in the process of developing and growing drug abuse treatment options for opiate and other drug dependent patients. Self-help approach is one of the essential approaches in community development. This approach is based on the belief that people can, will and should work together to solve community problems (Littrell & Hobbs, 1989). Self-help approach is becoming more significant as a planning style to solve the community problems and self-help is a community building approach and also it is a style of planning, decision making, and problem solving (Christenson & Robinson, 1980; Littrell & Hobbs, 1989).

Self-help approach a serious emphasize on education about the problem and its sources (vague! No verb). Self-help can exist as an institute, place or an interest group (Littrell & Hobbs, 1989). The person is vulnerable but can improve huge strength in self-help groups (Kindernothilfe, 2002). Berger & Neuhaus (1977) proposed empowerment as a way of improving individuals by means of mediating social institutions.

Self-help has become an integral part of treatment for emotional issues, behavior problems, drug use, relapse and also dealing with stressful situations. Many people find that self-help and support groups are an invaluable resource for empowerment and recovery (Focus adolescent service, 2008). Self-help support groups bring together people with common experiences. Participants share experiences, provide understanding and support and help each other find new ways to cope with problems (Younus, 2005). Most drug addiction treatment programs encourage patients to participate in a self-help group during and after formal treatment and also encourage parents who have adolescents with behavior problems like relapse to attend a parenting group for support and guidance (Kindernothilfe, 2002). Self-help groups play a necessary role for the family members to know the addiction. Self-help groups are effective in supporting the family, and addressing the feelings related to the addiction and the involvement of families in aftercare efforts as necessary to prevent relapses (Goodwin, 2000; Van Der Westhuizen, 2007). A support group can also supply emotional support, practical coping skills and strategies, and empower

individual towards personal growth, positive changes, and healing (Focus adolescent service, 2008). Brandt and Delpont (2005) indicated that the self-help groups provide addicted adolescents with role models to help them in forming new beliefs regarding drug abuse and also Focus Adolescent Services (2006) declare that self-help groups learn them to function in the community and to assist them to form healthy relationships. The strength of using the self-help approach in this study lies in its potential to focus on the influence and interaction of self-help group on relapse prevention in male adolescent. Self-help groups can be engaged powerfully in the context of aftercare services supplied in the route of relapse prevention. Self-help approach was included here to explain relapse prevention through self-help group after treatment.

3. Conclusion and Implication

This study explored the influence of life skills on relapse prevention in male adolescents opiate users who relapsed after treatment. The findings were supported by relevant literature and were also consistent with the literature of previous research. The general conclusion was that there are several factors that may lead to relapse. Lack of life skills, i.e. problem solving, critical thinking and ability to abstinence, is significantly related to relapse in addicted adolescents. Based on the results, the researcher suggests, the following methods to decrease relapse in Kerman.

The adolescents need self-help group in order to support them to avoid relapse. The opiate addicted adolescents should be assisted in dealing with high-risk situations. Also they should develop assertiveness to deal with peer pressure and learn how to get in to the right friendship. In addition, self-help groups play an essential role for the family members to understand the addiction. They should be empowered in the recovery process and get more involved in the treatment. Parents should be capable to support their adolescents and receive information on high-risk situations.

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Immediate Vascular Photochemical Reactions to Infrared Laser Irradiation in Normal Volunteers

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Abstract: Background: There are evidences that low level laser therapy (LLLT) stimulates wound healing. Objective: The study aimed at investigating the exact vascular mechanisms through which infrared (IR) laser acts to promote wound healing. Participants: Thirty normal female volunteers were selected from the female section, Faculty of Applied Medical Sciences, King Abdul-Aziz University. They were randomly divided into three equal study groups (G1, G2, and G3). Methods: Five ml. of whole blood were collected in a plane tube from all volunteers for the analysis of lipid profile including cholesterol (Chol); triglyceride (TGL); low density lipoprotein (LDL) and high density lipoprotein (HDL). Other five ml of blood were collected for the performance of glycated hemoglobin (HbA1c), hemoglobin (Hgb) and red blood cells (RBCs) count before and immediately after receiving continuous IR laser (810 nm, 100 mW). The irradiation doses were 12 J/cm² for 120 sec, 6 J/cm² for 60 sec and 1.4 J/cm² for 14 sec in groups one, two, and three respectively. Results: There was a significant increase in Chol, TGL, HbA1c%, Hgb concentration and RBCs count after irradiation. On the other hand, there was no significant difference in LDL or HDL concentration in the three groups. Conclusion: Infrared laser was effective in increasing the levels of different blood components that are important for wound healing processes with the best results obtained from laser dosage of 12 J/cm².

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Keywords: Vascular alterations, Wound healing, Infrared laser.

1. Introduction:

Large number of neurological disorders may be complicated with the development of ulcers and bed sores such as spinal cord injuries and diabetic polyneuropathy due to autonomic and/or sensory disturbance. Those ulcers need different kinds of treatment including medical, physical therapy, and nursing care. Recently, there has been an increase in the clinical application of LLLT in various therapeutic fields. One of the most important functional aspects of laser therapy is photobiostimulatory effects on various biological systems especially microcirculation [1]. Varicose ulcers and bedsores are appropriate indications for laser therapy combination with conventional therapies [2]. It was found that LLLT was effective in open wounds, which showed better regeneration and faster restoration of structural and functional integrity [3]. In one survey, LLL was ranked as more effective in promoting wound healing than other electrophysiological agents such as particular types of electrical stimulation and ultrasound [4].

Hopkins et al. [5] investigated the effects of LLL on wound healing. They applied laser (8 J/cm², 700 Hz) on an induced abrasion on the anterior surface of the forearm in twenty-two healthy subjects. Follow-up photograph testing revealed smaller wounds in the laser group than in the sham one. They also found that

other abrasion in the forearm of the study group was contracted more than that of the control group without direct laser application denoting that LLL produced an indirect systemic healing effect on surrounding tissues.

Other study also confirmed the positive efficacy of LLL in enhancing wound healing. Schubert [6] evaluated the effects of IR and red pulsed monochromatic light, with varied pulsations and wavelengths, on the healing of pressure ulcers in a prospective, randomized, controlled study. He concluded that pulsed monochromatic light increased healing rate and shortened healing time.

The use of radiations of all kinds to accelerate wound healing has a long history but radiations in the red part of the visible spectrum have been particularly employed and found to be effective. Despite of those promising effects, little is known about the exact mechanisms through which LLLT promotes healing.

Aim of the study:

The aim of the research was to investigate the possible vascular mechanisms through which IR laser accelerates wound healing. In addition, the study aimed to examine the effects of three different IR laser dosages on different blood components.

2. Materials and Methods

Enrollment of Subjects

Prior to inclusion, a complete medical history was taken. Intended enrollment comprised of 30 healthy female subjects who were selected from faculty of applied medical sciences at King Abdul-Aziz University, their age ranged from 18–24 years (mean=22 ± 0.1). For the initial evaluation, each subject was examined medically by a physician at King Abdul-Aziz University out patient clinics. Subjects were excluded in cases of psychological history or stresses, pregnancy, use of drugs, like corticosteroids, during menstruation period, bleeding or vascular disorders and liver or renal disease. Subjects were randomly divided into three equal groups (G1, G2 and G3). Procedures used in this study were approved by the Ethics Committee of the faculty of applied medical sciences at King Abdul-Aziz University, Saudi Arabia. Written informed consent was obtained from subjects prior to the start of the study.

Analytical Methods

Blood Sampling and Laboratory Methods

Blood samples (10 ml) were collected, before and immediately after laser irradiation, from antecubital veins with a 20G butterfly without use of tourniquet; hemolysed and lipemic samples were excluded. Samples were centrifuged at 3500 rpm for 5 minutes, to separate the plasma. All samples stored after centrifugation at -70°C until time of processing. These samples were collected in two different vacutainer tubes. One tube was used for measuring lipid profile (Total Chol, TGL, LDL and HDL). The second tube contains EDTAK₂ and EDTAK₃ for measuring complete blood count and glycated hemoglobin (HbA1c).

Blood Count

Blood count was measured in Beckman Coulter AC-T (Beckman Coulter, Fullerton, CA, USA) at king Abdul-Aziz University Hospital. Blood count provided red blood cells count (RBC) and Hemoglobin (Hgb) concentration.

Glycated hemoglobin (HbA1c)

Quantitative determination of HbA1c% was measured by using COBAS INTEGRA 400 system, Roche, German. The total Hgb concentration was measured calorimetrically. Glycated hemoglobin was determined immuno-turbidimetrically. The ratio of both concentrations yields the final HbA1c%.

Biochemical analysis

Biochemical parameters included serum for total Chol, TGL, LDL, and HDL. All were measured at the same time when the medical pre-check up was

performed. All of the biochemical assessments were performed using a fully automated analyzer using the principle of Electro-chemiluminescence's immunoassay (Modular Analytics E170, Roche, German) at king Abdul-Aziz University Hospital.

Laser

Sys*Stim, ME-540, USA was used, with Aluminium-Galium Arsenide (AlGaAs) diode and wavelength of 810 nm. The beam delivery system is hand held probe, continuous/ pulsed, the output power is 100 mW, and the dose ranges from 0.01 to 99.99 Joules.

Laser Application

Each Subject was asked to sit on a chair with back support and a table of suitable height was beside her to support the forearm in supination position. The area of application was determined, two cm proximal to the palmer crease of the wrist joint in the midline. The area was cleaned well with alcohol swab. The three groups were exposed to IR laser as follow: G1 received 12 J/cm² for 120 seconds [7], G2 received 6 J/cm² for 60 seconds [8], and G3 received 1.44 J/cm² for 14 seconds [9]. For safety measure, both the subject and the researcher wore goggles for eye protection.

Statistical Analysis

Data was presented as the mean and standard deviation. Paired t-test was used to analyze the data within each group and one way Anova test was used to analyze the data between the three groups. The p-value was <0.05.

3. Results

Lipid Profile Cholesterol

The results revealed no significant difference regarding chol. mean values between groups, neither pre nor post irradiation (5.2±0.9, 4.7±0.9 and 4.7±0.75 mg/dL, respectively) ($p= 0.888$ and 0.331 , respectively). On the contrary, there was a significant increase in chol. mean values after laser application compared to that before in the three groups ($p_1 = 0.0001$, $p_2 = 0.017$ and $p_3 = 0.001$) (Table: 1).

Table (1): Comparison of groups 1, 2 and 3 regarding cholesterol mean values before and after laser irradiation.

Cholesterol (mg/dL)	G 1 (Mean ± SD)	G 2 (Mean ± SD)	G 3 (Mean ± SD)	<i>p</i>
Pre	4.3 ± 0.8	4.5 ± 0.9	4.4 ± 0.76	0.888
Post	5.2 ± 0.9	4.7 ± 0.9	4.7 ± 0.75	0.331
<i>p</i>	0.0001	0.017	0.001	

Triglyceride

There was a significant difference in TGL mean values between the three groups after irradiation compared to that before ($p=0.115$ and 0.0001 , respectively). Also, the results revealed a significant difference after laser application compared to that before in the first two groups ($p_1=0.001$, $p_2=0.048$) and non significant difference in the third one ($p_3=0.875$) (Table: 2).

Table (2): Comparison of groups 1, 2 and 3 regarding concentration of TGL mean values before and after laser irradiation.

TGL (mg/dL)	G 1 (Mean±SD)	G 2 (Mean±SD)	G 3 (Mean±SD)	<i>p</i>
Pre	0.87 ± 0.3	0.74 ± 0.27	1.01 ± 0.3	0.115
Post	1.3 ± 0.5	0.91 ± 0.4	0.98 ± 0.5	0.0001
<i>P</i>	0.001	0.048	0.875	

High density lipoprotein

The results revealed no significant difference regarding HDL mean values between groups before and after irradiation ($p=0.834$ and 0.558 , respectively). Also, the results showed no significant difference after laser irradiation compared to that before in the three groups ($p_1=0.269$, $p_2=0.119$ and $p_3=0.666$) (Table: 3).

Table (3): Comparison of groups 1, 2 and 3 regarding concentration of HDL mean values before and after laser irradiation.

HDL (mmol/L)	G 1 (Mean±SD)	G 2 (Mean±SD)	G 3 (Mean±SD)	<i>p</i>
Pre	1.8 ± 0.2	1.8 ± 0.4	1.7 ± 0.5	0.834
Post	1.92 ± 0.5	1.97 ± 0.3	1.8 ± 0.6	0.558
<i>p</i>	0.269	0.199	0.666	

Low density lipoprotein

Also, There is no significant difference regarding LDL mean values between groups before and after irradiation ($p=0.907$ and 0.754 , respectively). The results revealed no significant difference after laser application compared to that before in the three groups ($p_1=0.116$, $p_2=0.143$, $p_3=0.914$ respectively) (Table: 4).

Table (4): Comparison of groups 1, 2 and 3 regarding concentration of LDL mean values before and after laser irradiation.

LDL (mmol/L)	G 1 (Mean ±SD)	G 2 (Mean±SD)	G 3 (Mean±SD)	<i>P</i>
Pre	2.7 ± 1.1	2.9 ± 0.7	2.7 ± 0.9	0.907
Post	2.96 ± 0.7	2.7 ± 0.8	2.7 ± 1.1	0.754
<i>p</i>	0.116	0.143	0.914	

Red Blood Cells

There was no significant difference regarding RBCs mean values between groups before and after

irradiation ($p=0.454$ and 0.153 , respectively). But there was a significant increase after laser application compared to that before in the first two groups ($p_1=0.0001$, $p_2=0.001$) and non significant difference in the third one ($p_3=0.126$) (Fig: 1).

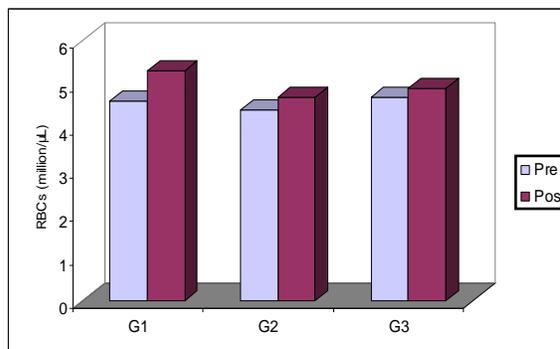


Fig (1): Mean values of RBCs count in the study groups before and after laser irradiation.

Hemoglobin

There was a significant difference regarding the Hgb concentration mean values among the three groups after laser irradiation compared to that before ($p=0.737$ and 0.038 , respectively). Also, there was a significant increase after laser application compared to that before within G2 and G3 ($p_2=0.0001$ and $p_3=0.0001$) while non-significant difference was found in G1 ($p_1=0.07$) (Fig 2).

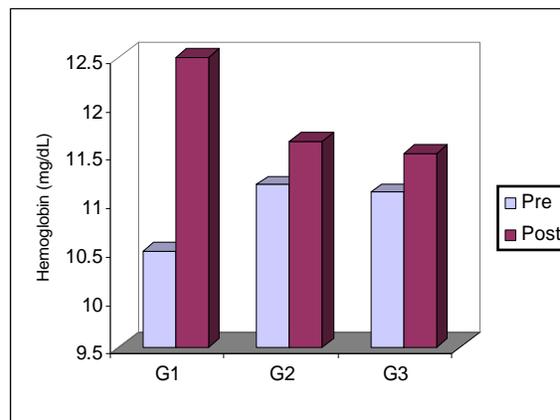


Fig (2): Mean values of Hgb concentration in the study groups before and after laser irradiation.

Glycated Hemoglobin

Significant difference in HbA1c% mean values was shown in the three groups after irradiation compared to that before irradiation ($p=0.234$ and 0.004 , respectively). Also, high significant increase was revealed after laser application compared to that before

in the three groups ($p_1=0.001$, $p_2=0.0001$ and $p_3=.0001$) (Fig: 3).

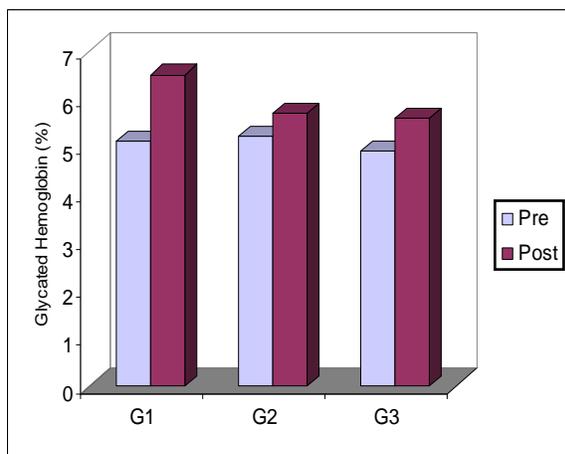


Fig (3): Mean values of HbA1c% in the study groups before and after laser irradiation.

4. Discussion

The current study aimed at investigating the vascular changes that may occur in different blood components in response to IR laser in normal subjects. It was also concerned with comparing the changes that result from exposure to three different laser doses.

The results revealed variable findings in the different measured blood components in the three groups. Some essential components for healing process showed significant increase after laser irradiation, especially in the first two groups, while others did not.

In accordance with the findings of the present work, Adltya *et al.* [10] studied the efficacy of low energy photon therapy (LEPT) in the treatment of venous leg ulcers in nine patients with 12 venous ulcers. Treatment was given three times a week for ten weeks using two different sources. One source provided a wavelength of 660 nm (red), while the second source delivered a wavelength of 880 nm (infrared). They concluded that LEPT of both sources was an effective modality for the treatment of venous leg ulcers.

Moreover, the findings of the current research are supported by those of kujawa *et al.* [7]. Their study aimed at investigating the effect of laser radiation on the structure of protein and lipid components of RBCs membranes and its functional properties. Human RBCs were irradiated with LLLT at different radiant exposures ($3.75 - 25 \text{ J/cm}^2$) and laser powers of 10 mW. An increase of the ATPase activity was found with maximal effect at $12-15 \text{ J/cm}^2$ of light dose. On the contrary, the same research procedures were carried out with laser power of 400 mW and inhibition of ATPases activities occurred.

In addition, the positive findings of the current work came in accordance with those of Verdote *et al.* [11]. They studied the LLLT effect for the treatment of open wounds in psycho-geriatric patients. In total, 84 psychiatric patients with 188 open wounds were referred for the treatment of open wounds of varying severity and etiology. Traditional wound care management was used in addition to laser therapy. About 84% of these wounds completely healed.

On the other hand, Lucas *et al.* [12] found no evidence that justifies using LLLT as an adjuvant to the decubitus ulcer treatment. Their negative findings may be attributed to laser parameters they applied. Parameters were infrared laser, 904 nm; total peak power was $12 \times 70 \text{ W}$ in an 830 Hz pulse frequency mode of 150 nsec pulses with an average beam power of $12 \times 8 \text{ mW}$ and a radiant exposure of 1 J/cm^2 , which required an exposure time of 125 sec.

The positive outcomes of the present research suggest that, in case of open wound, healing occurs due to photochemical changes in blood components as a result of IR laser irradiation. Photochemical reactions included increase in hemoglobin, RBCs and lipid levels in blood leading to an increase in blood flow and membrane stability. Hence, there will be increase in the ATP activity, oxygen and nutrition delivery to body tissues that enhances healing process. Such changes were also reported by Siposan and Lukacs [13] who found significant differences between control and irradiated blood samples for RBCs; Hgb; and viscosity. In addition, they found increase in plasma proteins including albumin; alpha one globulin and gamma globulin and fibrinogen.

Other study was carried out by Schindl *et al.* [14] who selected thirty patients with diabetic ulcers or gangrenes. They received either a single LLL irradiation with an energy density of 30 J/cm^2 or a sham irradiation over both forefoot regions. Skin blood circulation, as indicated by temperature recordings over the forefoot region, was detected by IR thermograph. Data from this first clinical trial demonstrated an increase in skin microcirculation due to athermic laser irradiation in patients with diabetic microangiopathy.

Furthermore, LLLT improves blood microcirculation by soothing blood vessels, which is biologically beneficial. It has been found that LLLT increases the delivery of oxygen and nutrients in the blood cell to the body's soft tissue areas [15]. Photons are picked up by the cell membrane and result in improved membrane stability and increased activity of the ATP dependent Na/K pump. Moreover, light therapy increases blood flow much better, resulting in improved systemic blood circulation thus increasing RBCs which stimulate the release of ATP [16].

Additionally, Wounds require adequate oxygen delivery to heal [17] and hemoglobin, in the blood, is

what transports oxygen from the lungs to the rest of the body tissues where it releases the oxygen for cell use. Also, Hemoglobin in the RBCs carries some of the waste product carbon dioxide back from the tissues to the pulmonary capillaries of the lungs [18]. Therefore, the significant increase in hemoglobin level and RBCs, whose cytoplasm is rich in hemoglobin, shown in the current study may be other possible mechanisms that contribute to healing process. In accordance, Vladimirov *et al.* [19] found that nitrosyl complexes of heme proteins, such as hemoglobin and cytochrome c, are the primary chromophores of laser radiation. Upon irradiation, they can easily dissociate to produce free nitric oxide which may be responsible for blood vessel relaxation and activation of mitochondrial respiration. Glycated hemoglobin has a nutritional role as well; it is a form of hemoglobin used primarily to identify the average plasma glucose concentration over prolonged periods of time.

The findings also showed significant increase in TGL, which is a type of lipid that circulates in the blood stream, in the first two groups. Certain vitamins such as vitamin A, D, E, and K are fat-soluble and depend totally on the presence of TGL for absorption. Therefore, TGL helps in ensuring adequate nutrition that is highly useful for wound healing [11].

Other mechanism of accelerating healing was also suggested by P^ontinen [15] which is the removal of accumulated toxins by LLLT through improving lymph circulation. The buildup of toxins in a health body could block the normal blood circulation and impair cellular energy. When IR waves are applied, water molecules that encapsulate the toxins get heat up, and start to vibrate. This vibration reduces the ion bonds of the atoms that are holding together the molecules of water. As the breakdown of the water molecules occurs, encapsulated gases and other toxic materials are released and the body gets rejuvenated.

The findings also revealed significant increase in blood cholesterol level upon irradiation in the three study groups. So, IR laser should be used cautiously with patients who are at risk of hypercholesterolemia. Finally, further studies are recommended with wounds or pressure ulcers monitoring both the immediate and long term effects of IR laser on different blood components and its correlation with the rate of wound closure.

5. Conclusion:

Infrared laser was effective in increasing the levels of different blood components that are important for wound healing processes with the best results obtained from laser dosage of 12 J/cm².

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Contraceptive use dynamics and effect of counseling on use- continuation of contraception in Assiut Governorate, Upper Egypt

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Abstract: Background: Egypt's family planning programs have followed a similarly unsteady course. Debated by Egyptian social scientists since the 1930s, Egypt's high population growth became widely viewed as an acute problem in the 1960s, when the government acknowledged the serious economic and social problems associated with it. **Objectives:** analyzing the factors associated with contraceptive methods discontinuation among women aged 15- 49 years in study area and contraceptive use dynamics. We also examined the effect of counseling on percent of continuation. **Study design:** A cross sectional survey was carried out among the eligible women. **Study setting:** The study areas included Assiut Governorate family planning units in different places providing contraceptive methods. **Study population:** One thousand and ten women in reproductive age from 15-49 who used contraceptive methods once or more, has one child or more were included. **Study tools:** An interview questionnaire were constructed including data about used contraceptive methods, discontinuation and its causes, failure and its fate. We asked about ten steps of counseling. Data entry –after revising and editing -was done via Excel software while data analysis was carried out via SPSS program version 11. **Results:** the most commonly used modern method was IUD (43.0%). The results revealed that (69.7%) of methods had been stopped within 2 years of starting for various reasons. The percent of discontinuation decreased significantly with increasing age. Discontinuation was the lowest when there were four or more living children and increased significantly by decreasing number of living children. It decreased significantly with increasing the number of sons. As regards infant deaths, discontinuation was insignificant among those who did not experience infant deaths, and presence of one and two deaths respectively. University graduated women showed least discontinuation level. As regards causes of discontinuations, side effects and health concerns was the most common reason of discontinuation. Most of method failure as expressed by pregnancy ended in live births. The results indicated that a higher score on counseling was significantly associated with continuation. **Conclusion:** Counseling should emphasize the possibility of side effects, stressing the fact that most will be transient, and the need to identify a backup method. Follow-up visits should be scheduled for 1 to 2 months after a prescription is written.

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Keywords: Contraception, use dynamics, counseling and Upper Egypt.

1. Introduction

Strengthening of reproductive health and family planning services in developing countries is repeatedly highlighted as a priority for reducing maternal mortality and improving maternal and child health. Effective implementation of appropriate services requires an understanding of the factors affecting reproductive outcomes among women at risk and their patterns of behavior⁽¹⁾.

Improvement in the quality of contraceptive use is an important goal of Egypt's family planning program. Information on the level of current use of contraception is important for understanding the key determinants of fertility and for measuring the success of the national family planning program⁽²⁾.

Contraceptive use in Egypt doubled from 24% in 1980 to 48% in 1995. The change was rapid in 1980, but virtually no change occurred in the use rate

during 1991-1995. The shift toward more effective methods which was evident in the 1980 continued during the first half of 1990. Although at slower pace in Assiut, 12.7% of married women use family planning method in 1988, 28.2% in 1992, 32.9% in 2000⁽³⁾.

In spite of unmet need for family planning remains a useful tool for identifying and targeting women at high risk of unintended pregnancy and used as a standard measure for evaluating programs effectiveness in meeting of reproductive needs of the individuals, it's validity and accuracy in identifying women most at risk of unintended pregnancy have been questioned⁽⁴⁾.

Counseling is an important element of providing good quality family planning services. For counseling to be effective, however, policy markers need to support clients ability and right to make decisions

about their reproductive health as well as allocate funding for counseling materials, services, and provider training/supervision⁽⁵⁾.

High rates of discontinuations are recognized as a major problem facing family planning programs and there is need to search for associated factors. Discontinuation is an indicator of method acceptability. Changing methods denotes dissatisfaction with specific method. Stopping all contraceptive use while at risk of an unintended pregnancy marks a more general dissatisfaction. The present research aimed at analyzing the factors associated with contraceptive methods discontinuation among women aged 15- 49 years in study area and contraceptive use dynamics. We also examined the effect of counseling on percent of continuation.

2. Subjects and Methods:

Definitions:

We adopt these definitions in our study:

Contraceptive method discontinuation: is the stoppage of use of method within two years of starting its use for any reason.

Contraceptive method switching : is the use of another method within the period of twelve months following discontinuations of the method.

Contraceptive method failure: is defined as a pregnancy occurring while contraception being practiced by using a contraceptive method .

Study design:

A cross sectional survey was carried out among the eligible women.

Study setting:

The study areas included Assiut Governorate family planning units in different places providing contraceptive methods which included:

1. Contraceptive units of Ministry of Health and Population (MOHP): Ministry of Health has 237 family planning units in Assiut Governorate, of them 12 mobile units, 7 urban health units, 12 units in general and central hospitals, 7 health office units, 12 units in urban health centers, 187 rural health units. Simple random sample of primary health care units, hospital units and mobile units were included in the study.
2. Assiut University Hospital Contraceptive Clinic (AUHs).
3. Clinical Service Improvement Project (CSI) in Assiut Governorate.
4. Sample of private clinics (PCs).

Study population:

By Epi Info 2000, at a confidence level = 95%, a power of 90%, a contraceptive prevalence rate

(CPR) = 38%⁽⁷⁾. In addition, the Egypt DHS sampling policy recommends that a minimum of 450 completed interviews with eligible women be obtained to provide reliable estimates for estimation of contraceptive prevalence rate and other health indicators⁽⁷⁾.

One thousand and ten women in reproductive age from 15-49 who used contraceptive methods once or more, has one child or more were included in the study of them; 710 women were selected from MOHP units, 100 from Assiut University Center (AUH) 100 from CSI centers and 100 from private clinics were included in the present study.

Study tools:

An interview questionnaire were constructed including data about socio-background characteristics of studied women. Other data included reasons of discontinuation, initiatives of switching and failure.

Ten counseling steps were tested in the form of either done or not done. We give one if done and zero if not done through asking the clients the following questions of counseling: Counseling and examination done in privacy, Telling about type and person who do physical examination, Complete flexibility to accept or refuse the service, Telling about useful function of family planning, Telling about all methods available in and outside the unit, Telling in a descriptive manner about each method and how to be used, Telling about effectiveness of each method, Discussion about rumors of different methods, Telling about side effects and complications of chosen method.

Data collection:

Data collection was done through personal interview with eligible women.

Data analysis and study hypothesis :

Data analysis phase was carried out via Statistical Package of Social Science (SPSS) version 11. A plan for data analysis was established based upon the objectives of the study and the conceptual framework.

Data analysis began by obtaining frequency distribution and descriptive statistics for most variables. Several cross tabulations were also included. Chi-square was the test of statistical significance of the observed association in some cross tabulations of the bivariate analysis. A significance level of 95% with a P value < 0.05 was considered.

Ethical issue:

Each client informed about the aim of the study and the client consented either orally or by written consent and she had a full chance to stop giving information about her method.

3. Results:

The total number of clients included in the present study was 1010 distributed as follow: 710 (70.3%) clients were taken from MOHP outlets. One hundred clients (9.9%) were selected from each sector, AUHS, CSI, and private clinics. The total number of methods used during reproductive age

group was 1728 distributed as follow: MOHP (59.3%), AUHS (13.8%) , CSI (17.7%) and private clinics (9.3). Most of clients used only one method (43.6%) or two methods (43.2%). Only 13.3% used three or more methods (Table 1).

Table (1): Percent distribution of ever users of modern contraceptive methods according to source of supply, Assiut Governorate, 2006.

	Sectors								Total	
	MOHP		AUHS		CSI		PCs		No.	%
	No.	%	No.	%	No.	%	No.	%		
-Total number of clients per sector	710	70.3	100	9.9	100	9.9	100	9.9	1010	100.0
-Total number of methods per sector	1024	59.3	238	13.8	305	17.7	161	9.3	1728	100.0
Number of methods:										
One method only	288	40.6	58	58.0	57	57.0	37	37.0	440	43.6
2 methods	309	43.5	23	23.0	41	41.0	63	63.0	436	43.2
3 methods and more	113	15.9	19	19.0	2	2.0	0	0.0	134	13.3

Table (2) shows Percent distribution of modern contraceptive methods according to source of supply. On the total level, the most commonly used modern method was IUD (43.0%) followed by injectables (28.4%), then OCPs (16.1%), followed by Norplant (7.6%) and barrier methods (5.0%).

The second method of choice was injectable methods in all sectors except AUHS in which OCPs was the second method. Norplant method was not recorded in CSI and private clinics but it represented 13.9% and 9.6% of methods used in AUHS and MOHP. Barrier methods was the least in use constituting 6.1%, 4.6%, 3.7% and 1.7% in MOHP, CSI, private clinics and AUHS respectively.

Table (3) shows the percent of discontinuation of modern contraceptive methods according to background characteristics. As regards age, the percent of discontinuation decreased significantly with increasing age ($P= 0.000$). It was 83.2% among those aged < 20 years, 70.5% in 20-34 years and 54.0% in 35-49 years.

As regards the **number of living children**, discontinuation was the lowest when there were four or more living children and increased significantly by decreasing number of living children ($P= 0.000$). It increased from 59.3% among women who had four children to 87.8 % among women who had only one child.

According to **number of sons**, discontinuation decreased significantly from 84.9% among those who did not have sons to 63.3% among those who have three or more sons ($P= 0.000$).

As regards **infant deaths**, discontinuation was (70.1%), (62.3%) and (64.7%) among those who did not experience infant deaths, and presence of one and two deaths respectively. This difference was statistically insignificant ($p= 0.313$).

As regards **education**, 67.8% were illiterate and 80.3% were primary graduated. Preparatory, secondary and university education represented (71.3%, 97.0%, and 41.9 of women respectively). The difference was statistically significant ($p= 0.000$).

Table (4) shows the percent distribution of contraceptive method discontinuation according to sector and method in use. The results revealed that (69.7%) of methods had been stopped within 2 years of starting for various reasons. It was found that, 95.4% of CSI methods, 68.9% of private clinics methods, 68.4% of AUHS and 62.5% of MOHP methods had been stopped within 2 years of starting use.

On comparing percentage of discontinuation according to different types of methods, it was 76.6%, 75.5%, 67.3%, 61.6% and 36.6% in OCPs, IUDs, Injectables, Barriers and Norplants methods respectively.

As regards causes of discontinuations (Table 5), side effects and health concerns (50.4%) was the most common reason of discontinuation. The desire to become pregnant was also frequently mentioned for discontinuing use (25.2%). An unintended pregnancy (method failure) as a reason for discontinuation was mentioned by (5.6%). Personal reasons as husband disapproved the method, wanted

more effective method, inconvenient to use, cost access availability, marital dissolution, infrequent sex, husband away, or menopausal were mentioned by (18.8%).

Table (5) also shows causes of discontinuation in different methods. Health side effects as a cause of

discontinuation was the highest among injectables (55.5%) followed by IUDs users (54.2%), Norplant (50.0%) and then OCPs (43.2%). Method failure was the main cause of discontinuation in barrier methods (73.6%).

Table (2) : Percent distribution of modern contraceptive methods by source of supply, according to specific method, Assiut, 2006.

contraception method	Sectors								Total	
	MOHP		AUHS		CSI		Private clinics			
	No.	%	No.	%	No.	%	No.	%	No.	%
OCP	159	15.5	55	23.1	39	12.8	25	15.5	278	16.1
IUDs	417	40.7	110	46.2	146	47.9	70	43.5	743	43.0
Injectables	288	28.1	36	15.1	106	34.8	60	37.3	490	28.4
Norplant	98	9.6	33	13.9	0	0.0	0	0.0	131	7.6
Barrier	62	6.1	4	1.7	14	4.6	6	3.7	86	5.0
Total	1024	59.3	238	13.8	305	17.7	161	9.3	1728	100.0

Table (3) : Percent distribution of discontinuation of modern contraceptive methods according to background characteristics of women, Assiut Governorate, 2006.

	Number of methods	Discontinuation		Sig.
		No.(1728)	No.(1205)	
Age:				
<20 years	393	327	83.2	79.088 P= 0.000
20-34 years	950	670	70.5	
35-49 years	385	208	54.0	
No. of living children				
1	74	65	87.8	90.164 P= 0.000
2	269	224	83.3	
3	550	421	76.5	
4+	835	495	59.3	
No. of sons				
0	225	191	84.9	60.425 P= 0.000
1	426	333	78.2	
2	467	295	63.2	
3+	610	386	63.3	
No. Infant deaths				
0	1634	1146	70.1	2.324 P= 0.313
1	77	48	62.3	
2	17	11	64.7	
Education				
Illiterate or just read	742	503	67.8	53.928 P= 0.000
Primary school	300	241	80.3	
Preparatory school	216	154	71.3	
Secondary school	200	194	97.0	
University	270	113	41.9	

Table (4) : Percent distribution of contraceptive discontinuation in different sectors according to type of method, Assiut Governorate, 2006.

Contraceptive Methods	Sectors								Total	
	MOHP		AUH		CSI		P Cs			
	No.	%	No.	%	No.	%	No.	%	No.	%
OCP	100	15.6	43	26.4	44	15.1	26	23.4	213	76.6
IUDs	299	46.7	70	42.9	139	47.8	53	47.7	561	75.5
Injectables	181	28.3	26	15.9	98	33.7	25	22.5	330	67.3
Norplant	36	5.6	12	7.4	0	0.00	0	0.00	48	36.6
Barrier	24	3.8	12	7.4	10	3.4	7	6.3	53	61.6
Total	640	62.5	163	68.4	291	95.4	111	68.9	1205	69.7

Table (5): Causes for discontinuing use of contraceptive method according to specific methods, Assiut Governorate, 2006.

Reasons of discontinuation	Contraceptive methods										Total	
	OCP		IUDs		Injection		Norplant		Barriers			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Side effects, health concerns	92	43.2	304	54.2	183	55.5	24	50.0	4	7.5	607	50.4
Method Failure	16	7.5	13	2.3	0	0.00	0	0.0	39	73.6	68	5.6
Desire for another child	52	24.4	167	29.8	67	20.3	14	29.2	4	7.5	304	25.2
Personal reasons	53	24.9	77	13.7	80	24.2	10	20.9	6	11.9	226	18.8
Total	213	17.7	561	46.6	330	27.4	48	4.0	53	4.4	1205	100.0

Regarding events within 12 months after use; (44.3%) of them switched to another method, (42.8%) got pregnant and (1.1%) returned to the same method, (11.8%) of discontinuation ended their use of any method (Fig.1).

Table (6) shows event within 12 months of discontinuation according to contraceptive method; it was as follow:

For **OCPs**; 47.9% switched to another method, 42.3% got pregnant, 7% did not use any methods and 2.8% returned to the same method.

For **IUDs**; 45.9% switched to another method, 43.5% got pregnant, 11.9% did not use any methods and 0.7% returned to the same method.

For **Norplant**; 33.3% switched to another method, 43.7% got pregnant, 16.7% did not use any methods and 6.3% returned to the same method.

For **barrier** methods; 9.4% switched to another method, 83.1% got pregnant, 7.5% did not use any methods and no woman returned to the same method.

Out of 1010 women, 68 (6.7%) stopped using contraceptive method due to method failure. Failure represented (3.9%) of all studied methods (1728) and (5.6%) of all reported discontinuation (1205).

Out of 1010 women, 68 (6.7%) stopped using the contraceptive method due to method failure. Failure

represented (3.9%) of all studied methods (1728) and (5.6%) of all reported discontinuation (1205). **Failure** was the main cause of discontinuation among barrier methods users (73.6%) followed by OCPs (7.5%) and then IUDs (2.3%). There was no failure cases reported among norplant and injectables method. (Table 5).

Most of method failure as expressed by pregnancy ended in live births (72.1%) and only (27.9%) ended in abortion. Events occurring within 12 months of end of pregnancy of failure : In general : Switching to another method (64.7%) constituted the highest percentage followed by no events occurred (20.6%) followed by another pregnancy (10.3%). Returning to the same method represented only 4.4% of failure cases. (Table 7) .

Table (8) shows effect of counseling on continuation of contraceptive methods. On the basis of 10 questions of counseling steps; the results of the quantitative assessment indicated that a higher score on counseling was associated with continuation. Mean score was 4.61 ± 4.11 among women who continue use of contraceptive methods as compared to 3.01 ± 3.86 Among those who discontinue ($p=0.0001$).

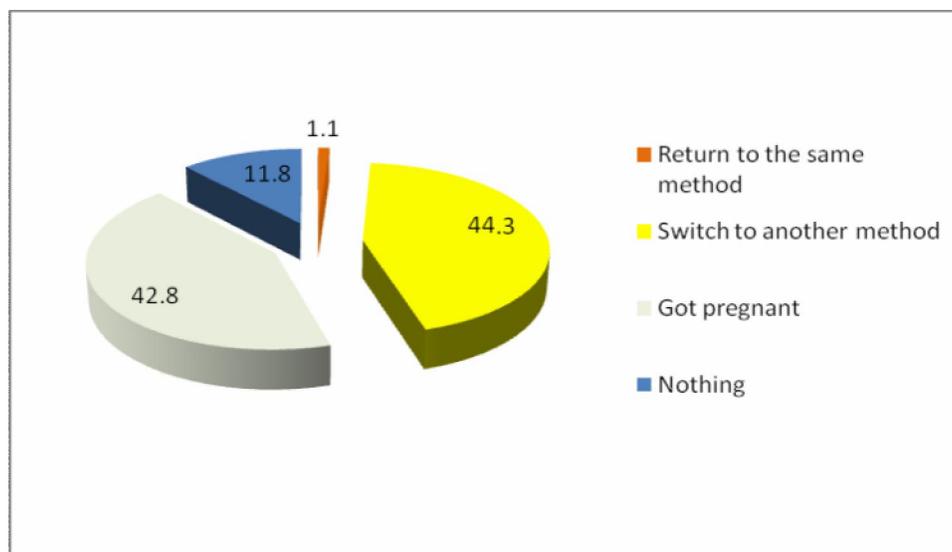


Fig. (1): Events within 12 months of discontinuation of contraceptive method.

Table (6): Events within twelve months of discontinuation according to type of contraceptive method, Assiut Governorate, 2006.

Events within 12 months of stopping use	Contraceptive methods										Total	
	OCP		IUDs		Injs		Norplant		Barriers		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Return to the same method	6	2.8	4	0.7	0	0.0	3	6.3	0	0.00	13	1.1
Switch to another method.	102	47.9	244	45.9	167	50.6	16	33.3	5	9.4	534	44.3
Got Pregnant.	90	42.3	246	43.5	115	34.9	21	43.7	44	83.1	516	42.8
Nothing	15	7.0	67	11.9	48	14.5	8	16.7	4	7.5	142	11.8
Total	213	17.7	561	46.6	330	27.0	48	4.0	53	4.4	1205	100.0

Table (7) : Outcome of failure and events within twelve months of failure

Variables	Total	
	No. of failure cases (68)	%
Fate of failure		
Live birth .	49	72.1
abortion	19	27.9
Events within 12 months		
Return to the same method	3	4.4
Switch to only method	44	64.7
Got pregnant	7	10.3
Nothing	14	20.6
Percent of failure out of total number of women	1010	6.7
Percent of failure out of total number of methods	1728	3.9
Percent of failure out of total number of discount.	1205	5.6

Table (8): Distribution of discontinuation of contraceptive methods according to counseling score, Assiut Governorate, 2006.

Score of counseling	Contraceptive method continuation	
	Continue	Discontinue
Mean \pm SD	4.61 \pm 4.11	3.01 \pm 3.86
Minimum	0	0
Maximum	9	9
T test	7.5707	
P value	0.0001	

4. Discussion

Egypt's family planning programs have followed a similarly unsteady course. Debated by Egyptian social scientists since the 1930s, Egypt's high population growth became widely viewed as an acute problem in the 1960s, when the government acknowledged the serious economic and social problems associated with it. The government soon established the National Family Planning Program as one response to the economic problems⁽⁶⁾.

In the present study, clients used one or two contraceptive methods in 43.6% and 43.2% respectively and only 13.3% used three or more methods (Table 1). As in agreement with our results, El-Zanaty and Way⁽⁷⁾ showed that half of ever user women have had experience with only one method while (33%) have used two methods and (19%) have tried three methods or more.

The most commonly used method was the IUD (43.0%) followed by injectables (28.4%), OCPs (16.1%), Norplant (7.6%) and Barriers (5.0%) and this was true for all sectors (Table 2). The second method of choice was injectable contraceptive methods in all sectors except AUHS in which OCPs was the second method. Norplant was not recorded in CSI and private clinics but it represented 13.9% and 9.6% of methods used in AUHS and MOHP. Barrier methods was the least in use constituting 6.1%, 4.6%, 3.7% and 1.7% in MOHP, CSI, private clinics and AUHS respectively.

Regarding sectors supplying methods in the present study, it is similar to previously mentioned by El-Zanaty and Way⁽⁸⁾ as IUDs and injectables are the common method supplied by MOHP and AUHS (Governmental units). Norplant were not available in non governmental units (CSI, private clinics). Therefore our population are in great need for implant to be supplied to all sectors especially in private, semi-private and public units. Training of the service providers to insert and remove norplant is also needed.

The recent El-Zanaty and Way⁽⁷⁾ survey showed that 59% of currently married women in Egypt are using contraception. The IUD, pill, and injectables

are the most widely used methods. There is dramatic shift from pill to IUD use that occurred during the past two decades. In 1980, almost 70 percent of current users relied on the pill, more than four times the percentage of users who relied on the IUD. By 2005, more than 60 percent of current users relied on the IUD compared to 17% who preferred the pill. The relatively rapid expansion of the use of injectables is also evident. Twelve percent of current users relied on injectables in 2005, compared to five percent in 1995 and only one percent in 1992 (El-Zanaty and Way)⁽⁷⁾.

In contrast to western societies the popularity of IUD among women of reproductive age in Europe varies from 5% in Great Britain to 19% in France and 21% in Finland⁽⁹⁾. In The United States of America, IUD use is very low as some think that this method is abortifacient and it increases the risk of pelvic inflammatory diseases and ectopic pregnancy⁽¹⁰⁾.

The higher rate of IUD use in our population has been attributed to its images as a safe, effective, inexpensive and long acting method which is independent of coitus. Injectables and norplant develop more accessibility after providing the clients more information about their rumors and emphasis on their advantages, but still need more efforts of counseling about their side effects especially amenorrhea. Injectables have several advantages, they are simple to administer, require minimum patient compliance with an administration schedule and reduce use error. In addition, they are independent of coitus, do not interfere with lactation and are highly effective⁽⁷⁾.

Back ground characteristics of clients:

Current contraception use is the net difference between acceptance and discontinuation. It is in fact a dynamic process, involving the decision to adopt contraception, the selection of the method and over time the decision to continue or discontinue contraception use. The nature of behaviour relating to contraception is complex as it is affected by a large set of factors and shows

considerable variation throughout the childbearing period ⁽¹¹⁾.

Contraception practice is mainly governed by women's reproductive status as the combined impact of age and number of surviving children ^(12, 13, 14). Surveys conducted in Egypt ⁽²⁾, Pakistan ⁽¹⁵⁾ and Bangladesh ⁽¹⁶⁾ revealed that women over the age of 30 years consistently maintain higher continuation rates. These findings are consistent with that of the current research. Generally, women opt for contraception either to end childbearing or to maintain adequate spacing ⁽¹⁷⁾. It is then expected to observe an ever use of modern contraceptives, longer duration of use and lower probability of discontinuation among older women who have more than four living children as they tend to use contraception to end childbearing. In contrast, younger women who have less number of living children may have a tendency to use contraception for child spacing as they are still in the phase of family formation.

Previous studies have indicated the higher likelihood of discontinuation of contraception among women of low parity ⁽¹⁶⁾ and those who had not achieved their desired family size at the start of use ⁽¹⁸⁾. Asari suggested that family size preference is apparently more important than preference about sex of children in determining contraception use ⁽¹⁹⁾. The current survey revealed that the representation of sons among surviving children was significantly associated with longer duration of contraception use and lower probability of discontinuation. It is true that Egyptian women express a higher preference for sons. This finding is in agreement with previous reports which documented the influential role of sons in the initial acceptance and maintenance of contraception use ⁽¹⁶⁾⁽²⁰⁾.

On the other hand, Rahman et al., observed that parental preference is not monotonically son-biased but is rather for a balanced composition of sons and daughters ⁽²¹⁾. It is not unlikely that women who have both boys and girls are also those who have a larger number of surviving children. Actually, the effect of sex composition of surviving children was eliminated when the number of surviving children was considered ⁽²¹⁾.

Chowdhury, Fauveau and Aziz & Rahman ⁽²²⁾ pointed out the negative effect of infant mortality on the initial acceptance and continuation of contraception use. In the present study, women who experienced the loss of a child were relatively short with high probability of discontinuation; this was not, however, statistically significant owing to the very few events reported.

The results show that the risk of discontinuing contraception methods will decrease by increasing

the woman's education level. In the present research university graduated women showed the least percent of discontinuation. Similar results have been shown in a study by Kijuan and Yue in 1994 ⁽²³⁾. Couples who had had 9 or more years of formal education each were more likely to report ever use of modern contraceptives. Several studies have documented the role of education in this respect ^{(24) (12)(17)(25)}. Education is likely to influence contraception use through its effect on women's preference for small family size, desire to be gainfully employed and the attainment of higher socioeconomic status.

In contrast to our results, Mahdy ⁽²⁾ found that contraceptive methods use were not significantly related to the level of education.

Discontinuation:

Table (4) shows the percent distribution of contraceptive method discontinuation according to source of supply and method in use. It was found that (69.7%) of methods had been stopped within 2 years of starting for various reasons. According to El-Zanaty and Way⁽⁷⁾ one third of users 33% in Egypt stop using methods within 12 months of starting use. In our study out of 1728 method only 523 (30.3%) continued up to 2 years. Mahdy⁽²⁾ found that (57.8%) of women continued using contraceptive method up to 2 years.

On comparing percentage of discontinuation according to different types of methods, it was 76.6%, 75.5%, 67.3%, 61.6% and 36.6% in OCPs, IUDs, Injectables, Barriers and Norplants methods respectively.

It was found that, CSI showed the highest percent as compared to other sectors (95.4%). On the other hand, 68.9% of private clinics methods, 68.4% of AUHS and 62.5% of MOHP methods had been stopped within 2 years of starting use (Table 4). Quality of the service may have slight impact on percentage of the discontinuation (Blanc)⁽²⁶⁾. A higher rate of method discontinuation among contraceptive users may indicate good quality service and availability of multiple choices methods rather than discontinuation itself (Kost) ⁽²⁷⁾.

Adequate counseling especially on side effect is significantly related to decision to continue contraception. The rate of discontinuation among women who reported that they had not been adequately counseled about side effects in high. In Ghana 51% of these who felt that they had not been properly counseled discontinue use compared with 14% who reported retrospectively on the information at the initial adoption of their contraception status (Cotton) ⁽²⁹⁾.

Side effects and Complications :

As regards **causes of discontinuations** side effects and health concerns was the most common reason of discontinuation (50.4%) (Table 5).

As in agreement with our results, Mahdy⁽²⁾ found that health concerns were the leading cause of discontinuation. He reported that the most common complaints were nausea, headache, weight gain, leg pain and breast fullness among OCPs users. Injectable users reported side effect as amenorrhea or bleeding problems. The majority of women had norplant implants removed because of health concern including amenorrhea followed by bleeding problems. Among IUD users women requested removal of device, because side effects, the greatest proportion of them do so because of bleeding problems or pelvic infection.

The same results were reported by Blanc⁽²⁶⁾ They stated that, one of the drawbacks of IUD was the increase in menstrual bleeding leading to discontinuation of method. As regards Injectables the commonest side effects was amenorrhea, followed by severe bleeding. For norplant severe bleeding was the commonest complaint. Change of libido was mentioned in women only using barriers.

In the present study, the desire to become pregnant was also frequently mentioned for discontinuing use (25.2%). Desire to be become pregnant was also frequently mentioned reason for discontinuing use (>25%)⁽³⁰⁾.

For other woman an unintended pregnancy (method failure) as a reason for discontinuation was mentioned by (5.6%) of methods. Ali and Cleland⁽³¹⁾ reported that discontinuation across six countries after one year due to desire for another child was relatively 5-10% except in Thailand 14%, but was higher after two years (11-24%).

Personal reasons as husband disapproved the method, wanted more effective method, inconvenient to use, cost access availability, marital dissolution, infrequent sex, husband away, or menopausal were mentioned by (18.8%)

Regarding events within 12 months after use; (44.3%) of them switched to another method, (42.8%) got pregnant and (1.1%) returned to the same method, (11.8%) of discontinuation ended their use of any method (Fig.1).

Failure and its fate :

Out of 1010 women, 68 (6.7%) stopped using the contraceptive method due to method failure. Failure represented (3.9%) of all studied methods (1728) and (5.6%) of all reported discontinuation (1205). **Failure** was the main cause of discontinuation among barrier methods users (73.6%) followed by OCPs (7.5%) and then IUDs (2.3%).

There was no failure cases reported among norplant and injectables method (Table 5).

According to El-Zanaty and Way⁽⁷⁾ 3% of users stop using due to method failure (they became pregnant while using the method). Method failure occurred most often with withdrawal, periodic abstinence, and other traditional methods^{(26),(31)}. This higher percentage of failure in barrier method (condom) may be related to low effectiveness either breakdown or in appropriate use.

Pill failure varied widely across countries but occurred much less frequently than withdrawal, periodic abstinence, and traditional methods. As in agreement with the present results, failure with IUDs and injectables was low across countries⁽³¹⁾.

In this research most of **failure** ended in live births (72.1%) and only (27.9%) ended in spontaneous abortion. Events occurring within 12 months of end of pregnancy of failure included: Switching to another method (64.7%) constituted the highest percentage followed by no events occurred (20.6%), got pregnant (10.3%) or return to the same method in 4.4% of cases (Table 7).

As in agreement with our research, Kost⁽²⁷⁾ reported that, after the end of pregnancy resulting from failure (82%) of women will become pregnant again. The probability of switching to another method after failure is high (24%). In contrast to the present results, kost⁽²⁷⁾ found that the probability of returning to the same method is twice great (48%). These means that these women consider that failure to be their own fault rather than of the method. Also Blanc⁽²⁶⁾ reported that Women who had experienced contraceptive failure and resumed using contraception after giving birth were most likely return to the same method. This was not the case in this study as returning to the same method represented only 4.4 of failure.

Clients' counseling:

Table (8) shows effect of counseling on continuation of contraceptive methods. On the basis of 10 questions of counseling steps; the results of the quantitative assessment indicated that a significant higher score on counseling was associated with continuation. Mean score was 4.61 ± 4.11 among women who continue use of contraceptive methods as compared to 3.01 ± 3.86 Among those who discontinue ($p=0.0001$).

Cotton⁽²⁹⁾ reported that adequate counseling especially on side effects is significantly related to decision to continue contraception. The rate of discontinuation among women who reported that they had not been adequately counseled about side effects is high. In Ghana 51% of these who felt that they had not been properly counseled discontinue use

compared with 14% who reported retrospectively on the information at the initial adoption of their contraception status.

Steel et al.,⁽³²⁾ reported that discontinuation are more likely with non-governmental sources of contraception as opposed to governmental sources (Clinic and hospitals) perhaps because of better and more counseling.

Recommendations:

for family planning programs were: 1) the focus should be on essential information and discussions that help the client make an adequate choice and properly use the method chosen; 2) the available time should be a factor in the number of issues discussed; 3) the client's ability to understand and retain information should be a factor in determining the amount of information; and 4) service providers must be aware of differing needs and levels of knowledge of clients 5) Counseling should emphasize the possibility of side effects, stressing the fact that most will be transient, and the need to identify a backup method. Follow-up visits should be scheduled for 1 to 2 months after a prescription is written.

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5/9/2011

Rediscovering Red Blood Cells: Revealing Their Antigens Store**Mahmoud Rafea¹, Serhiy Souchelnytskyi¹, Saleh El-Ayouby²**¹Karolinska Biomics Centre, Department of Oncology-Pathology, Karolinska Institutet, Stockholm, Sweden²Veterinary Serum and Vaccine Research Institute, Cairo, Egyptmahmoudrafea@gmail.comserhiy.souchelnytskyi@ki.sesaleh.elayouby@gmail.com

Abstract: This paper describes a newly observed phenomenon related to red blood cells (RBCs). We found that plasma from a healthy individual immune-reacted with hemolysates from the same person and from other individuals. This strongly suggested presence of antigens in RBCs and corresponding antibodies in plasma. Those RBCs' antigens are different from RBCs proteome. Those antigens can be separated using plasma / serum of blood from which RBCs were taken. It is found that those antigens consist of HLA antigens, tissue specific antigens, and foreign antigens. The foreign antigens can be fetus antigens in pregnant females, microorganisms' antigens, food, insects or other antigens from environment. The collection of those transported antigens represents a dynamic store. Consequently, RBCs may play role in tolerance through transporting those antigens to central organs of the immune system. The experiments, which have been done, reveal some of the antigens of the store, and show how this phenomenon can be exploited, for instance, in diagnosis of human tuberculosis (TB). In effect, this work opens a new avenue of research and hopes.

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Key words: Red Blood Cells, Erythrocytes, Immune Tolerance, Self-Antibodies, Erythrocytes Antigen Store, Erythrocytes Functional Proteome, Protection of Fetus as Allograft

1. Introduction:

We found that plasma from a healthy individual immune-reacted with hemolysates from the same person and from other individuals. This strongly suggested presence of antigens in RBCs and corresponding antibodies in plasma. Figure 1(a) shows Ouchterlony immuno-precipitation test of normal serum against self and other normal hemolysate. We confirmed this finding by using Western Blot technique, and showed that serum from one individual recognized antigens in hemolysate from two normal persons, Figure 1(b). Further confirmation was obtained by using two-dimensional gel electrophoresis (2-DE) of co-immunoprecipitated hemolysate antigens using self-serum, Figure 1(c). Antigenicity of the separated proteins was confirmed by immune-blotting proteins separated by 2-DE with the same self-serum. This excluded co-precipitation of non-antigens, as they would not be detected in immune-blotting. Notice that the number of the immunoprecipitated antigens is numerous and many spots were enriched by immune-precipitation because those antigens were not detected in 2DE gel of hemolysate, Figure 1(d). It should be remarked that this phenomenon is not reported before.

This observed phenomenon can be exploited in many directions. The proposed direction is to exploit

functional proteomics approach with the following three crucial aspects of the experimental design (Thompson, *et al.*, 2008):

- 1) The strategy used for the selection, purification and preparation of the antigens to be analyzed by mass spectrometry
- 2) The type of mass spectrometer used and the type of data to be obtained from it
- 3) The method used for the interpretation of the mass spectrometry data and the search engine used for the identification of the proteins in the different types of sequence data banks available

Consequently, using a subset of antibodies which are specific against a subset of antigens of a particular disease will enable the use of those antibodies and those antigens in beneficial applications. This approach has been used, in this article, to identify *Mycobacterium tuberculosis* bacilli protein antigens (MTPAs) in TB-patient hemolysate.

In the next section, the motivation and the aspects of experimental design are described. Experiments for identifying MTPAs in TB-patient hemolysate are detailed in section 3. Section 4 contains discussion arguments. The last section is the conclusion and future work.

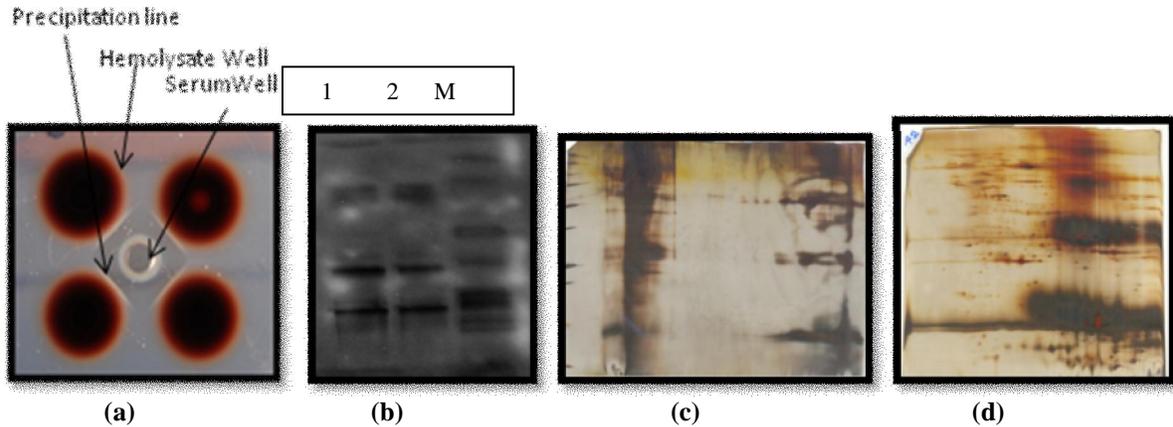


Figure 1: Detection of antigens in Red Blood Cells. (a) Ouchterlony test showing serum of normal against hemolysate of self and others (b) Western Blot using two normal hemolysate propped with serum of one of them (c) Silver stain of 2D electrophoresis of immune-precipitated hemolysate antigens (d) Silver stain of 2D electrophoresis of hemolysate.

2. Motivation and aspects of experimental design

Before trying to detect hemolysate antigens using self antibodies¹, there were some observations which lead to the induction of a number of hypotheses. Using background knowledge, some simple experiments were performed to prove or disprove those hypotheses. The observations start with a question related to Hemolytic Disease of Fetus and Newborn (HDFN). HDFN occurs sometimes due to ABO blood group incompatibility (Cariani, *et al.*, 1995). The incidence of HDFN does not exceed 5% (Cariani, *et al.*, 1995). In pregnant women with blood group 'O', ABO antibodies are mainly IgG in nature (Daniels & Bromilow, 2006). IgG antibodies usually pass the placenta barrier (Leach, *et al.*, 1996). In most pregnancies (> 95%), delivered infants are normal which means that there is an efficient mechanism that can handle this incompatibility. The question is: "How do circulating antibodies against blood group ABO in pregnant women who have blood group "O" not harm the fetus whose blood group is not "O"?"

It is claimed that the low prevalence of clinically significant ABO HDFN is due to the expression of ABO by fetal cells and tissues other than RBCs, i.e., ABO is a histo-blood group system (Mollison, *et al.*, 1997) and (Tawfik, 2005). In addition, it is also stated that A and B red cell antigens are not fully developed in the fetus (Hadley & Soothill, 2002) and (Tawfik, 2005). In fact, this

¹¹ Self antibodies are antibodies of blood from which RBCs are taken. This term is used because autoantibodies are just a fraction of self antibodies.

may explain the mechanism of why HDFN does not occur in 95% of pregnancies but it does not explain the mechanism of why it occurs in the 5%. Furthermore, neutralizing the effect of ABO antibodies on the fetus side is acceptable as a part of a mechanism, but not accepted as the full mechanism due to: a) the tiny size of a fetus in relation to the volume of blood of his mother, and b) the possible destructive effects of the consequences of antigen-antibody immune complex reactions. This neutralization effect should occur in the placenta by catering for the needed antigen similar to HLA antibodies (Koch & Platt, 2003). The placenta is designed for such reactions. This raises the question: "How are ABO antigens delivered to the placenta without being trapped by the ABO circulating antibodies and lymphocytes?"

For ABO antigens to be transported, a possible way is by RBCs because RBCs are specialized for transport. RBCs pinocytotic activity has been demonstrated very early (Orci & Perrelet, 1973). Consequently, the occurrence of HDFN is due to the depletion of the RBCs antigen store. The sources of those antigen(s) may be the fetus, the environment, and/or the male spouse. A simple experiment that shows that hemolysate contains ABO antigens different from the person's ABO group antigens is described in Figure 2. It was observed that whenever there is ABO incompatibility and male spouse is not 'O', male spouse RBCs agglutination by female spouse plasma, was inhibited by female spouse hemolysate and was not inhibited by male spouse hemolysate.

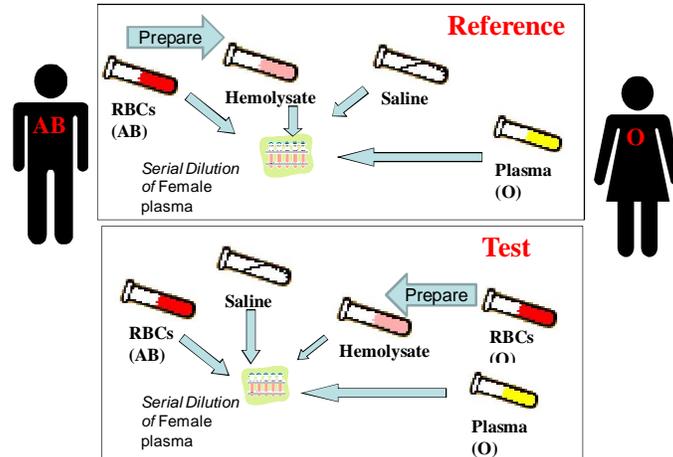


Figure 2: Detection of ABO antigens in RBCs' hemolysate. The experiment is performed, for each couple, by making two serial dilution of female plasma. In the first serial dilution (Reference), a drop of male spouse hemolysate is added to all tubes followed by a drop of his intact RBCs. In the second serial dilution (Test), a drop of female spouse hemolysate is added followed by a drop of male spouse intact RBCs.

If RBCs are capable of ABO antigen transport to the placenta, they may be also capable of transporting male spouse genetic antigens (e.g., HLA antigen) to thymus and bone marrow to induce tolerance to those antigens. RBCs may deliver also self antigens (e.g., HLA and Tissue Specific Antigens (TSAs)) to those central organs of the immune system to maintain self tolerance. Especially, this transport mechanism is important because the probability for any antigen to reach the thymus without being trapped by the immune system is zero. Consequently, the mechanism by which a pregnant woman is able to tolerate her fetus and placenta is the

same mechanism a body tolerates his self antigens. The simple experiment that demonstrates the existence of self and spouse HLA antigens is, also, based on competitive inhibition and was performed using commercial HLA Typing Trays for the identification and definition of HLA Class I Antigens using the microlymphocytotoxicity assay (Hopkins, 1990). It was observed that female and male spouse hemolysate inhibited the typing reaction while a third person hemolysate did not. This indicates the existence of male HLA antigens in his hemolysate and in his female spouse hemolysate, Figure 3.

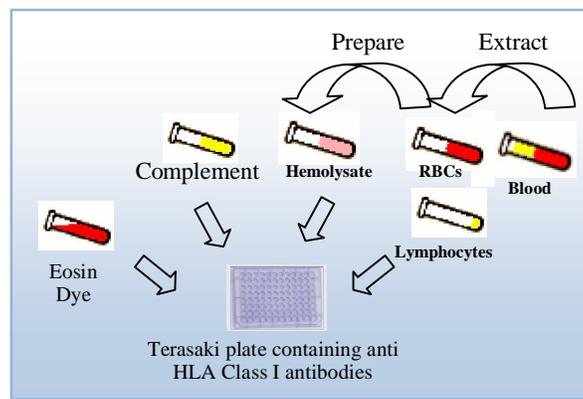


Figure 3: Detection of HLA antigens in RBCs' hemolysate. First, a couple is HLA typed and a suitable control person that does match the couple is selected. Three Terasaki plates are used for each couple. In each plate a different hemolysate (diluted 1/16) is used while male lymphocytes are used in the three plates.

If RBCs hide tolerated antigens (tolerogens) but antibodies still exist for those tolerogens because there is no absolute tolerance (Burek, 1998), then by implication some antigens, which induce immune

response, may exist in RBCs, i.e., there is no absolute immune response, too. Consequently, if this is true, then blood circulating antibodies in any individual will react with his RBCs' hemolysate antigens. When

it was found that this hypothesis is true, searching for specific bacterial antigens is needed to confirm the hypothesis. As TB is a priority disease, trying to find *Mycobacterium tuberculosis* bacilli protein antigens (MTPAs) in TB-patient hemolysate was conducted through 2D electrophoresis, and then identifying gel spots with mass spectrometry. Fortunately, we discovered four MTPAs. This motivated us to do the experiments of the next section to identify more MTPAs in hemolysate of TB patients.

Identifying MTPAs in TB patients hemolysate

The goal is to find the set of antigens, in TB patients' hemolysate, which is related to *Mycobacterium tuberculosis* bacilli. This set of antigens can be used in preparation of: 1) a kit for TB diagnosis, and vaccine. The approach taken follows the following steps Figure 4:

- The study resources are:
 - [A] Patients
 - [B] *Mycobacterium tuberculosis* (H37Rv)
- For each patient:
 - Collect blood sample on anticoagulant (step 1)
 - Separate RBCs and wash many times with saline (step 2)
- Hemolysate [C] is prepared by rupturing RBCs with low isotonic solution which is the binding buffer in affinity chromatography
- Prepare hyper immune serum for *M. tuberculosis* (step 3)
- Purify antibodies using Protein A Sepharose beads (step 4)
- The purified antibodies are then used to separate antigens from hemolysate (step 5)
- The disease related antigens are identified using in gel trypsin digestion and MALDI TOF mass spectrometry (step 6)

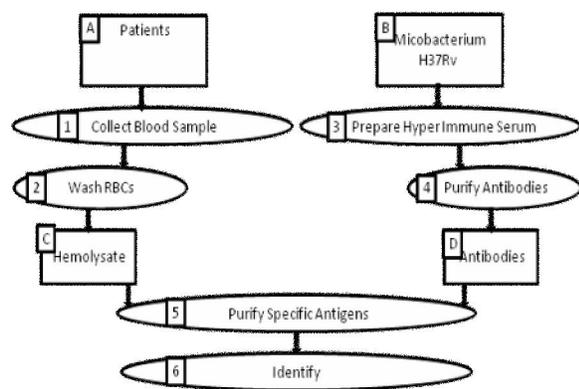


Figure 4: Flowchart depicting the resources and steps for identification of hemolysate antigens related to *Mycobacterium tuberculosis* (H37Rv)

2.1. *Mycobacterium tuberculosis* (H37Rv) Antigens Extraction

H37Rv strain was obtained from Veterinary Serum and Vaccine Research Institute (VSVRI), Tuberculosis Department. The protocol applied is a modified version of (Wood, *et al.*, 1988). *Mycobacterium* were grown on modified Middlebrook 7H11 medium (Gallagher & Horwill, 1977). The bacterial suspension was adjusted, approximately, to 10^9 bacterail ml^{-1} , and killed in 80°C waterbath for 2h followed by sonication for 10 min. The suspension was centrifuged at 4000g for 15 min. The supernatant was filtered sequentially through $0.45\ \mu\text{m}$ and $0.22\ \mu\text{m}$ cellulose acetate filters. The total protein content was estimated by measuring UV absorbance at 280 nm. This supernatant is referred to as extracted antigens.

2.2. Preparation of hyper immune serum

Female rabbits weighting 1.5- 2.0 kg were injected subcutaneously on 3 occasions at 2 week intervals with 0.5 ml suspension of the extracted antigens (100 μg of protein) in oily adjuvant (Jansen & Knoetze, 1979) and 150 μg of H7 Flagellin derived from *E. coli* O157:H7 (McNeilly, *et al.*, 2008) while Flagellin preparation was done according to (El Ayouby, *et al.*, 2008). Blood was collected 2 weeks after the last injection. Serum was separated immediately after clot retraction and stored as 2 ml aliquots at -70°C .

2.3. MTPSs separation using affinity column

The reagents used are Binding Buffer (BB): 0.02 M sodium phosphate, pH 7.0, Elution Buffer (EB): 0.1 M citric acid, pH 3.0, Neutralization Buffer (NB): 1 M Tris-HCl, pH 9.0, and Desalting buffer (DB): 8M urea. A syringe (5 ml) is packed with a small wad of cotton wool in the bottom which is thick enough to prevent the passage of solid support but not too thick that a large amount of air is trapped. The syringe was filled three-fourths full of EB and a small amount was drained. To remove any air bubbles from the cotton wool, a glass rod was used to tamp it. The solid support was prepared from 1 ml Protein A Sepharose 4 Fast Flow slurry by washing it 3 times with EB. The slurry is then slowly added after draining some of EB from the syringe.

The rabbit serum and hemolysate are centrifuged at $10\ 000\ \text{g}$ for 10 minutes to remove cells and debris. Both serum and hemolysate are diluted 1: 5 in binding buffer (BB) to adjust pH conditions and ionic strength. The diluted serum and hemolysate are used, in electrophoresis, as a reference to compare with the affinity column output. Figure 5 shows Western Blot of column elution fraction and the SDS-PAGE of all outputs of affinity

column. The labels shown in the figure are explained in the following column separation steps:

1. Equilibrate the column with 5 column volumes of binding buffer (BB).
2. Apply serum, and collect the output in a tube and labeled "Serum Sample (SS)".
3. Wash with 5 column volumes of BB to remove impurities and unbound material. Collect output in a tube labeled "Serum Wash (SW)".
4. Apply hemolysate, and collect the output in a tube and labeled "Hemolysate Sample (HS)".
5. Wash with 5 column volumes of BB to remove impurities and unbound material. Collect output in a tube labeled "Hemolysate Wash (HW)".
6. Elute with 5 column volumes of EB. Since elution conditions are quite harsh, collect

fractions of 1 ml into NB (100 μ l per fraction). Label tube fractions: E1, E2, E3, E4, E5.

7. Immediately re-equilibrate with 10 column volumes of BB.
8. The total protein content was estimated by measuring UV absorbance at 280 nm. Fractions were desalted with DB using a desalting column.

In Figure 5(b), notice the heavily stained 50 KDa bands which represent the concentrated antigens from the hemolysate. Meanwhile, Western Blot, **Figure 5(a)**, shows other larger and smaller proteins that appear hazy in the SDS-PAGE. Western Blot is done to compare human patient antibodies against MTPAs with those prepared in rabbits.

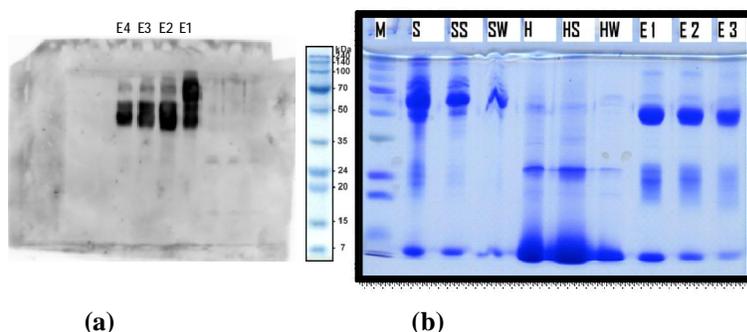


Figure 5: Verification of affinity column output. a) Western Blot of column elution fraction E4, E3, E2, and E1 which are transferred from SDS-PAGE to nitrocellulose membrane and then probed by human TB patient plasma. b) Coomassie Blue stain of affinity column output compared to serum (S) and hemolysate (H)

2.4. Antigen Identification

The affinity column separated hemolysate antigens from two patients were used in 2D-electrophoresis, Figure 6. Notice that the number of spots has decreased and become better manageable when compared with Figure 1(c). Spots were cut and

proteins were extracted and digested according to the trypsin digestion protocol mentioned in (Shevchenko, *et al.*, 2002). We could identify 11 proteins belonging to H37Rv from 60 spots. Other proteins were related to bacterial commensals, e.g., bacterioids.

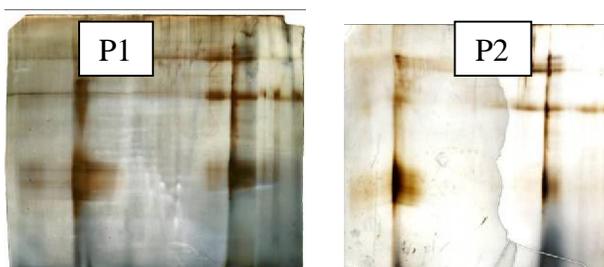


Figure 6: 2D-Electrophoresis of patients hemolysate antigens separated by affinity column chromatography containing Protein A Sepharose beads and the ligand is Ig of rabbit hyper immune serum against *M. tuberculosis*. Eleven proteins at pI: 4.8 and KDa: 219.14, 219.16, 219.27, 218.27, 54.23, 54.52, 54.62, 54.63, 54.65, 54.68, and 54.75. The rest are proteins related to bacterial commensals, mainly bacterioids.

3. Discussion

The study of RBC antigens was directed to cell membrane proteins, only. The differences in human RBCs are due to the presence or absence of certain protein molecules or antigens. The antigens are located on the surface of the red blood cells. Individuals have different types and combinations of these molecules. The blood group that one belongs to depends on what he has inherited from her/his parents. The antibodies against those molecules are in the blood plasma and depend on the type of antigens on the RBC membrane. There are more than 20 genetically determined blood group systems known today, but the ABO and Rh systems are the most important ones used for blood transfusions. Nobel Laureate Karl Landsteiner was involved in the discovery of both the ABO (Daniels & Bromilow, 2006) and Rh (Mollison, *et al.*, 1997) blood groups.

The only identifiable function of RBCs is the delivery of oxygen to tissues and return back of carbon dioxide to the lungs. Hemoglobin is the key player in this function. All the previous work in RBCs proteomics has not identified another function. Also, RBCs proteomics has not mentioned HLA, TSAs, or foreign proteins. The reasons are obvious. Firstly, it is not expected to find such proteins and consequently the method used for the interpretation of the mass spectrometry data, and the search engines used for the identification do not consider the right types of sequence data banks available. Secondly, the amount of most of the antigens which belong to the RBCs antigens' store is little. This makes those antigens invisible and hence easily missed. This is clear when one compares the 2DE gel of hemolysate immunoprecipitated antigens of Figure 1(c) and hemolysate of Figure 1 (d).

Although this phenomenon can be related to immune tolerance by logical induction, the concrete evidence and mechanism need further research. Mainly, the logical induction is based on the finding all kind of antigens in hemolysate, especially HLA antigens which are related to fetus. This existence of all kinds of antigens, definitely, plays some immunological role which may be immune tolerance.

Whatever the reason of this existence of antigens in hemolysate this existence can help in designing diagnostic kits for different types of diseases. Further, it will help in discovering, not only, new immunological disorders which are, now, categorized under idiopathic disease, but also, identifying the obscure cause of many immunological disorders, including cancer. The identification of the cause of a disorder will help in its treatment and prevention.

4. Conclusion

In this article, the work described is just a pilot study that throws some light on a new phenomenon related to RBCs. This phenomenon is the existence of antigens store consisting of self and non-self antigens. Most probably this antigens' store has some role in immune tolerance.

The initial experiment, which shows the existence of ABO antigens in hemolysate of pregnant females, explains the mechanism of how HDFN occurs. Meanwhile, the experiment which shows that HLA antigens exist in their hemolysates proposes a new hypothesis which is the mechanism by which a pregnant woman is able to tolerate her fetus and placenta is the same mechanism a body tolerates his self antigens.

The experiments which use hemolysate against self-serum: Ouchterlony immune-precipitation test, Western Blot, and 2DE of co-immunoprecipitated antigens demonstrated that RBCs have an antigens' store. Mass spectrometry of spots obtained from 2DE gel demonstrated the finding of all kind of antigens, self and non-self, in hemolysate. This indicates that blood circulating antibodies in any individual will react with his RBCs' hemolysate antigens. In effect, there is no absolute immune response, too.

This directed our attention to use hyper immune serum against Mycobacterium antigens. This will help to get rid of other proteins and do better separation; and hence better identification. Consequently, we could identify 11 proteins from 60 gel spots belonging to H37Rv strain. The rest of spots are proteins related to bacterial commensals. Consequently, purification of specific antibodies from hyper immune serum is recommended to get further better separation.

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5/6/2011

The effect of vitamin E on post-thawed buffalo bull sperm parameters

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Abstract: The sperm cells protection against oxidative reactions during cryopreservation process done by antioxidant and amino acids agents. The purpose of this study was evaluation of the effects of vitamin E on Azerbaijan Buffalo bull's sperm cells after thawing. Therefore for definition the percentage of motility, acrosomal membrane integrity, and live ratio of sperm cells, ejaculations from five mature buffalo bulls after preparation in tris-yolk base medium was added with five levels of vitamin E (0.1, 0.5, 1 or 1.5 mM) separately and frozen process was performed. One month latter, five piote selected randomly and after thawing in 37 °C water bath in twenty seconds, sperm cells motility evaluated with 37 °C warm plate microscope. On the other hand, the one step eosin-nigrosin staining for evaluation of live ratio percentage and formal citrate for acrosomal membrane integrity was performed, then slides evaluated with 1000x light microscope and 200 sperm per slide was counted. The result showed significant difference between blank and vitamin E groups and sperm motility was higher in vitamin E (P<0.05). On the other hand sperm motility in vitamin E 1.5 mM was higher than other vitamin E groups (P<0.05). Between vitamin E groups, the percentage of live-ratio was higher in vitamin E 1.5 mM and lower in vitamin E 0.1 mM (P<0.05) and the lowest was in control group (P<0.05).

[Rahim Beheshti, Aiden Asadi, Naser Maheri-Sis. The effect of vitamin E on post-thawed buffalo bull sperm parameters. Journal of American Science 2011; 7(6):227-231]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Buffalo bull, vitamin E, semen.

1. Introduction:

Buffalo population of the world was estimated to be more than 140 million (Sansone *et al.* 2000). Artificial insemination (AI) is one of the important reproductive biotechnologies, which causes the widespread propagation of semen, limiting the spread of sexually transmitted diseases, and chiefly facilitating genetic improvement programmes in livestock (Andrabi *et al.* 2008; Numan Bucak *et al.* 2009). Nevertheless, cryopreservation generates sub-lethal injury to the sperm due to chemical, osmotic, thermal, and mechanical stresses, which may result in loss of viability, motility, damage of deoxyribonucleic acid (DNA), destruction of acrosomal and plasma membrane (Numan Bucak *et al.* 2007; Rasul *et al.* 2001). Furthermore change of biochemical factors have been recognized during cryopreservation, including depletion of amino acids and lipoproteins, release of glutamic-oxaloacetic transaminase (GOT), decrease in phosphatase activity, decrease in loosely bound cholesterol protein, inactivation of acrosin enzyme and hyaluronidase, prostaglandins diminution, increase in sodium, decrease in potassium content, reduction of ATP and ADP synthesis and decrease in acrosomal proteolytic activity (Barbas *et al.* 2009). The extenders is an important factor in cryopreservation process. These mediums must have adequate pH and buffering capacity, appropriate osmolality and should

protect spermatozoa from cryogenic lesion. The Tris extenders are an important mediums that often used for semen freezing of bulls, rams, bucks and buffaloes (Barbas *et al.* 2009; Rasul *et al.* 2001).

In fact sperm plasma membrane is a primary target for freezing or cold shock injury (Numan Bucak *et al.* 2009).

Reactive oxygen are responsible to sperm dysfunction due the lipid peroxidation of membranes (Arabi *et al.* 2001). Agrawal *et al.* (2005) demonstrated that antioxidants are the major defensive mechanism against oxidative stress. It has been now documented that vitamin E is the major antioxidant agent of sperm cells which is a potent scavenger of free radicals and is able to protect plasma membrane from damages mediated by ROS and LPO (Yousef *et al.* 2003; Gurel *et al.* 2005; Sinclair, 2000). It has been established that presence of vitamin E is necessary for normal function of male reproductive system and traditionally, vitamin E is called as anti-sterility (Momeni *et al.* 2009).

Bansal *et al.* (2010) and Ball *et al.* (2001) reported that E is a main chain-breaking antioxidant in membranes because it may directly quench the free radicals such as superoxide anion ($\bullet\text{O}_2^-$), hydrogen peroxide (H_2O_2) and hydroxyl radical ($\text{OH}\bullet$).

The present study aimed at finding out the efficacy of E, a biological antioxidant, in reversing

the free radical-mediated oxidative damage on sperm motility, acrosome integrity and viability.

2. Material and methods

2.1. Chemicals

The anti-oxidant used in this study such as E, and other chemicals were obtained from Sigma–Aldrich.

2.2. Animals, Semen collecting and processing

The four mature buffalo-bulls (3–4 years of age, and 600–650 kg of body weight) maintained at the northwest buffalo Research Institute, Ministry of Agriculture, Urmia, Iran, under uniform feeding, housing and lighting conditions were used as a semen donor. A total number of 20 ejaculates were collected from buffalo-bulls with the aid of an artificial vagina at weekly intervals for 5 weeks. Immediately after collection, the ejaculates were transferred to the laboratory, and evaluated for sperm motility and sperm concentration.

The sperm concentration of each ejaculate was determined by means of a spectrophotometer. Only ejaculates containing sperm with >80% progressive motility and a concentration higher than 1.5×10^9 sperm/ml were pooled, in order to eliminate the bull effect. The base extender was Tris-based extender (Tris 2.66 g/100 ml, citric acid 1.47 g/100 ml, fructose 0.63 g/100 ml, egg yolk 20% (v/v), glycerol 7% (v/v), pH 6.8) was used as the basis extender. Each mixed ejaculate was split into 11 equal aliquots and diluted at 37 °C to concentration of 6×10^6 sperm/mL with the base extender containing E (0.1, 0.5, 1 or 1.5 mM), and no anti-oxidants (control), respectively.

Diluted semen samples were aspirated into 0.5 ml French straws, sealed with polyvinyl alcohol powder and cooled horizontally from 37 to 4 °C, and maintained at 4 °C for 4 hrs. The straws were frozen in vapor 4cm above liquid nitrogen for 10 minutes and plunged into liquid nitrogen. After being stored for one month, 5 frozen straws from each group were thawed individually at 37 °C for 20 s in a water bath for microscopic evaluation.

2.3. Semen evaluation

• Sperm viability

A 50 µL drop of frozen–thawed semen was placed on a pre-warmed slide and mixed with 50 µL drop of the supravital stain [1% (w/v) eosin B, 5% (w/v) nigrosin in 3% tri-sodium citrate dehydrate solution] to prepare a thin smear [20]. After air-drying, the smear was evaluated by microscope with 400× magnification. Two hundred spermatozoa were counted for unstained heads of spermatozoa (live)

and/or stained/partial stained heads of spermatozoa (dead) (Ijaz *et al.* 2009).

• Post-thawed sperm motility

Percentage motility was assessed using a phase-contrast microscope (×40). A 5 µL drop of thawed semen placed directly on a pre-warmed slide and covered with a cover slip. Sperm motility estimations were performed in three different microscopic fields for each semen sample by the same researcher. The mean of three observations was considered as a single data point.

• Normal Acrosomes:

A 500-µL portion of each semen sample was fixed in 50 µL of a 1% solution of formal citrate containing 2.9% (w/v) trisodium citrate dihydrate (Merck) and 1% (v/v) commercial formaldehyde. Two hundred spermatozoa were counted with a phase contrast microscope (1000×) for their normal apical ridge.

• Statistical analysis

The study was replicated three times. Results are expressed as the mean ± standard error of the mean (SEM). Analysis of variance (ANOVA) was used to assess differences among treatments on motion characteristics, plasma membrane integrity and normal acrosome morphology. When the F ratio was significant ($P < .05$), Tukey's post hoc test was used to compare treatment means (Version 12.0; SPSS, Chicago, IL).

3. Results

• Sperm parameters (percentages of motility, viability, acrosome Normality):

The effects of antioxidants on the sperm characteristics of frozen buffalo semen were evaluated in the five independent experiments. The post-thaw sperm motility improved significantly ($P < 0.05$) in the groups as compared to their respective values.

As set out in Table 1, the inclusion of vitamin E led to a higher motility, compared to the control group ($P < 0.05$). The motility of sperm cells post thaw increased significantly when adding of 0.1, 0.5, 1 or 1.5 Mm, E (56.98 ± 0.05 , 61.08 ± 0.07 , 63.16 ± 0.17 and 65.03 ± 0.09 respectively) to the extender as compared to the control group (45.86 ± 0.18).

No significant differences were observed in acrosome damage, following the supplementation of the freezing extender with antioxidants, following the freeze–thawing process.

Table 1. Effect of different concentrations of vitamin E on buffalo-bull semen Motility after freezing-thawing

Treatments	Motility (%Mean \pm SE)
E 0.1 mM	56.98 \pm 0.05 ^d
E 0.5 mM	61.08 \pm 0.07 ^c
E 1 mM	63.16 \pm 0.17 ^b
E 1.5 mM	65.03 \pm 0.09 ^a
Control	45.86 \pm 0.18 ^e

Values are (mean \pm standard error of mean). Different letters within a column indicates significant differences (P<0.05).

Table 2. Effect of different concentrations of vitamin E on buffalo-bull semen acrosomal normality after freezing-thawing

Treatments	acrosomal normality (%Mean \pm SE)
E 0.1 mM	68.38 \pm 0.14
E 0.5 mM	68.03 \pm 0.12
E 1 mM	67.91 \pm 0.11
E 1.5 mM	68.26 \pm 0.14
Control	68.38 \pm 0.11

Table 3. Effect of different concentrations of vitamin E on buffalo-bull semen viability after freezing-thawing

Treatments	Live sperm (%Mean \pm SE)
E 0.1 mM	66.86 \pm 0.06 ^d
E 0.5 mM	71.03 \pm 0.28 ^c
E 1 mM	73.03 \pm 0.10 ^b
E 1.5 mM	74.7 \pm 0.14 ^a
Control	55.51 \pm 0.16 ^e

Values are (mean \pm standard error of mean). Different letters within a column indicates significant differences (P<0.05).

The viability of sperm cells post thaw increased significantly when adding of 0.1, 0.5, 1 or 1.5 mM, vitamin E (66.86 \pm 0.06, 71.03 \pm 0.28, 73.03 \pm 0.10 and 74.7 \pm 0.14 respectively) to the extender as compared to the control group (P<0.05) and the highest viability of sperms were seen at 1.5 mM vitamin E treatment. Also, there are significant differences between the E treatments (P<0.05).

4. Discussions

Buffalo sperm is susceptible to cold stress than other species such as bull, rabbit and human (Andrabi et al., 2008; Fise et al., 1989). Of course, different reactions to temperature tensions is result

from differences in membrane lipid composition as buffalo sperm has high levels of saturated and unsaturated fatty acids and has lowest ratio of cholesterol/phospholipids compared with other species (Evans et al, 1987).

Antioxidant capability in sperm cells is limited because of deficiency cytoplasmic components having antioxidant effects to expunction of reactive oxygens. Thus, mammal's sperm haven't enough ability to encountering with peroxidation during the freezing and thawing processes (Alvarez et al, 2005; Bilodeau et al, 2000 and Lapointe et al, 2003). Reactive oxygen is known to play a major role in sperm membrane damage and directly damage sperm DNA that cause reduces of the sperm's motility, acrosomal membrane integrity and sperm metabolic alterations. In recent years, adding antioxidants to semen extenders for improvement of sperm quality were studied.

Addition of antioxidants such as vitamin E and vitamin C to the semen freezing diluent, may prevents or diminishes cryodamage to spermatozoa metabolism and antioxidant capacities (Anghel et al, 2009; Andrabi et al, 2008; Beheshti et al, 2011).

Beconi et al (1991) demonstrated that vitamin E prevents lipid peroxidation of frozen bovine semen. It has been demonstrated that this improved sperm quality and fertility in human sperm.

In some studies have been documented low levels of vitamin E would allow for production of physiological level of ROS that are necessary for capacitation, acrosome reaction and *in vitro* fertilization (DalEt al, 1998). Addition of vitamin E had a beneficial effect on sperm motility in liquid ram semen (Upreti et al, 1997), fresh human semen (Donnelly et al, 1999) and to little effect in equine chilled semen (Ball et al, 2001). In the present study, the inclusion of different levels of vitamin E to extender before freezing causes significant improvement in sperm quality parameters such as motility and viability of sperms than control group (P<0.05).

This study shows that all doses of vitamin E improve the buffalo sperm quality parameters such as motility and viability of sperms than control group (P<0.05). These findings were similar to results obtained with Ijaz et al (2009), Kheradmand et al (2006), Bansal and Bilaspuri (2009).

Supplementation the incubation medium with all doses of vitamin E improved the percent sperm motility compared to control group (P<0.05). It is suggested that addition of E may be useful in preventing the rapid loss of motility that occurs during semen freezing.

However, we haven't seen significant differences in normal acrosome percent between treatment and control groups. This finding was in contrast with results of Bansal (2010) that may be due to the differences in semen extender and animal species.

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Perceived autonomy support among Maternity and Psychiatric nursing students

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Abstract: Supporting students' autonomy has many outstanding benefits. It promotes self motivation and satisfaction for students in various learning settings. The aim of this study was to identify the nursing students' perception of their clinical instructors autonomy support. A convenient sample was taken from Faculty of Nursing, Alexandria University at Maternity and Psychiatric Nursing Departments. Sample of this study consisted of 250 undergraduate students attended and studied Maternity and Psychiatric Nursing courses. Data were collected in the second semester of academic year 2009/2010. Two tools were used to collect the necessary data. One questionnaire sheet to obtain demographic data including gender, age, and academic achievement. Second questionnaire sheet was Learning Climate Questionnaire, to assess the perceived autonomy support among students at different learning settings. Results of this study showed that the majority of Maternity and Psychiatric nursing students perceived either low or moderate levels of autonomy support and no statistically significant difference was found. Significant differences were only found between students' perception of clinical instructors autonomy support and gender differences among both groups. Teaching programs will be recommended to train clinical instructors in both specialties to display more autonomy-supportive behaviors.

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Keywords: autonomy support, self-determination theory, gender differences, maternity and psychiatric nursing students.

1. Introduction:

Motivation is a key element in nursing education. Highly motivated students are more enthusiastic, interested, involved, and persistent in their learning.⁽¹⁾ One source of intrinsic motivation is student autonomy. Autonomy is one of the basic psychological needs in which humans are intrinsically motivated toward learning, growth and intellectual challenge. This innate motivation requires nutrients from interpersonal environment in order to remain operative and creative.⁽²⁾ Among the necessary nutrients are support and encouragement for the individual to be self-initiating and volitional. Autonomy is encouraged when students are allowed to make decisions as to what, when, and how they learn.^(3,4)

According to a large body of empirical research in social psychology, individual autonomy is defined as "independence from others, feeling free and volitional in one's actions".⁽⁵⁾ Spear and Kulbok (2004) had performed a conceptual analysis of autonomy including the examination of selected research studies published between 1985 and 2001 within the fields of education, psychology, and nursing. Their findings demonstrated that the autonomy concept has been used to describe maturation, self-governance, individuation, and self-actualization.⁽⁶⁾ In learning situation, autonomy is

defined as "the students' ability to take charge of their learning, to develop a personal learning plan, to find resources for study and to evaluate themselves".⁽⁷⁾

Autonomy is a priority human need that improves the quality of human development in the light of different theoretical perspectives in psychology, ranging from psychoanalytic thinking in the conceptualization of personality to evolutionary psychology.⁽⁸⁾ It fosters human development in two ways. *First*, human development promotes autonomy because it expands human potentials and people's opportunities to participate in social life. *Second*, it supports human development because the more autonomous people are in better position to expand the potentials they most value and experience the responsibility for their own behaviors. Accordingly, they can enact significant social change in coordination with others to pursue common goals for improving their present and future well-being.⁽⁹⁾

Autonomy in nursing profession refers to nurse's freedom to act on what she/he knows in the best interests of the patient, to make independent clinical decisions in the nursing sphere of practice and interdependent decisions in those spheres where nursing overlaps with other disciplines. It often exceeds standard practice and includes being held accountable in a constructive and positive manner.⁽¹⁰⁾

Nurses in all nursing specialties have to act on their own in different situations. Some of these specialties can at times be much more physically, mentally, and emotionally demanding, such as maternity and psychiatric nursing specialties. Nurses in maternity nursing provide physical and psychological care to women during pregnancy, childbirth, and to women and their babies following birth. Similarly, nurses in psychiatric nursing provide emotional care for patients experiencing acute mental illness, administer and monitor psychopharmacologic agents, and provide crisis intervention. Furthermore, nurses in both specialties respond to the psycho-educational needs of the patient and their family members. All of these caring behaviors in maternity and psychiatric nursing professions require high level of autonomy and flexibility to independently make clinical decisions within the nurses' scope of practice.⁽¹¹⁾

Accordingly, the intended learning outcomes of maternity and psychiatric nursing education endorse many autonomous activities that have been evaluated by clinical instructors in various clinical settings for both specialties. Maternity activities include: the biopsychosociocultural assessment of pregnant, parturient, and puerperal women. Also provision of appropriate nursing interventions throughout the above mentioned 3 stages of the maternity cycle. In addition the provision of the immediate care of the newborn. In psychiatric nursing education, students assess patients' psychological needs, utilize therapeutic communication, build trustful relationships with psychotic patients, produce emotional care plans and apply de-escalation techniques to help patients manage their emotions and behavior. Hence, the development of the autonomous profession, capable of self-determination and independence of thought, has long been valued as a goal of professional nursing education.

Several studies showed that the quality of learning engagement does not depend on students' cognitive abilities alone, but is also influenced by complex motivational and affective factors.^(12,13,14) A necessary component for developing autonomy in nursing students is autonomy in approaches to learning, where students can specify what they want to learn, how they want to learn it, how to demonstrate learning, and the criteria to measure learning. The learning climate, which supports students' autonomy, will enhance their intrinsic motivations, whereas climates that control students' behavior and diminish their sense of volition and choice will undermine this natural motivation.⁽¹⁵⁾ Many studies revealed that learners who are involved in making choices and decisions about the aspects of the learning programs are self-motivated and

reflective learners and are likely to feel more secure in their learning.⁽¹⁶⁻¹⁹⁾

The role of clinical instructors in nursing education is to support the students' autonomy to facilitate their growth educationally and personally. The clinical supervision during clinical practice allows student nurses to focus on personal and professional strengths and difficulties. There are number of educators-behaviors that affect students' autonomy support, these behaviors include providing choice, minimizing the use of controls, and acknowledging the students' perspectives and feelings.⁽²⁰⁾

Supporting students' autonomy has many outstanding benefits; one of them is the positive effect it will have on students' perception of self as well as how they view their peers, experience emotional stability and being less vulnerable to depression and psychological distress. It will also create confident, independent thinkers, who will be motivated leaders in nursing profession and this ever-changing global society.^(21,22) Although autonomy supportive contexts in nursing education may hold promise for enhancing students' achievement and psychological development, few researches were done to investigate autonomy support among nursing students in different nursing specialties. Yet, a descriptive study was conducted by Karagozoglu (2009) aimed at determining the level of autonomy of final-year university students. He found that the nursing students' level of autonomy was lower than the students' level of autonomy in other health-related branches.⁽¹²⁾ Another study revealed that clinical accompaniment was perceived as being the availability of nurse educators in clinical settings, it provides autonomy support to student nurses.⁽¹³⁾

Learning strategies in maternity and psychiatric clinical practice can either prepare or be an obstacle to the students' thinking and acting like independent professionals. Therefore, this study aimed to investigate the maternity and psychiatric nursing students' perception of their instructors autonomy support during clinical experience.

Aim of the study:-

This study aims to identify the nursing students' perception of their clinical instructors autonomy support.

Research questions:

- 1- What is the nursing students' perception of their clinical instructors autonomy support?
- 2- Is there a difference between Psychiatric and Maternity nursing students' perception of their clinical instructors autonomy support?

2. Materials and Method

Materials

Design:

A descriptive correlation research design was utilized in this study.

Setting:

The study was conducted at Faculty of Nursing, in Alexandria University.

Subjects:

A total of 250 undergraduate nursing students who were enrolled in the BSN program and who just finished their clinical practice in maternity and psychiatric Nursing courses at the previously mentioned setting (130 of them were maternity nursing students and 120 of them were psychiatric nursing students).

Tools:

Tool (1)

A structured questionnaire sheet was developed by the researchers .It entailed information related to: socio-demographic data of the students such as name, age, sex, residence, and academic achievement.

Tool(2)

A modified version of the learning climate questionnaire (LCQ) that was originally developed by William (1996)⁽²³⁾. It assesses the perceived autonomy support among students at different learning settings. It comprises 15 items .Each item is scored on a 5 point Likert-scale that ranges from one to five where one denotes, two indicates, three to 5. The total score ranges between 15 and 75 with higher average scores represents a higher level of perceived autonomy support.

Methods:-

-Permission to conduct the study was obtained Official permission to conduct the study was obtained from the head of both Maternity and Psychiatric Nursing Departments.

-Tool (LCQ) was tested for the content validity by experts in the fields of Maternity and Psychiatric nursing education and necessary modifications were done. The reliability of the LCQ with the test - retest was tested. It produced an alpha coefficient of 0.94 for maternity nursing students, and 0.96 for psychiatric nursing students.

-Psychiatric and maternity nursing students were asked to complete a confidential Questionnaire. They were informed of their rights to decline participation or to participate voluntarily.

-A pilot study was carried out on 20 students who were excluded from the study. The aims of the pilot study were to:

-Test the validity, relevance and clarity of the questions.

- Estimate the time needed to complete the tool.

- Find out any problem that might interfere with the process of data collection.

-Appropriate modifications were done prior to data collection.

- Explanation of the aim of the study for students was done and the written consent to participate in the study was obtained.

-Students received research questionnaires and were given 30 minutes to complete the questions. Data were collected in the second semester of academic year 2009/2010.

Statistical analysis

The data was collected and entered into the personal computer. Statistical analysis was done using Statistical Package for Social Science (SPSS/version17) software. A comparison of the overall abilities of the two groups to accurately classify the subjects was performed by a Z test to compare two groups.

Arithmetic mean, standard deviation, number and percent were being utilized. For categorized parameters Chi square test was used while for numerical data t-test was used to compare two groups. The level of significant was 0.05.

3. Results

Table (I) presents number and percent distribution of the study subjects according to their general characteristics. The mean age of the subjects was 20.6 ± 1.56 years for maternity nursing students & 22.1 ± 1.1 years for psychiatric nursing students. More than one- half of the maternity and psychiatric students (68.5% &63.3% respectively) were female. The majority of the maternity and psychiatric groups were from rural areas (75.4% and70.0% respectively).

Concerning the students' clinical grades in maternity nursing specialty, only 3.8 % of students had excellent grade, slightly less than one third of them (33.1%) had very good grade , two- fifths of them (40%) obtained good grade , about one- fifth (19.2%)had pass grade , and only 3.8% of the students failed.

On the other hand, only 5.8% of psychiatric nursing students received excellent grade, one third and slightly more (33.3% &34.2%) had very good and good grade respectively. Less than one quarter of them (23.3%) had pass grade and 3.3% failed.

Table I: Socio-demographic data of the studied sample in the two groups.

	Maternity		Psychiatric		X ² P
	No.	%	No.	%	
Gender					
Male	41	31.5	44	36.7	0.73
Female	89	68.5	76	63.3	0.39
Age					
< 20	76	58.5	0	0.0	42.9
20 or more	54	41.5	120	100.0	0.0001*
Range	18 – 23		20 – 24		
Mean	20.6		22.1		
S.D.	1.06		1.17		
Residence					
Rural	98	75.4	84	70.0	0.91
Urban	32	24.6	36	30.0	0.33
Grade					
Excellent (A, A- to B+)	5	3.8	7	5.8	1.63 0.804
Very good (B, B-)	43	33.1	40	33.3	
Good (C+ - C)	52	40.0	41	34.2	
Pass (c-d)	25	19.2	28	23.3	
Fail (d-f)	5	3.8	4	3.3	
Total	130	100	120	100	

Table (II) illustrates the study subject's total score of perceived autonomy support. It was noticed that only 15.4% of maternity nursing students perceived high autonomy support. While about half (49.2%) of them had moderate level and 35.4 % experienced low autonomy support. For psychiatric group, only 12.5% of psychiatric nursing students perceived high autonomy support. 50% & 37.5 % experienced moderate and low autonomy support respectively, no statistical significant difference was found between both groups.

Table II: Total score of perceived autonomy support among the two studied groups.

	Maternity		Psychiatric		X ² P
	No.	%	No.	%	
Low	46	35.4	45	37.5	0.46 0.79
Moderate	64	49.2	60	50.0	
High	20	15.4	15	12.5	
Total	130	100.0	120	100.0	

Table (III) shows the comparison between maternity and psychiatric nursing students' perceptions about instructors' support for their autonomy. The table reveals that, a statistically significant differences between the two studied groups in relation to feeling that instructors provide choices and option as well as able to be open with instructor during clinical training. ($p = 0.03$ & 0.021 respectively.)

Furthermore, a significant differences were also found between both groups in relation to feeling a lot of trust in instructors and not feeling very good about the way the instructor talks to student. ($p = 0.031$ & 0.041 respectively).

Table (IV) presents the relationship between total score of perceived autonomy support among maternity and psychiatric nursing students and their gender. As regards to maternity nursing students, it were obvious that high, moderate and low autonomy score of autonomy support were obtained by (7.3%, 24.4% and 68.3%) respectively of male students as compared to (19.1%, 60.7% & 20.2%) of those female student.

Table III: Comparison between the two studied groups regarding autonomy support Questionnaire.

No. of questions	Maternity	Psychiatric	p
1. I feel that my instructor provides me choices and option	2.62±1.00	4.08±0.97	0.03*
2. I feel understood by my instructor	2.92±0.92	3.74±1.00	0.51
3. I am able to be open with my instructor during clinical training.	2.54±1.06	4.01±1.0	0.021*
4. My instructor conveyed confidence in my ability to do well in the clinical setting.	3.77±1.10	3.71±0.98	0.61
5. I feel that my instructor accepts me.	3.80±1.06	3.01±0.99	0.53
6. My instructor made sure I really understood the goals of the clinical training and what I need to do.	3.61±1.01	2.16±1.21	0.34
7. My instructor encouraged me to ask questions.	3.56±1.02	3.27±1.11	0.33
8. I feel a lot of trust in my instructor.	1.85±1.24	3.41±1.00	0.031*
9. My instructor answers my questions fully and carefully.	3.98±1.02	3.41±1.01	0.42
10. My instructor listens to how I would like to do things.	3.96±0.91	3.18±1.00	0.37
11. My instructor handles people's emotions very well.	2.21±1.01	2.38±1.10	0.42
12. I feel that my instructor cares about me as a person	3.44±1.00	3.68±1.00	0.39
13. I don't feel very good about the way my instructor talks to me.	4.21±1.00	3.05±1.04	0.041*
14. My instructor tries to understand how I see things before suggesting a new way to do things.	3.11±1.28	3.42±1.01	0.32
15. I feel able to share my feelings with my instructor	3.31±1.00	3.61±0.94	0.41

Table IV: Relation between total score of perceived autonomy support and gender.

	Maternity						Psychiatric					
	Low		Moderate		High		Low		Moderate		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	28	68.3	10	24.4	3	7.3	7	15.9	28	63.6	9	20.5
Female	18	20.2	54	60.7	17	19.1	38	50.0	32	42.1	6	7.9
Total	46		64		20		45		60		15	
X ²	12.85						5.65					
P	0.0022*						0.012*					

On the other hand, high, moderate & low score of autonomy support were obtained by 20.5%, 63.9%, & 15.9% (respectively) of male psychiatric nursing students compared to 7.9%, 42.1% , & 50% of those who were female psychiatric nursing students. A statistically significant differences between high , moderate & low of perceived autonomy support among the two studied group regarding gender .where p= 0.0022 & 0.012 for maternity & psychiatric group respectively.

Table (V) reveals the relationship between age and total score of perceived autonomy support

among maternity and psychiatric nursing students. For maternity nursing students it was noticed that about one-fifth (19.7%) of students who were less than 20 years old had high autonomy support compared to only 9.7% of those who were 20 years old and more. On the other hand, for psychiatric nursing students all studied groups (100%) were 20 years old had high (17.5%) , Moderate (50%) and low autonomy support (37.5%). A statistically significant differences were found between age and total score of perceived autonomy support for maternity group where P= 0.0255.

Table V: Relation between total score of perceived autonomy support and age.

	Maternity						Psychiatric					
	Low		Moderate		High		Low		Moderate		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 20	20	26.3	41	53.9	15	19.7	0	0	0	0	0	0
20 or more	26	48.1	23	42.6	5	9.3	45	100	60	100	21	100
Total	46		64		20		37.5		50		17.5	
X ²	7.33						-					
P	0.0255*						-					

Table (VI) shows the relationship between residence and autonomy support among maternity & psychiatric nursing students. For maternity nursing students, it was observed that, 7.1% of the students who came from rural areas had high autonomy support as compared to 40.6% of the students who came from urban areas. In addition, 52% & 40.8% of the students who came from rural areas had moderate and low autonomy support respectively as compared to 40.6% and 18.8% of those who came from urban areas.

Table VI: Relation between total score of perceived autonomy support and residence.

	Maternity						Psychiatric					
	Low		Moderate		High		Low		Moderate		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Rural	40	40.8	51	52.0	7	7.1	30	35.7	42	50.0	12	14.3
Urban	6	18.8	13	40.6	13	40.6	15	41.7	18	50.0	3	8.3
Total	46		64		20		45		60		15	
X ²	21.54						0.95					
P	0.0002*						0.621					

Table VII presents the relationship between total score of autonomy support and students' academic grades. It was found that most of the maternity & psychiatric nursing students who had excellent grades experienced high autonomy support (80% & 85.7% respectively). Whereas, the majority of the students in maternity and psychiatric groups who

As for psychiatric nursing students, 14.3% of the students who lived in rural areas experienced high autonomy support as compared to 8.3% of those who lived in urban areas. While 50% & 35.7% of the students who lived in rural areas had moderate & low autonomy support score respectively as compared to 50% & 41.7% of those who lived in urban areas. It was observed that no statistical significant differences between residence and perceived autonomy support among students for both studied groups

failed experienced low autonomy support (100% & 75% respectively). Statistically significant differences were found between perceived autonomy support and students' academic grades for both studied groups.

Table VII: Relation between total score of perceived autonomy support and grade.

	Maternity						Psychiatric					
	Low		Moderate		High		Low		Moderate		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Excellent (A,A- to B+)	0	0.0	1	20.0	4	80.0	0	0.0	1	14.3	6	85.7
Very good (B, B-)	1	2.3	30	69.8	12	27.9	14	35.0	20	50.0	6	15.0
Good (C+, C)	18	34.6	30	57.7	4	7.7	13	31.7	28	68.3	0	0.0
Pass (C-)	22	88.0	30	12.0	0	0.0	15	53.6	10	35.7	3	10.7
Fail (D, F)	5	100.0	0	0.0	0	0.0	3	75.0	1	25.0	0	0.0
Total	46		64		20		45		60		15	
X ²	12.5						16.22					
P	0.007*						0.004*					

4. Discussion

Maternity and psychiatric nursing education requires the nursing students to be more self-directed and engaged in a process of continuous professional development. They need encouragement to participate in social and educational activities that affect the practice of nursing and the quality of health care. The concept of autonomy in nursing education is regarded as an essential element for gaining professional status. Yet, it remains poorly defined and understood, little research has focused on exploring how nursing students in different

specialties perceive autonomy support.^(24,25) Hence, the purpose of this study was to determine the perception of autonomy support among maternity and psychiatric nursing students in their clinical practices.

The results of the present study indicated that nearly half of both maternity and psychiatric nursing students perceived a low level of autonomy support with no significant difference was found between them. This can be explained in the light of lacking of instructors' experience to promote motivational learning climate within the stressful context of the practical area in both specialties. Moreover, these

results are expected because the faculty curricula still focus on the traditional educational practices, where they prioritize conveying knowledge, preventing the apprentices from being creative, innovative, and of becoming responsible for their own learning process.

However, a significant differences were found between both groups regarding student's perception for some aspects of autonomy support as: allowing students to have some choices and options, being opened with instructors and having a lot of trust in instructors. These aspects of autonomy support were more reported by psychiatric nursing students as compared to maternity nursing students. While the aspect of feeling bad about the way that instructors talk to students was more reported by maternity nursing students than psychiatric nursing students. These data are consistent with the findings of Saarikokkia et. al. (2007) who claimed that a good mentor in psychiatric nursing education possesses appropriate professional attributes, knowledge, good communication skills and the motivation to teach and support students as well as maintaining supportive relationships with student nurses.⁽²¹⁾ Freeburn (2009) added that Psychiatric nursing students experience more stressors in Psychiatric settings than any other nursing specialties. Hence, they need supportive learning climate to manage these stressful situations during practice placement.⁽²⁶⁾

Furthermore, the role models in psychiatric nursing education must have the required knowledge, skills, integrity, personal bearing, neatness, empathy, sympathy and willingness to assist and motivate students. Role models are accountable for what happens in their clinical settings and should be trusted by student nurses because they are professional nurse practitioners. The image projected by role models should be positive and acceptable to student nurses at all times.⁽²⁷⁾

Clinical instructor's motivating style influences a great deal of engagement in learning situations and enhances intrinsic motivation among students. It is suggested that whenever students perform under autonomy supportive conditions, they tend to perceive themselves as more competent in cognition-based activities and report higher self-esteem⁽²⁸⁾. This explains why perceived autonomy support was positively correlated with students' final grades among nursing students in the present study for both groups. Several studies have also confirmed the detrimental effects of controlling environment over student's intrinsic motivation and academic performance.^(22, 28,29)

Regarding the relationship between autonomy support and gender differences, the present study showed a significant difference between male and female students in relation to their perception of

autonomy support for both groups. Male students in psychiatric nursing specialty perceived more autonomous support from clinical instructors than female students did. This can be explained by the fact that, culture fosters the sex difference by permitting male independency and assertiveness, while encouraging female dependency and passivity. Other studies reported that female students have less positive attitudes toward autonomous behavior, and participate in fewer relevant extracurricular activities than males. Furthermore, they also revealed that teachers' attitudes toward the inclusion of male students in nursing education indicated overall positive acceptance of males in nursing.⁽³⁰⁻³⁴⁾

As for maternity nursing students, the results of the present study were the opposite. Male students experienced low level of autonomy support than female.

Men in obstetric nursing often find themselves discriminated against, especially in the area of obstetrics. Male nursing students are not allowed to provide personal or intimate care for female patients. The biases that exist for men in nursing might be better described as "glass walls," since they are a barrier that prevents men from functioning in a full nursing role in this nursing specialty. Based on researchers' observation, male students at Faculty of nursing, Alexandria University, in Egypt are prevented from practicing clinical skills on real patients in the maternity hospital for some practical areas such as antenatal care, natal care, post - natal care and family planning. They allowed only carrying out some clinical skills in lab on simulated patients. Many studies revealed that male students have reported increasing numbers of women declining to have male students involved in their care and that some clinical instructors are less helpful than they are to female students. Differences in clinical experience according to sex have been reported in the United States, with women students receiving more experience in seven of 12 skills specific to women and men receiving more experience in two of three skills specific to men. Greatest experience was gained where teacher, student, and patients were of the same sex. This reason can clear up why male students perceived low autonomy support than female and had inferior position when trained in this female-bias specialty.⁽³³⁻³⁵⁾

Descriptions of the meaning of autonomy support in psychiatric and maternity nursing education can add to nursing knowledge by identifying how higher perceived autonomy support is positively correlated with student's academic performance and psychological maturity. Supporting the student's autonomy may increase students' interest and involvement in learning. It allows students to see

themselves as decision makers who are able to influence events in their professional and social lives.

4. Conclusion

According to the findings of the present study it could be concluded that, most of maternity and psychiatric nursing students perceived either low or moderate levels of autonomy support and no statistically significant difference was found. Significant differences were only found between students' perception of clinical instructors autonomy support and gender differences among both groups. The majority of male students in maternity nursing course perceived low level of autonomy support in comparison with male students in psychiatric nursing course. Furthermore, most students who experienced low level of autonomy support had obtained lower academic grades than those with high autonomy support among both groups

Recommendations

Based on the study findings it is recommended that:

1. Clinical instructors of maternity and psychiatric nursing courses need to be aware of their styles of supporting students' autonomy during clinical experience.
2. Teaching programs should be conducted for clinical instructors in both specialties by psychiatric nursing professors to train them to display more autonomy-supportive behaviors.
3. Formative and summative evaluation of students' perception of autonomy support should be conducted periodically in both specialties in order to provide information on program effectiveness and to make early improvements.
4. Undergraduate educational programs should promote self-directed and reflective learning.
5. Structuring the learning environment and using a variety of self learning strategies in both specialties for promoting and supporting students' autonomy.
6. Helping students to set and prioritize goals, and work towards explicit goals when developing and applying maternity and psychiatric care plans in clinical experiences.
7. Maternity nursing educators should develop learning strategies to improve the educational experience for male nursing students .
8. Re-planning of some of the clinical rotations of Maternity Nursing to include substitute clinical experience for the male students .
9. Male students should be oriented to and encouraged to identify with role model of male obstetricians during the clinical practice.
10. Further research is needed for larger sample to compare between nursing students' perception of

autonomy support with other health- related students

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Concurrent External Radiotherapy And Doxorubicin Based Chemotherapy In Breast Cancer Patients Any Cardiac Side Effects?

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Abstract: Doxorubicin, has for long been a major component in the combination chemotherapy for Breast Cancer. At a cumulative dose of 400 and 600mg/m² cardiomyopathies and electrocardiographic changes have been reported which may be worsen in patients who receive external beam radiation treatment to the left chest wall. This study aimed at examining presence of cardiac sequelae that may result from concurrent use of Doxorubicin based chemotherapy and external beam radiotherapy to the chest wall in our breast cancer population. Sixty-five (65) patients with cancer of the breast on combination therapy who received 50mg/m² of Doxorubicin in four divided three weekly doses and had 50Gy of external beam radiation in 25 daily fractions over 5 weeks were evaluated. The patients also had 5-fluorouracil 1000mg/m² and Cyclophosphamide 1000mg/m² as part of the combination chemotherapy. All patients had ECG and Echocardiography before commencement of treatment and at three and nine months post treatment. Only 55 were found evaluable at the end of the study with mean age of 48 years. Eleven patients had history of hypertension while none had any previous history of heart diseases. The pre and post-treatment ECG and Echocardiography were similar (p>0.05). The participants were also symptom free during the follow up period. Though this study suggests a safe combination of Doxorubicin-base chemotherapy and chest wall radiation within the period of evaluation, this may however, not exclude the possibility of long term complications. [A.A. Adenipekun, O. Oladapo, T.N. Elumelu. Concurrent External Radiotherapy And Doxorubicin Based Chemotherapy In Breast Cancer Patients Any Cardiac Side Effects? Journal of American Science 2011;7(6):241-244]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Concurrent Radiotherapy; Doxorubicin Chemotherapy; Cardiac side effect

1. Introduction

Doxorubicin is anthracycline, cytotoxic agent used in combination with Cyclophosphamide and 5-fluorouracil as first line chemotherapy in breast cancer management worldwide.

Doxorubicin has among other side effects, cardiac toxicity^{1, 2}, which necessitates monitoring of cardiac functions by ECG and echocardiograph before commencement of Doxorubicin based chemotherapy regimen. At a cumulative dose of 400mg – 600mg/m² cardiac side effects such as congestive heart failure, cardiomyopathies associated with reduction of QRS voltage, and reduction of the left ventricular ejection fraction have been reported^{3,4,5}, hence the need for regular follow up.

A potential increase in risk of cardiotoxicity is envisaged when Doxorubicin is used concomitantly or prior to External Radiotherapy to the mediastinal pericardial area when delivering radiotherapy to the chest wall of breast cancer patients.^{7, 8}

Concurrent use of Radiotherapy and Chemotherapy is preferred because delay in commencement of radiotherapy has been shown to decrease local control of breast cancer.⁹

There is an inclination towards chemo-radiotherapy because chemotherapy potentiates the effects of irradiation, on this combination reduces total length

of time for treatment, but may increase risks of cardiac toxicity.

This study aims to define the risks of cardiac toxicity in patients on combination therapy.

2. Materials and Method

Sixty five new consecutive patients with confirmed diagnosis of breast cancer attending Radiotherapy clinic of University College Hospital, Ibadan, Nigeria were recruited. Treatment involved 4 courses of combination chemotherapy with Doxorubicin 50mg/m², 5-Fluorouracil, 1000mg/m², Cyclophosphamide 1000mg/m² given intravenously on day 1 and repeated every 21 days. External Radiotherapy commenced 3 days later with 50 Gy in 25 fractions delivered to the chest wall by tangential fields. Cobalt-60 Teletherapy machine of 1.25 MeV energy was used. Each patient was simulated prior to commencement of radiotherapy. All patients were reviewed weekly to monitor any side effects.

All the patients had full blood count, serum urea and electrolyte, ECG and Echocardiography prior to commencement of treatment. The Echocardiography was repeated at the 3rd and 9th month after completion of treatment.

The echocardiography studies defined pre and post left ventricular ejection fraction, left ventricular end-

diastolic volume, (LVED) left ventricular (LVED) end-systolic volume, left ventricular internal Diameter (LVID) (diastolic), left ventricular Internal Diameter(Systolic) and Ejection fraction (Teicholz/Pombo method).

The objective of the study was explained to the patients and informed consent form was signed by them. Ethical clearance was obtained from the Joint University of Ibadan/University College Hospital, Ibadan ethical review committee.

Short interview with a set of questionnaires was conducted to obtain demographic data and medical history. The second part of the questionnaire consisting of data on investigation results was completed by the attending doctor.

Exclusion Criteria: Patients who have had any previous form of cytotoxic chemotherapy were excluded. Patients were withdrawn from the study when chemotherapy could not be tolerated. Patients with other co-morbid illness e.g. diabetes, were also excluded. Data Analysis Package: The data collected was analyzed using SPSS statistical soft ware.

3. Results

A total of 65 subjects were recruited but only 55 were evaluable. The reasons were deviation from study protocol and inadequate parameters for study in their Echocardiogram reports .The age group ranged from 24- 72 years while the age group 50-59 (32.7) were in majority. 37 subjects (67.2%) had parity of 4 and above. Eleven of the subjects had history of hypertension; none had history of heart disease. 48 (87.2%) of them were sedentary workers. All participants had their Full blood Count and Serum Electrolytes and Urea within normal limits. The six parameters mentioned above in the Echo-cardiograph pre and post treatment were compared.

Table 1

T-Test

		Group			
TREA		N	Mea	Std.	Std. Mea
EF	Pre	55	71.011	10.9355	1.4745
	Post	55	71.338	10.5758	1.4260
LVDiD	Pre	55	4.312	.7451	.1004
	Post	55	4.309	.7542	.1017
LVDiS	Pre	55	2.798	.5183	.0699
	Post	55	2.777	.6011	.0810

The result in table 1 did not show any significant difference in the Pre and Post Echocardiographs.

EF= Ejection Fraction

LVDiD =Left ventricular Internal diameter in Diastole.

LVDiS=Left ventricular Internal diameter in systole.

Table2

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
EJEFRAC	Equal variances assumed	.035	.852	-.159	108	.874	-.3264	2.05132	-4.39243	3.73970
	Equal variances not assumed			-.159	107.879	.874	-.3264	2.05132	-4.39248	3.73975
LVDiAD	Equal variances assumed	.025	.874	.022	108	.983	.0031	.14296	-.28028	.28646
	Equal variances not assumed			.022	107.984	.983	.0031	.14296	-.28028	.28646
LVDiAS	Equal variances assumed	1.484	.224	.190	108	.849	.0204	.10703	-.19179	.23252
	Equal variances not assumed			.190	105.713	.849	.0204	.10703	-.19185	.23257

Findings In this Table also did not show any differences in the parameters Pre and Post Treatment.

LVDiAD=Left ventricular end diastolic volume.

LVDiAS=Left ventricular end systolic volume.

Table 3

Pearson Correlation Coefficients

Prob > |r| under H0: Rho=0

Number of Observations

EJEFRAC1	LVEDV1	LVESV1	
LVEF1	LVDiAD1	LVDiAS1	
EJEFRAC2	0.10980	-0.08350	0.11246
	0.04214	0.19211	-0.07468
	0.4431	0.6609	0.5541
	0.8250	0.1640	0.5915
LVEDV2	-0.01771	0.48872	0.34859
	0.09889	0.10177	0.11621
	0.9274	0.0053	0.0546
	0.5966	0.5859	0.5336
LVESV2	0.01221	0.74924	0.51813
	0.17608	0.14644	0.38839
	0.9499	<.0001	0.0028
	0.3434	0.4318	0.0308
LVEF2	0.04769	0.02123	-0.03405
	0.15244	-0.04396	-0.04771
	0.8060	0.9098	0.8557
	0.4130	0.8143	0.7988
LVDiAD2	-0.00904	0.16288	0.23420
	0.23884	0.85206	0.30172
	0.9498	0.3813	0.2048
	0.1957	<.0001	0.0252
LVDiAS2	-0.12791	0.11094	0.42290
	0.50817	0.19288	0.54761
	0.3711	0.5524	0.0178
	0.0035	0.1583	<.0001

Correlations were significantly present between Pre treatment Left ventricular end diastolic volume LVEDV1 and Post treatment Left ventricular end systolic volume LVESV P : 0.001. Same was noticed for Pre treatment Left ventricular internal Diameter Diastolic (LVDiAD1)and post treatment Left ventricular internal diameter diastolic LVDiAD2 p: .0001, this was also true for internal diameter systolic pre and post treatment with p: .0001

Table 4

Age Group	Number	%
20-29	1	1.8
30-39	12	21.8
40-49	16	29.0
50-59	18	32.7
60-69	6	10.9
70-79	2	3.6
Total	55	100

4. Discussion

Chemo-radiotherapy is a regimen of cancer treatment being used for most Head and Neck and gynaecological malignancies, it is also now being used in Breast cancer cases, the idea is to take advantage of the synergistic effect of the cytotoxic chemotherapy and radiotherapy. This prospective study has shown that there is little or no harmful effect on the heart when Doxorubicin based cytotoxic chemotherapy is combined with radiotherapy of the chest wall of breast cancer patients. The differences noticed in the parameters of the echocardiograph of the 55 patients studied pre and post treatment were not statistically significant as shown in the Tables 1 and 2. No serious side effects were observed during the 9 month post treatment follow -up.

As shown in Table 3, correlations were significantly present between Pre treatment Left ventricular end diastolic volume LVEDV1 and Post treatment Left ventricular end systolic volume LVESV P : 0.001. Same was noticed for Pre treatment Left ventricular internal Diameter Diastolic (LVDIAD1) and post treatment Left ventricular internal diameter diastolic LVDIAD2 p: .0001, this was also true for internal diameter systolic pre and post treatment with p: .0001. These observations did not translate to any observable clinical signs among the study group Clement IP et al in their study of cardiac dysfunction following initiation of Doxorubicin therapy reported that LV systolic and diastolic function were not related to doxorubicin dose, however the decrease in LV ejection fraction with Doxorubicin were more notable in patients who received concurrent mediastinal irradiation with Doxorubicin.

In our study there was no notable difference in LV ejection fraction pre and post current irradiation and Doxorubicin.

Minow R.A et al reported cardiomyopathy to be of increase in uncontrolled hypertensive patients exposed to Doxorubicin even at lower doses.

It was also observed that congestive Heart failure was more likely to be fatal if it developed shortly after the last dose of Doxorubicin. There were 11 patients with controlled hypertension among the patients studied, non had any adverse reaction expect for a patient whose last course of Doxorubicin had to be delayed

because of dizziness and easy fatigability she however admitted to having these symptoms periodically even before the commencement of treatment. In conclusion our results on a general note did not reveal any adverse cardiac side effects as seen on the outcome of the echocardiographs within the study period of 9 months, however in view of the limited number of patients involved in this study it might be difficult to conclude on the safety of this regimen of treatment. A larger and longer study will be required to ascertain the long term safety of the regimen.

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Effects of administration of industrial tannins on nutrient excretion parameters during naturally acquired mixed nematode infections in Moghani sheep

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Abstract: Tannins are one of the secondary metabolites of plants that tend to combine with protein and reduce parasitic properties in livestock and veterinary industry. The aim of this study was to investigate effects of different levels of Quebracho Condensed Tannins (QCT) on Crude protein (CP) and other excretion parameters during naturally acquired mixed nematode infections in Moghani sheep. Twenty ewes (6-12 months years-old) with average body weight (26.5 ± 3.5 kg) were selected randomly and divided into four experimental groups: Control, A, B and C (were given 0, 1.5, 2 and 2.5 g/kg body weight QCT, respectively) in summer 2010. In order to reduce the undesirable effects of tannins, it was used as a single oral dose drenches. Faecal samples were taken at 24 and 48 hour after treatment. Our result showed that protein excretion has a significant difference in all treatment groups compare to control group after 24 hours from drenching ($P < 0.05$). Also, 48 hours after drenching, CP excretion was significantly decreased in treatment groups ($P < 0.05$) and the QCT has no significant effect on faecal excretion of dry matter (DM), organic matter (OM) and ash ($P > 0.05$). Our results indicate that high levels of tannins intake were decreased protein excretion and increased retention of nitrogen in animal body.

[Majid ChaichiSemsari, Naser MaheriSis, Mohammad Sadaghian, Behrad Eshratkhah, Shahin Hassanpour. Effects of administration of industrial tannins on nutrient excretion parameters during naturally acquired mixed nematode infections in Moghani sheep. Journal of American Science 2011;7(6):245-248]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Quebracho tannin, protein excretion, nematode, sheep

1. Introduction

Plant secondary metabolites are a diverse group of molecules that have not especial role in major plant processes such as Photosynthesis and Respiration. One of the most important secondary compounds can be pointed to the tannins (Karma et al., 2008). Mainly tannins were in all trees, shrubs and leguminous plants (Perevolotsky, 1994) and any altering in soil quality and weather conditions can change the levels of tannin in plant (Van Soest, 1994). Tanin has a very complex chemical structure (polyphenolic substances with various molecular weights and variable complexity) so it define is difficult (Schofield et al., 2001). Tannins are divided into two groups condensed (CT) and the hydrolysable tannins (HT) (Mueller-Harvey, 1999). The most important properties of tannins are mixture with proteins and ions but most tannin tend to combine with relatively large, hydrophobic and rich praline proteins (Hagerman et al., 1992).

Few decades ago, believed the anti nutrition effects of tannins are mixture with dietary protein which causes to reduce feed intake, diet digestibility and rumen fermentation (Barry and McNabb, 1999; Kumar and Singh, 1984; Mueller-Harvey and McAllan, 1992). Also, concluded that the tannins of different plant species have different chemical and

physical properties (Hagerman and Butler, 1991). Therefore, previous researchers demonstrated that ruminants fed by tanniniferous plants cause to benefits such as greater availability of (mainly essential) amino acids for absorption in the small intestine, nitrogen retention, reduce bloating, increase milk production, live weight, wool production and rates of ovulation (Min et al., 2003, 1999; Kriaa and Thewis. 1998/1999; Wang et al., 1996, 1994; McMahan et al., 2000).

On the other hand, gastrointestinal nematodes (GIN) are major problems in the livestock industry which considered decreasing of prolificacy, reducing reproductive performance, poor growth rate, low milk and wool production in ruminants (Max et al., 2005). Additionally, previous researchers reported grazing sheep and goats with tanniniferous hay cause to decrease load of nematode infection. Thus, they believe tannins have anthelmintic effects (Max et al., 2005; Maherisis et al., 2001). It seems CTs are capable formation complex with nematodes cuticle and may be due toxic effects on them (Niezen et al., 1995). The main propose of this study was to investigate short term effects of different levels of QCT as a anthelmintic on CP, OM, DM and Ash

excretion during naturally acquired mixed nematode infections in Moghani sheep.

2. Material and Methods

This study was carried out at Moghan plateau in Ardebil province, Northwest of Iran, which is located around 30°24'35.47" N and 48°18'12.36" E at 98m above sea level. In the first step, faecal samples were taken from the rectum of 200 grazer sheep in plastic containers and sent to lab by cold-temperature process (4°C). The parasite infection was determined in fecal samples. In laboratory, faecal egg counts (FEC) was monitored regularly using the modified McMaster technique (MAFF, 1978). In the second step, Twenty ewes (6–12 months' years old) with averaging body weight (26.5 ± 3.5 kg) with moderate load of GIN infection (the mean of FECs was about 450 per gram) were selected. Animals randomly were divided into 4 treatment groups ($n = 20$). All animals were given 7 hours fasting period then Control group received tap water as a placebo whereas A, B and C groups drenched (1.5, 2, 2.5 g/kg body weight) QCT as a water suspension, respectively for one day. The CT is astringent, so QCT suspended in 300 cc tap water. During the study, all animals fed *ad libitum* in Moghan plateau and free access to water. Faecal samples were taken 24 and 48 hours after drenching QCT. CP, DM, OM and Ash were determined using standard procedure (AOAC 1990). Data were processed in excel and analyzed as a complete randomized design for repeated measurements using SAS Software (version. / 9.1) and the least square means compared with Tukey multiple range tests.

3. Results

The mean \pm SE of the studied parameters was shown in Table 1. Also, the mean variation of CP excretion in different groups during the experiment was shown in Figure 1.

Our results indicate that there was a significant difference in CP excretion at 24 hours after administration of tannin to treatments compare to the control group ($P < 0.05$); however, there was no significant difference between B and C groups and maximum CP excretion was observed in C group. Also, there was a significantly difference in CP excretion at 48 hours after administration of the QCT only between C and other groups ($P < 0.05$).

Additionally, there was no significance differences between groups in DM, OM and Ash levels ($P > 0.05$).

4. Discussions

Tannins are mainly effective on reducing the nutrition ration digestibility but their influence on the proteins to form hydrogen bond that dependent to pH

(3.5 to 8). This combination is strong at pH rumen. It separates easily when the pH is lower than 3.5 or higher than 8 (Hagerman et al., 1992). Most possible mechanisms to reducing food digestibility in rumen by tannins were accepted by previous researchers which tannins due to this manner by substrate, enzyme and microorganisms inhibition (McMahon et al., 2000; Jones et al., 1994; Scalbert, 1991). McAllister *et al.* (1994) had reported to prevent tannins from binding microorganisms to plant cell walls which is necessary for them digestibility. Also, some researchers believe that the tannins have the ability to change the activity of Fibrolytic and Proteolytic enzymes (O'Donovan and Brooker, 2001; Waghorn, 1996). However, some authors observed that tannins may have directly affected by increase the membrane permeability of microorganisms (Scalbert, 1991; Leinmüller et al., 1991).

Table 1- Effect of different levels of Quebracho tannin on CP, DM, OM and Ash excretion in nematode infected ewes

Factors	Groups	Time (hour)	
		24	48
CP%	Control	13.57 \pm 0.21 ^c	13.33 \pm 0.2 ^{cd}
	A	14.2 \pm 0.19 ^b	13.16 \pm 0.18 ^{cd}
	Mean \pm SE	15.34 \pm 0.17 ^a	12.92 \pm 0.15 ^d
DM%	Control	33.44 \pm 0.25	33.4 \pm 0.51
	A	33.75 \pm 0.19	33.88 \pm 0.44
	Mean \pm SE	34.67 \pm 0.22	33.82 \pm 0.45
OM%	Control	77.02 \pm 1.47	76.79 \pm 0.68
	A	76.64 \pm 1.3	77.21 \pm 0.55
	Mean \pm SE	76.03 \pm 1.31	77.56 \pm 0.63
Ash%	Control	22.79 \pm 0.74	23.24 \pm 0.69
	A	23.02 \pm 0.56	22.47 \pm 0.59
	Mean \pm SE	22.53 \pm 0.61	21.76 \pm 0.6
	Control	22.2 \pm 0.64	22.78 \pm 0.65
	B		
	C		

A: 1.5g QCT/kg body weight; B: 2g QCT/kg body weight; C: 2.5g QCT/kg body weight; CP: Crude protein; DM: Dry matter; OM: Organic matter; there is a significant difference among groups with different letters (a, b, c, d, e) in protein and other excretion factors values ($P < 0.05$); SE: Standard error.

One of the most obvious evidence demonstrates that tannins due to reduce protein digestibility by increased nitrogen excretion and increasing amounts of tannin nutrition ration (Silanikove et al., 1994). Excreted protein has 2 sources: Endogenous and exogenous; tannins have to be inclined with both of the protein so it's difficult to determining site of excreted protein (Waghorn, 1996). Research showed that feeding sheep with the tannin silage Mimosa was

added, protein excretion greater than the sheep fed with hay addition to the chestnut tannin (Deaville et al., 2010). Bengaly et al., (2007) showed that Wattle tannins in food goats (3 g/kg Dry matter of ration) increase the protein excretion. Also, previous researches were reported drenching different levels of Wattle tannin decreased faecal protein excretion in nematode infected Moghani ewes (Hassanpour et al., 2011). However, Kriaa and Thewis (1998, 1999) reported that sheep fed with little amounts of chestnut (0.8 g/kg Dry matter of ration) were decreased protein excretion and increased retention of nitrogen in animal body. Results of this experiment were different with previous researchers (Scalbert, 1991; Deaville et al., 2010; Bengaly et al., 2007). According to our previous results (Maherisis et al., 2011) We believe increasing high levels of QCT cause to decreasing nematode FEC and increase tannin-protein complex and decrease protein degradability in the rumen; thus, increasing NPN and amino acid flow to the small intestine and increased dietary protein absorption. Finally, decreased excretion of protein and increased nitrogen retention in the body.

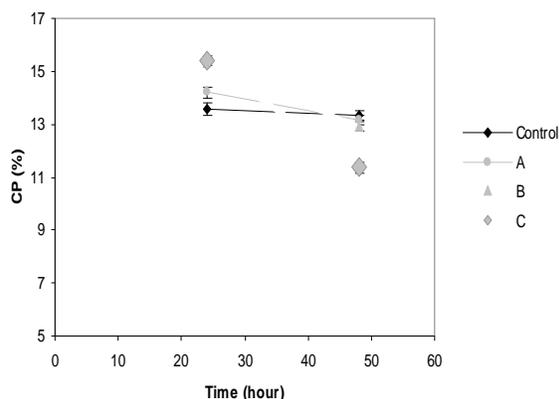


Figure 1- comparison of mean variations of CP excretion in different groups during the experiment period.

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Outcome of Mild and Moderate Preterm Newborns Admitted to NICU of Assiut University Children Hospital, Relation to Birth Weight

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Abstract: Prematurity and intrauterine growth restriction continues to be the major determinant of neonatal morbidity and mortality. The aim of this study was to assess morbidity and mortality of mild and moderate preterm newborns admitted to NICU of Assiut University Children Hospital, and to find out the effect of birth weight on these outcomes. Three hundreds and six preterm cases were included of which 194 were mild preterm (34-36 gestational weeks) and 112 were moderate preterm (32-33 gestational weeks). Cases with birth weight <10th percentile on growth charts were classified as small for gestational age (SGA). Cases were followed during the admission period for neonatal mortality and /or morbidity including respiratory distress (RD), need for mechanical ventilation, sepsis/meningitis, intraventricular hemorrhage (IVH), and necrotizing enterocolitis (NEC). The length of hospital stay was also recorded. Results showed that moderate preterm group had significantly higher susceptibility to RD and IVH, and higher need to mechanical ventilation than the mild preterm group. Furthermore, they showed higher rate of death and longer hospital stay than the mild preterm. There was a significant negative correlation between gestational age and length of hospital stay. According to birth weight it was noticed that SGA moderate preterm showed higher mortality rate and higher rate of IVH and sepsis/meningitis than the corresponding AGA group, while SGA mild preterm newborns had significantly lower rate of RD and higher rate of IVH and sepsis/meningitis than the corresponding AGA group. Both SGA subgroups had significantly longer hospital stay than the corresponding AGA groups. In conclusion, preterm infants especially SGA are at greater risk of neonatal morbidity and mortality. Management strategies and guidelines should be settled to prevent spontaneous preterm deliveries and to early diagnose and manage intrauterine growth restriction.

[Hanaa A. Mohammad, Nafisa H R Abd ElAziz, and Randa Shams Eldeen. Outcome of Mild and Moderate Preterm Newborns Admitted to NICU of Assiut University Children Hospital, Relation to Birth Weight. Journal of American Science 2011;7(6):249-253]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: preterm, small for gestational age, neonatal outcome

1. Introduction:

Prematurity, defined as birth before 37 weeks gestation, is the major determinant of morbidity and mortality for newborns. Preterm births have increased 30% since 1981 and composed 12.5% of all births in some countries⁽¹⁾. Preterm births account for 75% of perinatal mortality and more than half the long-term morbidity⁽²⁾. Kramer *et al.*⁽³⁾ studied the contribution of mild (34-36 gestational weeks) and moderate (32-33 gestational weeks) preterm to infant mortality in United States and Canada. They found that, although the mortality rate of these groups was significantly lower than that of newborns whose gestational age < 32 weeks (severe preterm), yet these infants contribute substantially to over all infant and neonatal mortality. This is because these infants represent ~ 75% of total number of preterm infants and their deaths constitute much larger etiologic fraction of infant and neonatal mortality than do those who are more premature.

Evans *et al.*⁽⁴⁾ found that, in addition to prematurity as the dominant risk factor of mortality, low birth weight for gestational age had a dose-

response effect; the more growth restricted the infant, the greater the risk of mortality.

Advancement in the care of extremely preterm infants has led to a shift of focus away from the more mature preterm, who are being managed as near terms and treated as near normal⁽⁵⁾. The aim of this study was to assess morbidity and mortality of mild and moderate preterm newborns admitted to Neonatal Intensive Care Unit (NICU) of Assiut University Children Hospital, and to find out the effect of birth weight on these outcomes.

2. Patients and Methods

This study was conducted in the NICU of Assiut University Children Hospital in the period between January and December 2010. All admitted cases within the target gestational age range (32-36 weeks) were enrolled. Exclusion criteria included major congenital malformations, cases showed signs of intrauterine infection, and multiple births more than twin.

Prenatal data included maternal age, parity, socioeconomic state, consanguinity, medical

diseases, prenatal medical care, and premature rupture of membrane. Mode of delivery, state of placenta, and multiple births were recorded. Gestational age was calculated in completed weeks from the first day of mother's last menstrual period or according to early gestational ultrasonographic reporting. According to the gestational age, the studied preterm cases were classified into mild preterm group (34-36 gestational weeks) and moderate preterm group (32-33 gestational weeks)⁽³⁾. Birth weight and length was recorded. The birth weight was plotted against the National Center for Health Statistics charts⁽⁶⁾ and patients had weights < 10th percentile for their gestational age were classified as small for gestational age (SGA)⁽⁷⁾. The ponderal index was calculated as follows {PI = weight (g)×100 / length (cm)³}.

All cases were subjected to full physical examination and proper investigations according to their morbidity and managed accordingly. They followed up for the period of admission for neonatal mortality and /or morbidity including respiratory distress (RD), need for mechanical ventilation, sepsis/meningitis, intraventricular hemorrhage (IVH), and necrotizing enterocolitis (NEC). The length of hospital stay was recorded in completed days. The criteria for discharge from the NICU were fixed for all cases.

The study was approved by Ethical Committee of Assiut University. Collected data were coded, analyzed and computed using the Statistical Package for Social Science (SPSS) version 10. Chi-square test was used to assess differences between numerical values and student t-test was used to assess differences between continuous values. Correlations were assessed using Pearson coefficient. Differences were considered significant statistically when P< 0.05

Table (1): Demographic data and risk factors of the studied preterm newborns.

Demographic data & risk factors		Number (%)
Maternal factors	Mother <20 years	24 (7.8%)
	Primipara	53 (17.3%)
	Low socioeconomic	108 (35.3%)
	No antenatal care	94 (30.7%)
	Consanguinity	91 (29.7%)
	Maternal diseases	43 (14.0%)
	PROM	62 (20.2%)
	Cesarean section	117 (38.2%)
	Spontaneous preterm delivery	176 (57.3%)
Fetal factors	Sex (% male)	183 (59.8%)
	Multiple birth	115 (37.5%)
	Gestational age	
	32 – 33 weeks	112 (36.6%)
	34 – 36 weeks	194 (63.4%)
	Birth weight (mean ± SD)	1836.44 ± 421.20 g
Small for gestational age	63 (20.5%)	

3. Results

During the study period, 306 preterm newborns (32-36 weeks gestation) were eligible to the inclusion criteria; of which 194 were mild preterm (34-36 weeks) and 112 were moderate preterm (32-33 weeks). The demographic data and risk factors of the studied preterm newborns are shown in Table (1). In this study, the etiology of prematurity could not be precisely defined. However, depending on reviewing the maternal health record, 20.2% could be attributed to preterm premature rupture of membrane which followed by either induction of labor or cesarean delivery, 22.5% were due to medical indication (either maternal or fetal), and the remaining 57.3% were due to spontaneous preterm delivery. About 38% of the studied preterm cases were delivered by cesarean delivery of which 16% were elective cesarean delivery.

Table (2): shows the rate of adverse outcome of the studied preterm newborns according to gestational age. Moderate preterm group had significantly higher susceptibility to respiratory distress than the mild preterm group. Causes of respiratory distress included transient tachypnea of newborn, neonatal pneumonia, and respiratory distress syndrome. The majority of respiratory distress in the moderate preterm group was due to respiratory distress syndrome and lung immaturity (65/82; 79.2%), while the main cause in the mild preterm group was due to transient tachypnea of newborn (47/68; 69.1%).

Table (3): shows the rate of adverse outcome of the studied mild and moderate preterm newborns according to birth weight

Table (2): The rate of adverse outcome of the studied preterm newborns according to gestational age

	Mild preterm n = 194	Moderate preterm n = 112	P<
Respiratory distress	68 (35.5%)	82 (73.2%)	0.001
Mechanical ventilation	31 (15.9%)	59 (52.6%)	0.001
Sepsis/meningitis	47 (24.2%)	26 (23.2%)	NS
Necrotizing enterocolitis	4 (2.0%)	7 (6.2%)	NS
Intraventricular hemorrhage	27 (13.9%)	33 (29.4%)	0.05
Length of hospital stay	10.71 ± 5.2	14.34 ± 6.1	0.01
Death	24 (12.3%)	35 (31.2%)	0.01

Table (3): The rate of adverse outcome of the studied mild and moderate preterm newborns according to birth weight

	Mild preterm N= 194		Moderate preterm N= 112	
	SGA n=36	AGA N=158	SGA n=27	AGA n=85
Respiratory distress	9 (25.0%)	59 (37.3%)*	19 (70.3%)	63 (74.1%)
Mechanical ventilation	6 (16.6%)	25 (15.8%)	15 (55.5%)	44 (51.7%)
Sepsis/meningitis	12 (33.3%)	35 (22.1%)*	8 (29.6%)	18 (21.1%)*
Necrotizing enterocolitis [#]	1 (2.7%)	3 (1.8%)	2 (7.4%)	5 (5.8%)
Intraventricular hemorrhage	8 (22.2%)	19 (12.0%)*	12 (44.4%)	21 (24.7%)*
Length of hospital stay	12.28 ± 5.5	9.14 ± 4.9*	15.07 ± 7.1	13.61 ± 5.1*
Death	4 (11.1%)	20 (12.6%)	13 (48.1%)	22 (25.8%)*

SGA: small for gestational age AGA: appropriate for gestational age

Differences were calculated between SGA and AGA of each preterm group

* P < 0.05 ** P < 0.01

Statistical difference could not be done due to small number of cases

4. Discussion

In this hospital based prospective descriptive study, we compared the adverse outcome of the admitted mild preterm (34-36 gestational weeks) versus the moderate preterm (32-33 gestational weeks) newborns. It was noticed that moderate preterm group had significantly higher susceptibility to respiratory distress, intraventricular hemorrhage and significantly higher need for mechanical ventilation than the mild preterm group (Table 2). Similar results were reported by Escobar *et al.*⁽⁸⁾. Furthermore, moderate preterm group showed higher rate of death than the mild preterm. Kramer *et al.*⁽³⁾ found, in his population based study, that relative risk (RR) of infant mortality were higher among moderate preterm infants in USA (6.6) and Canada (15.2) than the mild preterm (RR were 2.9, and 4.5, respectively).

In this study, the mean length of hospital stay was significantly higher in the moderate preterm group than the mild preterm group (Table 2). There was a significant negative correlation between gestational age and length of hospital stay ($r = -$

0.047, $P = 0.0217$). Beside the more likely medical problems in the former group, further delay in discharge of these cases may be attributed to delayed establishment of breast feeding which is one criterion of discharge from our unit. It has been reported that feeding problems were the dominant reason for delay in discharge of preterm infants as immature infants are less able to achieve effective suckling and swallowing⁽⁹⁾. However, the larger number of cases in the mild preterm group makes the sum of admission days of this group was higher with subsequent higher cost of admission of these cases than that for the moderate preterm group. This is supported by similar findings reported by several investigators^(9, 10). Although in obstetric and pediatric practice, the mild preterm is considered functionally full term, this group of infants still pause neonatal medical problems.

It is noteworthy to mention that 16.2% of all studied cases were delivered by elective CS which was done between gestational ages 35- 36 weeks. In obstetric practice, 34 completed weeks of gestation began to be considered a maturation milestone,

beyond which active interventions are rarely undertaken to prevent preterm birth⁽¹⁰⁾. Based on results reported by many investigators^(9,11,12), late or mild preterm infants are at greater risks of neonatal morbidity and mortality than full term infants

Gestational age, however, is just one factor in newborn and infant morbidity and mortality; additional risk is associated with being small for gestational age. So we sub-classify each studied preterm group into SGA and AGA. Small for gestational age infants constituted 20.5% of the whole studied cases; 18.5% of the mild preterm group and 24.1% of the moderate preterm group. The association between growth restriction and prematurity has been reported^(13,14). The explanation of this association may depend on the underlying condition; firstly growth restriction occurs and if the underlying pathology is severe premature labor supervenes⁽¹⁵⁾. The outcome of SGA preterm might differ than that of AGA preterm.

To study the effect of the birth weight on the adverse outcome of the preterm neonates, we compare the SGA group versus the corresponding AGA group of each gestational age group. It was noticed that the SGA moderate preterm group showed higher mortality rate than the corresponding AGA group, whereas, this finding was not found when we compared the SGA mild preterm group with the corresponding AGA group (Table 3). The SGA mild preterm group had significantly lower mean ponderal index than the moderate SGA preterm group (2.2 ± 0.41 , 2.69 ± 0.26 $P < 0.05$). This means that the SGA mild preterm infants were of the asymmetric type (wasted: normal length and head circumference but with low weight for length) while those of the SGA moderate preterm group were of the symmetric type (stunted: symmetrical reduction in weight, length and head circumference). It has been hypothesized that symmetric SGA occurs early in gestation and is due to genetic and chromosomal abnormalities, while asymmetric SGA occurs late in pregnancy and is due to inadequate nutrition⁽⁷⁾. This finding may denote that the growth restriction of moderate preterm are due to fetal causes rather than the prenatal malnutrition which may explain the high rate of their mortality.

Win *et al.*⁽¹⁶⁾ found that there was a 3.6-fold greater risk of neonatal mortality in preterm SGA, when used neonatal growth standards, as compared with AGA infants. Piper *et al.*⁽¹⁷⁾ showed that the neonatal mortality of infants with birth weight of less than the 10th percentile was higher than the AGA neonates at each gestational age up to 36 weeks.

Basso *et al.*⁽¹⁸⁾ summarizes that neonatal mortality of SGA infants is not due to the growth restriction itself, but is due to some confounding

factors causes the growth restriction and also causes the neonatal mortality. Such factors would include malformations, fetal or placental aneuploidy, infections or others.

Small for gestational age mild preterm infants had higher rates of intraventricular hemorrhage and sepsis/meningitis than the corresponding AGA group. Similarly, SGA moderate preterm infants had significantly higher rates of intra ventricular hemorrhage and sepsis/meningitis than the corresponding AGA group (Table 3). Simchen *et al.*⁽¹⁹⁾ found that SGA preterm infants had a higher mortality rate and high culture proven sepsis than the AGA preterm. Moreover, Win *et al.*⁽¹⁶⁾ found that the neonatal morbidity including RDS, assisted ventilation, intraventricular hemorrhage were high among preterm SGA infants than the AGA group.

In this study it was noticed that SGA mild preterm infants had significantly lower respiratory distress than the AGA group. Whether the intrauterine growth restriction is protective from respiratory distress or not is still a point of conflict. Simchen *et al.*⁽¹⁹⁾ found that growth restriction in the preterm neonate was not found to protect against neonatal outcomes associated with prematurity. They added that the presence of intrauterine growth restriction adversely affected survival independently of other variables. On the other hand, Sharma *et al.*⁽²⁰⁾ and Gortner *et al.*⁽²¹⁾ observed a lower incidence of RDS in preterm infants with IUGR.

Furthermore, both SGA mild and moderate preterm groups had significantly longer hospital stay than the AGA groups. There was a significant negative correlation between birth weight and length of hospital stay ($r = - 0.036$, $P = 0.0341$). Rocha *et al.*⁽²²⁾ found that preterm SGA newborns had significantly longer hospital stay and greater need for NICU treatment than the AGA preterms.

A limitation of this study was that we did not include a full term group for comparison. We recommend further follow up of preterm infants throughout the first year of life to detect morbidity and mortality of this category of infants. Management strategies and guidelines should be settled to prevent spontaneous preterm deliveries and to early diagnose and manage intrauterine growth restriction. When considering elective preterm delivery for this high risk group of pregnancies, the increased risks in the neonatal period should be taken into account.

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LMI Based Switching Congestion Controller for Multiple Bottleneck Packet Switching Networks

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Abstract: In this paper a new Linear Matrix Inequality (LMI) based switching controller for multiple Bottleneck packet switching Network has been considered. The main goal is to illustrate the effects of the Switching Control methodology on the congestion control problem of the packet switching Networks with dynamically varying parameters such as Link capacity and time delays. The congestion dynamic for congested network is presented and LMI based switching controller is being discussed. Then, the proposed control method has been applied on a case study in ATM Congested Network and simulations are conducted, and simulation results will be compared with old method.

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1. Introduction

High-speed computer communication networks are generally store-and-forward backbone networks consisting of switching nodes and communication links based on a certain topology. All the links and all the nodes are characterized by their own capacities for packet transmission and packet storing, respectively. A node which reaches its maximum storing capacity due to the saturation of its processors or one or more of its outgoing transmission links is called congested. Some of the packets, arriving at a congested node, cannot be accepted and have to be retransmitted at a later instance. This would lead to a deterioration of the network's throughput and delay performance or even the worst situation—network collapse. Therefore, congestion control is an important problem arising from the networks management. It follows that congestion is essentially a result of a mismatch between the network resources and the amount of traffic admitted for transmission. Consequently, congestion control can be linked to the classical problem of feedback control in which the main aim is to match the output to the input of dynamical systems [1].

Many algorithms have been proposed for computing explicit rates in single congested node. In general, these algorithms are of two types: the queue length and arrival rate of queue. The stability of the closed-loop system is critical in any congestion control scheme due to the fact that propagation delay encountered in high-speed networks may cause the controllers and the whole network to operate at an unstable point. This yields the notorious oscillation

problem that greatly degrades the network performance [2]. But many of these algorithms are not shown to be asymptotically stable in steady state situation, and also these algorithms cannot able to use of full capacity of resources in transient states [3-6]. In [7] an analytical method for a design of a congestion control scheme in multiple congested nodes in packet switching network is presented. The control method is rate based with a local feedback controller associated with each switch node. The controller is a generalization of the standard proportional-plus-derivative controller. It is shown that there exist a set of control gain that result in applying asymptotic stability of the linearized network model for delay in networks.

In this paper a new LMI based switching controller for multiple Bottleneck packet switching Networks has been considered. The main goal is to illustrate the potential impact of the Switching Control methodology [8], [9] on the congestion control problem of the packet switching Networks with dynamically varying parameters and time delays.

2. Congestion Dynamics

Three types of dynamic equations are defined:

1. The equations which are related to the trend of x on which the input rate to the congestion link has affect and its difference with the link transition capacity is c . With only one bottle-neck node there is only one x but when there are multiple bottle-neck nodes (i.e. when multiple nodes are congested), for each $x_i, i \in \mathbb{N}$ there is a equation for the changes of

the queue length in buffer. $x_i, i \in N$, denote the number of packets buffered for transmission on link i and $N = \{1, 2, K, N\}$ denote the set of links in network.

2. The calculating allowed sending rate q_i and its changes made new equations. This is the control algorithm equations. If there were multiple bottle-neck nodes, there would be separate suggested source sending rates calculations – according to the queue length and the implemented control algorithm – for each of them and the signals are sent to different traffic-sending nodes.

3. All the information about the suggested sending rates are sent to the source by control packets and the applicable traffic rate would be the minimum of the suggested rates and the rate of the source. The point here is that there is delay between calculating the suggested allowed sending rate and their delivery to the source. According to what mentioned above, for multiple bottle-neck nodes congestion equations are more complicated than single bottle-neck node but they follow the same concept. Generally, regardless of the complexity of the model, it is suitable to benefit from the concepts used in single bottle-neck node models in cases of multiple bottle-neck nodes and therefore it is worth investigating both together. The three equations of the network for multiple bottle-neck nodes are as follows [2]:

$$x_i^{ab}(n+1) = x_i^{ab}(n) + \min \left\{ \psi_i^{ab}(n - \tau_i^{ab}), \frac{\psi_i^{ab}(n - \tau_i^{ab})}{f_i(n)} (X - x_i(n) + \psi_i(n)) \right\} - \psi_i^{ab}(n)$$

$$q_i(n+1) = \text{Sat}_{q_i} \left\{ q_i(n) - \sum_{j=0}^{j_i} a_{ij} (x(n-j) - x^o) - \sum_{k=0}^{K_i} b_{ik} q_i(n-k) \right\} \quad (1)$$

$$\psi_{e_m}^{ab}(n) = r_{ab}^{o_m}(n) = \min \{ q_m(n+1 - d_{ma}^{ab}), m \in p(ab); r_{ab}^o(n) \}, i \in N \quad (ab) \in C(i)$$

Where a_{ij} and b_{ij} are the controller gains and $x_i^{ab}(n)$ is the queue length for (ab) connection traffic stored in buffer link i in the moment n , $\psi_i^{ab}(n)$ is the passing traffic of connection (ab) on link i on a time interval of $[n, n+1)$. The feedback delay d_{ma}^{ab} is equal to $\lceil \tau_{ma}^{ab} \rceil$. $\lceil \tau_{ma}^{ab} \rceil$ is smallest integer greater or equal to τ_{ma}^{ab} .

Since q_m is generated in time T , the most updated feedback information in node a in the moment n is $q_m(n-1 + d_{ma}^{ab})$ which may be arrived any time in the interval time $(n - d_{ma}^{ab}, n + 1 - d_{ma}^{ab})$. It is important to know that the equations are not closed with respect to the variables because in the equations, ψ_i^{ab} is not expressed in terms of the state variables x_i^{ab}, q_i and the applied traffic r_{ab}^o . We can simplified network dynamic equations as below [7]:

$$x_i(n+1) = \text{sat}_x \left\{ x_i(n) + \sum_{k=0}^{D_i} I_i^k(n) q_i(n+1-k) + f_{i\pi}(n) - c \right\}$$

$$q_i(n+1) = \text{sat}_{q_i} \left\{ q_i(n) - \sum_{j=0}^{j_i} a_{ij} (x_i(n-j) - x^o) - \sum_{k=0}^{K_i} b_{ik} q_i(n-k) \right\} \quad (2)$$

Then network can be divided into two sections: bottle-neck sub-network (the links in which congestion occurs) and non-bottle-neck sub-network. Equations (3) are for bottle-neck sub-network ($i = 1, \Lambda, N1$):

$$x(n+1) = \text{sat}_x \left\{ x(n) + \sum_{i=0}^D I_i(n) q(n+1-i) + r^o(n) - c \right\} \quad (3)$$

$$q(n+1) = \text{sat}_{q_i} \left\{ q(n) - \sum_{j=0}^J a_j (x(n-j) - x^o) - \sum_{k=0}^K b_k q(n-k) \right\}$$

$I_i^k(n)$ is the number of passing connections from i , limited by i , with a RTD delay of k and $f_i(n)$ is the summation of the connection traffic rates passing from i which are not limited by i (this kind of traffic may be limited by another bottle-neck link). Here, limited means a link creates a minimum suggested sending rate for a specific connection. Queue equations for link i is:

$$x_i(n+1) = \text{Sat}_x \{ x_i(n) + f_i(n) - c \}, i \in N \quad (4)$$

Where $x_i(n), f_i(n)$ are the total occupancy of the buffer of link i and the aggregate input flow to link respectively and x is buffer size [7].

3. Problem definition

Since congestion control methods are inefficient in confront of variation in Network condition and directly depends on input traffic rate and network uncertainty, the multiple switching-based logic controllers are used to reduce the inefficiency and also improve the performance of the network. In addition in order to solve the problems caused by unknown system parameters, robust controllers are used. The goal of congestion control in a network is to queue length (x) to be achieved to desire value of x_0 . If a buffer becomes full, it is saturated. Here, the controller objective is to control the number of the packets entering the buffer in order to keep it in a desired value. Suppose that a part of a network is congested. This part may include a number of connected links which are affected by several data streams. Figure 1 shows a part of a network affected by $r_A, r_B, r_C, r_D, r_E, r_F$ connection data stream.

4. Material and Methods

4.1. Proposed Method

In the proposed method for all network conditions a controller based on LMI should be determined. When network condition changed, then working area changed then controller should be

changed. In this paper uncertainty in the number of the transfer packets which causes some changes in the parameters of the equations is considered. In order to design a controller some areas should be defined. These working areas are defined according to the buffer saturation. For each working area a dynamic equations can be defined according to how the buffers are saturated. The best tool for designing the controller that guarantees the robustness of the network is LMI [10].

During the congestion control of the network the areas change and make different dynamics then switching control is used for stabilizing the system [8], [9]. In such type of switching, it is assumed that the system remains in a single working area for a certain period of time. The Switching Control system based on the LMI theory, used for the design of congestion control scheme, is described In Figure 2. The set of candidate controllers is taken to be LMI should be selected by switching index function that recognized the network area based on network feedback.

4.2. Switching

Plant models are inherently inaccurate, and controllers regulating processes described by such models must be able to ensure satisfactory closed-loop performance in the presence of exogenous process disturbances which cannot be measured. Modern linear control theories (e.g., pole placement/observer theory, linear quadratic theory, H^∞ theory, ...) are very highly developed and can be used to design controllers with such capabilities. Processes admitting linear models, provided the model uncertainties are time invariant and “sufficiently small.” But for “large” model uncertainties derived from real-time changes in plant dynamics, common sense suggests and simple examples prove that no single, fixed-parameter linear controller can possibly regulate in a satisfactory way. Such large uncertainties might arise in real time because of changes in operating environment, component aging or failure, or perhaps a sudden change in plant dynamics due to an external influence.

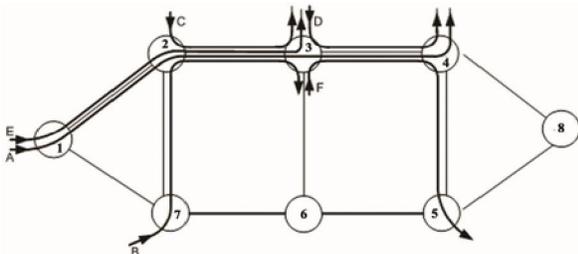


Fig. 1. A network with several bottle-neck nodes.

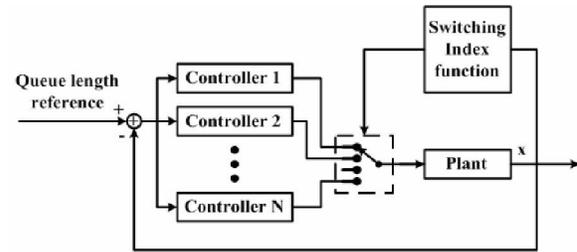


Fig. 2. congestion control structure

To deal with these types of uncertainties a controller better than linear feedback theory can provide, is obviously required. What is needed is a controller which can change or be changed in response to perceived changes in plant dynamics. If plant changes can be predicted in advance or can be directly measured when they occur, then controller gain scheduling will be often sufficient. But if plant changes cannot be predicted or directly measured, online controller selection or “tuning” must be carried out.

The aim of this paper is to describe a simply-structured “high-level” controller called a “supervisor” which is capable of switching into feedback for congestion control of a communication packet switching networks. A sequence of linear positioning controllers from a family of candidate controllers should be identified in order to output of the network approach and track x_0 .

4.3. LMI Theory

Linear Matrix Inequalities (LMIs) and LMI techniques have emerged as powerful design tools in areas ranging from control engineering to system identification and structural design. Three factors make LMI techniques appealing: A variety of design specifications and constraints can be expressed as LMI. Once formulated in terms of LMI, a problem can be solved exactly by efficient convex optimization algorithms (the “LMI solvers”). While most problems with multiple constraints or objectives lack analytical solutions in terms of matrix equations, they often remain tractable in the LMI framework. This makes LMI-based design a valuable alternative to classical “analytical” methods. See[10] for a good introduction to LMI concepts.

Theory [11], [12]: undetermined closed loop system equation (6) with the input signal mentioned in equation (5), is totally exponentially stable if symmetric and positive definitive matrix X and a set of matrices Q_1 can be found such that equation (8) holds. The feedback gain needed for stabilizing the closed loop system is expressed in equation (9).

$$u(t) = \sum_{i=1}^m \mu_i K_i x(t) \quad (5)$$

$$x(t+1) = \sum_{j=1}^m \mu_j (A_j + B_j K_j) x(t) \quad (6)$$

$$V(x) = x^T X^{-1} x \quad (7)$$

$$\begin{bmatrix} -X & XA_1^T + Q_1^T B_1^T \\ A_1 X + B_1 Q_1 & -X \end{bmatrix} < 0 \quad (8)$$

$$K_1 = Q_1 X^{-1} \quad (9)$$

5. Applying the proposed control method

The Figure (1) shows a network with several nodes. The traffic applied to each buffer is presented in Table 1 and Table 2. The reason for selecting the second and third type of the applied traffic is to investigate the efficiency of previously discussed method in the case of changing the working area. In this paper uncertainty in link capacity (c) which causes some changes in the parameters of the equations is considered. The goal of this paper is definition of the problem and the investigation of the proposed method in comparison to the one presented in [2], the addition of uncertainty is not considered.

Table. 1. Traffic applied to A

The applied traffic rate	End time	Start time	Link
0.6	3000	20	1
0.1	2500	50	2
0.1	3000	500	3
0.7	2500	1000	4
0.1	3000	1500	5
0.7	3000	2000	6

Table. 2. The applied traffic to B

The applied traffic rate	End time	Start time	Link
0.9	3000	20	1
0.8	2500	50	2
0.9	3000	500	3
0.9	2500	1000	4
0.9	3000	1500	5
0.8	3000	2000	6

According to the system equations of the multiple bottle-neck node network presented in [7] and the conditions in the following table also by ignoring the waiting time in the buffer, the initial value of system equations is $x_0 = 30, c = 60, \tau_{pr} \ll \tau_s$, RTD- Sampling time = T, $x=100$ and $10 \times \tau_s =$ Propagation delay τ_p^1 .

Now by considering the network in figure (1) the working area have been defined according which buffers are saturated as below:

- no buffer is saturated**
- buffer 2 is saturated**

- buffer 3 is saturated**
- buffer 1 and buffer 2 are saturated**
- buffer 2 and buffer 3 are saturated**
- all buffers are saturated**

These are all working areas, in the following the details of proposed method for all of working area have been presented.

If no buffer is saturated

In this working area $x_i(n) + f_i(n) \leq c$, i.e., the buffer capacity is not full so the equations are as follows:

$$x_i(n+1) = Sat_x \{x_i(n) + f_i(n) - c\}, i \in \{1, 2, 3, 4\}$$

$$\Rightarrow x_i(n+1) = 0, i \in \{1, 2, 3, 4\} \quad (10)$$

It can be seen that input traffic affects the performance of the system and the network traffic behavior is much more desirable and no control is needed.

If buffer 2 is saturated

Buffer 2 being saturated, a new working area is created in which $x_2(n) + f_2(n) > c$ and for other buffers, $x_i(n) + f_i(n) \leq c, i \in \{1, 3, 4\}$. The fact that the saturation in one buffer may result in saturation in other buffers is not considered here, because if another buffer becomes saturated due to saturation of buffer2, another working area is created. Here, the control goal is that this working area, $x_2(n)$, converges to x_0 . It should be noticed that the possibility of other buffers become saturated due to convergence of $x_2(n)$ to x_0 is not the point because in this case a new working are is created. Assuming that buffer 2 is saturated, the dynamic equations is as follows:

$$x_i(n+1) = 0, i = 1, 3, 4$$

$$x_2(n+1) = x_2(n) + r_B + r_C + r_A + r_E - c \quad (11)$$

In order to achieve the control objective in this area, a dynamic error is added to the system which expressed by the following equation:

$$e_2(n+1) = e_2(n) + x_0 - x_2(n) \quad (12)$$

Since there is no uncertainty in the governing equations of the network, convergence of $e_2(n)$ to zero is sufficient to achieve the control objective. In order to do, pole placement method and the control rule $u = kx$ should be applied where the state vector is $\bar{x} = [x_2, e_2]$.

$$K_{10} = \begin{bmatrix} 0.075 & -0.005 \\ 0.075 & -0.005 \\ 0.075 & -0.005 \\ 0.075 & -0.005 \end{bmatrix}$$

If buffer 3 is saturated

Saturation of buffer 3 creates a new working area in which $x_3(n) + f_3(n) > c$ and for other buffers

we have $x_i(n) + f_i(n) \leq c$, $i = \{1, 2, 4\}$. According to Figure 5, the input $r_D(n)$ and $r_F(n)$ enter the third buffer immediately and the input $r_A(n)$ can enter the buffer either immediately or with delay. The bi-aspect behavior of $r_A(n)$ makes us consider it as an uncertainty. The dynamic equations of the network for this working area are as follows:

$$x_i(n+1) = 0, \quad i = 1, 2, 4$$

$$x_3(n+1) = x_3(n) + r_B + r_C + r_A + r_E - c \quad (13)$$

where $\Delta r_A(n)$ represents the uncertainty in $r_A(n)$ which may appear as:

$$r_A(n-4), r_A(n-3), r_A(n-2), r_A(n-1) \quad (14)$$

Design of a controller for this working area should be based on robust control theories such as LMI. In order to design the dynamic control, the buffer error of x_3 from x_1 and the delays related to $\Delta r_A(n)$, considered as uncertainty, should be added to the dynamic equations of the system. Therefore, the uncertainty in $\Delta r_A(n)$ is implicitly taken into account in the controller design.

$$x_3(n+1) = x_3(n) + r_D(n) + r_F(n) + r_A(n) - c + \Delta r_A(n)$$

$$x_3(n-1+1) = x_3(n) \Rightarrow x_3(n-2+1) = x_3(n-1)$$

$$e_3(n+1) = e_3(n) + (x_0 - x_3(n)) \quad (15)$$

$$r_A(n-1+1) = r_A(n) \Rightarrow r_A(n-2+1) = r_A(n-1)$$

$$\Rightarrow r_A(n-3+1) = r_A(n-2) \Rightarrow r_A(n-4+1) = r_A(n-3)$$

Hence, system dynamic matrices are:

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & p_1 & p_2 & p_3 & p_4 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}, B = \begin{bmatrix} w & 1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Where $w \in \{0, 1\}$ is the uncertainty of matrix

B. If one of the p_i is equal to 1, other p_i and w is zero. In other words, in set $\eta \in \{w, p_i\}$ only one of the members can be 1 at the same time. Therefore, the control input is considered in the form of $u = Kx$ to ensure the robustness of the system. Then, the state vector X is defined as follows:

$$[x_3(n), x_3(n-1), x_3(n-2), e(n), r_A(n-1), r_A(n-2), r_A(n-3), r_A(n-4)]$$

By using LMI, K is:

$$K_{01} = \begin{bmatrix} -0.0149 & -0.0094 & -0.0005 & -0.0280 & -0.4312 & -0.3027 & -0.0469 & -0.0022 \\ 0.7730 & 0.0251 & 0.0011 & -0.0927 & 0.2518 & 0.1811 & 0.0291 & 0.0014 \\ 0.7730 & 0.0251 & 0.0011 & -0.0927 & 0.2518 & 0.1811 & 0.0291 & 0.0014 \end{bmatrix}$$

If both buffer 1 and buffer 2 are saturated

In this case, for buffer 1 we have $x_1(n) + f_1(n) \geq c$ and since the all the data stream passing through buffer 1 enters buffer 2, then buffer 2 becomes saturated and the dynamic equations of the system considering the buffer error dynamics of x_2 from x_0 is as follows:

$$x_1(n+1) = x_1(n) + r_1 + r_5 - c$$

$$x_2(n+1) = x_2(n) + r_3 + r_2 - c$$

$$x_i(n+1) = 0 \quad i = \{3, 4\} \quad (16)$$

$$e_2(n+1) = e_2(n) + (x_0 - x_2(n))$$

This system does not contain any uncertainty. buffer 2 cannot be controlled while buffer 1 is still saturated and therefore, this working area should be omitted. In order to exit this working area it is assumed that buffer 2 is saturated. The design of this controller in this case is similar to the case in which buffer 2 is saturated. Since only buffer 2 is saturated.

If both buffer 2 and buffer 3 are saturated

In this case, for buffer 2 we have $x_2(n) + f_2(n) \geq c$ and for buffer 3 we have $x_3(n) + f_3(n) \geq c$. Therefore, by adding the new variables, buffer error integral x_2 from x_0 and x_3 from x_0 , the governing equations of the system are as follows:

$$x_i(n+1) = 0 \quad i = \{1, 4\}$$

$$x_2(n+1) = x_2(n) + r_A + r_B + r_C + r_E - c \quad (17)$$

$$x_3(n+1) = x_3(n) + r_D + r_F + \delta - c$$

where δ is the uncertainty of buffer 3 which can be defined as follows:

$$\delta = \begin{pmatrix} (x_2^A + r_A(n-i)) \\ x_2(n) + r_A + r_E + r_C + r_B \end{pmatrix} \quad i = 0, 1, 2, \dots \quad (18)$$

By adding the new equations we have:

$$e_2(n+1) = e_2(n) + (x_0 - x_2(n)) \quad (19)$$

$$e_3(n+1) = e_3(n) + (x_0 - x_3(n))$$

As it can be seen in the above equations, the input to buffer 2 and buffer 3 are independent and therefore, distributed controller design methods can be applied for designing the controller. Hence, first for buffer 2 and then for buffer 3 controllers are designed separately. Because in the dynamics of buffer 3, some deterministic terms appear, LMI is used for controller design. In this case, the coefficient of buffer 2 and the coefficient of buffer 3 are as follows. Since in this problem the uncertainty has the form of noise and causes instability in the closed loop system, only if it is unbounded, decentralized controller is used for x_2 and the uncertain norm which

is a part of x_2 is bounded. Therefore, the problem is to design a decentralized controller for which the state feedback gain is as follows:

$$K_{11} = \begin{bmatrix} 0.075 & 0 & -0.005 & 0 \\ 0.075 & 0 & -0.005 & 0 \\ 0.075 & 0 & -0.005 & 0 \\ 0 & 0.15 & 0 & -0.01 \\ 0.075 & 0 & -0.005 & 0 \\ 0 & 0.15 & 0 & -0.01 \end{bmatrix}$$

If all buffers are saturated

In this case, the working area in buffer 1 is c , in buffer 2 is $x_2(n) + f_2(n) \geq c$ and in buffer 3 we have $x_3(n) + f_3(n) \geq c$. Therefore the governing equations of the system by adding the new variables, buffer error integral of x_2 from x_0 and x_3 from x_0 are obtained as follows:

$$\begin{aligned} x_1(n+1) &= x_1(n) + r_A(n) + r_E(n) - c \\ x_2(n+1) &= x_2 + r_C(n) + r_B(n) \\ x_3(n+1) &= x_3(n) + r_D(n) + r_E(n) + \delta - c \\ x_4(n) &= 0 \end{aligned} \tag{20}$$

where δ is the uncertainty related to buffer 3 and may have the following form:

$$\delta = \left(\begin{array}{l} \left(x_2^A + \frac{x_1 + r_A(n-i)}{x + r_A(n) + r_E(n)} \times c \right) \\ \left(x_2 + c + r_B(n) + r_C(n) \right) \end{array} \right) \times c \quad i=1,2,\dots \tag{21}$$

By adding the new variable we have:

$$\begin{aligned} e_2(n+1) &= e_2(n) + (x_0 - x_2(n)) \\ e_3(n+1) &= e_3(n) + (x_0 - x_3(n)) \end{aligned} \tag{22}$$

In this case, similar to the case in which buffers 1 and 2 are saturated, we assume that only buffer 2 is saturated and since saturation of buffer 3 is taken into account, the controller design is the same as the design for the case mentioned before.

If there is no space in the buffer, the system will be saturated, i.e. if $X - x_i(n) + \psi_i(n) < f_i(n)$ then definitely $x_i(n) + f_i(n) > c$ because since $x \gg c$, we have $c < X + \psi_i(n) < f_i(n) + x_i(n)$. In this case the equations are as follows:

$$x_i(n+1) = x_i(n) + (x_0 - x_i(n) + \psi_i(n)) - c \Rightarrow x_i(n+1) = x_0 \tag{23}$$

which shows that there is no need for analysis because in this case the system does not obey the input and therefore, this should be prevented.

6. Simulation

Considering above, for the presented example there are four working areas: The working area in which only the second buffer becomes saturated, the working area in which only the third buffer becomes saturated, the working area in which the second and third buffer become saturated and the working area in which none of buffers become saturated. For each of these working areas the appropriate controller is designed based on the robust control theory and by applying the silence time switching logic the appropriate controller is selected and used.

Since if there isn't available any saturated buffer, transition rate will be upper limit i.e. full capacity of link ,therefore using of controller isn't necessary and for other working area following control signal is applied: $r_A, r_B, r_C, r_D, r_E, r_F=c$.

By applying these controllers and using the silence time switching logic, the following results for the applied traffic are presented in Table 1 and Table 2. Figure 3 – 7 depict the results of comparison between the obtained results and the response of the closed loop system controlled by a single controller. The comparison criteria is the response of the closed loop system according to the output performance and the control signal.

Figures 3 and 4 shows the response of the closed loop system when the traffic in Table 1 is applied. By considering the output response of the closed loop system it is obvious that the proposed design method results in an enhancement in the performance of the closed loop system and by using the proposed controller the control signal is enhanced (Figure 5).

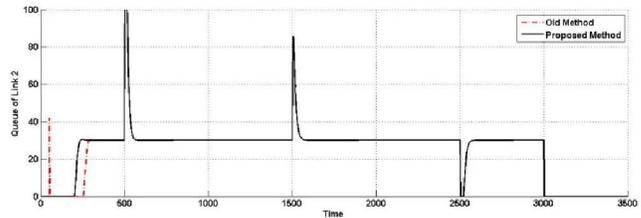


Figure 3. The output of the second queue lentgh.

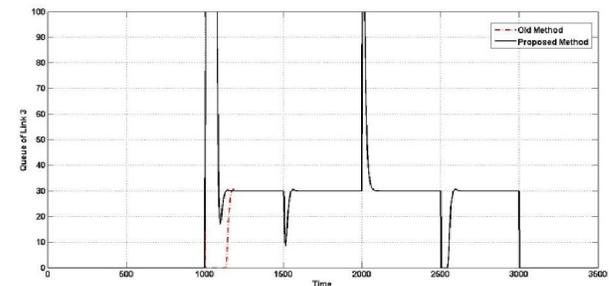


Figure 4. The output of the third queue lentgh.

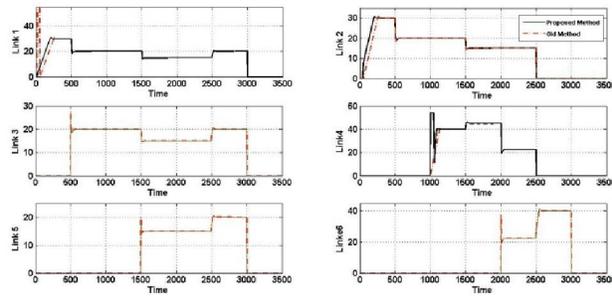


Figure 5. The control signals.

Figure 6 depicts the response of the closed loop system when the traffic is applied according to Table 2. By comparing between the closed loop system response, it is obvious that the performance of the closed loop system is improved by using the proposed method and the controller signal is also enhanced (Figure 7).

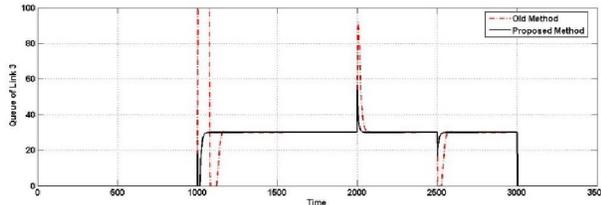


Figure 6. the output of the third buffer

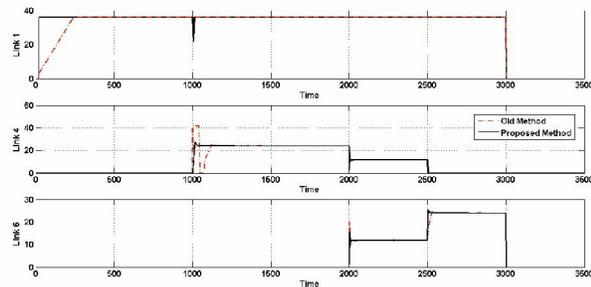


Figure 7. The resulted control signal

7. Conclusion

In this paper a new LMI based switching controller for multiple Bottleneck packet switching Networks was presented. The main goal was to illustrate the impact of the Switching Control methodology on the congestion control problem of the packet switching Networks with dynamically varying parameters such as link capacity (c) and time delays. Depends on network condition different working area defined and for each of these working areas the appropriate controller was designed based on the robust control theory. By applying the silence time switching logic the proposed method has been stable because there is no interference between controllers. Simulation result depicts that by considering the output response of the closed loop

system, it is obvious that the proposed design method results in an enhancement in the performance of the closed loop system and by using the proposed controller the control signal is enhanced.

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Designing Affordable Solar Dryer for the Small Scale Holder

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Abstract: The local farmer preserves the farm produce either by drying over the cooking tripod flue or by the use of natural sunlight. The quantity of produce that can be accommodated over the cooking flue is limited and the traditional solar drying is inefficient because the produce is exposed to vagaries of nature, birds and occasionally to rodents. The produce is preserved for use during the lean period, sold when the price is right and stored to provide seeds for the next planting season. The cost of building the typical glass covered solar dryer is generally beyond the means of the average rural farmer. There is therefore a need to find cheaper construction materials to replace the major cost components such as glass. Two solar dryers with glass and plastic covers have been designed and constructed for the purpose of assessing the suitability of plastic sheet as a replacement for glass. The drying performance of the two dryers has been compared. The results from the plastic covered solar dryer compare favourably with those of the glass dryer. It is therefore concluded that glass can be replaced with plastic sheet without significant performance loss.

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Key Words: transparency; incident; angle of inclination; absorption coefficient; reflection coefficient; tracking; dimensionless parameters.

1. Introduction

The harvest season for most grains and seeds in Aba district starts around July. Unfortunately however this is the same period when the rain fall starts to peak, a situation which is unfavourable for drying. The farmer needs to preserve the harvest both for use during the lean months and to sell when the price is right for maximum returns. The local farmer does not have the facilities to store and preserve fresh produce as the mechanised farms do. The capital outlay required for such an undertaking is well beyond the capability of the average rural small scale holder. The local farmer is well aware that there is more money to be made if fresh produce storage facilities are used but it is an option he, as an individual, cannot afford. Where fresh produce storage facilities are available the cost of leasing a small space is well beyond his means. Drying, as a result, is the option that the local farmer traditionally uses for farm produce preservation.

Before the grains and seeds can be stored they need to be dried. There are two main methods used in drying for preservation: the natural sunlight and heat from the cooking flue. Solar drying is prevalent especially where the grains and seeds are in reasonable quantity. Wood that used to be the main source of fuel for drying fairly large quantities of grain (Achara 1987) has shown is now hard to come by because of deforestation.

1.1 Cooking Tripod Drying:

After harvest, maize not yet husked is hung in bundles over the cooking tripod. The flue heat from cooking dries the grains. This fresh but mature produce would be dried and preserved to provide the seed for the next planting season, food during the lean months and extra cash when sold to other farmers the next planting season. The quantity that can be dried is limited by the space above the cooking tripod. To accommodate a fairly large quantity, the farmer resorts to drying in batches. The batch that the farmer considers dry enough but still not yet to the pre-determined storage level, makes way for a new batch while still hanging within reach of the warm cooking flue gases. In this traditional method of preservation, the farmer has learnt that for the seeds and grains to survive till the next planting season they cannot, at this stage, be completely removed from above the cooking tripod. If completely removed before the dryness level is reached, the tendency is for insects/pests to attack and destroy the grains. The farmer however, has to watch out to ensure the seeds and grains do not over dry. If the seeds and grains over dry, grinding to make meal becomes difficult and on occasion, the seeds cannot germinate when planted/sewn the next planting season.

For seeds, a woven basket with cover to prevent the ingress of insects and rodents is used. The basket is woven from material sourced locally from palm trees. The basket filled with seeds is hung over the tripod for drying. The seeds when completely dry, are

transferred to huge clay pots that serve as silos. Traditionally this basket serves other purposes for example the drying and preservation of fish and meat

1.2 Natural Sunlight:

The other technique for drying the harvest is by the use of natural sunlight. In this technique the grains and seeds are spread on a mat without any protection from inclement weather. To ensure that his produce is not destroyed, the farmer has to detail a member of the family to keep watch over the grains. The person on watch has to drive the birds and domestic animals away from the area and when the weather threatens, has to hurriedly pack up before the rains arrive. The pitfalls in this arrangement include the use of scarce human resource to keep watch over the grains, the unpredictability of the weather and the introduction of sand in the grains when hurrying to pack up as the rains threaten.

In this study, the construction of affordable solar energy dryer is considered. Two types of dryers have been designed, constructed and trialed and the results analysed. The basic difference in construction between the two designs is the transparent cover. The most common transparent cover for solar energy devices is glass but the small scale rural farmer is unable to provide one. There is a need therefore to look elsewhere for alternative transparent cover that is cheap to procure and yet in performance, comparable to glass cover. Any alternative material selected must be transparent to incoming solar radiation and able to block long wavelength radiation to reduce heat loss from the solar dryer. Glass cover itself is not entirely transparent at all wavelengths of solar radiation. However energy loss by reflection and absorption is considered insignificant.

There have been studies in the literature of solar energy dryers but unlike in the current work, non could be found that considered the cost implication to the rural small scale farmer. Folaranmi (2008), for an example, has studied solar energy dryer where the heat needed for drying is generated in a separate compartment and then transported to the dryer. The cost of a dryer unit of this type will still be beyond the resources of the target user, the small scale farmer.

2. Heat and Mass Balance

All modes of heat transfer are involved in solar drying devices but radiation and convection are predominant. For a given incidence, the energy balance is resolved by summing the following: the incident solar energy, energy absorbed by the wet grain and the base surface, energy absorbed and reflected by the transparent cover and that reflected from the drying grain. The energy absorbed by any surface varies with the time of the day since

reflectivity depends on the incident angle. This can explain the reason why some solar installations track the sun. Tracking the sun could however be an expensive undertaking especially in small and medium scale installations. For locations between latitudes 0 and 46° and where the tilt of the solar dryer is fixed, (Cooper 1970) has shown that the variation in absorption rate is insignificant for solar energy devices having transparent cover and angle of inclination not exceeding 60°. The absorption and reflection coefficients are assumed constant.

For convenience and to aid understanding of the physical processes taking place, the heat transfer in the solar dryer may be considered in two parts: that external to the transparent cover and that within the dryer itself. In reality however these are coupled. The main distinction between the two is that while within the dryer heat transfer by convection and mass transfer occur simultaneously especially at the early drying stages, there is no significant mass transfer effect outside the dryer. Within the dryer also the heat reflected to the transparent cover is unable to escape since it is within the infrared spectrum. Unless the base of the dryer is adequately insulated, considerable conductive heat losses would also occur.

The convective heat transfer term has in appearance a simple expression (the product of heat transfer coefficient, the surface area and the temperature difference) but in reality the heat transfer coefficient, a member of the product, is complex to express. It depends on the fluid flow characteristics, the geometry of the system under consideration as well as the physical properties of the fluid. Usually, the evaluation of the heat transfer coefficient is based on the correlation of data obtained from experiments using dimensional analysis. There are four dimensionless parameters used in the literature to relate the heat transfer coefficient and these are the Reynolds number, the Nusselt number, the Grashof number and the Prandtl number. In this study, the only relevant convective transfer is the free or natural convection. (Jacob 1947) has expressed the Nusselt number as a function of the Grashof number and the Prandtl number and shown that the Grashof number increases with the magnitude of convection. The Grashof number increases as the flow changes from laminar to turbulent. In this study, the convective heat transfer is by natural convection and all flows are within the laminar regime.

3. Solar Dryer Design

Two identical solar dryers have been designed and constructed with transparent cover as the only major difference. Each of the dryers measured 1.0m long by 0.4m wide and 0.2m high to form a rectangular box. One end of the 0.4m side is hinged

and the framework lined with sealing material to provide tight seal when the hinged ends is closed. Material for the dryer is timber board 0.3m wide and 25mm thick joined to make up the dimensions. The interior of both boxes is lined with locally sourced black plastic sheet derived from bin bags. The top of one of the boxes is covered with transparent plastic sheet and the other with glass. Holes 8mm in diameter are drilled at 50mm intervals all around each of the boxes, just below the transparent cover to aid the escape of moisture formed during the drying process. This is the main difference between this study and others found in the literature, where transparent covers other than glass, have been investigated. In this study moisture is considered a waste product and the aim is to get rid of it as soon as possible whereas the other studies considered the distillation of brackish water where the moisture when condensed forms the main product. Qasim

(1978) studied a solar still greenhouse combination in which polyethylene was used to cover the greenhouse. Similar work by Kumar et al (1981) as well as Moustafa and Brusewitz (1997) employed a wick-design in the desalination process. Kumar et al (1980) further studied the performance of solar stills with reference to the moisture deposition on the transparent cover.

Wood has been selected for the framework and main body of the dryer because of its fairly good thermal insulation properties, it is readily availability and cheap to buy locally. The choice of materials for construction is driven by the requirement in the study to design and build a solar dryer whose cost is within the financial capabilities of the rural farmer. The glass covered dryer is only used as a comparator to the performance of the transparent plastic covered dryer. Figure.1 is a schematic sketch of the dryers.

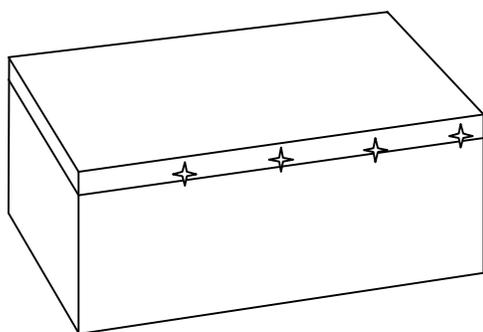


Figure.1 Solar Dryer Design

4. Testing

The experiments in this study were carried out in Aba, Abia State Nigeria, a city that lies at latitude 5° 10' north of the equator and between harvest months of July and November. The period chosen for the tests was dictated by the time in the year when the farm produce that require drying are abundantly available. Although other grains and seeds were tried, the tests finally settled on maize/corn and melon seeds because they were more readily available. In the original design 12mm holes were provided for moisture escape. Later, in the course of the tests the 12mm holes were replaced by the 8mm design in order to prevent the ingress of rodents into the dryer.

In each batch of the tests, two equal weights of the seed or grain were measured out and fed to the dryer through the hinged window ensuring even spread of the seeds or grain on the base. The maize used was husked and the melon seed was the type already washed and stored in a basket to drain some of the excess water. The decision was taken at the outset to reduce human handling to the barest minimum once the tests have been set up for compliance with the requirement to release human resources otherwise employed to keep watch in the traditional drying process. At the end of each day, the grains or seeds were weighted to check the weight loss for the day and whether the target weight had been reached. This

was the only handling allowed. However weighing the grains served another purpose of turning over the grains and seeds to prevent the burning of the side directly exposed to the incident solar energy.

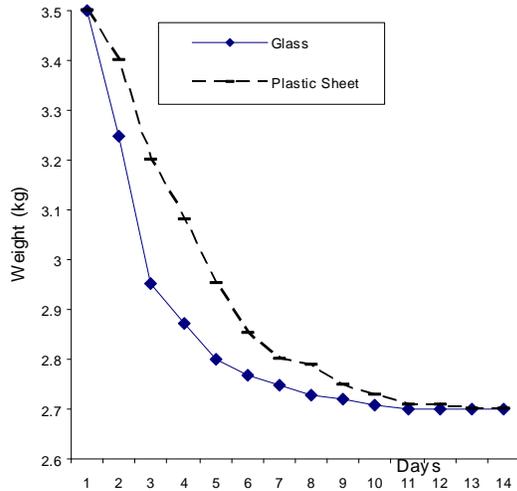


Figure.2 Performance of Glass and Plastic Dryers (High moisture)

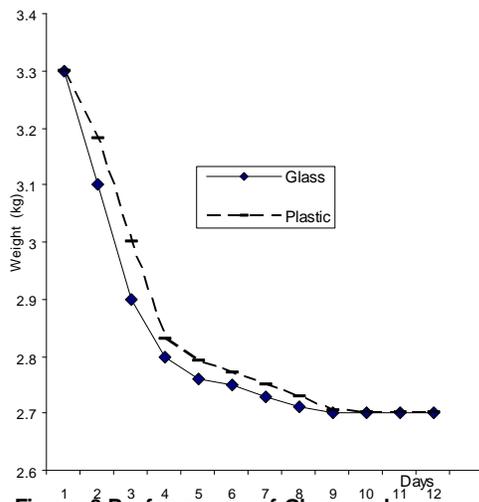


Figure.3 Performance of Glass and Plastic Dryers (low moisture)

5. Result and Discussion

Maize and melon seeds as common produce in the Aba district have been dried in transparent plastic sheet and glass covered dryers and the weight losses

measured at the end of each day. Typical results for melon seeds are recorded in figures 2 and 3. The produce in these figures is considered dry when the weight loss has reached a predetermined level.

Earlier in the drying process when the grains were very wet the drying was found to be sluggish because of the water vapour that settled on the inner transparent surface and inhibited the amount of solar energy transmitted. This phenomenon appeared to cause a physical reduction of the transparency of the cover and an increased reflection of solar energy back to the outside environment. At the initial stages, when the water moisture build-up was highest, the 8mm holes near the top of the dryer could hardly cope with getting rid of the moisture. The interest in this study is to find a cheap dryer design option which can be considered simple enough to construct as well as within the financial means of the average local farmer. As a result, the glass covered dryer on the bases of cost is used only as a performance comparator with the plastic sheet covered dryer. Figure. 2 is the result of weight loss as a function of time in days plotted for both the plastic sheet and glass covered dryers when the initial moisture content was high. This batch has an extra 6% of moisture by weight. Similarly figure.3 shows the result also for melon seeds when the pre-drying initial water content is considerably reduced. In the early period of these experiments, the glass covered dryer performed better than the plastic dryer but with time the two curves describing the performance tend to converge. This finding is consistent with those of Howe and Tleimat (1967) who in a study of solar distillation of brackish/salty water showed that the performance of a plastic covered build was about 82% that of glass distiller. In general, the plastic dryer performs considerably more poorly at high initial moisture content and this can account for longer period (13 days) for the two curves in figure 2 to converge. The agreement in weight loss between the two dryers gets better as the water content at the pre-drying stage is reduced, figure. 3 and convergence occurs earlier in 11 days. In all cases in the performance, the plastic dryer lags behind the glass dryer and this may be attributed to the fact that the plastic dryer has the tendency to clog up with moisture more easily than the glass dryer. This misty cloud inhibits the amount of solar energy transmitted into the inner part of the dryer.

There is hardly any noticeable difference in drying performance between the dryers in figure.3, however the glass dryer is still marginally better in weight loss than the plastic sheet covered dryer. At the initial stages, the weight loss per given time in both cases is more pronounced than towards the final stages this accounts for the asymptotic drop in the

plot at these stages. Towards the end however, the graph tends to level off for convergence as hardly any noticeable weight drop is observed. The trend in figure.2 and figure.3 agree with those of (Oladosu and Egusoje 1985) on glass covered solar energy fish dryer as well as a similar design work by (Arinze, 1985). At one stage in this study, the plastic cover had to be replaced as it was attacked in the night by rodents. The attack left a number of holes on the plastic sheet. After this incident a fine wire mesh was constructed around the dryers to prevent further attack. Although there was no question of the rodents attacking the glass, it was also enclosed within the wire mesh in order to provide a true like-to-like comparison. If the presence of the wire mesh affects the drying performance, this should not alter the performance comparison since each of the two dryers would equally be affected. Some other low cost material would have to be found for the farmer to protect the transparent plastic sheet if the overall construction cost of the dryer is to be kept low as originally planned. The wire mesh if used as cover on the production dryer will significantly add to the overall product cost. As time progressed towards the end of the tests, the plastic cover started to deteriorate in appearance turning yellowish in colour hence increased physical loss of transparency. At this stage, although there was no significant loss in performance, it was decided that the plastic sheet would have to be replaced if it was found necessary to run the experiment again.

6. Conclusion

1. Two dryers identical in all respects but covers have been designed, built and used to compare the performance of plastic sheet covered dryer against the conventional glass covered version.
2. For low product cost, plastic cover can be used since comparison with glass cover has shown that performance loss is minimal.
3. In each case the weight loss at the earlier stages of the drying process is rapid and occurs asymptotically levelling off with time for convergence as the grain/seed becomes drier.
4. To ward off rodent attack, the farmer is advised to cover the plastic top before retiring for the night and in compliance with low cost requirement, corrugated sheet is recommended as a cover.

8. Acknowledgement

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Assessing techniques in Participatory Rural Appraisal (PRA)¹Zahra Kaveie and ²Fakhteh Ghahramani^{1,2}Damavand Branch, Islamic Azad University, Damavand, Iran

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Abstract: PRA requires researchers / field workers to act as facilitators to help local people conduct their own analysis, plan and take action accordingly. It is based on the principle that local people are creative and capable and can do their own investigations, analysis, and planning. The basic concept of PRA is to learn from rural people. Chambers (1992) has defined PRA as an approach and methods for learning about rural life and conditions from, with and by rural people. He further stated that PRA extends into analysis, planning and action. PRA closely involve villagers and local officials in the process. Similarly, Rapid Rural Appraisal (RRA) reflects the new thinking about development, needs, and people oriented responsibilities. It is a process that is highly systematic and structured, relying on interdisciplinary teamwork and special strategies for data collection and analysis such as triangulation, probing, and iteration. Some critics consider RRA to be a quick and dirty technique. There are a wide range of participatory tools and techniques available. People can use these tools and techniques according to their situation or needs. Generally, the application of different tools may vary from one situation to another. However, the process for conducting RRA/PRA remains the same.

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Keywords: Participatory Rural Appraisal (PRA)

Introduction:

RRA is a social science approach that emerged in the late 1970s. The basic idea of RRA is to rather quickly collect, analyse and evaluate information on rural conditions and local knowledge. This information is generated in close co-operation with the local population in rural areas. Therefore, the research methods had to be adjusted to local conditions, i.e. they had to meet the communication needs of illiterate people or people who are not used to communicating in scientific terms. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA is intended to enable local communities to conduct their own analysis and to plan and take action. PRA involves project staff learning together with villagers about the village. The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation. Participatory Rural Appraisal (PRA) is considered one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-up approach, and from blueprint to the learning process.

The most common methods are the following:

- 1- Diagramming, Mapping and Modeling:
 - transects
 - maps (resource, social, farm)
 - venn diagrams
 - seasonally analysis

- historical analysis (time lines, trend lines, activity profiles)

2- Ranking and scoring

- pair wise ranking
- matrix ranking
- matrix scoring
- well-being analysis and wealth ranking
- proportional piling
- pie charts (injera charts)

3- Problem analysis

- identification and specification
- causal chaining
- prioritization

Community Sketch Maps

The purposes of community sketch map or a model: is a visual representation of what the community perceives as their community space. This include showing the shape (appearance) of the community, boundary and all the major features as understood and known by the community (Scrimshaw and Gleason, 1992).

The map shows where resources, activities, problems and opportunities are located, as well as the dimension and scope of issues to be investigated. It is critical to understanding the boundaries and characteristics of the community involved.

Topographical data (elevation, slope, drainage etc.)

Topographical data are basic when drawing a map of community, so is information on soils, vegetation, water availability, road, schools, health facilities etc.

There are different sketch maps known for different purposes. Some of them include(Dunn, 1992):

A. Social maps: Specific type of topical map representing households according to certain indicators.

- Indicates where people live and how many people live in an area
- Social and residential differences in status and wealth
- Buildings where people live or work, uses of space in a house

B. Physical and resource maps: drawn by the people to show natural resource of an area, location and use of natural resources.

- fields and land uses
- physical land features
- water location, quality and use
- soil types, uses, location

C. Topical maps: specific topic maps are drawn to draw attention to a particular type of information of the area, example:-

- location of forest resources
- soil types
- different crops grown
- houses and the number of people live in
- social & economic infrastructures etc.

D. Farm sketch: Making a farm or compound sketch highlight details that would otherwise be lost in a smaller scale maps.

Gender daily calendar:

Purpose

Most daily activities in traditional rural, societies are managed along gender lines. There are activities that are specifically performed by women, men or children. In some communities gender role divisions are still pronounced. In such cases it is necessary for the PRA team to be aware in order not to be seen as interfering with the community cultural norms specific gender roles so that new programmers are not introduced to overburden an already overworked group. Introducing gender awareness in PRA helps a community to begin examining itself(NCAER, 1993).

Who

Community members both men and women, young and old should be in attendance. PRA team members, men and women and local extension staff in the analysis of gender roles and responsibilities.

How

It is better if the community is allowed to lead gender related discussions. The PRA team facilitates discussions through a neutral process of mapping out a gender daily calendar. Men and women discuss on each daily activities on agreed season (raining or dry season). The groups on their timetable, from the time

they wake up in the morning to the time they got to sleep in the evening.

Application

Gender daily calendar provides a clear picture of who does what in the community. It will help in the formulation of the community Action Plan. The community will become aware that unless some changes in gender relations are effected rural development will not proceed as quickly as they would like it to be(Holland, 1998).

_ Daily-activity profiles -- Researchers can explore and compare the daily-activity patterns of men, women, youth, and elders by charting the amount of time taken to complete tasks.

_ Semi structured interviewing -- A semi structured interviewing and listening technique uses some predetermined questions and topics but allows new topics to be pursued as the interview develops. The interviews are informal and conversational but carefully controlled(Chambers, 1994).

Semi structured interviews (SSI)

SSI is a guided interview here the major topics and a few key questions are formulated before the interview. But many new additional are asked during the interview based on answers to the key question.

Types of SSI:

1. The individual interview

- Get representative information about the society form individual informants
- Ask individuals at a time

2. The key informant interview

- Get specialized information from one or group of persons about the community
- Informants with specialized knowledge

3. Group interviews:

- Useful for obtaining general information about the community
- Better for cross checking information
- Group interviews require very careful preparation
- The ideal group is 8 – 15 people

_ Types, sequencing, and chain interviews -- Individual, pair, and group interviews are combined in a sequence to take advantage of key informants and specialist groups.

Using secondary sources

- Secondary sources of information include previously written documents maps, diagrams, tables etc
- Review secondary sources before beginning field survey is census data, aerial photos, marketing reports, etc.

- In reviewing secondary sources, you should keep summary notes, in the form of short paragraphs, diagrams, charts, etc
- In reviewing secondary sources, you should keep summary notes, in the form of short paragraph, diagrams, charts, etc.
- Be as critical as possible in reviewing secondary sources
- To develop understanding of local livelihoods
- Short period of time

Venn Diagram (Institutional analysis)

Venn diagramming is a method to find out who, what person or organizations are important in and for a community.

Purpose

To identify groups and institutions operating in the community and to show how they interact with each other To show the degree of their cooperation and involvement in development programs. To discover their important or influence on decision making in the community.

What?

Venn diagrams have been used with in PRA in institutional context to discuss:

- The role and significance of various institutions
 - Levels of communication between organizations
 - The role of project bodies and their intervention
- Improving missing links between existing organizations,
- Potential for working through existing organizations, which ones and with which links.
 - Potential roles for new organization
 - Formal and non-formal groups and their levels of cooperation
 - Communities perceptions of the institutions, always

Who?

The PRA team, key informants as elders, religious leaders, extension staff and other knowledgeable person take the responsibility of listing and evaluation of individuals and institutions influencing decision making of the community.

How?

List institutions in the community and discuss importance of each institution and what they do. Make different sized circles and not which circle represents each institution i.e. big circle very important and decision maker, small circle with little importance. During overlapping the circles, the size of the circle indicates the importance of the institution, the distance between the circles indicate the degree of contact between institutions. For instance a large overlap high interaction. No overlap distant relationship.

Application

Identify individuals, groups or institutions. Important in the lives of people and establish close relationship with them. Provide the necessary support and effectively utilize their skills and experiences.

– **Participatory diagramming** -- People are encouraged to display their knowledge on pie and bar charts and flow diagrams.

– **Wealth and well-being rankings** -- People are asked to sort cards (or slips of paper) representing individuals or households from rich to poor or from sick to healthy. This technique can be used for crosschecking information and for initiating discussions on a specific topic (for example, poverty). The technique can also be used to produce a benchmark against which future development interventions can be measured or evaluated(Blackburn, 1999).

CONCLUSION:

As a result of the PRAs, the communities are expected to attain many benefits including:

- Expressing their own ideas and concerns;
- Organizing their knowledge about the past and present;
- Identifying as a community their problems, the causes of these problems and possible solutions;
- Developing a common plan to address these problems;
- Developing the ability to use their own resources more effectively and attract more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following benefits:

- Developing better understanding of rural environments and social as well as economic dynamism taking place there;
- Appreciating the fact that communities are capable of analyzing their problems and outlining possible solutions to their problems;
- Participating in designing possible solutions to community problems;
- Utilizing the results of the PRA work as a research output for publications and presentations;
- Building their research and problem investigation capabilities;
- Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;

2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;

3. utilization of the research questions/problems identified during the PRAs for further investigation;

4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.

PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas.

During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

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Distance in Economics Education: A Study of Factors

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Abstract: In conventional face to face education, as far as teaching approaches are concerned everything is left up to the teacher concerned. Though the infrastructure is available the problem lies in its proper communication. In order to gauge the distance perceived across various aspects in the educational system, the researcher conducted the present study. After consulting the literature, nineteen factors were identified and an opinionnaire was accordingly prepared for teachers of Economics from the conventional face to face education. The nineteen factors and the teachers' opinion show how conventional educational system has not taken into consideration the communication aspects which would hamper overall performance of teachers as well as students. It has taken for granted that no communication distance can be present because of physical proximity between teacher and students and institution. Therefore there is a need to reconstruct the conventional curriculum taking into consideration the factors and compensate for them. To compensate for this distance, one can look towards the distance education mechanisms. The face-to-face education has thus a number of lessons to learn from distance education. In distance education, distance is presumed and attempts are made to create devices to compensate for it. As this study has showed, there is no reason to believe that the face-to-face education does not have any communication distance. It is a rather serious matter that most of the teachers in the face-to-face system perceive a communication distance.

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Keywords: Economics, Distance Education, Conventional Education, Communication Distance.

1. Introduction

As a teacher for the last 15 years in conventional face to face education the researcher realized that the students failed to do the given homework. Even after face to face teaching sessions the percentage of failure is high (Meyer, 2003). During oral examinations it is found that students are not able to analyse or synthesise the prescribed text material (Twigg, 2003). Also there is system present which will give guidelines as to how to carry on evaluation. Also the system of feedback is not present in conventional educational system. As far as teaching approaches are concerned everything is left up to the teacher concerned. Though the infrastructure is available the problem lies in its proper communication (Johnson et al. 2002). In order to gauge the distance perceived across various aspects in the educational system, the researcher conducted the present study. Distance education (DE) theory and practices are based on the principles of how to achieve communication in an otherwise physically distanced learner (Reiboldt, 2001). Hence help was sought from DE discipline to locate the factors which could be leading to communication distance in face to face education (Aycock et al. 2002).

Techniques of Distance Education System

Distance Education System is a non traditional system of education. It imparts education through innovative and modern techniques. Self instructional material, radio, television, audio and video cassettes, computer and satellite are some of the means through which distance education is imparted. Teleconferencing, radio paging, satellite communication and group telephone tutorials are new watchwords for interactive communication.

Differences between Face-to-Face and Distance Education Systems

There are many merits of distance education system which are reflected in the growth and diversification of the system. These are as follows:

1. It provides a second chance to those who have missed the opportunities of higher education, in their early years due to some reason or the other;
2. It helps in extending education to people at large and in equalizing educational opportunities;
3. It can provide instruction to those living in remote areas where formal education opportunities are scarce;
4. It offers a vast scope for innovations in teaching methods, provides scope for variety of subjects and inter-disciplinary options;

5. It is highly economical compared to formal system;
6. It is flexible and enables the learner to learn at his own place, pace and time;
7. It enables the workers to acquire knowledge, skills and capabilities without drawing them from work place i.e. it facilitates professional competence and earning while learning;
8. The institutions can ensure proper organization of instruction and motivate learners to evolve a careful study programme;
9. It involves all media of technology such as the radio, TV, audio cassettes and video tapes to supplement the print media;
10. It helps the individuals to utilize their leisure time for educational purposes;
11. It helps those who are interested in pursuing advanced studies in the subject of their interest;
12. It provides education for all irrespective of disparities-social, cultural and economic;
13. It is accessible to potential students regardless of their formal qualifications; and
14. It overcomes the disadvantages of private study where no instruction is available to the students.

2. Materials and Methods

After consulting Holmberg (1981), Moore (1973), Wedemeyer (1977), Thorpe (1989) and Ramiszowski (1984); nineteen factors were identified and an opinionnaire was accordingly prepared for teachers of Economics from the conventional face to face education (Appendix 1). The prepared opinionnaire was initially given to five experts from conventional and open education, to pretest if the opinionnaire was transparent enough for expressing opinions. After incorporating necessary changes, a pilot study was carried out to validate the opinionnaire. A three point scale was used. While preparing the opinionnaire statements due care was taken to ensure that a casual and less serious respondent did not provide misleading data. Thus only statements which needed careful rendering and reading were included.

Teachers of economics are choose from the universities in the provinces of Tehran, Isfahan, Fars, Markazi, Hamedan and Semnan including: Tehran University, Payame Noor University, Islamic Azad University, Isfahan University, Shiraz University, Boo Ali Sina University and Shahrood University of Technology.

3. Results and Discussion

The main point of interest in the study is to find out which factors contribute to the communication distance. The opinions of the teachers were therefore grouped into the 19 factors pre-defined from a survey of DE literature. We now discuss the impact of each

of these factors on the perceived communication distance. Before giving the results for each factor, an explanation of the factors, has been given, as understood by the DE theoreticians and practitioners.

1. Document Clarity

Documents provided by the university to the teachers and the students are limited to syllabus statements. Syllabus has inherent lacunae such as it is unclear, ambiguous, vague and provides insufficient information. These documents do not provide aims and objectives of study in terms interpretable by the teachers and learners. So there remains a vast scope for misunderstanding and misinterpretation. The view with which the syllabus makers have prepared the document should be clearly communicated to the students. The channel for this communication is the documents. Therefore document clarity is of utmost importance to achieve this transparency.

More than 50% of teachers did not find syllabus statements sufficiently clear to tell them what to teach.

2. Time Frame

It is generally wrongly assumed that face to face education offers ample amount of time for face to face contact. In actuality however, the time is generally limited to forty hours of teaching for each prescribed course. While deciding that this time is optimum, only administrative criterion has been applied. It is clear that this time is insufficient, since many teachers are seen engaged in taking 'extra' classes.

Only 15% teachers found that the time frame given by the university to complete the syllabus to be enough. About 50% of them have to conduct extra classes to complete the portion. However, almost all of them found the time given for the practical to be sufficient.

3. Statement of Objectives

In the conventional system of Economics education, it is assumed that objectives are generally known to all those who are part of the system. It is also assumed that a student need not really know the objectives, since it is the responsibility of teachers to take the necessary steps to achieve learning.

Both these assumptions are dangerous. This lack of direction directly hampers their progress of learning. Because of the lack of a clear statement of objectives, an Economics teacher is not able to perceive the course as a whole, but sees it in bits and pieces. Such type of lack of continuity creates a feeling of distance in the mind of the Economics teacher.

4. Self-Study

Economics teachers do give homework to students as was revealed in their responses to the opinionnaire. However how to go about it is generally not described. There is no study guide incorporating how to develop study skills.

Almost all the teachers expected their students to do any homework.

5. Textbook

The textbooks which are recommended by the Economics teacher to the students are generally those which are written in accordance with the syllabus prepared by the university. There is no prescription of books directly from the Board of Economics Studies of the university. The prescribed textbooks generally do not provide study aims, lack proper organisation and structure.

About 25% of the teachers did not find the language used in the textbook student friendly. 75% of them realized the need to present textbooks in different manner. About half of them felt that students are not able to understand from the textbook to a certain extent and they felt that the textbook is not correct for the level of students. Nobody agreed that the textbook is rich in content and is significant.

6. Learner Autonomy

Here we mean that the learner has to have a wide variety of subjects to choose from. It has been found that most undergraduate Economics colleges offer a typical Economics-Management-Accounting-Mathematics-Statistics subject combination and later specialisation in one of the subjects. A few colleges offer Economic Development and Econometrics as specialization. Even if a student wants a slightly different combination, it is generally not available for administrative reasons. This may create a feeling of distance in students as his individuality is not recognized.

There was unanimous dissatisfaction among the teachers regarding the lack of variety of subjects for the students to choose from.

7. Layout

This factor is associated with most of the teaching colleges. Layout aspects do lead to disturbance and can lead to communication distance despite the physical proximity between the learner and the teacher.

About 50% of teachers had problems with the layout of the class.

8. Teacher Personality

Despite the presence or absence of the above factors, the type of teacher personality will affect the

communication in the classroom. A teacher with a certain type of personality can either greatly reduce or increase the communication distance in the setting.

About 50% of the teachers felt that students' understanding depends on the type of teacher personality.

9. Language

Most of the school Economics education is done through verbal medium. Language thus plays an important role in creating or reducing the communication distance. The fact of English being the medium of science education at undergraduate level is thought about too often. The crux of the problem could actually lie in the use of a comprehensible language.

Half of the sample felt that the language of communication does create a communication gap as far as students are concerned.

10. Interaction

The classrooms generally follow the lecture method, sometimes leaving some scope for occasional questioning and seeking clarifications from the students. This lack of interaction adds to the communication distance.

Owing to the individuality of the students 15% of the teachers did not find the problem of academic communication among students. About 75% were not satisfied regarding the amount of academic interaction among the students. Everybody wanted an increased amount of interaction between teacher and students in classroom. 75% of them felt that the system does not provide sufficient time for teacher-student contact.

11. Student Pace

A teacher generally tries to complete the course in the given forty hours of time. On very few occasions he has time to match the student's pace learning. Changing the mode and method of teaching according to the feedback received in the classroom is very necessary to reduce the communication distance. However, around 60% of teachers admitted that they do not accommodate any such change in their teaching behavior.

12. Teacher Accessibility

It is very well known that in the conventional system of education the teachers' vacations frequently coincide with the examinations of the students. At these crucial times, therefore, the teacher's time is not available to the students.

In case of 60% of teachers the time required to be spent by the teacher on extra-curricular activities affected the teaching schedule.

13. Student Individuality

Student personalities differ and they definitely affect the communication distance present in the educational setting.

80% of the teachers found that the number of students working on a computer was a bit too large, while 70% of them found that the number of students in the class was too large.

14. Facilities

Learners need reading rooms, private space in libraries, discussion rooms and a resource centre. It is however questionable how many institutions really plan to build such resources.

For about 50% of teachers facilities were not available as and when needed.

15. Library

The textbooks and reference books available are not present in the required numbers. One reason could also be the lack of space. For 80% of teachers audio-videos are not readily available for teaching activity. 60% voiced the opinion that reference books are not available in sufficient number for the students.

16. Examination System

Confidentiality in this system generally takes over the academic and instructional principles. Very little thought has been given to techniques like Open Book Examinations which encourage more creative and evaluative thinking on the part of the students.

75% of the teachers felt that the weightage given to the final examination is inadequate. However, 50% of them were of the opinion that the examination system is in contradiction with the aims and objectives of teaching science.

17. Question Papers

The format of the question papers is seldom communicated to the students. The students as well as the teachers are therefore generally not aware of the behaviors and skills expected of the learner during the examinations. The question papers themselves are never communicative. Culturally, it is generally believed that a question paper has to be written in minimum words and should be as terse as possible. The paper setters generally shy away from giving explanations and necessary help in the question paper itself. A student therefore may perform poorly not for want of knowledge or skills, but for his misunderstanding of the question. Instructions given to the students at the beginning of the question paper are also vague, unclear and written in a difficult language.

More than half the sample were not sure of the validity of questions posed in the examination.

18. Evaluation Methods and Techniques

The way a process or content is evaluated will affect the way teaching is conducted. If the evaluation systems demand less communication and more recall of facts, this will affect the teaching-learning processes and these processes will not give much importance to communication.

More than 90% of teachers agreed that when teachers evaluate answer sheets he does not have guidelines for it. Therefore marks given by two teachers may not match.

19. Feedback Comments

There is no system to provide feedback to the students from the university. Similarly, there is a need to provide a corrective, constructive and meaningful feedback to the learner when the teacher assessed their written work. It is however generally found that the feedback comments consist of marks on the work of the learner, that seldom make any sense to him.

Almost all of them agreed to that there is no corrective feedback after examination, and students do not realize where they had gone wrong.

4. Conclusion

The nineteen factors discussed above and the teachers' opinion show how conventional educational system has not taken into consideration the communication aspects which would hamper overall performance of teachers as well as students. It has taken for granted that no communication distance can be present because of physical proximity between teacher and students and institution. Therefore there is a need to reconstruct the conventional curriculum taking into consideration the above factors and compensate for them.

To compensate for this distance, one can look towards the distance education mechanisms. The face-to-face education has thus a number of lessons to learn from distance education. In distance education, distance is presumed and attempts are made to create devices to compensate for it. As this study has showed, there is no reason to believe that the face-to-face education does not have any communication distance. It is a rather serious matter that most of the teachers in the face-to-face system perceive a communication distance.

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Rumen degradation of dry matter and organic matter digestibility of Cherry tree leaves in ruminant nutrition using *in vitro* gas production and *in situ* techniques

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Abstract: This study was carried out to determine the chemical composition and estimation of nutritional value of cherry tree leaves in the ruminant nutrition. In this study *in vitro* gas production and *in situ* techniques were used to evaluate nutritional value of cherry tree leaves. Cumulative gas production was recorded at 2, 4, 6, 8, 12, 24, 48, 72 and 96 h of incubation also, *in situ* disappear of dry mater for experimental samples was measured at 0, 4, 8, 16, 24, 36, 48, 72 and 96 h of incubation. Chemical composition including dry matter (DM), crude protein (CP), crude Ash (Ash), ether extract (EE), neutral detergent fiber (NDF), acid detergent fiber (ADF) and tannin compounds, 91.11, 2.76, 9.3, 8, 27.6, 20 and 2.185 percent, respectively measured. Gas production test and *in situ* rumen degradability with of three Taleshi native male cattle rumen fistulae were performed. Digestibility of organic matter (OMD) 65.74 percent and metabolizable energy (ME) 10.27 (MjKg⁻¹) were estimated. The Polyethylene Glycol (PEG) supplementation had also a significant ($p < 0.05$) increase in the estimated parameters of gas production, OMD and ME of samples. Potential degradation (a+b) for dry matter and Effective rumen degradable (ED) at a rate of 0.05/h were estimated, 84.12 % and 52.20% respectively.

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Keywords: In situ, Cherry leaf, Gas production, Metabolizable energy and Dry matter degradability

1. Introduction

Tree leaves and shrubs have always played a role in feeding livestock. Trees and shrubs are increasingly recognized as important components of animal feeding, especially as suppliers of protein and energy (FAO, 1997. Gutteridge, 1990. Ikhimioya, 2005).

In difficult environmental conditions, where the available grazing is not sufficient to meet the maintenance requirements of animals for part of the year, the contribution from trees and shrubs is significant. Trees and shrubs are valuable sources of fuel wood, shelter, timber, herbal medicines and food for people, and also help to maintain soil fertility. Tree fodders contain high levels of crude protein and minerals and many show high levels of digestibility. They are readily accepted by livestock and presumably because of their deep-root systems, they continue to produce well into the dry season. However, Anti-nutritive Factors such as polyphenol and tannin compounds can be a problem in some species (Paterson, 1998).

The presence of tannins and other phenolic compounds in a large number of nutritionally important shrubs and tree leaves hampers their utilization as animal feed. High levels of tannins in leaves due to decrease voluntary food intake, nutrient digestibility and N retention (Silanikove, 1996).

There are many method for reduce negative effects of tannins, such as polyethylene glycol (PEG) supplementation. The PEG a non-nutritive synthetic polymer having high binding capacity with tannin compounds (Makkar, 1995), therefore PEG has been widely used to reduce the detrimental effect of tannin compounds in ruminant diets (Makkar, 1995 Pritchard, 1998). There is little information available on the nutritive value of tree leaves in Iran, Therefore the present study was, carried out to determine the chemical composition, phenolic composition and degradation of cherry tree leaves.

2. Material and Methods

Forage Samples During fall season from different parts of East Azerbaijan province were collected. Next, there were drying for one week, and uniform mixture were papered for nutritive chemical. The species of Forage Sample was (*Prunus avium*). For determination of PEG effects, we added PEG with 2:1 ratio (400 mg PEG: 200 mg sample) into gas test syringes.

After drying samples were milled through a 1-mm sieve for chemical analysis. DM was determined by drying the samples at 105°C overnight and ashing the samples in a muffle furnace at 550°C for 6 h. Nitrogen (N) content was measured by the Kjeldahl method (AOAC, 1990). Crude protein was calculated as $N \times 6.25$. Neutral detergent fibre (NDF) and acid

detergent fibre (ADF) contents were determined by the method of AOAC (1990).

Animals: Tree fistulated Taleshi steers (5 years old, about 550 kg weights) were used for rumen application in nylon bag and gas production techniques.

In vitro gas production

Forage samples milled through a 1-mm sieve were incubated in vitro in rumen fluid in calibrated glass syringes following the procedures of Menke and Steingass (1988). Rumen fluid was obtained from three fistulated cattle fed twice daily with a diet containing alfalfa hay (60%) and concentrate (40%). The samples were incubated in the rumen fluid in calibrated glass syringes following the procedures of Menke and Steingass (Menke, and Steingass, 1988) as follows. 0.200 g dry weight of the sample was weighed in triplicate into calibrated glass syringes of 100 ml in the absence and presence of 400 mg PEG. Syringes were pre-warmed at 39°C before injecting 30 ml rumen fluid-buffer mixture into each syringe followed by incubation in a water bath at 39°C. Syringes were gently shaken 30 min after the start of incubation and every hour for the first 10 h of incubation. Gas production was measured as the volume of gas in the calibrated syringes and recorded after incubation of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours. Total gas values were corrected for blank incubation which contained only rumen fluid. Cumulative gas production data were fitted to the model of Ørskov and McDonald (1979).

$$y = a + b(1 - e^{-ct})$$

Where:

a = the gas production from the immediately soluble fraction (ml)

b = the gas production from the insoluble fraction (ml)

c = the gas production rate constant

a + b = the potential gas production (ml)

t = the incubation time (h)

y = the gas produced at the time t

The OMD of forages was calculated using equations of Menke et al.(1979) as follows:

$$\text{OMD (\%)} = 14.88 + 0.889 \text{ GP} + 0.45 \text{ CP} + \text{XA}$$

Where:

GP= is 24 h net gas production (ml / 200 mg),

CP = Crude protein (%)

XA = Ash content (%)

ME (MJ/kg DM) = content of forages was calculated using equations of Menke et al.(1979) as follows:

$$\text{ME (MJ/kg DM)} = 2.20 + 0.136 \text{ GP} + 0.057 \text{ CP} + 0.0029\text{CP}^2$$

Where:

GP = is 24 h net gas production (ml/200 mg)

CP = Crude protein

In situ DM disappearance

In situ nylon bag technique: For determine the *in situ* degradation characteristics of the samples, 4 g of dry sample milled through a 3 mm screen was weighed in nylon bags (16*8 cm, pore size 45 to 60 µm). The bags were incubated in the rumen of three fistulated cattle. Nylon bags were withdrawn at 0, 4, 8, 16, 24, 36, 48, 72 and 96 h after insertion. For soluble fraction (0h) measurement was obtained by soaking the two bags of sample in warm water (37°C) for 1 h. The 0 h and incubated bags were then washed with cold water for 15 min in a washing machine and dried for 48 h at 60°C. The DM degradation data were fitted to the exponential equation $p = a + b(1 - e^{-ct})$ (Ørskov and McDonald, 1979).

To determine the degradation characteristics (a, b, a+b, c, ED); where p is the DM degradation at time t, a denotes washing loss (representing the soluble fraction of the feed); b insoluble fraction; c is the rate of degradation of fraction b; ED denotes effective degradability, calculated at an outflow rate of (0.02, 0.05 and 0.08 per h). After incubation, DM degradability (DMD) for each bag, for each incubation period and for each cattle were calculated with formulas suggested by Susmel et al. (1990)

Where:

y = DM disappearance in rumen at time t

a = the rapidly soluble fraction

b = the potentially degradable fraction

c = the constant rate of degradation of b (%/h)

Effective DM Degradability (EDMD) was calculated applying the equation of Orskov and McDonald (1979).

Statistical Analysis

All of data were analysis by using SAS software (1999) and means of two sample groups were separated by independent samples t-test (Torrie JH, 1980). All data obtained from three replicates (n= 3).

3. Results and discussion

The chemical composition of Cherry leaves has shown in table1

Chemical composition including dry matter (DM), crude protein (CP), crude Ash (Ash), ether extract (EE), neutral detergent fiber (NDF), acid detergent fiber (ADF) and tannin compounds, 91.11, 2.76, 9.3, 8, 27.6, 20 and 2.185 percent, respectively measured.

Table 1: The chemical composition of cherry tree leaves (%)

Dry matter	91.11
ether extract	8
Crude protein	2.76
Neutral detergent fiber	27.6
Acid detergent fiber	20
Ash	9.30
tannin compounds	2.185

***In vitro* gas production**

Gas production volumes (ml/200mg DM) at different incubation times has shown in figure 1.

There are a steadily increase in the gas production for over a period of 24h.

The gas production parameters, are given in Table 2. The soluble fraction (a) and insoluble but fermentable fraction (b), for with PEG and without PEG treatments were -1.44, 54.38 and -4.25, 52.90 ml, respectively. The negative (a) value for both treatments due to delay in onset of fermentation and microbial attachment were in agreement with Chumpawadee et al (2005) and Maheri-sis et al (2008). The PEG supplementation increased the gas production from the gas production of immediately soluble fraction (a) and gas production from the gas production rate (c), Whereas PEG supplementation had no significant effect on the gas production from insoluble fraction (b) and the potential gas production (a+b), also there were significant increases ($P < 0.05$) in the OMD and ME content of the Cherry leaves in the addition of PEG.

***In situ* degradability characteristic of apple leaves shown in table 3.**

The DM degradability from the soluble fraction (a) and Potential degradability (a+b) were, 14.32 and 84.12 percent respectively and the rate degradability(c) was 0.060/h estimated. The total degradability of the sample is given by a + b which obviously cannot exceed 100. It follows that 100 - (a+b) represents the fraction which will appear to be undegradable in the rumen. If 'a' is positive, then there is a component which is degraded rapidly and/or a component which is soluble, or fine enough to escape from the bags simply by soaking and washing. Whether 'a' represents rapid degradation, or simply washing losses, can be determined with control bags which are simply soaked in water and then washed and dried in the normal way. When a negative value for 'a' is obtained this means that there has to be an initiation period for degradation to start (termed the lag phase).

Effective degradability (ED) of the examined nutrient components were calculated using the outflow rates of 0.02, 0.05 and 0.08/hr, according to Ørskov et al. (1980), model: $ED = a + [bc/(c+k)]$ where ED is effective degradability and 'a', 'b' and 'c' are the constants as described earlier in the non-linear equation above and 'k' the rumen fractional outflow rates.

Effective rumen degradable dry matter at a different rate were determine, Effective degradability (ED) of DM decreased with increase in outflow rates DMD decreased of 66.46% (k=0.02) to 44.13% (k=0.08) in the leaves.

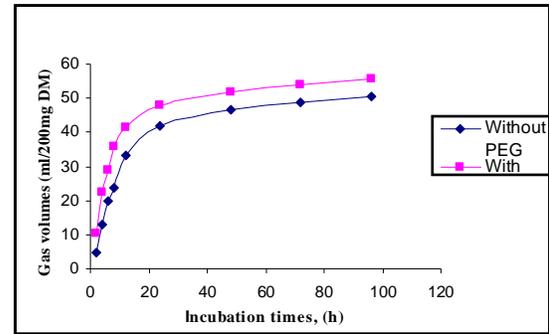


Fig1. *In vitro* gas production volume of cherry tree leaves at different incubation time in the presence Of (PEG)

Table 2. The estimated parameters from the gas production of cherry tree leaves.

Estimated Parameters	Without PEG	With PEG	P value	SEM
a	-4.25 ^b	-1.44 ^a	$P < 0.0001$	0.201
b	52.90	54.38	$P < 0.022$	0.530
a +b	57.15	55.82	$P < 0.026$	0.680
c	0.097 ^b	0.135 ^a	$P < 0.0001$	0.005
OMD	62.74 ^b	68.14 ^a	$P < 0.003$	0.402
ME	10.27 ^b	11.10 ^a	$P < 0.003$	0.02

a: the gas production from soluble fraction (ml/200mg DM)

b: the gas production from insoluble fraction (ml/200mg DM)

c: rate constant of gas production during incubation (ml/h)

(a + b): the potential gas production (ml/200mg DM),

OMD: Organic matter digestibility (%),

ME: Metabolisable energy (MJ/kg DM), and

S.E.M: standard error of the mean.

Table 3. The parameters of estimated from the *In situ* degradability of cherry leaves (%)

Cherry tree leaves DM	Estimated Parameters			
	a	b	a+b	c
	14.32	69.79	84.12	0.060
effective degradability				
	Lag time	0.02	0.05	0.08
DM	0.782	66.46	52.20	44.13

a = washing losses, soluble or rapidly degradable:

This value is the intercept of the degradation curve at time 0 h (%)

b = the insoluble but potentially fermentable (%)

c = degradability rate (h)

a+b = Potential degradability (%)

Conclusion

In conclusion, this study has demonstrated that the use of cherry leaves, which have low crude protein (about 2.76% of DM) therefore, recommended the use of these resources be used to supplement protein

in ruminant diets also, the high percentage of gas production, dry matter degradation and low percentage of tannin compounds having tested samples, we can say that the cherry tree leaves have relatively good nutritional value in ruminant nutrition. However, further study is needed to investigate of use of tree leaves in ruminant diets.

PEG supplementation had a significant increased ($P<0.05$) on the gas production, OMD and ME content of cherry tree leaves.

PEG addition, significant increased ($P<0.05$) the gas volumes in all different incubation times, gas production from soluble fraction (a), and gas production rate (c), but had no effect on the gas production from the insoluble fraction (b) and the potential gas production (a+b).

PEG supplementation to improve the nutritive value of tannin-containing tree leaves.

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Canola oil and its effect on the EPA and DPA content of abdominal fat of Iranian native turkey

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Abstract: The aim of this research was to evaluate the effect of canola oil on the EPA and DHA fatty acid contents in the abdominal fat of Iranian native turkeys. A total of 90 turkey chicks were randomly divided into 3 experimental treatments with 3 replicates were arranged in a completely randomized design. The experimental period lasted 20 weeks. Experimental diets consisted of: Basal diet with 0% canola oil; basal diet with 2.5% canola oil and basal diet with 5% canola oil. Results show that different levels of canola oil could not affect significantly EPA and DHA content but DPA percent significantly increased in experimental treatments compared with control group.

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Keywords: Turkey, abdominal fat, DHA, EPA, DPA

1. Introduction

Omega-3 fatty acids (n-3) are a group of polyunsaturated fatty acids (PUFA) which include - linolenic acid (ALA, C18:3 n-3), its long chain metabolites eicosapentaenoic acid (EPA, C20:5 n-3) and docosahexaenoic acid (DHA, C 22:6 n-3). Humans can synthesize EPA and DHA through desaturation and elongation of ALA [1]. However, this conversion has been found to be limited [2]. Major sources of ALA include the seeds and oils of flaxseed, soybean and canola, with flaxseed containing 50-60% ALA [3]. EPA and DHA are obtained in the diet from aquatic and marine products only such as fish, shellfish, algae and their oils[4]. Increased knowledge of the health benefits of omega-3 fatty acids especially EPA and DHA has led to a growing demand for products rich in omega-3 fatty acids [5]. Abdominal fat are excellent sources for fat which are one of the components of the diet of individuals living in the developed countries [6]. Some of vegetable oils such as canola oil enriched with the perfect balance between omega 3 fatty acids and omega 6 fatty acids. However the aim of this research was to evaluate canola oil effects on the incorporated DHA and EPA fatty acid in abdominal fat and increase their omega-3 PUFA contents.

2. Material and methods

Animals and Diets

Ninety Iranian native turkey male chicks were divided into 3 groups of 30 chicks each. One group was fed a control diet and the other two with two different experimental diets enriched in omega-3 fatty acids (diet 1 containing 2.5% canola oil and diet 2 containing 5% canola oil are given in Table 1). The experimental diets formulated isonitrogenous and isoenergetic, accordance with the 1994 recommendations of the

National Research Council (table 1). Fattening period was performed at four periods: 4-8, 8-12, 12-16 and 16-20 week.

Abdominal Fat

Abdominal fat pad (including fat surrounding gizzard, bursa of Fabricius, cloaca, and adjacent muscles) was removed at 20 wk of age for turkeys. The abdominal fat was stored at -20 °C until analysis. Fatty acid composition was determined by gas chromatography (GC).

Gas chromatography of fatty acids methyl esters

Sample preparation

Total lipid was extracted from breast and thigh according to the method of Folch [8]. Approximately 0.5 g of meat weighed into a test tube with 20 mL of (chloroform: methanol = 2:1, vol/vol), and homogenized with a poltroon for 5 to 10 s at high speed. The BHA dissolved in 98% ethanol added prior to homogenization. The homogenate filtered through a Whatman filter paper into a 100-mL graduated cylinder and 5 mL of 0.88% sodium chloride solution added, stopper, and mixed. After phase separation, the volume of lipid layer recorded, and the top layer completely siphoned off. The total lipids converted to fatty acid methyl esters (FAME) using a mixture of boron-trifluoride, hexane, and methanol (35:20:45, vol/vol/vol). The FAME separated and quantified by an automated gas chromatography equipped with auto sampler and flame ionization detectors, using a 30 m × 0.25 mm inside diameter fused silica capillary column, as described. A (Model 6890N American Technologies Agilent) (U.S.A) Gas chromatography used to integrate peak areas. The calibration and identification of fatty acid peak carried out by comparison with retention

times of known authentic standards. The fatty acid results form gas chromatography with Chem Station software analyzed and expressed as weight percentages.

Table2: Least square means for EPA, DPA and DHA fatty acids in turkey abdominal fat

	Treatments			P value	SEM
	control	2.5	5		
EPA	2.8226 a	2.4456 a	2.0535 a	0.6334	0.5483
DPA	3.2516 c	6.9323 b	8.0224 a	0.0001	0.2636
DHA	2.3414 a	2.5786 a	2.6517 a	0.7924	0.3301

TABLE 1. Percentage composition of experimental diets in four period

Ingredients'	4 -8 week			8 - 12 week			12 - 16 week			16 - 20 week		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Corn	42.50	38.00	36.00	45.60	43.00	35.00	56.64	48.50	40.00	64.41	58.00	48.00
SBM	34.40	36.00	31.15	28.25	27.30	28.24	26.00	27.00	27.50	21.00	21.00	21.00
Oi	0.00	1.25	2.50	0.00	2.50	5.00	0.00	2.50	5.00	0.00	2.50	5.00
Fish	4.80	3.70	6.60	8.00	8.00	8.00	2.64	1.82	1.50	0.65	0.70	0.67
Starch	3.10	3.22	1.56	7.46	3.32	3.37	6.57	6.51	6.50	7.10	5.56	6.71
Alfalfa	3.47	5.00	6.00	3.00	5.00	6.00	1.50	4.00	6.00	1.00	3.80	6.00
DCP	1.38	1.52	1.11	0.63	0.61	0.62	1.03	1.15	1.18	1.17	1.15	1.15
Met	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Lys	1.50	1.50	1.50	1.50	1.50	1.50	1.40	1.50	1.50	1.50	1.50	1.50
Oyster	1.02	1.02	0.86	0.73	0.67	0.62	0.92	0.87	0.82	0.90	0.81	0.73
wheat bran	2.00	3.00	6.00	2.50	5.00	6.00	1.00	3.00	6.00	0.00	1.70	5.00
Vit supp ¹	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Min supp ²	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Sand	3.58	3.54	4.47	0.08	0.85	3.40	0.05	0.90	1.75	0.02	1.03	1.99
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated nutrient content												
ME kcal/kg	2755	2755	2755	2850	2850	2850	2945	2945	2945	3040	3040	3040
Crude protein (%)	24.7	24.7	24.7	20.9	20.9	20.9	18.1	18.2	18.1	15.7	15.7	15.7
Calcium (%)	0.95	0.95	0.95	0.81	0.81	0.81	0.71	0.71	0.71	0.62	0.62	0.62
Available P (%)	0.48	0.48	0.48	0.40	0.40	0.40	0.36	0.36	0.36	0.31	0.31	0.31
ME/CP	112	112	112	136	136	136	163	162	163	194	194	194
Ca/P	2	2	2	2	2	2	2	2	2	2	2	2

¹Vitamin content of diets provided per kilogram of diet: vitamin A,D, E and K.

² Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

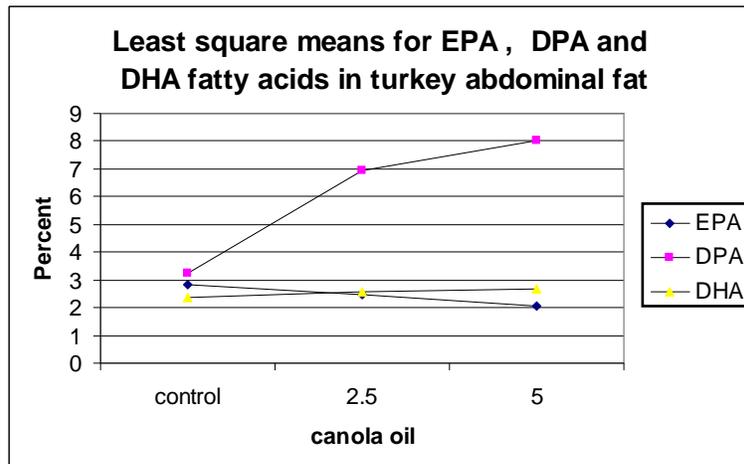


Figure 1. Least Square

Statistical Analysis

The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 8.2 [9]. The Duncan mean separation test was used to determine significant differences between mean values.

$$y_{ij} = \mu + a_i + \varepsilon_{ij}$$

Where

y_{ij} = all dependent variable

μ = overall mean

a_i = the fixed effect of oil levels ($i = 1, 2, 3$)

ε_{ij} = the random effect of residual

3. Results and discussion

Results of fatty acids content was shown in table 2. Results show that canola oil could affect beneficial fatty acid content in the abdominal fat fatty acid. EPA content from 2.8226 percent in the control treatment reached to 2.4456 and 2.0535 percent in experimental treatments, respectively, but this change were not significant. DPA contents significantly increased in the treatment with usage canola oil and from 3.2516 percent in control group reached to 6.9323 and 8.0224 percent in experimental treatments and between treatment with 2.5 and 5 percent canola oil were have significant deference and 5 percent canola oil have good effect on the increased DPA content, but DHA content have not significant deference in treatments and partials increased in treatment and from 2.3414 percent in control group and reached to 2.5786 and 2.6517 percent. EPA and DHA are among the most biologically important fatty acids included in the human diet. A high EPA content would improve not only the meat but also the regulation of human lipid metabolism [10, 11]. However result show that usage of enrich vegetable oil such as canola oil could improve fatty acid profile of animal tissue and application animal product in human nutrition help to social health.

4. Conclusion

Usage canola oil could increase DPA content in abdominal fat and this status have beneficial effect on the abdominal fat tissue and this status help to human health.

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Investigation of dip coated ZnO thin film: X-ray reflectivity and Fourier analysis

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Abstract: In this study we fabricated Zinc Oxide thin film by sol-gel dip coating method on glass substrate. X-ray reflectivity (XRR) and its optimization have been used for characterization and extracting physical parameters of the film. Genetic Algorithm (GA) has been applied for this optimization process. Independent information was exploited from Fourier transform of Fresnel reflectivity normalized X-ray reflectivity. The Auto Correlation Function (Fourier transformation of X-ray reflectivity) yields thickness of each coated layer on substrate. This information is a starting point for constructing optimization process. Specular X-ray reflectivity optimization yields structural parameters such as thickness, roughness of surface and interface and electron density profile of the film. Acceptable agreement exists between results obtained from Fourier transformation and X-ray reflectivity fitting. [Ghahraman Solookinejad. Investigation of dip coated ZnO thin film: X-ray reflectivity and Fourier analysis. Journal of American Science 2011;7(6):293-298]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: X-ray Reflectivity, dip coating, roughness, Fourier Transformation

1. Introduction

Sol-gel thin film technology is being applied for producing new novel devices and has been extensively explored for optical and electrical applications due to their very low cost and fast fabrication procedure (Banerjee, *et al.*, 2001, Morelhao, *et al.*, 2002). Application of these materials in solid state lasers, integrated circuits, light emitting devices, magnetic heads and tapes and coated window glass make them interesting in industry. Mechanical, magnetic, optical and electrical properties of these materials make use of them in industry. These aspects are related to their structural parameters such as thickness, roughness and electron density profile. Therefore research, development of applications, production and characterization of new thin films is essential effort (Dane, *et al.*, 1998, Zhu, *et al.*, 1998).

Fabrication of Zinc Oxide thin film can be accomplished with different techniques such as chemical vapor deposition (Nishino, *et al.*, 1997), sputtering (Hsu, *et al.*, 2008) and sol-gel process (Shao, *et al.*, 2006). Among these techniques sol-gel technique contests with the others due to its low cost and this technique is a process well suited to large scale production (Habibi, *et al.*, 2008).

There is a populous use of thin layered films with layer thickness in some nanometer range of thickness in modern technology and industry. Also manufacturing of high quality light emitting devices with longer operational lifetime needs smooth interface between hetero-junction structures. Controlling of structural parameters such as roughness at the surface and interface is essential in making high-performance devices, based on low-dimensional structures such as thin films and

quantum wells. So analyzing the structure of the thin films is technologically very significant. Material characterization enables the improvement of new materials, structures and technologies. By developing instrumentation for improved measurement methods, there is an analogous need for the progress of techniques in order to operate these tools to their maximum benefits.

One of the most excellent techniques to study the structural and physical aspects of thin films is X-ray reflectivity (XRR). XRR is well established and nondestructive technique used for extraction density, thickness and roughness of surface and interface of thin film structures. In grazing incidence X-ray reflectivity (GIXR) technique, the X-ray beam is incident on the film at grazing angle and the interfered reflected beam is aggregated by X-ray detector. Presence of interfaces in the film causes interference process. The thickness of the layers causes interference periods and the amplitude of the interference oscillations depends on the both interfacial roughness and the electron density difference between the layers (Stoev, *et al.*, 1999).

A distinctive way to characterize the structural parameters of a film from its X-ray reflectivity is to construct a model that we expect logically qualifies its structure and from which we can simulate X-ray reflectivity. By calculating the differences between the experimental and simulated curves using a number of fitness functions, the model fitted by some optimization methods in order to minimize the difference between the two curves. This procedure is repeated until the difference between the two curves is arbitrated to be sufficiently small, at which point we believe that the model to be an

accurate representation of the structure (Wormington, *et al.*, 1999).

A disadvantage of the X-ray reflectivity fitting for exploiting structural parameters of thin films is that more than one electron density profile may be used to generate a single reflectivity result. Therefore we require model independent information about the system to estimate a close model of the system for correct analysis of the data.

Fourier transformation process of the X-ray reflectivity is the quick method to obtain useful model independent information concerning to the real space structure. Use of the Fourier transformation of X-ray reflectivity (Auto Correlation Function - ACF) can prepare useful layer thickness measurements for constructing fitting procedure. The combined use of Fourier analysis and fitting procedures would make X-ray reflectivity data more practicable for realistic analysis of thin films.

Fitting algorithm, which minimizes the discrepancy between theory and experiment, is the main part of iteration process. Classical gradient based optimization procedures show acceptable performance but remain unreliable due to trapping in local extreme. In contrast genetic algorithms (GAs) combine the advantages of stochastic search with intelligent strategy of solution finding. G. R. Liu *et al.* (Liu, *et al.*, 2002) suggested computational method for material characterization of composites, by combining the advantages of least squares method and Genetic Algorithm in the inverse procedure. They applied displacement response as the structure action data for material characterization of composite plates. The material property can be found by minimizing error functions formulated using the measured displacement response. Application of GA in science and engineering has made this technique to be robust and effective (Dane, *et al.*, 1998).

Surface morphology and its acceptable characterization play an essential role in the study of thin films from different aspects. Generally each existing and future application of thin films needs specific optical, electrical, chemical and mechanical properties, which almost all strongly depend on the surface quality of the film. For this reason in this study Auto Correlation Function of Zinc Oxide thin film, obtained by calculating the Fourier transformation of the ratio of reflectivity data and Fresnel reflectivity, was applied for extracting layer thicknesses of Zinc Oxide thin film. This thickness information of the film is the starting point for constructing fitting procedure between the experimental and theoretical X-ray reflectivity. Genetic Algorithm was applied for optimization of the fitness function between logarithmic experimental and theoretical X-ray reflectivity. Structural

parameters such as roughness of surface and interface, layer thickness and electron density profile were extracted by fitting procedure.

2. Material and Methods

2.1. Sample preparation

A Zinc Oxide thin film was fabricated by sol-gel dip coating method (Habibi, M.H, *et al.*, 2008). ZnO thin film preparation by dip coating was carried out at room temperature onto the substrate with a controlled withdrawal speed of 1 cm min⁻¹. For each layer, the film was preheated at 275 °C for 10 min and annealed at 350 °C for an hour. The deposition was repeated five times to obtain five-layered film of Zinc Oxide. X-ray reflectivity measurement was performed using Bede GXR1 reflectometer at Durham University, Physics Department. The specular reflectivity curve was recorded with -2 scan.

2.2. X-ray reflectivity

X-ray reflectivity is a method used to characterize the surface structure of materials irrespective of their crystalline perfection. Hence this technique can be applied to crystalline, polycrystalline and amorphous materials. Application of this technique for thin films provides information about thickness, roughness and electron density in the film.

By impinging X-ray beam (I_0) with a grazing incident angle on the film, a reflectivity is specified as

$$R = \frac{I}{I_0}$$

Here I_0 and I are incident and reflected X-ray intensities.

The recursive formula for reflectivity is (Parratt, 1954)

$$r_{i,i+1} = \left[\frac{r_{i+1,i+2} + F_{i,i+1}}{r_{i+1,i+2} \times F_{i,i+1} + 1} \right] \times a_i^4$$

Where

$$F_{i,i+1} = \left[\frac{g_i - g_{i+1}}{g_i + g_{i+1}} \right] \times \exp(-8\pi g_i g_{i+1} \sigma_{i+1}^2 / \lambda^2),$$

$$a_i = \exp(-i\pi g_i d_i / \lambda)$$

$$g_i = \sqrt{n_i^2 - \cos^2(\theta)} = \sqrt{(1 - \delta_i + i\beta_i)^2 - \cos^2\theta}$$

where θ , λ , d_j and σ_j are incident angle, X-ray wavelength, j th layer thickness and surface roughness respectively.

The recursive equation was first obtained by Parratt for X-ray reflectivity simulation (Parratt, 1954). The roughness term was introduced in the framework of the Distorted Wave Born Approximation (DWBA)

(Tidswell, *et al.*, 1990). This expression indicates that the reflectivity profile will have series of minimum and maximum giving interface fringes, called Kiessig fringes, and the successive maxima in q -space ($q = \frac{4\pi}{\lambda} \sin \theta$) is inversely related to the thickness of the film.

For exploiting structural parameters of film GA optimization was performed in order to minimize the fitness function. The selection of a suitable fitness function is crucial for data-fitting procedure independent of the optimization method used. A number of fitness functions can be assumed, but in the case where a measured and a calculated curve are compared, a fitness function consisting of the Root Mean Squared Error (RMSE) of measured and the calculated data has been observed to work well in practice (Wormington, *et al.*, 1999). We used the mean-squared error of the log transformed data as a fitness function

$$E = \frac{1}{N-1} \sum_{j=1}^N [\text{Log} I_{\text{exp},j} - \text{Log} I_{\text{cal},j}]^2$$

where N is number of data points.

Before starting optimization, the thickness of the film was extracted by ACF of normalized X-ray reflectivity. For fitting the program with the experimental data, the Zinc Oxide thin film is considered to be made of a number of slabs of same thickness with varying electron density. Electron density in each slab and roughness of each interface are other fitting parameters.

2.3. Fourier transformation

The use of classical Maxwell equations for Fresnel reflectivity in terms of the scattering wave vector q yields (Tidswell, *et al.*, 1990)

$$R_F(\theta) = \frac{q - \sqrt{q^2 - q_c^2 + \frac{2i}{\mu}}}{q + \sqrt{q^2 - q_c^2 + \frac{2i}{\mu}}}$$

where $q_c (= \frac{4\pi}{\lambda} \sin \theta_c)$, is the critical wave vector in air and is independent of wavelength.

If scattering wave vector is greater than the critical value q_c , then we can represent X-ray reflectivity as a Fourier transform of the derivative of the electron density profile ($\rho'(z) = \frac{d\rho(z)}{dz}$) (Banerjee, *et al.*, 2004).

$$R(q) = R_F(q) \left| \frac{1}{\rho_\infty} \int_{-\infty}^{\infty} \rho'(z) \exp(iqz) dz \right|^2$$

Here ρ_∞ is the substrate electron density and $R_F(q)$ is the Fresnel reflectivity of substrate. By taking

Fourier transform of the fraction of reflectivity data and Fresnel reflectivity of substrate we can extract Auto Correlation Function of the derivative of the density profile.

$$ACF[\rho'(z)] = \int_{-\infty}^{\infty} \rho'(t) \rho'(t-z) dt = \text{const} \int_{-\infty}^{\infty} \frac{R(q)}{R_F(q)} \exp(-iqz) dz$$

The position of peaks in Auto Correlation Function corresponds to the distances between regions where electron density changing rapidly, or between interfaces.

Topography explanation of thin films by optical Fourier Transformation was investigated by J. Jaglarz (Jaglarz, 2008). In his work, the major problems about the scattering of light by real surfaces and films are presented in view of results achieved with the bidirectional reflection distribution function (BRDF) method and optical profilometry (OP). The BRDF and OP studies permit one to get information about surface topography. The surface power spectral density (PSD) function for rough film has been found from the optical data. This function has been evaluated from the Fourier transform (FT) of the surface profiles. The utility of BRDF and OP methods in characterization of real surfaces was confirmed when analyzing the optical data obtained for metallic TiN thin films. J. Borowski *et al.* (Borowski, *et al.*, 2001) analyzed the effect of the Fourier transform of the incident beam on the measured diffracted intensity in X-ray diffraction. Their theory is a more precise physical picture of X-ray diffraction in the case of a narrow incident beam than the typically supposed spherical-wave theory. Their suggested method may be applied for direct calculations of the correlation function for electromagnetic fields and studies of the coherence degree of X-ray radiation.

3. Results

Fig. 1(a) indicates the measured X-ray reflectivity, normalized to Fresnel reflectivity, of Zinc Oxide thin film. Fig. 1(b) represents Auto Correlation Function computed from the Fourier transform of $\frac{R(q)}{R_F(q)}$. The peaks of Auto Correlation

Function (ACF) represent the interfaces between different layers of the film. As can be seen from this figure, the first layer of Zinc Oxide has 90, 2nd 74, 3rd 68, 4th 78 and 5th layer 80 Å Thicknesses and the total thickness of the film is 390 Å. Since this calculation was done independent of the fitting procedure, extracted information is unambiguous and model independent. Also existence of the broad peaks in the ACF suggests that there are inter diffusions between film layers. C. Renard *et al.* (Renard, *et al.*, 2006) investigated The existence of a

highly disturbed thin layer on top of the GaInAs by applying a model-independent Fourier transform procedure, applied to the high-resolution X-ray diffractometry profile. This procedure gave two thicknesses, one corresponding to the thickness from thin-layer to the sample surface and the other one corresponding to the thickness from thin-layer to the substrate surface. These calculated layer thicknesses must be compared with equivalent parameters derived from electron density profile perpendicular to the surface that extracted from fitting the X-ray reflectivity by genetic algorithm. Information that extracted from ACF is appropriate keyword for constructing 40-layer model for fitting and derivation physical parameters of the film.

The thicknesses of individual layer in addition to multi-layers of SrZrO₃ thin films were extracted with reflectometry measurements by K. Galicka-Fau et al. (Galicka-Fau, *et al.*, 2008). They applied the model independent Fourier-inversion method to reflectivity curve to determine the individual thin thicknesses and multi-layers of a stack formed in the SrZrO₃/Si films. Fourier-inversion technique applied to XRR profiles corresponds to a one-dimensional Patterson analysis of the interface positions and gives the Auto-Correlation Function (ACF) of the electronic density derivative, leading to distances between interfaces.

Fig. 2.a exhibits measured experimental X-ray reflectivity and best fit of theoretical reflectivity of Zinc Oxide thin film. The circles represent the experimental data and solid line represents recursive formalism based data after fitting process. This 40 layer model also applied for extracting electron density profile (EDP) perpendicular to the film surface from the XRR data fitting. This electron density profile is shown in fig. 2(b). We have considered 40 boxes each of 10 Å sizes for extracting electron density profile of X-ray reflectivity data.

One observable feature in the fit is that the electron density gradually increases from surface and decreases near interface. Three extra boxes added for extracting electron density of substrate. This electron density for silicon substrate was determined to be $0.77 \text{ e}/\text{Å}^3$. The peaks in EDPs are imputed to transition layers formed at interfaces during annealing process, which have been reported by others (An, *et al.*, 1994). From oscillatory behavior of electron density with thickness one can deduce that with each application of new layer during spin coating, the whole film was not reconstructed and softened but they have inter diffusions. Oscillation of electron density profile corresponding to fit was also obtained by others (Morelhaio, *et al.*, 2002) in sol-gel derived systems.

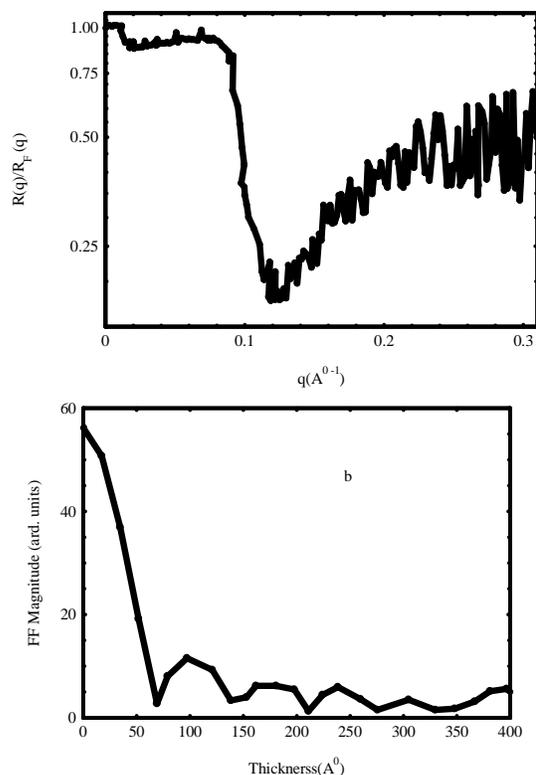


Figure 1. (a) Fresnel reflectivity normalized XRR scans (b) Fourier transformation

The electron density profile shows position of interfaces of 5 layers of the film. The peak in the electron density around a depth of 90 Å could be due to interface between first and second layers in the film. In the EDP profile, we observe a jump down of the electron density beyond 390 Å and it approaches to a constant value of $0.77 \text{ e}/\text{Å}^3$ which is the value of substrate electron density. The fitting was carried out using an average electron density $0.96 \text{ e}/\text{Å}^3$ for the film. The total film thickness obtained from electron density profile after optimization process has good agreement with amount that obtained from Auto Correlation Function of X-ray reflectivity. The prominent oscillations in the electron density profile may be explained in terms of repulsive interactions between layers of the film.

The thickness of layers of chemisorbed hydrocarbon monolayer films coated on silicon substrate were extracted by fitting the data to reflectivity calculated from models of surface electron density and by calculating Patterson function directly from the data (Tidswell, *et al.*, 1990). The surface and interface roughness and thickness of Mo/Si multilayer was calculated by considering additional interlayer of Mo-Si in addition to a pure layer of Mo and Si due to roughness phenomenon

(Modi, *et al.*, 2003). Recently G. Krishna Mohana Rao et al, by using neural networks and genetic

density of layers only can be extracted from X-ray reflectivity fitting.

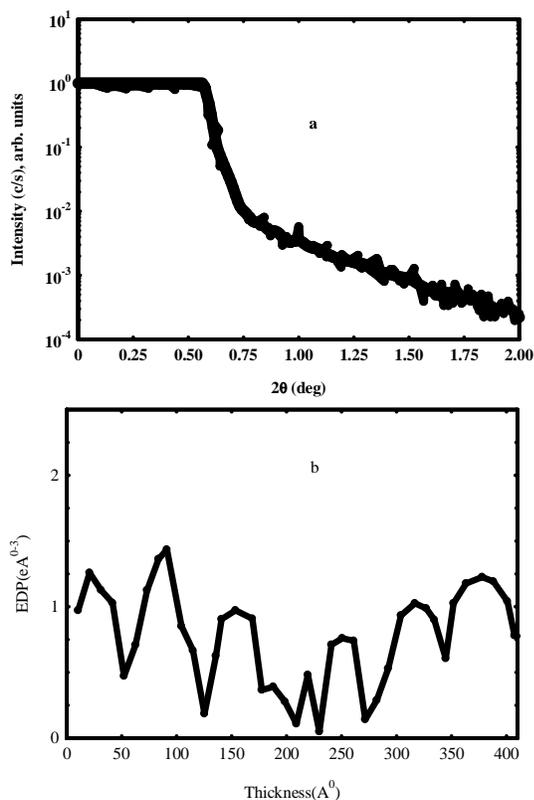


Figure 2. (a) XRR scans (circles) and calculated reflectivity after fitting (solid line) for Zinc Oxide thin film (b) corresponding electron density with thickness.

algorithm optimization, have optimized surface roughness of die sinking electric discharge machining by considering the simultaneous effect of various input parameters (Krishna, 2009). C. L. Tien *et al.* (Tien, *et al.*, 2009) presented the measurement of surface roughness of optical thin films based on fast Fourier transform (FFT) associated with a Gaussian filter. With the aim of progress the accuracy, they normalized the fringe pattern to remove the background variation before using the FFT. The roughness profile was filtered by the Gaussian filter after the phase change was converted to surface height distribution. The root-mean-square value of surface roughness of optical thin films was extracted by their proposed method.

Table 1 summarizes results of parameters calculation of Zinc Oxide thin film by autocorrelation function method and X-ray reflectivity fitting. As can be seen from this table, layer thicknesses extracted from both methods have acceptable agreement. Also surface and interface roughness and mean electron

Table 1: Comparison of results from XRR and ACF

	XRR fitting			ACF
	Thickness(Å)	Roughness(Å)	Mean ED	Thickness(Å)
First	87±5	8.1±1	1.04±0.02	90±5
2 nd layer	72±5	7.2±1	0.9±0.02	74±5
3 rd layer	70±5	6.9±1	0.6±0.02	68±5
4 th layer	74±5	7.4±1	0.72±0.02	78±5
5 th layer	78±5	6.5±1	1.2±0.02	80±5
Substrate	∞	7.2±1	0.77±0.02	∞

4. Discussions

We have shown that one can fit the reflectivity profile using recursive formalism by considering a number of layers and extracting EDP from the fit parameters. As an independent calculation, the information about film thickness can be extracted directly from Auto Correlation Function of X-ray reflectivity normalized to the Fresnel reflectivity. The theoretical model that used in this study exhibits excellent agreement with experimental XRR pattern and give accurate information of thickness, roughness of surface and interface and EDP of each layer of the film. Frequency analysis of X-ray reflectivity data is feasible and significant when some careful analysis is need without depending on special model. We used Fourier transformation of X-ray reflectivity as independent process for extracting thickness of layers in the film. Combination of modern fitting procedures such as genetic algorithm with frequency analysis methods will make X-ray reflectivity more reliable in realistic analysis.

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New look to indigenous knowledge in developing countries

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Abstract: in the process of agriculture renovation in the third world that is indeed unavoidable, the indigenous agriculture knowledge and local methods in management of agriculture resources is to be destroyed and simultaneously environmental regions are on the verge of destruction. Modern agriculture prefers huge profit from resources and didn't pay attention to environmental, cultural, social and economic varieties of traditional agriculture. So incongruities of agriculture development plans are not compatible with rural needs and talents and also rural conditions. By recognizing indigenous agriculture features such as traditional classification for identifying plant and animal species and using of indigenous practices like simultaneous cultivation of compatible crops, we can get useful information about suitable ways for agriculture. Surely these guidelines will be more compatible with rural needs and agriculture and environmental features of each region and won't be reckless to social, economic and environmental complex issues.

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Introduction:

From Robert Chambers' view, power and wealth are at industry and at cities, and poverty and deprivation are part of villager's life. Power and wealth of cities of world has absorbed experts, sources and needed research facilities for producing and disseminating knowledge. Knowledge of these modern centers is considered scientific, advanced, and valid and enjoys premium technology. He labeled this group as "first" and in contrast "last" for deprived villagers. Because, preferences and values of these two groups are different. Their knowledge and attitudes are also different. he believes that since "first" development remedies and their attitudes have led to fault , irregular and deprivation , so deprived villager's attitudes and knowledge should be considered serious in order to reach to improve conditions for this part of human society as they need and demand(Azkiya, M and Imani, 2008) .

Some of these features are as follow:

Indigenous knowledge is holistic: indigenous knowledge is gained by sense and inspiration force and leads information unity. In spite of formal knowledge that is aural, visual and analytic.

Indigenous knowledge is verbal: writing and documenting indigenous knowledge would make it out of reach of villagers who can add to it, if it would not follow applied activities.

Indigenous knowledge is practical: it is possible to write about indigenous knowledge but it is impossible to educate and learn it through books and articles. Only way to learn it is close view and follow professor.

Indigenous knowledge isn't explanatory: it isn't possible to expect one master (e.g. mason, apothecary, farmer) to explain his method efficiency in a way that is apprehensible to us (literate people)

Indigenous knowledge is local: villager's knowledge has formed in itself environmental and climate framework. Effective indigenous knowledge at one geographical area isn't necessarily effective at other area (Nowroozi, A and Alagha, 2000).

Indigenous knowledge is general: while, formal knowledge emphasis is on saving time and removing ideas and also monopoly of knowledge at universities and research institutes , but indigenous knowledge is, receptive, incentive and needs to more people's participation at learning , developing and add to it. Furthermore, in verbal cultures, it is impossible to separate science from world and even include it to computer and book. Every human are important in indigenous knowledge.

Indigenous knowledge is deteriorating quickly: by every death of old indigenous people, great knowledge resources would be lost also, so every action toward gathering indigenous knowledge is necessary.

Learning by doing: repeating action in order to sustain and enforce indigenous knowledge through "learning by doing" is one of features of indigenous knowledge in real operation environment (Emadi and Abbasi, 2001)

Villager's knowledge and especially indigenous knowledge systems have various dimensions that include linguistic knowledge, zoology, ecology, climate, agriculture, ranching and professional skills. Range and value of this knowledge hasn't been

considered. Four aspects of various dimensions of rural knowledge were selected and were analyzed, In order to change attitudes and reformer's behavior of rural development. These dimensions are: agriculture operations, rural knowledge about nature, rural people's aptitudes and abilities and their experiences (Razavi, 2002).

In Chambers' opinion, indigenous knowledge or rural knowledge has various dimensions that he classified them to four parts in order to explain more and better about diversity of indigenous knowledge that are as follow: A: farming activity; B: knowledge in relation to nature; C: indigenous people's aptitude and ability; D: indigenous people's test. indigenous people's knowledge originated from exact viewing of environment; since indigenous villagers have direct contact with phenomenon and also see all different processes at nature so have especial aptitude and ability compared to outside people. Maybe least known aspect of indigenous villager's knowledge is essence of tests that they do which maybe these tests are available to choose "bests" and some other for "minimizing risks" (Dewes, 1998).

Advantage of indigenous agriculture

Studies have given new dimension to agriculture research. Now, in many countries the managers of agriculture resources are the people who are trained in western countries. So if the manager become familiar with the culture and environment roots of indigenous system of resource management, they won't do mistake. Indigenous agriculture is based on cooperation of farmer with nature. Recently researchers of ecological agriculture have more attention to these systems. The result of these studies is important from two sides:

- 1- At the first, in the process of agriculture renovation in the third world that is indeed unavoidable, the indigenous agriculture knowledge and local methods in management of agriculture resources is to be destroyed and simultaneous environmental regions are on the verge of destruction. Modern agriculture prefers huge profit from resources and didn't pay attention to environmental, cultural, social and economic varieties of traditional agriculture. So incongruities of agriculture development plans are not compatible with rural needs and talents and also rural conditions. By recognizing indigenous agriculture features such as traditional classification for identifying plant and animal species and using of indigenous practices like simultaneous cultivation of compatible crops,

we can get useful information about suitable ways for agriculture. Surely these guidelines will be more compatible with rural needs and agriculture and environmental features of each region and won't be reckless to social, economic and environmental complex issues (Appleton and Jeans, 1995).

- 2- Second, with studying indigenous agriculture we can get points that will help us to design the same systems in industrial countries. Sustainable agriculture which is taken from indigenous systems will remedy the shortcoming of modern agriculture. In a single-product of modern farm, life circles of nature has changed by using chemical poison that give no chance for using principles of ecological agriculture. But completeness (evolution) of culture and environment is the result of local agricultural systems (Ahmed, 2000). In indigenous agriculture, variety and alternation of cultivation make minimize the possibility of farming products destruction. Although these systems have resources limitation, but they use of learning advantage and intellectual ways for use of animals, soil and compatible farm species. For this reason, researchers of ecological agriculture know these systems as unexampled kinds to specify constant static scales for agriculture activities. In industrial countries they use of these scales for designing and managing ecological production systems (Emadi and Amiri Ardekani, 2004).

With all the advantage we account for native knowledge we should contemplate that for reaching a balanced understanding of this knowledge, we shouldn't indicate it very important or not very unmeaning as Chambers say. Also we shouldn't consider rural people an intellectual people. Because they can make mistake like any other people or group. And also this knowledge is not reliable forever. In some places this knowledge is combined with some superstition believes and we should not forget its spiritual and mental aspect (Warren, 1999).

Dictated pattern's failure through western development countries to third world countries show that native knowledge is necessary to reach development.

Untrop believe that usage of local knowledge is efficient and useful in development and native knowledge's researchers believe that they achieved to an important source for innovation in agriculture methods and a good farming production to improve the rural people's life. On his idea, some of researchers call native knowledge as a good supplement and replacement for modern knowledge and they have tried to spread the usage of this

knowledge all around the world. These plans as a “communion research with farmers” or “first is the first” are introduced. In this research method, private organs and local groups have the main role and unlink the current research plans, the tests are done with the farmers attendance in their farms and not in research centers and far from environment condition. The ways that farmers and rural people use for management of their living environment are the most scientific ways, although we couldn't understand it at the first sight (Chambers, 2000).

Eshraghi (2000) explained that by introducing sustainable development model or development environmental model and according to world food organization (FAO), sustainable development will create when applied technologies in rural development are in proportion with rural people's knowledge and also are acceptable by them. Also he says that one the main ways to reach sustainable development in society is that to have enough and necessary attention to the rural's native or local knowledge (Merrewij, 1998). It is also explained that attention to this knowledge needs a complete recognition of rural people and their knowledge that through assembling of this knowledge we can find a correct way to reach a sustainable development and we should know that the movement toward sustainable development is not possible without correct using of native knowledge. Many development experts believe that the Sustainability of this concept is at the studying of this knowledge and in becoming popular in development. Indeed, native knowledge with its holist features had known the relation between nature's components better and had smoothed the way to Sustainability of development (Gigler, 2003).

We can summarize the usage of native knowledge in development as follow:

- 1- Protection and maintenance of natural sources. Native methods in management of natural sources are suitable pattern for managing natural sources in sustainable development.
- 2- The success of sustainable development plans is depended to rural people's communion at designing, schematization, performance and assessment. Use of native knowledge is necessary for rural people's communion.
- 3- Native and modern knowledge should be combined because according to our needs and vulnerability of remained natural sources, none of them are able to remove our needs a lonely.
- 4- For recognizing development needs, trouble shooting problems should be polestar from rural people's view and recognizing problems and making efficient relation with rural people are possible through native knowledge.

- 5- In industrial countries, native methods are forgotten completely because of using modern knowledge in production process. As native methods are the most suitable way for achieving sustainable development goals so, many efforts were done to make this knowledge alive.

As a result not only we shouldn't forget the native knowledge but also we should use of this knowledge in developmental plans. Using native knowledge in developmental projects will help to have sustainable development in villages. So developing and not developing that were using of western development patterns for many year, should use of their native and local knowledge which is the result of many years experience and by helping these plans they can reach to a sustainable development (Brouwer, 1998).

Conclusion:

At sustainable human development, people are considered as “goal” of social and economic policies that their range of their selections would be extended in order to actively participate at decision making. Therefore, people's participation is one of tools of sustainable agriculture development. But active rural people's participation at extension programs as a form of sustainable would not be possible unless by believing role of rural people's knowledge, vision and skills (Brouwer 1998).

So, not only attendance of indigenous knowledge is necessary for applied researches but is important at compatibility researches and it enforced importance of attending to indigenous people and their knowledge. Therefore, applying affective strategy for transmitting technology has been among from affective fields at attending to indigenous people's knowledge and especially experts; because, development institutes realized positive their affects for doing this more than ever (Merrewij 1998).

Indigenous knowledge has been manifested at sustainable process and improving extension programs at industrial countries of world, very well. Indigenous knowledge related to agriculture, medicine, food and architecture has been widely used At European countries, USA, Canada, Australia, by new names.

So, effort and national commitment and multi-dimensional support is very critical for recording, valuing, extending and exchanging this rich source and also preparing mechanism and practical strategy for synthesizing this knowledge with new knowledge and agricultural development programs.

Agricultural extension was identified as one powerful IT focused area, due to role variation at knowledge

system and agriculture information at one hand and at the other hand due to its dependence on various exchanges among farmers, that can has great affect on rural society and developing agriculture. So that work and productions of farmers would increase by farmer's access and use of Internet and subsistence farmers at all over the world are at developing by gaining needed knowledge and information that during time would becoming as commercial producers. Transmitting from system-cycle source of agriculture to technology-cycle system of agriculture placed more responsibility on agricultural extension because agriculture extension system is as vital technology transfer crossing to farmers at one hand and as crossing for referring feedbacks, needs and agriculture issues, researchers and policy makers of market.

What that is obvious is that extending and researching agriculture can help to sustainability through close relation to farmers , attending to their experiences , gaining their information and logical understanding of agriculture activities , attending to their vital needs for doing "demand-base" researches and extension education efforts for developing agriculture , at process of improving agriculture development.

In the past half century, modern knowledge has provided new and modern technologies in agriculture that has caused a main evolution in production process. Also this technology has caused problems in environment, production and social aspects and has forced thinkers and deciders to think about them carefully. One of the ways to solve these problems is that to use of our ancestor's tentative knowledge. Using of our ancestor's knowledge and experience is called native knowledge and this provide an opportunity to use of local knowledge in the process of specifying needs and designing suitable technologies and applying it. The native and modern knowledge not only are not in contrast with each other but also are each other's supplement to reach a sustainable development and we can use of them in our needed technologies. Believe of educated people to native people and their knowledge "precondition for making them close" is called combination and compilation. Making evolution in modern system for attention to tentative knowledge is the main necessity for this compilation. Another necessity for this evolution is the researcher's attention to experimental accumulated wisdom and historical exploit by using qualitative and communion methods. Also applying compilation methods and making evolution among government, educational centers, farmers and peasant is the necessity and pre condition for combination of modern and native knowledge.

On the research which was done by Bozarjomhari (2004) with this title "analyzing native knowledge position on rural sustainable development". It was specified that although there are many differences between native and modern knowledge but they are not in contrast with each other, because they are each other's supplement and we can't be success when we use them separately. According to new parameters in rural development, for solving rural problems, at the first we should use of native solutions and if it was not efficient, we can use and test external solutions.

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The role of distance learning tools in Increase the efficiency of adult education

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Abstract: Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out. To be successful, the Commonwealth's strategies must energize and gain the commitment of all the state's political, education, business, and civic leaders. No strategy will succeed unless it engages leaders in each community and county to identify needs and develop programs and services appropriate to the community's unique circumstances.

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Introduction:

The most serious challenge will be to motivate low-skilled, under-educated adults within the working age population to seek further education. Simply expanding the number of providers and programs will not necessarily increase demand from the populations and communities where the needs are greatest. Deepseated social, economic and cultural barriers—many dating back generations—lead people to undervalue education. In addition, in many counties it is difficult for people to see a direct relationship between better education and better-paying jobs. Either there are no jobs available or many existing employers do little to emphasize the connection between better education and the possibilities for getting a job, keeping a job, or earning a higher wage. For many, getting more education and earning a high school diploma or a college degree has little positive meaning. While there is still prejudice surrounding some distance learning, it is increasingly being accepted as an alternative to traditional classroom learning. Courses can be offered via the Internet, where students are able to interact with instructors and other students without physically being in the same room. Getting a college education can be difficult for people with inflammatory bowel disease (IBD). Frequent trips to the restroom, exhaustion, doctor visits, and medication side effects are all barriers to the traditional college experience. What if

you could get the degree without ever setting foot on a campus? You can do just that through distance or virtual learning. Distance learning has been around for a long time (we've all seen the commercials on TV).

Only the negative consequences are obvious: getting more education often means leaving one's family and community for jobs and opportunities for advancement somewhere else. The future of Kentucky depends on uplifting the quality of life and economy of all of Kentucky. The social and economic costs of neglect of large parts of the state will drag down the rest of the state and seriously hinder its capacity to compete in the global economy. Much like strategies to curb epidemic, strategies to reduce illiteracy and raise the educational attainment of Kentucky's population must include both short-term efforts to face the immediate crises as well as long-term strategies to get at the underlying causes. Short-term crises include the imperative to keep helping welfare clients make the transition from welfare to work within the constraints of federal and state mandates and the need to train workers for immediate employer demands. Long-term prevention must address the underlying, persistent problems of the state's economic structure as well as the low awareness--if not appreciation--among segments of the population of the vital connection among

education, employment, and improved standards of living.

Distance Learning Program

Distance learning is one of the fastest-growing components of higher education. Almost 3.5 million students were enrolled in at least one distance learning course in the fall of 2006 and online enrollments are increasing every year. The convenience of taking classes at any time from any location appeals to today's adult learner, especially those who work, have families or live in rural areas. Below are several important factors to consider in choosing a distance learning program.

1. **Accreditation.** Accreditation is a means of ensuring the quality and effectiveness of higher education institutions and programs in the United States. Eight regional accrediting agencies accredit most of the colleges and universities in the United States. A host of national and professional accrediting organizations also exist, including the Distance Education and Training Council (DETC), an organization that identifies and accredits distance learning programs. These twelve questions outlined by the Council for Higher Education Accreditation are helpful in examining a distance learning program's claims of accreditation.

In evaluating distance learning paralegal programs, determine if the school is accredited by one of the regional accrediting bodies and by the American Bar Association (ABA). ABA-approval signifies that the school has met certain standards in terms of academics, facilities and instruction. Graduating from an ABA-approved school may give you an advantage in the legal job market.

2. **Reputation.** The reputation of the distance learning program you attend may hinder or enhance your post-graduate employment prospects. In evaluating the reputation of a distance learning program, you should not solely rely on the school's website or marketing materials. Other ways to investigate the reputation of a distance learning program include:
 - Visiting the school.
 - Talking to alumni (contact the career services department for alumni names and contact information).
 - Researching the distance learning program's record with the Better Business Bureau.
 - Talking to paralegals, attorneys and legal employers about the reputation of the school you are considering.

- Researching the school in print publications, news articles and on the Internet.

1. **Academic Offerings.** When evaluating distance learning programs, it is also important to consider the program's academic offerings. A quality distance learning program offers a comprehensive curriculum with a variety of options, electives and advanced coursework. Talk to professors or an academic dean regarding the content and delivery of courses. The American Association for Paralegal Education (AAfPE) recommends that paralegal instructional content include courses in legal research and writing, litigation, ethics, contracts, business organizations and torts. In addition, courses should develop students' critical thinking, communication, computational, computer and organizational skills, and competency to handle ethical issues, according to the AAfPE.

Legal programs should also offer an experiential learning component such as an internship, practicum, pro bono work or clinical experience. These are great resume-building opportunities and allow you to learn practical skills and gain real-world experience.

2. **Instructional Technologies.** Distance learning courses can be delivered in a variety of ways through a growing array of technological tools including audio tapes, CD or DVD ROM's, e-mail, telephone conferences and web-based delivery systems. Questions to ask include whether the program employs a mix of instructional technology? Is hands-on training and support provided? Can students preview courses online and try out the technologies before enrolling?
3. **Teaching Staff.** The faculty is the backbone of any distance learning program. Are the courses taught by professors or are the courses pre-taped correspondence instruction? If the courses are taught by instructors, what is the background and qualifications of the teaching staff? Are classes taught by paralegals, attorneys or a mix of both?
4. **Career Services.** Another important consideration in any distance learning program is the extent and quality of its career services program. Research indicates that the greater the resources offered by the career services department, the greater the program's job placement success. You might inquire as to what percentage of graduates find related employment following graduation and whether the career center offers personalized career counseling, job placement assistance, job search seminars, online job boards or resume assistance.

Conclusion:

Beyond the issues relating directly to DAEL (Department of Adult Education and Literacy), the task force heard a number of concerns about the Commonwealth's overall approach to adult literacy.

- Lack of coherent statewide leadership and coordination among multiple complementary initiatives aimed at the same problem.
- Lack of continuity in state leadership. Cited in particular was the difficulty sustaining a high level commitment to the issue long enough to make a difference because of changes in priorities of the state's political leaders. A high level of turnover in the leadership of the Department of Adult Education and Literacy has also contributed to the instability.
- Tendency to think of adult education as a separate categorical program rather than a strategy that cuts across the mission and responsibility of multiple Commonwealth programs and initiatives (e.g., early childhood education, welfare reform, economic development, and corrections).
- Multiple uncoordinated categorical federal initiatives that tend to drive (and fragment) policy for an overall state effort that is largely funded by Kentucky.
- A tendency to commingle and confuse different functions. The most important distinction is between functions focused on the needs of clients (adult learners, employers, communities, regions, and the Commonwealth as a whole) and functions associated with the operations and performance of providers. It is important that each of these functions receive attention, yet the tendency is for one (e.g., overseeing a network of providers) to drive out attention to overall system strategy.
- Inadequate coordination of services to meet the needs of individual adults, communities, employers, and regions is hindered by:
 - Vertical financing and regulatory relationships between separate federal and state programs and local providers and administrative units. These vertical relationships can hinder the horizontal coordination of services for individual adult learners, communities, and employers.
 - Turf wars among providers, local politics, and long-standing conflicts among neighboring counties.
- Inadequate links with and leverage of other public and private initiatives and investments to reach the target population. Major sources of

help include employers, postsecondary education, and workforce development.

- Lack of a state financing policy and strategy for provider performance incentives and collaboration, and tax and other employer incentives for leverage of non-state resources.
- Lack of programmatic and administrative flexibility to meet the rapidly changing needs of adult learners, employers, regional economies, and communities.

Additional material for the next stage of learning often means to be expected when developing your learning skills. Learners to increase awareness and enjoyment of reading and studying to operate.

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and codification are included out of class activities, dialogue, role playing, etc.

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and

audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning

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Assessing relationship between rural women empowerment and employment

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Abstract: Rural women constitute about half of the world's population and in the world production supply they have energetic communion and constitute a great part of agriculture workforce. They constitute% 50 of the workforce and they participate in the production of half of the foods in the agriculture section. As an example the rural women constitute about 70 to% 80 of agriculture workforce in sub-Saharan Africa, %65 in Asia, %45 in Latin American & Caribbean, %80 in Nigeria & Tunisia and %80 in India, but their role in production system is the men's supplements roles and this causes a big responsibility inside their mother & wife duties and it takes a great time and energy of them. Studies in this field show that women spend about two thirds of their time for production, management & organize of their house as the men spend only one third of their time for such things. In the development countries, rural societies which are poverty for geographic reasons such as being far from urban societies or because of mountainous of zone and also as the roads are impassable and some other reason, they became deprived of many human development programs. Unfortunately these societies are suffering of mortality because of poverty but what is clear here is that we can't attribute such privation to geography and nature of the zone. Every country is trying to solve such critical conditions by applying depoverity policies.

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Keywords: Employment, rural women, empowerment

Introduction:

If rural women can work through receiving credits, loan and others finance facilities at favorite jobs and live through earned income (as it called "self-reliance and independence"), so undoubtedly we would see changes in social, economic and cultural relations of village.

paying part of cost of life by government or charities, establishing forums to analyze family supervisor women's problems, supplying necessary facilities to grow and improve child's life quality and paying facilities to provide sustainable employment, are among most important approaches to support family supervisor women. Paying credit facilities to access sustainable employment with easy terms at limited time, is one of the most important approaches to support family supervisor women. Because alongside supplying their continues needs, their esteem wouldn't be marred. Currently, this approach is used at many countries and positive results have emerged. (Ghaffari, 2000).

Increasing Suffrage, lack of relying on vast patriarchal families, increasing cultural acknowledgment, relation with newer institutions, having intellectual independence, making decision for marrying, occupation, emigration and etc are those rights that they gain. gaining aforementioned rights by women in context of cultural and social framework followed some changes that maybe lead to disfunctions and even create disorders and

abnormalities at traditional, familial and kinship relations that dominated on villages (Fakhraee 2002)

What that performing credits programs, has made in recent years, was on broad outlook with purpose to access to same results as above findings.

Thus, in one inclusive outlook, it is possible to use micro-credits programs to solve those issues which involved with rural women's economic limitations, so that lead them toward social empowerment, in the context of economic growth(Rahmani andalibi, 2001).

Poverty spreading in village is a global issue. According to the Fao finding about % 75 of world's poor people that are more than 1 milliard people are living in rural zone and more than % 70 of this poverty people are women. As the most of the people who are poor are living in village and are women is the reason for insufficiency of rural development programs.

One of the other basic barriers in development of rural women is their independent inaccessibility to get credits for investment in their job. Although their illiteracy is the big barrier to use of bank credits, but this view that women are dependent people that their husband should decide about their financial decisions is the other reason that rural women couldn't access to official credits. Maybe these barriers are the reason why rural women are happy about applying micro-credit thought in village. (Najafi, 2007).

One of the raised strategy, in order to accelerate investment process and reinforcing financial

foundations, and saving, at deprived and rural areas, has been empowering and eradicating poverty of rural societies through efficiency with emphasize on applying micro-credits. Micro-loans as useful tool to fight against poverty and starvation, has proven its capabilities and values to develop these areas. These tools have ability to change and improve human's life, especially poor peoples. Supplying credits and analyzing credits approaches cause opportunity to activate poor men's working power, establishing field for sustainable production and income, prevent usurers and pre shoppers of agriculture productions to plunder poor rural men and finally empowering poor people especially women who can work but were deprived to have capital and work tools, and extension accordance to their activities such as needs assessment, identifying target group, organizing poor people, giving needed specialized and public training and ... have important role on effectiveness and make effective activities of these credits.

Aforementioned plan, due to containing special advantage such as giving accessible loan with low commission fee and no interest rate and also long-term repayment, could provide chances for many farmers to release from dealers and broker jobbers. In this approach, giving micro-credits to rural women seems more effective. because alongside agricultures activities that needed more investments, women by enjoying of very micro-credits not only could create remarkable creativities in rural productions but also gained worthy economic and social abilities, and even improved their field of social presence, well. (Lahsaeizadeh, 2000).

Having investment (capital) independency enforce people to think about economic from different angles. He should study the ways for using capital, he must consult with authority and experienced people and he will investigate about relevant markets. Such things will help him to be authoritative & independent. But how rural women can get such independency? Are the women created inherently for housekeeping, parenting and working or is there any opportunity for rural women to show their skills in economic & social development?

It seems that experiences which are obtained from performing financial programs in some villages in the developing countries could answer clearly to such questions.

A glimpse to previous planning about rural development in the world shows that from 1950 many developing countries understood that the main reason for making their economic growth (development) slowly in their countries is the weakness of investment in the agriculture part. Although many countries by patterning from developed societies have proceeded to improve &

develop their industrial agriculture part and by this action not only had irreparable damages to many traditional farmers but also the main problem (the lack of capital sources) is also remained in the rural regions. (Rahimi, 2001).

In recent years, the point was well clear that a major share of the income of rural households are obtained through the women activity, and sometimes even share of women income in the household economy is more than the share of men. For example, in 2000, about 854 million women that include 32 percent of the workforce of the world are active economically and their major activity in third world countries are in the agriculture sector and 60 percent of cultivated rice, 90 percent produce vegetables and, 50 percent cotton and oilseeds, 30 percent had affairs and gardens, 90 percent silkworm related activities and 65 percent of rearing livestock-related activities and handicrafts have the highest proportion (Emadi, 2001). This shows that the role of women as agricultural work force, not only isn't less than men but they have greater share in the process of planting, cropping, and more importantly in the sale of crops and livestock and a research specialized that 50 percent of food global production activities were owed to women (souri, 2002). Aside from the economic role of women that clearly has been made in the past decades, the vital role of women in social and cultural dimensions of development process in rural areas has remained hidden from the polls. They train the next generation of farmers and teach them the next generation necessary knowledge. A Chinese proverb says, "If training a man, just training a man but if you teach a woman you teach a family." Women are local knowledge and local educators themselves, in preparing and providing food, health treatments and cultural values are the next generation (Fami, 2003).

Empowering rural women:

The empowerment is equality that women for financial self-reliance and self-sufficiency can obtain by controlling their emotional decisions. The empowerment can be defined as an evolution and development of activity through private organizations that guides empowerment in the society toward economic improvement.

Empowerment is a process through which people can do activities to conquest on development obstacles that enable them to assign their destiny.

The word empowerment is not the meaning of overcome to main in equalities so it is different with the word self-reliance. (Ruhail amin, 2010).

Empowerment enable person to overcome any difficulties by a suitable management. Finally we can

say empowerment provide energy to conquest on mental problems & outer difficulties.

On conclusion we can give a suitable definition to women's empowerment as this: the process of realization of women about themselves (and also the men's realization about them) for the thing they want or have to do.

It should be reminded that the main point should be attended in women's ability is the omission of subjective & social problems and providing economic & social communion for women in all aspects. The mean of women communion is their presence in all of village affairs such as making decision, presence in organization & councils that includes their communion in all economic & social aspects. (Araghzadeh, 2002)

Conclusion:

Woroniuk Schalkwyk (1998) at their conducted research believe that now, micro credits, micro finance sources and small business unites are most effective mechanism to decrease poverty.

Plitt and others, conducted research as they called it "do credits programs, can empower women"? Results showed that corporation at credits programs helps empowering women.

Goetz Sengupta (2003), presented negative image of credits effects on empowering women. They concluded that most women have minimum control on their loans. And when repayment period is short, this shortage of control has devastating effects on women welfare.

Hashemi and others (2004) found that joining to Gramin Bank, has meaningful positive affects on controlling women, and helps to family income.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive affects on their demand about health care.

Fiona Steele and etal (2008) in researches that conducted as called " influences of credits programs on empowering women at Bangladesh, found that women who joined to credits programs, have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Women by getting these rights can make change in the rural cultural & social issues which make disfunction & crudity in their family's relation. However, rural women's self-reliance has caused

improvement in the economic, social & cultural issues. For solving women's self-reliance problems we can do these activities:

- Giving promotional services for increasing rural women's skills in various fields.

- Giving promotional instructions to men for believing their women's economic role & their women opportunity to participate in all economic, authority & aspects.

- Increasing rural women's knowledge in all social, political, cultural & economic fields.

- Making use of micro-credits programs to motivate & support women for doing economic affairs better & finally to make women self-reliance.

According to the most important factor of economic population development and growth rate are human resources of that community and also each community consists of activist men and women that under the social interaction have direct influence on community economic and development therefore strategies are required to developed community base on more and active participation of women that include the half of society instruct in economic, political and social foundation. Women as an effective member of society, can crystalline their lead roles in various responsibilities formations. These responsibilities include promoting the concept of participation and employment in life and building the suitable areas for freely activity and introduce the right of economic management, ownership and... This requires that all fees and necessary training for women to be considered. Due to the fact that the concept of women's participation, is not necessarily the female employment, although certainly part of the participation of women will be crystallized in their employment, but in this context, home and family affairs by women and their role in nutrition and child growth and Their education are also many responsibilities that women often are responsible for them. Throughout history we have always been seen that women have always been active but in culture and tradition, this mentality largely exists that if the job exists, it would be for men. Because they are responsible for their families Economic or wherever there is a good opportunity for participation, men have a prior right.

Perhaps the reason that women are less important in the development is this thought and action. Because women are in occurred opportunities in the second stage, or even sometimes do not come into account. Zanjani in the article "Women's Empowerment" according to economic, social and cultural characteristics, one of the important subjects that have investigated is the effect of number of children in female employment in urban and rural communities. In Iran urban, employment opportunity

population continually reduces by increasing the number of children. This reduction is weak, up to the third child and then takes the intensity. So that the employment opportunities of women decrease in pay to first child to the second 3 / 2 percent and the second child to the third 9 / 6 percent, while this reduction from third child to the quarter is 3 / 27 percent. But in rural society due to the household problems, type of activity and employment, increasing numbers of children not only make no reduction in women employment opportunities so with increasing the number of children, women's job opportunities is also growing and by having 7 child reaches its peak. Since then relegated to minor finds, in a way that employment opportunities of rural women that has nine child is equal to the job opportunities of a woman with one child. Thus children are effective on women employment so that increasing the number of children in urban society has negative effect and in rural society has positive effect (Zanjani, 2002). Lhsay Zadeh in a research by the name that (considering the role of Iranian rural women in the economic scene), first specified the women's place in job structure, and then compared it with the job site of rural men. His study demonstrated that the employment of rural women is important as men. Because the rural economy includes three separated and also related parts, namely agriculture, industry and services and the author, with the share of women in agricultural activities come to the conclusion that in addition to their considerable added value contribution in agriculture, unfortunately, the real value of their activity is not known has been formed in the article. (Lahsaezadeh, 2004)

Safiri in his PhD thesis, as "study of quantitative and qualitative aspects of women's employment and its relationship with economic development", knows that a part of the employment problems is because of some barriers that relates countries structure and also other parts is because of some non development barriers an some parts is also from the social - economic, and cultural barriers as development obstacles.

If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that

it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live with out dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes.

In some countries where are not appropriate and much needed job, women are damage more. In some where that the social hierarchy is base on physical strength, force and tyranny both in the family system and the hiring of women in institutions and organizations makes the difficult situation for them. Surely also the cultural background are continuing these economic and social conditions, Safiri, the knows the Personality barriers and physiological barriers as non- development knowledge barriers and he say they are effective on women's employment (Safiri, 2000).

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Importance of educators' knowledge about teaching methods in adult education

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Abstract: Complex role of adult learning and training process is significant, his role gradually changed from the donor information and active for many years will assume that the principles and techniques that are used in teaching children to contribute equally in the adult learning process. On the other hand is effective in children for adult education teachers were employed. Later that person was well trained (ie the experts), who could well slow or a group leader to manage the program, was selected as an adult educator. Thus learners directly in adult education programs that are based on experience were used, and adult As a mature child which has its own characteristics and is unique is that the principles and techniques of the different techniques used for the education of children is needed. As a result the role of adult educator gradually from non-skilled person without the expertise of individual specialists and trained to be changed and Instructors for training and educational opportunities were provided at all levels are therefore unable to work for educators from institutions with short-term training courses for users of the guidance program (project leaders) through summer workshops for professional leaders through programs Training of Master and PhD levels in schools of higher education courses were provided. other procedures, where the role of teacher has changed the theoretical concepts first, an understanding of adult learning was unfounded on the principle that the concept of adult education is based on transferring knowledge to them and saying what they should know or duty to interpret absorption educator their training. In recent years the practice has changed and the role of educator as a "change agent" and reform as a donor and an "auxiliary roles" or "facilitators" were raised as his understanding of adult personal and community among people.

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Keywords: teaching methods, educator, adult education

Introduction:

In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education.

Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

Educational materials on adult education with daily life, needs, goals, aspirations and past experiences of adults and their relationship helps to results learned in life and career are used.

adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities

and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings.

Adult characteristics:

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

Operating speed:

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

Consciousness:

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak inhibitors of natural forces (mostly visual and

auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability (which varies with the speed of learning) is not relevant.

Health:

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

Background of knowledge - skills and beliefs of adults:

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

The role of adult educator:

Complex role of adult learning and training process is significant, his role gradually changed from the donor information and active for many years will assume that the principles and techniques that are used in teaching children to contribute equally in the adult learning process On the other hand is effective in children for adult education teachers were employed. Later that person was well trained (ie the experts), who could well slow or a group leader to manage the program, was selected as an adult educator. Thus learners directly in adult education programs that are based on experience were used, and adult As a mature child which has its own characteristics and is unique is that the principles and techniques of the different techniques used for the education of children is needed. As a result the role of adult educator gradually from non-skilled person without the expertise of individual specialists and trained to be changed and Instructors for training and educational opportunities were provided at all levels are therefore unable to work for educators from institutions with short-term training courses for users of the guidance program (project leaders) through summer workshops for professional leaders through programs Training of Master and PhD levels in schools of higher education courses were provided.

Other procedures, where the role of teacher has changed the theoretical concepts first, an understanding of adult learning was unfounded on the principle that the concept of adult education is based on transferring knowledge to them and saying what they should know or duty to interpret absorption educator their training. In recent years the practice has changed and the role of educator as a "change agent" and reform as a donor and an "auxiliary roles" or "facilitators" were raised as his understanding of adult personal and community among people. In addition, a person well trained teacher who is fluent in adult education as a change agent responsibility is beyond routing plans and activities, In recent years the practice has changed and the role of educator as a "change agent" and reform as a donor and an "auxiliary roles" or "facilitators" were raised as his understanding of adult personal and community among people. In addition, a person well trained teacher who is fluent in adult education as a change agent responsibility is beyond routing plans and activities. His role in the educational process as a facilitative (helpful), leader (leading), incentives, consultant and source of information (not move), regular (planned), judge poster and Is. The ultimate goal of people helping him to his ability to help raise up to be adult. Fact that the adult educator role of a marginal position in society has changed to a central location for this position change the natural outcome of many social problems such as wars, crime, illiteracy and disease Can easily be resolved through processes of adult education. a well trained teacher who is fluent in adult education as a change agent responsibility is beyond routing plans and activities, In recent years the practice has changed and the role of educator as a "change agent" and reform as a donor and an "auxiliary roles" or "facilitators" were raised as his understanding of adult personal and community among people. In addition, a person well trained teacher who is fluent in adult education as a change agent responsibility is beyond routing plans and activities. His role in the educational process as a facilitative (helpful), leader (leading), incentives, consultant and source of information (not move), regular (planned), judge poster and Is. The ultimate goal of people helping him to his ability to help raise up to be adult. Fact that the adult educator role of a marginal position in society has changed to a central location for this position change the natural outcome of many social problems such as wars, crime, illiteracy and disease Can easily be resolved through processes of adult education.

Although two decades of adult education a fundamental instrument of national policy and local governments, state and national cost millions of

dollars for adult education began (1950), and cost requests in the years 1960 million by the sectors of trade, industry, universities, religious institutions and government agencies will pay increased. Where adult education resources in 1950 are allocated only for the welfare of individuals found with increasing social problems such as urban crisis, Nvady inequality, unemployment and illiteracy. In these areas was also widely added. So the mission developed its adult education and its usefulness for human growth and development became clearer.

Comparison of adult education in various countries:

Literacy goals include:

- Providing primary education in childhood that adults were deprived
- raising awareness for adults;
- knowledge bases and adults about their cultural heritage;
- increase confidence in adults.

Professional education goals include:

- Equipped with the necessary skills to adults living;
- providing the necessary manpower for the country's goals;
- achieving social equality and equity and eliminate the existing differences between different classes.

Conclusion:

Material often set different types of materials and educational content in books and pamphlets, books, training guides, trainers, equipment auxiliary audio, visual and material are included such that during actual teaching sessions, are used in the transmission and content but also to achieve the goals of making education programs are important.

Additional material for the next stage of learning often means to be expected when developing your learning skills Learners to increase awareness and enjoyment of reading and studying to operate.

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and

codification are included out of class activities, dialogue, role playing, etc.

Some research findings that can be a learning process for the Guidelines for training operations are applied, is given below:

1- - Preparation for adults to learn how much he depends on previous learning. Knowledge that has accumulated because of an ability to absorb new information more person is. Past educational experience features a diverse group of adult learners, the starting point of any activity on the diversity training is emphasized.

2- intrinsic motivation, learning a deeper and make them sustainable. When the need is met directly by the learning itself, what is learned, but is complementary learning. Creating a training activity in adult learning needs, learning ensures stable

3- Positive reinforcement (reward) learning to reinforce the negative (punishment) is more effective. Many adults because of negative experiences at the beginning of schooling, are weak and afraid. Feeling of success in adult learning for continuous learning and adult participation is essential.

4- To maximize learning, information must be provided an organized manner. Entries can be simple or complex can be arranged around related concepts are organized. Starting point for organizing content knowledge for adults and adults is linked to past experiences

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Numerical Analysis of the Geomembrane Behavior in the Sar Cheshmeh Copper Mine Tailings Dam

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Abstract: The use of Geomembranes as Tatrava surface can be considered as valuable and affordable solution compared to other techniques for sealing of earth dams. In one Of the earth dams in Iran (Sar Cheshmeh Copper mine dam), the Geomembrane is used to increase the height of the dam. In this study, using by software modeling to try to achieve the optimum thickness for Geomembranes used in The shell was added to the old dam, based on analysis of Seepage and slope stability downstream slope of dam, So using by obtained thickness of the Geomembrane, the smallest leak can cause, and Downstream slope of dam can maintain its consistency and economic aspects are also considered for implementation. To achieve this purpose, Geomembranes with different thickness in the respective place, Considered as a model and determine the optimal thickness of the Geomembrane By comparing the results from the analysis of leakage. Then downstream slope dam stability will examine. then with using of SIGMA/W program from GeoStudio software is applied to evaluate Geomembrane behavior in addition crust to old dam and research be done about sufficiency and insufficiency against enter forces that this evaluation is done base on stress- strain analysis.

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Keywords: Geomembrane, Earth dams, Numerical Analysis, Sealing.

1 – Introduction

Geomembrane is made of polymer plastic or rubber membranes that have very low permeability. Polymeric materials which are mainly used in the manufacture of Geomembranes is a thermoplastic polymer. The most important application of Geomembranes, confront with leakage phenomenon or infiltration water or other liquids and gases, toxic and hazardous in their care sites. According to the International Committee Geosynthetic (IGS: Society Geosynthetics International), Geomembrane which are used to in civil engineering are panels, relatively impermeable and the polymer in contact with soil, rock or other geotechnical material. Between the Geomembrane and other Geosynthetic (Geotextile, a Geogrid, etc.), there are important differences. Geomembranes They are designed so that have a low permeability as possible. In other words, the Geomembrane to restrict fluid flow, while other Geosynthetic cause flow of liquid or conduct of it. Geomembrane types include: 1) polymer Geomembrane 2) and Bituminous Geomembrane. Polymeric Geomembranes include thermo plastic (EIA - PVC), the crystalline thermoplastic (VLDPE - LLDPE - HDPE), Thermoplastic Alastvmtrhay (CPE - CSPE). Geomembranes are used in earth dams, the core of earth dams, to increase of dam height, Walls of water and to repair leaking dams.

2 - Sar Cheshmeh Copper Mine Tailings Dam

Sar cheshmeh Copper Mine is located 60 kilometers from city of Rafsanjan. It is used for recovery operations of the copper and water . Therefore, the required water is supplied from the wells, Salt rivers, Return water and in the output in mining, the amount of weakest water flow is 1000 liters per second. that, Firstly it must be maintained and control in place to prevent environmental pollution, And secondly, after separating

the dry material through sedimentation, water returned to the factory and it is used again. The sediment retention dam about 21 km downstream of the mine site In order to collect the weakest water plant was launched and was operating. The primary Sediment retention dam was kind of gravel dams with copper core and have been Height of 70 meters of river bottom. In terms of specifications, such as the dam has a width of 10m in the crest, Geomembrane is used Because of the low width clay core in the primary sediment retention dam (about 3 meters). Consequently, The initial stage of sediment retention dam Consisting of gravel with a clay core height of 70 m, has been changed to The gravel dam with a mixture of clay and Geomembrane sealing system and with a height of 110 meters, And a total of 37,000 square meters of PVC Geomembrane is used.

3- Analysis of the leak in the Sar cheshmeh Copper dam

The GeoStudio software is used to analysis of the Leak in the mentioned dam. GeoStudio software is including geotechnical software Based on Finite Elements. Through its, can be examine analyzes such as the stress - strain, leakage, flow, Slope stability and Dynamic Analysis. This software includes parts SIGMA / W for the analysis of the stress - strain, SEEP / W for the analysis of the flow and Leakage, SLOPE / W for the analysis of the slope stability, QUAKE / W for the dynamic analysis and other application areas. In this section, using the SEEP / W will be analysis of the Leakage in the sar cheshmeh cooper dam. Sar cheshmeh copper dam is shown in Figure 1. Also the geotechnical parameters and leakage barrier material is presented in Table 1.

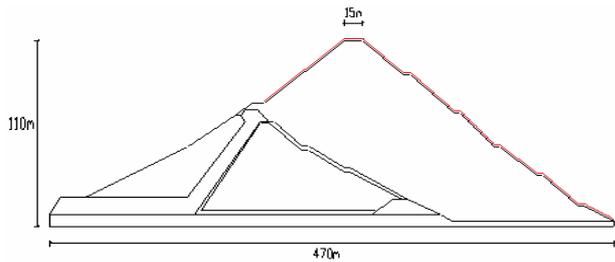


Figure 1 - section of the Sar Cheshmeh Copper dam

Table 1 - Geotechnical parameters and leakage of the barrier materials

Material properties	Specific gravity (KN/m ³)	Drained angle of internal	Cohesion Drained (K.na)	Shear Modulus	Bulk Modulus	horizontal permeability (cm/s)
upstream gravel	20	47	-	80	170	10 ⁻¹
clay core	19	22	20	10	90	10 ⁻⁶
downstream weir	20	47	-	86	115	10 ⁻²
the shell was added	22.5	44	-	86	115	10 ⁻³
Geomembrane	-	-	-	-	-	10 ⁻¹²
The andesite Foundation	22.5	-	-	700	2600	5×10 ⁻⁶

Axial standard test results on Geomembrane cover show antiseptic values like delivery stress 1700 Pa, rapture stress in 3500 Pa tension and rapture strain 10% . For finding useful and optimized width of Geomembrane in dam, it is necessary that Geomembrane with different widths are modeled like Figure 1. With using of SEEP/W program is analyzed leakage of Sar cheshmeh copper mine Tailings Dam. First, said dam section is modeled in SEEP/W program (Figure 2), then Geomembrane with 1, 2, 3 and 4 mm thickness is modeled in add crust location to old dam and in three section of dam, the rate of passing flow rate is calculated from their sections by software. Finally, with notice to passing flow rate and economical aspect of plan, optimize thickness get base on leakage analysis. Water head is shown with red color point on dam body.

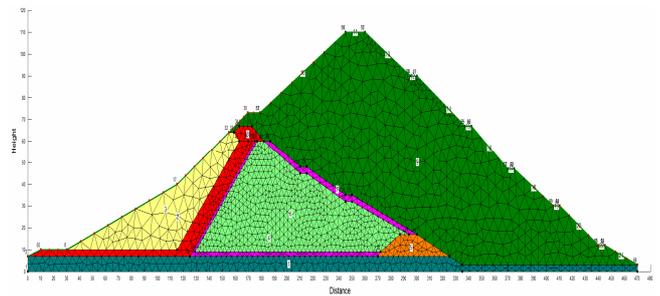


Figure 2- modeling section of Sar cheshmeh copper mine in SEEP/W program

Sections that are considered for passing flow rate calculation are:

1. One section is considered from dam upside to dam substratum.
2. A section that pass from dam center
3. A tangent section to dam body in downside that get final sediment rate from substratum and dam body (total sediment).

Section number 1

This section is shown in Figure 3 that starts from upside part and it continues to dam substratum. This section is chosen with error and exam way that can say about most of passing flow rate in dam body is related to this section.

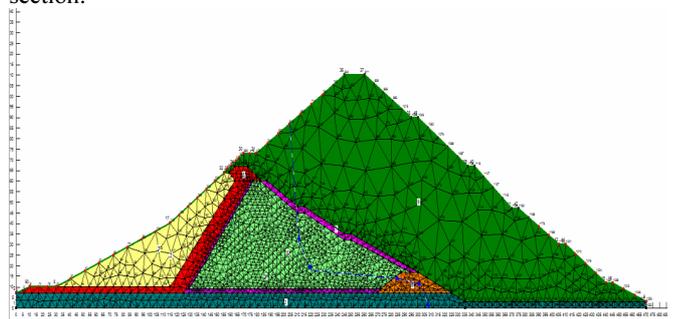


Figure 3- Section Number 1

After choosing section, are done analysis activities. Passing flow rate from section is shown for different states in Table 2.

Table 2- passing flow rate from section number 1 under influence of Geomembrane with different thicknesses

Geomemb rane thickness	1	2	3	4	Without Geomemb rane
Passing flow rate	9.527×10^{-3}	4.26×10^{-3}	1.28×10^{-3}	0.237×10^{-3}	14.903×10^{-3}

With notice to Table 2, reduce percentage of passing flow rate is illustrated in Table 3 for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 1.

Table 3- reduce percentage of passing flow rate for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 1.

Geomembrane thickness (mm)	1	2	3	4
Reduction of passing flow rate in proportion to without Geomembrane (%)	36	72	92	98

With notice to Table 3 can be said that optimize thickness for Geomembrane base on passing flow rate from section number 1 is 3 mm because passing flow rate reduces in proportion without Geomembrane as 92% and so the reduction rate of passing flow rate for thickness less than 3 mm in comparing with without Geomembrane state is less than threshold that it can proper dam stability. About 4 mm thickness however passing flow rate in proportion to without Geomembrane state reduce 98 percentages but with notice to cost of Geomembrane performance, using of 4 mm thickness is not acceptable of economical aspect.

Section number 2

This section is shown in Figure 4 and it passes from dam center.

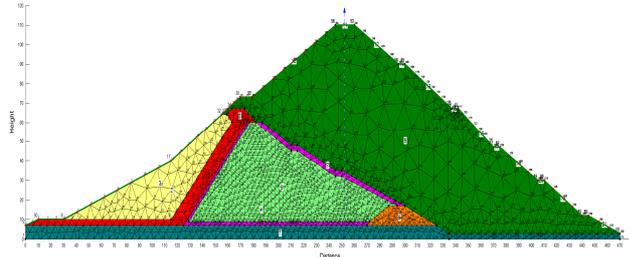


Figure 4- Section Number 2

After choosing section, are done analysis activities. Passing flow rate from section is shown for different states in Table 4.

Table 4- passing flow rate from section number 2 under influence of Geomembrane with different thicknesses

With notice to table 2, reduce percentage of passing flow rate is illustrated in Table 3 for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 2.

Geomemb rane thickness	1	2	3	4	Without Geomemb rane
Passing flow rate (m ³ /s)	11.246×10^{-3}	4.899×10^{-3}	1.3824×10^{-3}	0.2988×10^{-3}	16.6294×10^{-3}

Table 5- reduce percentage of passing flow rate for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 2.

Geomembrane thickness (mm)	1	2	3	4
Reduction of passing flow rate in proportion to without Geomembrane (%)	32.36	70.54	91.68	98.2

With notice to Table 5 can be said that optimize thickness for Geomembrane base on passing flow rate from section number 2 is 3 mm because passing flow rate reduces in proportion without Geomembrane as 91.68% and so the reduction rate of passing flow rate for thickness less than 3 mm in comparing with without Geomembrane state is less than threshold that it can proper dam stability. About 4 mm thickness however passing flow rate in proportion to without Geomembrane state reduce 98.2 percentages but with notice to cost of Geomembrane performance, using of 4 mm thickness is not acceptable of economical aspect.

Section number 3

This section is shown in Figure 5; it is a section that is tangent on dam body in downside that it gives final sediment rate from dam substratum and body (total sediment). For clearing this section should be clicked on all points of dam body fundamental in downside.

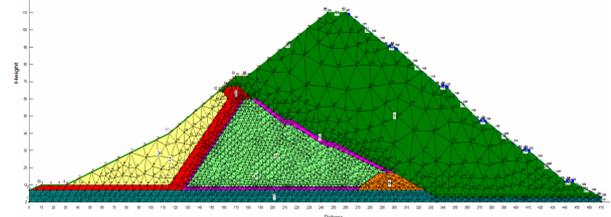


Figure 5- Section Number 3

After choosing section, are done analysis activities. Passing flow rate from section is shown for different states in Table 6.

Table 6- passing flow rate from section number 3 under influence of Geomembrane with different thicknesses

Geomembrane thickness	1	2	3	4	Without Geomembrane
Passing flow rate (m ³ /s)	8.2843 × 10 ⁻³	3.3876 × 10 ⁻³	1.0135 × 10 ⁻³	0.2278 × 10 ⁻³	13.5082 × 10 ⁻³

With notice to table 6, reduce percentage of passing flow rate is illustrated in Table 7 for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 3.

Table 7- reduce percentage of passing flow rate for different thicknesses of Geomembrane in proportion to without Geomembrane state for section number 3.

Geomembrane thickness (mm)	1	2	3	4
Reduction of passing flow rate in proportion to without Geomembrane (%)	38.67	74.92	92.49	98.31

With notice to Table 7 can be said that optimize thickness for Geomembrane base on passing flow rate from section number 3 is 3 mm because passing flow rate reduces in proportion without Geomembrane as 92.49% and so the reduction rate of passing flow rate for thickness less than 3 mm in comparing with without Geomembrane state is less than threshold that it can proper dam stability. About 4 mm thickness however passing flow rate in proportion to without Geomembrane state reduce 98.31 percentages but with notice to cost of Geomembrane performance, using of 4 mm thickness is not acceptable of economical aspect.

With notice to results of three sections, can be said base on leakage analysis that for using Geomembrane as add crust cover to old dam is considered 3 mm thickness. After selecting a thickness of 3mm for Geomembranes used in the shell was added to the old dam, check dam downstream slope stability are addressed in two modes. One case is when do not use the Geomembrane and the latter is when the Geomembrane thickness 3mm to be used. To check the stability of the dam downstream slope from SLOPE / W section, GeoStudio software is used. For this purpose, the stable flow is considered. In Figure 7 slip surfaces in the downstream of the dam when is not used the Geomembrane is displayed. And In Figure 8 slip surfaces in the downstream of the dam

when the Geomembrane thickness 3mm to be used is displayed.

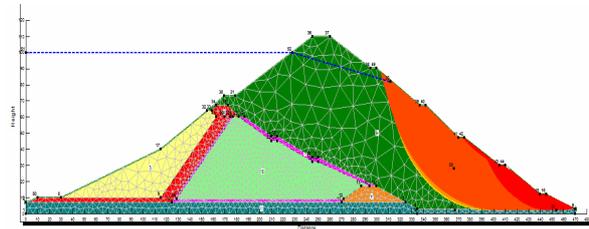


Figure 7 - The slip surfaces related to Without the Geomembrane

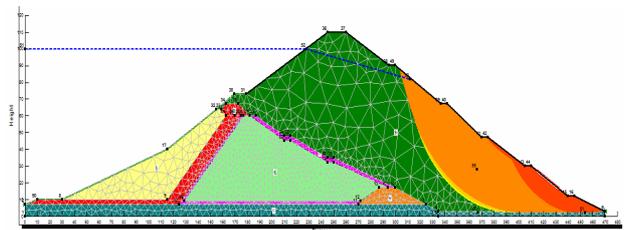


Figure 8 - the Slip surfaces associated with the use of Geomembranes with a thickness of 3mm

It should be noted that the red color shown in Figures 3 and 4, Shows the critical mode of the slip. And farther away from the red, we can reduce the risk of slip. Obtained Coefficient of confidence is obtained in the case without the Geomembrane by 0.68 and in the 3mm thickness of the Geomembrane by the 1.604. That means when is not used the Geomembrane, the lower dam would be unstable, when the Geomembrane thickness 3mm to be used, stability of the Dam will provide.

Stress – strain Analysis with the SIGMA/W program

Modeling section of dam in SIGMA/W program is shown in Figure 9.

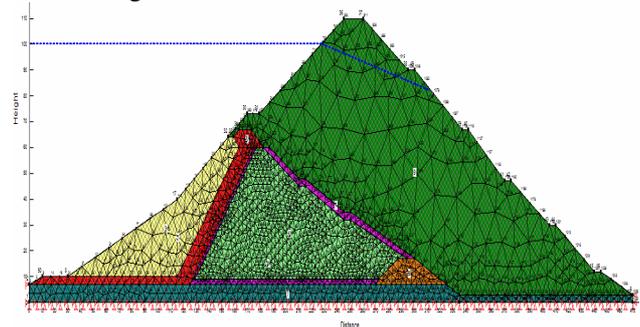


Figure 9 - cross of the modeling at the Dam Copper in the SIGMA/W program

Results of SIGMA/W program is shown in figure 10-16 as graphical.

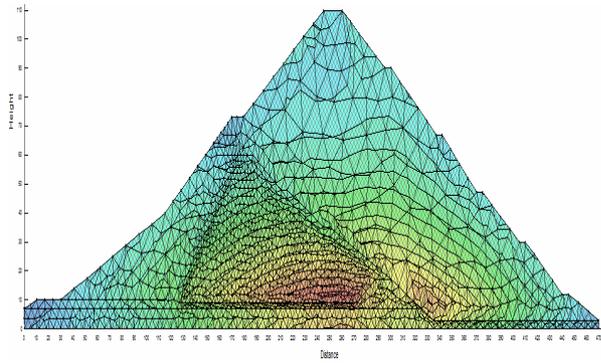


Fig 10- meter of horizontal total stress

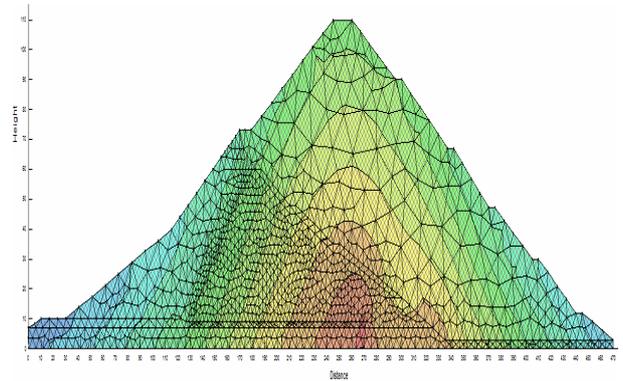


Fig 13 - meter of vertical effective stress

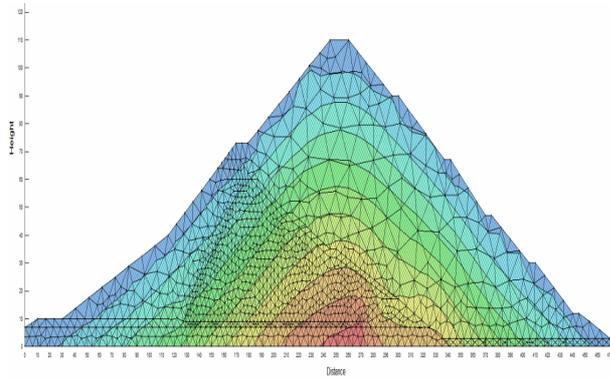


Fig 11 - meter of vertical total stress

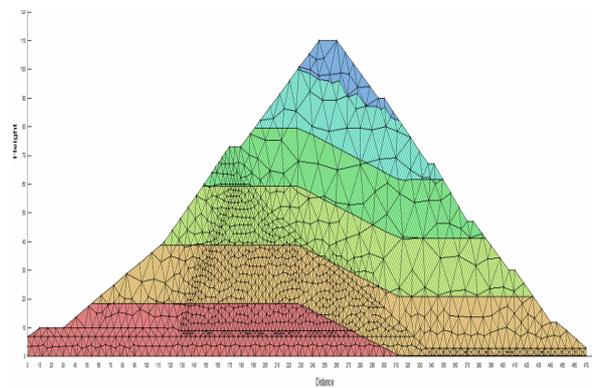


Fig 14 - meter of Pressure of hole water

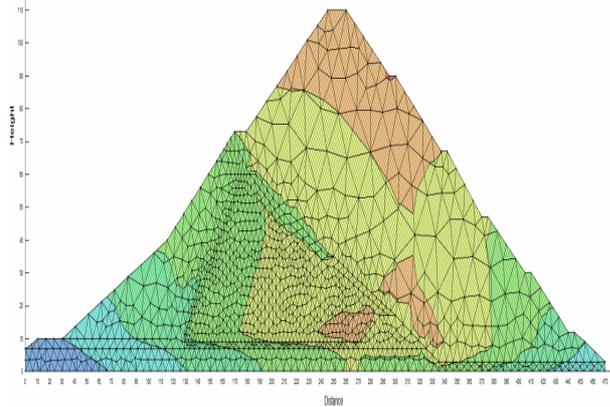


Fig 12 - meter of horizontal effective stress

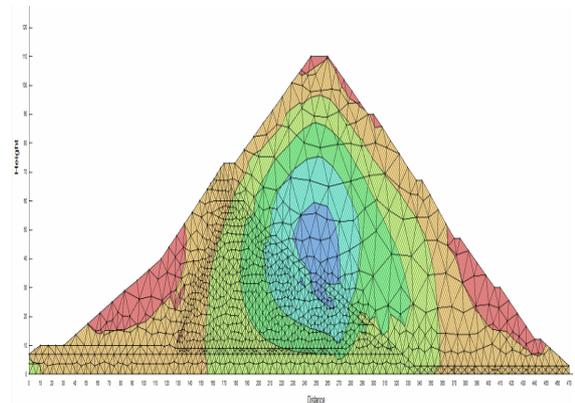


Fig 15 - meter of horizontal strain

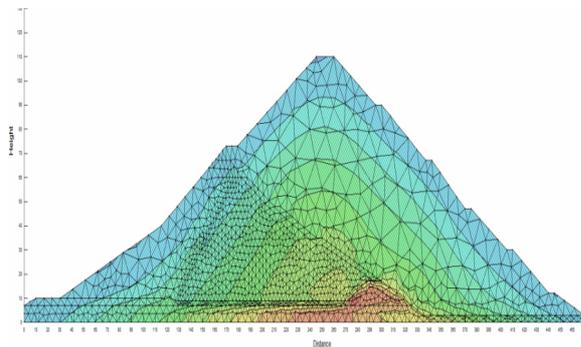


Fig 16 - meter of vertical strain

Conclusion

Impermeable Geomembrane used as cover in the dams is a new method. Similar dams used in the lower elevations of the dam with height Copper is very limited. Similar application of that in dams with lower height than Sar cheshmeh Copper dam, With increase of the height is very limited. In the Sar cheshmeh Copper dam due to dam construction, its sealing to prevent destructive leakage is of considerable importance. Because of the low width of the clay core in the old dam to increase the height of the dam must be used Geomembrane for the sealing barrier. Due to the high cost of the Geomembrane implementing, Geomembrane thickness used will impact significantly on project costs. So, the Geomembrane must be used with required minimal thickness. We can say optimized for Geomembranes used in shell thickness was added to the old dam, is 3mm. Obtained Coefficient of confidence is obtained in the case without the Geomembrane by 0.68 and in the 3mm thickness of the Geomembrane by the 1.604 That means when is not used the Geomembrane, the lower dam would be unstable, when the Geomembrane thickness 3mm to be used, stability of the Dam will provide. With notice to figures 10-16 have seen that regions that are used Geomembrane cover in their surface are illustrated stress in acceptable range dominantly blue and green. In figure 7 that is meter of hole water pressure, have been seen that in upside of dam from base floor to approximately height 18 m from upside base, hole water pressure have maximum value. Best way for decreasing water leakage in this area will be use of Geomembrane to decrease until range rate that is happen maximum hole water pressure. With notice to tension meter, maximum of produce tension is 938.299 Pa and is tensional in a range that is used Geomembrane And with notice to tension rate and rupture tension in tensional for using Geomembrane is 1700 Pa and 3500 Pa respectively. So using Geomembrane against enter tension show enough resistance. Also maximum rate of produce strain in Geomembrane is 3.26% and with notice to Geomembrane rupture strain is 10%, so produce strains in geomembrain is located in acceptable range too.

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5/5/2011

Characteristics Adult and children education¹Mehran Bozorgmanesh and ²Mojtaba Sadighi^{1,2} Damavand Branch, Islamic Azad University, Damavand, Iran*Corresponding author: mehran11070@yahoo.com

Abstract: adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation.

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Keywords: adult education, children education

Introduction:

Much like strategies to curb epidemic, strategies to reduce illiteracy and raise the educational attainment of Kentucky's population must include both short-term efforts to face the immediate crises as well as long-term strategies to get at the underlying causes. Short-term crises include the imperative to keep helping welfare clients make the transition from welfare to work within the constraints of federal and state mandates and the need to train workers for immediate employer demands. Long-term prevention must address the underlying, persistent problems of the state's economic structure as well as the low awareness--if not appreciation--among segments of the population of the vital connection among education, employment, and improved standards of living. Adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge.

Concept of adult education:

Several definitions of adult education has been done Community

- Adult Education is a in the following examples are given of them. conscious effort by public institutions or voluntary organizations to promote community awareness comes action.
- adult education teaching is typically specific age group above the legal age} limits as formal and informal, voluntary and at different levels of time, place

- Adult Education is a process in which people who} and education is presented. somehow been cut course they consciously
- to change or advance their skills in information and do organized activities.
- Adult education includes all formal and informal training and volunteer after} school, which by experienced educators and aware of the system.

Educational materials on adult education with daily life, needs, goals, aspirations and past experiences of adults and their relationship helps to results learned in life and career are used.

Adult characteristics:

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

Operating speed:

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

Consciousness:

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak inhibitors of natural forces (mostly visual and auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability (which varies with the speed of learning) is not relevant.

Health:

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

Background of knowledge - skills and beliefs of adults:

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

Issues Beyond the Department of Adult Education and Literacy

Beyond the issues relating directly to DAEL(Department of Adult Education and Literacy), the task force heard a number of concerns about the Commonwealth's overall approach to adult literacy.

- Lack of coherent statewide leadership and coordination among multiple complementary initiatives aimed at the same problem.
- Lack of continuity in state leadership. Cited in particular was the difficulty sustaining a high level commitment to the issue long enough to make a difference because of changes in priorities of the state's political leaders. A high level of turnover in the leadership of the Department of Adult Education and Literacy has also contributed to the instability.
- Tendency to think of adult education as a separate categorical program rather than a strategy that cuts across the mission and responsibility of multiple Commonwealth programs and initiatives (e.g., early childhood education, welfare reform, economic development, and corrections).

Comparison of adult education in various countries:

in developed countries, adult education is a form of informal education for people above 24 years is presented. In fact, a means of expanding knowledge, skills and abilities of adults. In these countries, adult education helps adults to variable conditions of political, social, economic and cultural adjustment, and pay to fix their shortcomings.

In developing countries and backward because the problems in primary education, lack of resources and facilities, poverty, social existence, economic and cultural concept of adult education is different. In such countries the concept of adult education, literacy education is.

Concept of adult education in revolutionary countries, is a combination of these two concepts. Changes in these countries due to social, political and cultural revolution, resulting from, literacy and continuing education necessary to find because of the revolution, there is cultural poverty on the other hand the implementation of development plans and the need for skilled personnel are expert. General adult education system based on economic conditions - social and cultural community is different and each specific goals will follow. General objectives of adult education and literacy in two categories is divided into professional education.

Characteristics of adult education:**flexibility in time:**

In the past, usually one of the obstacles in the way of learning and development of adult education was being inflexible and time courses were programs. But now most countries have to consider that the speed limit of time and learning ability and facilities must be adults. Flexibility in time means that not only should the time classes and programs for adults is appropriate, but necessary facilities should be provided for independent study.

Flexibility in the location:

One of the aspects of flexible space is that individuals can, regardless of their residence to the study and advancing their knowledge and skills pay. For example, adults in remote villages should like people who live in the city use of educational programs. After flexibility in other places is that the issue of specificity of location is not considered primarily educational.

Flexibility in age:

Educational opportunities for certain age should not use it for all regardless of their age, is possible. In fact, educational programs must use people of different ages to prepare.

Flexibility in admission:

No adult should not only be deprived of education because of the necessary conditions for admission in the class does. Of course this is not such a person without academic records to participate in university classes is accepted, Adoption order is that the adults in educational programs at different levels, according to the possibility of using the opportunity that is provided must be based on the experience and knowledge and their knowledge is.

To combine education and job responsibilities:

Adults should be able to work during that time engaged in training classes take them. In other words, their presence in the class should be considered part of their work. This means that low-literate or illiterate

working people who are allowed to work an hour of your daily spending surpassed participation in educational programs.

Conclusion:

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and codification are included out of class activities, dialogue, role playing, etc.

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning

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The role of Distance education in improving adult education

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Abstract: Distance learning is one of the fastest-growing components of higher education. Almost 3.5 million students were enrolled in at least one distance learning course in the fall of 2006 and online enrollments are increasing every year. The convenience of taking classes at any time from any location appeals to today's adult learner, especially those who work, have families or live in rural areas. Today a growing number of paralegal and legal secretarial programs have a distance learning component (no law schools currently grant credit for distance learning studies). However, not all distance learning programs are of equal quality. Moreover, the increasing popularity of distance learning programs have led to "diploma mills" or "accreditation mills" that offer bogus degrees and certificates. Choosing a distance learning program requires careful research and evaluation. Below are several important factors to consider in choosing a distance learning program. In evaluating distance learning paralegal programs, determine if the school is accredited by one of the regional accrediting bodies and by the American Bar Association (ABA). ABA-approval signifies that the school has met certain standards in terms of academics, facilities and instruction. Graduating from an ABA-approved school may give you an advantage in the legal job market.

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Introduction:

Adults learn best when learning is focused on them, not the teacher. This is called andragogy, the process of helping adults learn.

Malcolm Knowles, a pioneer in the study of adult learning, observed that adults learn best when:

1. They understand why something is important to know or do.
2. They have the freedom to learn in their own way.
3. Learning is experiential
4. The time is right for them to learn.
5. The process is positive and encouraging.

Teaching adults can be very challenging, but also very rewarding. Most teachers would agree that the benefits derived from a successful adult education program in agriculture far outweigh the costs. In addition to the direct benefits to adult participants, the teacher, the school, the community, and the secondary program also benefit from a quality adult education program in agriculture.

Adults in agriculture use a number of sources to gain new information that can be used to help them solve problems. Persons employed in agriculture utilize newspapers, magazines, newsletters, radio, television, government publications, internet, and meetings to gather information which can be directly utilized in their business activities. In many communities, the agriculture teacher is the primary source of agricultural information.

Successful adult education programs develop and utilize an Agricultural Education Program Advisory Committee to assess the informational needs of adults in the community. Agriculture teachers should utilize the expertise and communications link, which an effective advisory committee provides. Specifically, the advisory committee should be asked to provide advice regarding planning, conducting, and evaluating the adult education program in agriculture. Adult education programs in agriculture should emphasize practical application of the information presented. Topics and information included in adult programs should be provided which fulfill needs of the local community. Providing information which cannot be applied to solve a local problem or address a local issue will generally be viewed as frivolous and over time will result in decreased interest (i.e. participation) in the adult education program.

The role of the agriculture teacher should be as a facilitator of the learning process. Most adults reject the traditional teacher-student relationship, which is necessary to maintain in secondary programs. Teachers should be encouraged to view themselves as partners with adult participants in the learning process. The democratic philosophy of shared responsibility for planning, conducting, and evaluating adult education programs distinguishes adult education from secondary education.

A local plan for adult education in agriculture should consist of two major components. Namely, a broad statement of philosophy, goals, and objectives of the

local adult education program, and an annual calendar of program activities.

Adult education in agriculture is important for continued community prosperity, growth, and improvement.

The local Agricultural Education program has a responsibility to provide up-to-date information, training, and retraining for all adults interested in agriculture.

The goals of the Adult Education Program are:

1. To assist adults in establishing personal and business goals.
2. To enhance the self-confidence and decision making skills of adults in agriculture.
3. To develop agricultural leaders.
4. To maintain the local agricultural knowledge and technology base.
5. To improve the home, living, and business conditions of persons employed in agriculture.
6. To encourage adults to participate in cooperative efforts.

The objectives for the local Adult Education program are:

1. To increase the net farm income of local agricultural producers.
2. To improve the safety practices of adults employed in agriculture in the local community.
3. To educate the public about the significant role in agriculture in the local economy.
4. To encourage the use of practices that protect and conserve natural resources to maintain a good environment for everyone.
5. To assist local producers in the development of marketing plans that are tailored to their individual needs.
6. To assist local producers in developing strategies to make optimum use of agricultural support agencies (e.g. FSA, MO Department of Agriculture).

A comprehensive program of adult education in agriculture includes three major components: (a) organized instructional classes for adults, (b) a Young Farmers/Young Farm Wives Chapter, and (c) Farm Business Management Analysis (FBMA). State Agricultural Education Program standards implemented in 1992 indicate that a minimum of 20 clock hours of organized adult education classes be provided. Many local agriculture programs will far exceed this minimum standard. Salary reimbursement Procedures for "Full Time" and Short Term adult programs are.

Getting a college education can be difficult for people with inflammatory bowel disease (IBD). Frequent trips to the restroom, exhaustion, doctor

visits, and medication side effects are all barriers to the traditional college experience. What if you could get the degree without ever setting foot on a campus? You can do just that through distance or virtual learning. Distance learning has been around for a long time (we've all seen the commercials on TV). While there is still prejudice surrounding some distance learning, it is increasingly being accepted as an alternative to traditional classroom learning. Courses can be offered via the Internet, where students are able to interact with instructors and other students without physically being in the same room. Before considering if distance learning is a viable option for you, there are several questions you should ask yourself:

- What course of study would you pursue?
- Are you interested in pursuing a degree? Brushing up on existing skills?
- Would your course of study require some traditional classroom time (such as laboratory or field work)?
- After obtaining a degree, would you be able to obtain employment that allows for your illness (such as telecommuting or flexible hours)?

Distance Education:

Distance education is any type of schooling that takes place away from a physical campus. Distance education is also known as:

- distance learning
- virtual learning
- online learning
- e-learning
- online education
- web-based training

Types of Distance Education Programs:

There are two types of programs offered by distance education schools: synchronous learning programs and asynchronous learning programs. With synchronous learning, distance education students must log on to the school's website at a set time. Often, they interact with their peers and professors via group chats, web seminars, video conferencing, and phone call-ins. With asynchronous learning, distance education students complete all coursework on their own time. They often learn via assignment sheets, message boards, email, pre-recorded video lectures, mp3s, and traditional mail correspondence. Many students find that distance education courses give them the freedom to complete a degree while meeting their personal and professional obligations. Motivated learners are often able to complete distance education degrees in a fraction of the time often required. Distance education courses also allow students to network with participants from all over

the nation. On the downside, distance education courses do not offer the face-to-face interaction found in traditional classrooms. Some students find that they struggle to stay motivated and meet deadlines due to the independent nature of distance education courses.

When searching for a distance education program, the most important factor to consider is accreditation. Make sure the distance education school you choose is recognized by a regional accreditor or the Distance Education Training Council.

Choosing a Distance Learning Program:

Distance learning is one of the fastest-growing components of higher education. Almost 3.5 million students were enrolled in at least one distance learning course in the fall of 2006 and online enrollments are increasing every year. The convenience of taking classes at any time from any location appeals to today's adult learner, especially those who work, have families or live in rural areas.

Today a growing number of paralegal and legal secretarial programs have a distance learning component (no law schools currently grant credit for distance learning studies). However, not all distance learning programs are of equal quality. Moreover, the increasing popularity of distance learning programs have led to "diploma mills" or "accreditation mills" that offer bogus degrees and certificates. Choosing a distance learning program requires careful research and evaluation. Below are several important factors to consider in choosing a distance learning program.

1- Accreditation. Accreditation is a means of ensuring the quality and effectiveness of higher education institutions and programs in the United States. Eight regional accrediting agencies accredit most of the colleges and universities in the United States. A host of national and professional accrediting organizations also exist, including the Distance Education and Training Council (DETC), an organization that identifies and accredits distance learning programs. These twelve questions outlined by the Council for Higher Education Accreditation are helpful in examining a distance learning program's claims of accreditation.

In evaluating distance learning paralegal programs, determine if the school is accredited by one of the regional accrediting bodies and by the American Bar Association (ABA). ABA-approval signifies that the school has met certain standards in terms of academics, facilities and instruction. Graduating from an ABA-approved school may give you an advantage in the legal job market.

2- Reputation. The reputation of the distance learning program you attend may hinder or enhance your post-graduate employment prospects. In evaluating the

reputation of a distance learning program, you should not solely rely on the school's website or marketing materials. Other ways to investigate the reputation of a distance learning program include:

- Visiting the school.
- Talking to alumni (contact the career services department for alumni names and contact information).
- Researching the distance learning program's record with the Better Business Bureau.
- Talking to paralegals, attorneys and legal employers about the reputation of the school you are considering.
- Researching the school in print publications, news articles and on the Internet.

3- Academic Offerings. When evaluating distance learning programs, it is also important to consider the program's academic offerings. A quality distance learning program offers a comprehensive curriculum with a variety of options, electives and advanced coursework. Talk to professors or an academic dean regarding the content and delivery of courses. The American Association for Paralegal Education (AAfPE) recommends that paralegal instructional content include courses in legal research and writing, litigation, ethics, contracts, business organizations and torts. In addition, courses should develop students' critical thinking, communication, computational, computer and organizational skills, and competency to handle ethical issues, according to the AAfPE.

Legal programs should also offer an experiential learning component such as an internship, practicum, pro bono work or clinical experience. These are great resume-building opportunities and allow you to learn practical skills and gain real-world experience.

4- Instructional Technologies. Distance learning courses can be delivered in a variety of ways through a growing array of technological tools including audio tapes, CD or DVD ROM's, e-mail, telephone conferences and web-based delivery systems. Questions to ask include whether the program employs a mix of instructional technology? Is hands-on training and support provided? Can students preview courses online and try out the technologies before enrolling?

5- Teaching Staff. The faculty is the backbone of any distance learning program. Are the courses taught by professors or are the courses pre-taped correspondence instruction? If the courses are taught by instructors, what is the background and qualifications of the teaching staff? Are classes taught by paralegals, attorneys or a mix of both?

6- Career Services. Another important consideration in any distance learning program is the extent and quality of its career services program. Research indicates that the greater the resources offered by the career services department, the greater the program's job placement success. You might inquire as to what percentage of graduates find related employment following graduation and whether the career center offers personalized career counseling, job placement assistance, job search seminars, online job boards or resume assistance.

Conclusion:

To improve the quality of life, learning materials should reinforce the skills they acquired previous. This material should have access to information and provide new technology. should also have to make learning more fun. Additional materials should provide opportunities for literacy skills to read and to strengthen their cognitive awareness.

Track materials (continued) which increased literacy skills and knowledge gained is also effective in enriching learning environment for learners are important. Participatory materials to ensure the participation of learners in the learning process and codification are included out of class activities, dialogue, role playing, etc. In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them. Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered. Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

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To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These

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Rural women empowerment and rural development

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Abstract: in the rural community of Iran, there are gaps between the ruling class (capital owners) and villagers, between literate and illiterate, and between men and women. Especially in villages women have fewer possibilities in terms of investment and less power and credit. Role of rural women, over of men, is more influenced with different economic, social, cultural and ecologic factors. Rural women are considered as a noticeable potential in the community either directly (crops production, livestock, handicrafts, cottage industries) or indirectly by helping the agricultural sector (as labor). About 5.6 million women are involved in agricultural production, and activities related to planting... harvesting, preparation of animal food, and taking care of livestock and poultry and some certain activities related to trading and marketing are all different fields of rural women's role and participation. Based on current statistics, women in rural area participate about 50% in conversion industries, 22% in producing crops and livestock, 75% in handicrafts and in areas related to planting...harvesting, respectively, 25, 24 and 4.26. And also in activities related to livestock, they handle 23% of livestock grazing, 42% of animal care and 100 percent of total poultry in the village. Therefore their role in achieving food security is undeniable. But, like most developing countries, this crucial role in society and in process of rural development, is not obvious. In Iranian rural community, about 80% of women work, but they are mostly considered as housewives, unpaid employment, domestic workers, family workers, or independent employers. The statistics often do not take into account seasonal, part-time, unpaid employment, and housekeeping activities. In economics and social sciences, those of women's activities that have emerged out of house and affected national economy, are the ones to be noticed. In most research and statistics men are known as the heads of household and they are also the owners of lands and fields. That only 1% of the rural lands are belonging to women does confirm such matter.

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Introduction:

For an active participation of women in development, first we need to give a definition for their role in development and then barriers related to their role will be discussed. Although apparently there is no difference of gender in development programs but reality is that women are less considered in participatory programs and most of these plans are planned for men. Finally, planner's optimistic look toward women's participation will be greatly helpful improve rural family budget and will increase the difference between urban and rural families. If, by credit, loans and other financial facilities, rural families are able to build up their own business and make a living through the income and become financially self-reliance or independent, no doubt we will witness some social, economic and cultural changes in villages (Varzgar and Azizi, 2001).

participation is to guide people caught by disability, to help them realize their potentials and to empower them to make the best use of life.

According to preceding definition of participation, and the ability of participation to turn potential into imminence power, women should participate more

actively in economic affairs. Statistics regarding women and girls' activities, especially in rural areas, are always presented much lower than the real numbers (Ghaffari, 2000).

Village with the word "woman" removed will lose its literally in production and economic activities, their everyday activities in different fields all are evidence of woman being required in rural production. Rural girls and women are responsible for a variety of roles and duties including wife, mother, producing crops, livestock and agricultural activities, making and marketing handicrafts which are common in each area, and food preparation.

Daily activities of girls and women in different fields all are evidence of woman being required in rural production sector. Women are the major potential for developing the rural economy which leads to further growth of rural production. Increasing awareness towards the role of this class in production and towards necessity of their broader participation in economical and social development, have forced the countries to consider and support their activities while making new rural, Local and national policies (Rahmani Andalibi, 2001).

Being aware of women and girls' important role in rural activities, many countries have established institutes and organizations to advance women's progress. These organizations try to remove legal barriers that prevent women to participate in development activities as much as men. And finally improve their social, political and economic status in society. With continues evaluation and analysis of current development plans, we can provide especial conditions to ease women's access to production recourses and social services, and considering women's social situation in every society, we can provide the opportunity for them to increase their participation, share income like men, and take part in decision-making (FAO, 1998).

If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live with out dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Criteria of empowering women:

Enabling as a theory of policy making for women, in it present five criteria:

Welfare, access, Concientisation, participation and control.

1- welfare criteria :

In this criteria, men and women as human resources of development should enjoy of desirable welfare conditions and equality (Paknazar, 2000).

Most of timing developmental programs, have worked on base of women's welfare. They have considered and provided some services for women who were passive recipient of these services. But

these services were limited to physical needs and mostly were considered to revive their role of productivity, again. sometimes, it has been said that this approach has begun at colonial era and has considered women from poor country and intended services for them that dose not exceed from that poverty level . Agricultural and industrial projects were designed for men and social programs for women and children. Most of welfare programs were inadequate or its success was limited. Considerable point in this criteria is that men and women as human resources of development should enjoy equality and desirable welfare conditions. At this stage, women's material welfare and their enjoyment of welfare programs, compared to men (nutrition, death rate and ...) were considered. And women's role as producer to supply their own needs isn't very important.

2- access criteria :

Lack of access or limited access for women to sources including (fields, job, capital and training) cause that their functions at production is less than men (Paknazar 2000). Access to facilities, sources, designed program and projects for women and access to schools and ... are in this part. Just whenever most of other legal, cultural and social issues being solved, men and women would equally access to sources and facilities. Concept of enabling at this stage is that women have equal right to access to sources at family and greater society.

3- Concientisation criteria

Women should know that their problems aren't due to their individual inefficiency and shortage but it has emerged by social system in which discriminations has become formal and acceptable issue. (Araghzadeh, 2002). This stage is more critical and important than other stages. Because women can participate at development activities not just be passive users. Women have real equality at development, just when be aware. Concientisation will help to increase women's ability to equality at participation at society. At this stage, women face with critical analysis with society and will find that what has been considered natural and unchangeable reality, is changeable. (Bakhshoodeh, 2005).

4- Participation criteria

One the most important items that this criteria has considered , is men and women's equal participation at decision making process of affairs of family at society (Paknazar 2000) . Men and women both should participate at process of assessment needs, designing, performing and evaluation of projects and development programs (UNICEF, 1998). In summary, this criterion means women's participation at all stages of surveying needs, detecting problems, planning, management, performing and valuation.

5- Control criteria

This criterion emphasize on this point that in addition to equal access of men and women to development sources, they must have adequate control on these sources that this issue is balance criterion, between men and women so that no one exceed other one (Paknazar 2000). Women should have opportunities for decision making at workplace and home. If woman is producer, should be shared with part of her interest and wage. Women like men, should be able to choose her individual and social field and able to make decision and also development activities should be facilitator of these processes.

FAO (food and agricultural organization) addresses these three purposes as strategic goals while enabling women:

- 1- equality between men and women to access production sources
- 2- women's participation at policy and decision making
- 3- decreasing rural women's workload and increasing job opportunity and income for them (Paknazar 2000)

within theoretical framework of enabling women, having control on sources is presented as highest stage at women's participation process on development, but existing data at most developing countries, indicates that not only rural women haven't any control on financial resources of family but even they were deprived to access to sources and credits, specially through formal credits system (Shaditalab, 2002).

The question that arises here is that what relation is there between enabling women and micro-credits programs? Nowadays, micro-credits are considered as effective mechanism to eradicate poverty for women. Interests of micro-credits further increasing women's income, include:

- improving women's role in family
- Increasing women's confidence, not only through obtain financial success through business activity, but through increasing women's access to social services and communication with other women.
- Changing at social level (social class) at perspective of women's role.

Discussion:

Some barriers to women's participation which can be categorized in 3 groups of personal, familial, and social include: law literacy level, large volume of work both inside and outside of home for many reasons including seasonal migration of men and the great diversity of rural women's activities (nursing, housekeeping, agriculture, handicrafts, livestock,...), malnutrition, law health indicator, Patriarchal structure of society, father or husbands disagreement with a

woman's participation in social and economic activities for various reasons like cultural reasons or unwilling to lose the labor force at home, negative attitudes towards women's abilities, gender discrimination, family's poverty, superstitious beliefs, misleading customs like fatalism, law access of women to credit and facilities, inaccessibility of extension services, men-orientated social activities and participation plans, deficiency of professionals needed to educate rural women, problems of access to health services and social facilities, low income of rural women compared with men, lack of non-governmental organizations dealing with rural women's problems, few women managers in rural area. (Rahimi, 2001)

Nowadays, micro-credit and micro-financing have changed people's lives; it has brought back life to poorest and richest communities of the world. So we can easily observe a great increase in people's access to general financial services. Facilitating the access of families to financial services, they begin to invest on educational expenses, healthcare, healthy nourishment, trading, and housing based on their priorities. Overall in many countries financial plans mostly focus on women. Women, provided with financial facilities, will receive a loan, guarantee to pay it back, keep their saving account and also they'll have insurance coverage. Micro-financial plans have an important message for families and communities. Many studies have proven that women's access to mentioned facilities may improve their conditions in family and society; it also helps them feel more self-confident and makes them aware of their own abilities. Thus providing micro-credit services for the poor in society is a powerful tool to reduce poverty and so that they are able to create assets, earn more money and become less vulnerable against the economic pressure. Of about 1.3 billion poor in the world there are 900 million poor women, this obviously shows that poverty has a feminine face. According to UN's development fund, 10% of world's income and less than 10% of world's assets belongs to women. While a majority of them never possess the capital needed for their activities, women still play an important role in the economic development of country. Therefore women draw the micro-credit policy maker's attention more than others. Choosing women as the main target of micro-credit plans is an effective strategy to eradicate poverty; because their income will upgrade the family welfare; furthermore earning money improves their social status. In some countries this choice is influenced by society's attitude and culture (Araghzadeh, 2002).

For instance founder of Grumman Bank of Bangladesh, Mohammad Yunes, has stated that: "women have plans for themselves, their children, and

their family life; they always have an overlook while men just look for fun” to explain why 94% of their clients are women.

Women’s access to micro-credits have shown that their income benefit to improve their family and provide livelihood. In addition to all these another reason of women being the target of micro-credit plans is that women have higher loan recovery rates. Totally, expanding women’s access to micro-credits may lead to many useful results which in economy is mentioned as “virtuous spiral”; because their access to micro-credits results in family welfare and in a broader point it’ll improve community’s welfare and shall be increased welfare this process is repeated.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive effects on their demand about health care. Fiona Steele and et al (2008) in researches that conducted as called “ influences of credits programs on empowering women at Bangladesh , found that women who joined to credits programs , have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash .

Shahnaj and Chaudhury(2009) in research as “credits and its role on empowering women “ concluded that there is meaningful relation between attending in credits programs and empowering women , at economical dimensions .

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

A study conducted by Chabokru et al (1384) shows the crucial importance of micro-credits for farmers who do not possess physical financial assets (land, building, livestock, well...) and work in agricultural sector because of environmental conditions (such as living in a village) or because it’s their ancestral occupation.

So today, women’s participation in sustainable economic, social, and cultural development in rural areas is not optional but an essential matter. Those communities that have not seriously considered the necessity of participation faced failures and delayed community’s development, welfare and security process. In any community, village, or social group, broad participation of every women in decision-making and any other matter related to national or local development programs, is a key variable in social sciences and in the last few decades, it has interested many scholars of socio-economic and especially cultural issues, and is considered as one of the most fundamental democratic rights of women in a society. As we know in a popular participation, all people are given the opportunity to participate in planning and decision making for their society and for their own future. When in practice women feel that they can be involved in

planning, policy making and deciding or solving problems in the society certainly they’ll feel more solidarity and become more interested in social, economic, and cultural development programs.

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Rural women participation and Employment in iran

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Abstract: Among developing countries, millions of women always are in farms and lands, work in engaged industries, keep the cattle, store firewood and water and earn livelihood and participation in economic activities is one of their important characteristics. But Despite their widespread presence in economic activities and benefits associated with it, they always face with discrimination. The discrimination has never tired them, but as a major force in economic activities is discussed around the world. In Semi-desert areas in Africa, women traditionally are active in keeping poultry and Vegetarian animals and wild plants and trees fruit collected. In Turkey, women are employed to produce vegetables and dairy products. Among Indians, agricultural activities of women include the region around the home and caring small animal, garden products and collective activities such as spinning, weaving, wool weaving, and the cheese production. In China, when the job opportunity outside the farm is not available, the men are trying to produce crops and women are keeping livestock, doing crafts and spending to food products. In that case, women are responsible for all the agricultural tasks and do some activities such as the poultry production.

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1- Introduction:

In recent years, the point was well clear that a major share of the income of rural households are obtained through the women activity, and sometimes even share of women income in the household economy is more than the share of men. For example, in 2000, about 854 million women that include 32 percent of the workforce of the world are active economically and their major activity in third world countries are in the agriculture sector and 60 percent of cultivated rice, 90 percent produce vegetables and, 50 percent cotton and oilseeds, 30 percent had affairs and gardens, 90 percent silkworm related activities and 65 percent of rearing livestock-related activities and handicrafts have the highest proportion (Emadi, 2001). This shows that the role of women as agricultural work force, not only isn't less than men but they have greater share in the process of planting, cropping, and more importantly in the sale of crops and livestock and a research specialized that 50 percent of food global production activities were owed to women (souri, 2002).

In recent years, the point was well clear that a major share of the income of rural households are obtained through the women activity, and sometimes even share of women income in the household economy is more than the share of men. For example, in 2000, about 854 million women that include 32 percent of the workforce of the world are active economically and their major activity in third world countries are in the agriculture sector and 60 percent of cultivated

rice, 90 percent produce vegetables and, 50 percent cotton and oilseeds, 30 percent had affairs and gardens, 90 percent silkworm related activities and 65 percent of rearing livestock-related activities and handicrafts have the highest proportion (Emadi, 2001). This shows that the role of women as agricultural work force, not only isn't less than men but they have greater share in the process of planting, cropping, and more importantly in the sale of crops and livestock and a research specialized that 50 percent of food global production activities were owed to women (souri, 2002).

Aside from the economic role of women that clearly has been made in the past decades, the vital role of women in social and cultural dimensions of development process in rural areas has remained hidden from the polls. They train the next generation of farmers and teach them the next generation necessary knowledge. A Chinese proverb says, "If training a man, just training a man but if you teach a woman you teach a family." Women are local knowledge and local educators themselves, in preparing and providing food, health treatments and cultural values are the next generation (Fami, 2003).

2 - Factors associated with employment of rural women:

Women's share of the total lot of manpower required in the agricultural sector worldwide, and Iran form. Facts and figures and statistics in relation to women in productive activities are offered much less than

real, because the statistics many times, often including seasonal employment, part time and unpaid, and housekeeping activities Women are not considered (lahsaeizadeh, 2001). Perhaps the most fundamental problems brought on participation rate of women in rural agricultural economy; this is a topic that participation and employment of women more than men, influenced by economic conditions and various factors - social, cultural and ecological is. As a result of how women's employment in different areas or within a country is different. Here are some important factors are mentioned:

2-1 - Structure of agricultural and social classes:

Women as the first group are known to have paid agricultural work, and evidence shows that women farmers have been the first. Important factor causing women's participation in agricultural activities has been, among them we can mention the following (Fami, 2003):

A - Seasonal agricultural employment, and intensified the need for labor in certain seasons.

B - Men migrate to find better jobs and to assume responsibility for home and farm and agricultural work and its management by women:

In some countries men migrate to cities, or on bringing those to wage jobs have led to women's responsibility for 30 to 40 percent of agricultural plants and are responsible, in some areas this figure reaches 70 percent (lahsaeizadeh, 2001).

C - Effect of cultural - social conditions on women work:

Sociological experience shows that kinship networks status and community practices determine that who and in which areas women can have activity and employment. Several Kinship networks provide different economic roles for women based on age, marital status and their place in father and husband family (Movahedi, 2005).

2-2 - cultivation and diversity of products system:

The decisions to change cultivation products, whether the products have domestic consumption or export aspects are taken, can have an important effect of working pressure on women.

The fact that women traditionally reserve can't have the means that they don't have any ability or interest to generate cash products. If they feel that a cash product yields is higher than a livelihood one, they cultivate it and play the role in its production that have much more widespread that it is thought. For example, 70 percent of coffee production activities are performed by women in Rwanda (Saleh Nasab, 2004) the role of women in rice and tea production is very important in Iran. Based on research carried, 76 percent of rice productions in some Lahijan villages (in Iran) are carried by women. The effect of improving the plantation related to rural poverty is

different. Food and increase production affected farmers and workers increasing income. Rising agricultural and production incomes, lead to labor force employed by them are and this reduce the work pressure on women and make some free time for them(fani, 2001).

2-3 - agricultural modernization

Towards expansion and agricultural intensification activities, rural activity rates also increased. Thus it need for a tool which reduces the men and women working pressure. Agricultural Modernization and technology development, lead to business development orientation, and investments are seeking more money. In capitalist development, monetary employment takes the money force and the separates the workforce and capital. Overcome these two variables have interaction effect on the type and amount of work that women should spend for plantation. If the Modernization development doesn't increase women's agricultural participation, it leads to separation of housework from productive activities. In some cases, with the agricultural trading and the technology boom, men have more responsibilities that previously were done by women. Some development theorists, believe that with technology development and application of agricultural machinery, employment of women, have been affected (Mehrabi Basharabady 2000) Of course, this theory can be discussed from different angles and study, but what can affect on agricultural labor force modernization structure, is that the every day dependence of farmers to new agricultural and investment methods, small farmers are likely to get out from stage. The reason can search in increasing costs and decreasing prices of agricultural products that the petty peasants were forced to sell their land. This led to inequality rural employment in (Azkia and imani, 2006) that lead to reduced wages and in this case is whether women as agricultural workers or housewives impact by politics.

2-4 - Family status:

Women are considered as labor in the family, for example, every woman in the animal economy, can bleed a few sheep and goats and this implied that the number of women in families is high. By considering that in developing countries, the economic power is in men hands, men for supply their required labor, married again and in some cases, women go to woo for their husbands second marriage, because it reduces their exploitation (Aly and et al, 2000). young families with many children in villages often are an obstacle for agricultural and non-farm employment of women and diminish their working time, but with the growth of children their free times increase to acquire more working on the farm(zanjani, 2003) .Being Households head is being

one of the important factors determining the participation rate of women. For example, in Colombia when a woman is household's head, her entering to market, increases to 47 percent, but for women who are not heads of households, entering the job market is only 21 percent. So the family status is one of the factors affecting rural women's work and leads their participation or non participation.

2-5 - participation rate of women in decision making:

a positive relationship between women's participation in agricultural and non-agricultural employment of men can be seen, so that in some countries men migration to cities or bringing them on a day wage jobs has led them responsibilities in the absence of their husbands take charge of 30 to 40 percent of work related to home and agriculture. In some areas this figure reaches to 70 percent. Number of factors also led to a kind of common gender division of labor, especially in rural societies and one the most veteran of these factors is a particular power and ability of women to provide sustenance (Ghaffari, 2005).

Conclusions:

Women as an effective member of society, can crystalline their lead roles in various responsibilities formations. These responsibilities include promoting the concept of participation and employment in life and building the suitable areas for freely activity and introduce the right of economic management, ownership and.... This requires that all fees and necessary training for women to be considered. Due to the fact that the concept of women's participation, is not necessarily the female employment, although certainly part of the participation of women will be crystallized in their employment, but in this context, home and family affairs by women and their role in nutrition and child growth and Their education are also many responsibilities that women often are responsible for them. Throughout history we have always been seen that women have always been active but in culture and tradition, this mentality largely exists that if the job exists, it would be for men. Because they are responsible for their families Economic or wherever there is a good opportunity for participation, men have a prior right.

Perhaps the reason that women are less important in the development is this thought and action. Because women are in occurred opportunities in the second stage, or even sometimes do not come into account. Zanjani in the article "Women's Empowerment" according to economic, social and cultural characteristics, one of the important subjects that have investigated is the effect of number of children in female employment in urban and rural

communities. In Iran urban, employment opportunity population continually reduces by increasing the number of children. This reduction is weak, up to the third child and then takes the intensity. So that the employment opportunities of women decrease in pay to first child to the second 3 / 2 percent and the second child to the third 9 / 6 percent, while this reduction from third child to the quarter is 3 / 27 percent. But in rural society due to the household problems, type of activity and employment, increasing numbers of children not only make no reduction in women employment opportunities so with increasing the number of children, women's job opportunities is also growing and by having 7 child reaches its peak. Since then relegated to minor finds, in a way that employment opportunities of rural women that has nine child is equal to the job opportunities of a woman with one child. Thus children are effective on women employment so that increasing the number of children in urban society has negative effect and in rural society has positive effect (Zanjani, 2002). Lasay Zadeh in a research by the name that (considering the role of Iranian rural women in the economic scene), first specified the women's place in job structure, and then compared it with the job site of rural men. His study demonstrated that the employment of rural women is important as men. Because the rural economy includes three separated and also related parts, namely agriculture, industry and services and the author, with the share of women in agricultural activities come to the conclusion that in addition to their considerable added value contribution in agriculture, unfortunately, the real value of their activity is not known has been formed in the article. (Lahsaezadeh, 2004)

Safiri in his PhD thesis, as "study of quantitative and qualitative aspects of women's employment and its relationship with economic development", knows that a part of the employment problems is because of some barriers that relates countries structure and also other parts is because of some non development barriers an some parts is also from the social - economic, and cultural barriers as development obstacles.

In some countries where are not appropriate and much needed job, women are damage more. In some where that the social hierarchy is base on physical strength, force and tyranny both in the family system and the hiring of women in institutions and organizations makes the difficult situation for them. Surely also the cultural background are continuing these economic and social conditions, Safiri, the knows the Personality barriers and physiological barriers as non- development knowledge barriers and

he say they are effective on women's employment (Safiri, 2000).

Razavi during a study has shown those women's achievements in academic and social areas in the past 30 years; according to their status in the labor market has not improved. Women's participation rates are low and their non-employment rates increase in these years their and their career options are still limited (lahsaeizadeh, 2004).

Hashemi (2000) with the employment status of women in Iran has shown that the rate of economic participation of women in Iran were similar with developing countries, while their literacy and education rate are comparable with advanced countries. He believes that formal institutions, namely laws and regulations have the most effective on women's employment levels that in their turn are under the social and cultural effects.

Bamdad during his study on socio - economic status of women has shown that social and economic improvement of society is associated by increasing employment rate of women. There are also differences in cultural and social discrimination between men and women, is a serious obstacle in increasing the economic participation of women. Finally, increasing women's economic participation is the function of social development – economic factor (Banihashem, 2002).

The positive effect of government spending in women employment indicates the fact that, there are limitations and discrimination for women in the labor market that the market mechanism can not destroy it thus recognizing these limits, discrimination and government intervention in the market (of course in cooperation with people) is necessary to eliminate them.

Today there is this belief that communities rather than, affected by mood men and environmental conditions, affect by personality and education of women. Thus in the process of economic and social development, women affects are more than men, and the non-developed countries have understood the undeniable fact that to achieve the economic development should employ women creative and effective forces. Structure of female employment in different countries shows that there is a direct relationship between population growth and increasing employment rates of women. In other words, in countries where female employment rate is lower, the population growth and economic development is slower. So if the state goal and the country's development policies, be the attention to women's active participation in society as half of the labor community, the cultural, social, political and economic area of their presence should allow to

provide till we can use their intellectual power, creativity, innovation and The large number of workforce innovation for family and society economic development, otherwise, with the slogan and write policies and strategies and using no proper tools and executive Migration, like the former, manpower of this huge group saw little presence in the various community activities. Different economic sectors (particularly industry and service sector) have the capacity to create many job opportunities for active participation of rural women that can be more benefit in more employment opportunities. Some variables such as marriage to divorce ratio, the share of government expenditure of GDP, the degree of development and Underdevelopment, number of children born and household expenditure are impressive on rural women's employment rates. Thus, if policy makers intend to predict the employment status of rural women, they should attend to affective factors on this group employment.

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Adult learning principles

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Abstract: adult education in the local agricultural education program is an essential component of the "total" program. Offering adult education programs helps to keep farmers and agribusiness employees better informed of current trends and provides them with opportunities to learn new skills and improve existing ones. Teaching adults can be very challenging, but also very rewarding. Most teachers would agree that the benefits derived from a successful adult education program in agriculture far outweigh the costs. In addition to the direct benefits to adult participants, the teacher, the school, the community, and the secondary program also benefit from a quality adult education program in agriculture. Adults in agriculture use a number of sources to gain new information that can be used to help them solve problems. Persons employed in agriculture utilize newspapers, magazines, newsletters, radio, television, government publications, internet, and meetings to gather information which can be directly utilized in their business activities. In many communities, the agriculture teacher is the primary source of agricultural information.

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Keywords: adult learning, adult education

Introduction:

Successful adult education programs develop and utilize an Agricultural Education Program Advisory Committee to assess the informational needs of adults in the community. Agriculture teachers should utilize the expertise and communications link, which an effective advisory committee provides. Specifically, the advisory committee should be asked to provide advice regarding planning, conducting, and evaluating the adult education program in agriculture. Adult education programs in agriculture should emphasize practical application of the information presented. Topics and information included in adult programs should be provided which fulfill needs of the local community. Providing information which cannot be applied to solve a local problem or address a local issue will generally be viewed as frivolous and over time will result in decreased interest (i.e. participation) in the adult education program. The role of the agriculture teacher should be as a facilitator of the learning process. Most adults reject the traditional teacher-student relationship, which is necessary to maintain in secondary programs. Teachers should be encouraged to view themselves as partners with adult participants in the learning process. The democratic philosophy of shared responsibility for planning, conducting, and evaluating adult education programs distinguishes adult education from secondary education.

A local plan for adult education in agriculture should consist of two major components. Namely, a broad statement of philosophy, goals, and objectives of the

local adult education program, and an annual calendar of program activities.

Adult education in agriculture is important for continued community prosperity, growth, and improvement.

Principles of Adult Learning

1) Purpose:

The Financial Literacy Foundation has prepared this document to provide education materials developers with information on the key principles of adult learning. It is a short summary of a very broad area of research and advice, prepared with the input of Adult Learning Australia, the national peak body representing organisations and individuals in the adult learning field.

2) NEEDS, WANTS, CONCERNS AND ABILITIES OF YOUR LEARNERS

Assess the needs, wants, concerns and current abilities of the target learners. Each target group will have their own special needs and probably expect different outcomes from undertaking your training program. Common themes you can prepare for are: no-one readily admits to not knowing something fundamental that may impact on their life chances. Therefore program material, particularly that designed for adult learners should always treat aspects of why learners are in the training sensitively. Describe the outcomes expected from the training in positive, enhancing terms and not as redressing a

weakness or failure on the part of the learner. For example, "Undertaking this program will improve (rather than redress a failing) the way you manage your money".

learners may well enter programs like this with poor past experiences of money matters or at least some trepidation about handling personal finances in the future. Recognise this in the program introduction but individual learners should never be required to expose any of their negative experiences in a group. It might seem a good 'ice-breaker' to ask a new group of learners to share what they expect from the program but resist going too far when asking learners to talk about past problems they may have had with finances. Firstly, they may be uncomfortable doing this in a group and secondly you could start the program in a sea of negative views about financial matters generally. A successful program introduction will focus on where the learners will go rather than dwell too much on where they may have been.

Gauge the likely capabilities of your target groups. Overestimating their current skills in dealing with money could mean the program misses fundamental principles and understandings. Underestimating existing knowledge is also not good as plodding through basic material most already are familiar with will bore participants and the full program content will not be assimilated.

above all these target groups will want to be hands on and demonstrate to themselves and their peers that that can do something they could not before the training; and do it well. Let them know right at the beginning that they will be able to do things that will be of great benefit to them, not just know more.

if a target group of learners has had limited positives in their life or work experiences its important to provide small and regular 'success' points in the program. Simply exposing the content and assuming everyone is assimilating it, putting it all together holistically and building up their skills is not enough. The beginning of the program should be designed so that a discrete piece of learning that the learners can use right away builds their confidence to move on. The program should be a series of steps where the learners confirm their progress and reinforce one new skill by relating it to another they can already confidently apply.

many adults and people not regularly engaged in learning fear testing. Many may have had bad experiences of assessment in school and view the practice among peers as stressful. Make sure they understand that what they are in is a life skills program and no-one can 'fail' as such. In fact each can support others in things they do well that fellow learners may need help with so it's a cooperative not competitive environment that they are learning in.

Build in some teamed exercises and assessments to avoid people feeling isolated in their learning and fearful of failure in front of the group.

You need to consider learners with special needs and those who have English as their second language. Reasonable adjustment should be made depending on each individual learner's particular needs and abilities. Your program material should include advice to the trainer on how to determine the need to make adjustments which, depending on a learner's abilities may include:

- providing interpreters for people who are deaf;
- ensuring access, for example by conducting training and assessment in facilities which have ramps for people using wheelchairs and adjustable desks for people with physical disabilities;
- allowing for access of personal assistants or note takers;
- allowing additional time for assessments;
- allowing oral instead of written responses to questions;
- adaptive technology such as screen readers, speech synthesisers, computer software or hardware;
- and,
- assistance with managing stress and anxiety.

3) HOW DO ADULTS LEARN?

Your program needs to account for:

- Motivation of the learner;
- Reinforcement of the skills and knowledge being developed;
- Retention of key learning; and,
- Transference of what is learnt to new situations.

Motivation - Adults learn most effectively when they have an inner motivation to develop a new skill or gain new knowledge. They resist learning material if it is forced on them, or if the only reason given is that the material will, in some vague way, be "good for them to know." Adults need to know why they are being asked to learn something; and they definitely will want to know what the benefits will be before they begin learning. This means the best motivators for adult learners are explicit interest and self benefit. If they can be shown that the program will benefit them pragmatically and practically, they will learn better, and the benefits will be much longer lasting. Typical motivations include a desire for better handling of personal money matters, say in retirement, wanting a new or first job, promotion, job enrichment, a need to reinforce old skills in say, handling credit or learn new ones, a need to adapt to community changes such as on-line banking and so on. Remember the tone of the program should be motivating. Your program should employ methodologies so that your trainers establish a

friendly, open atmosphere that shows the participants they will help them learn rather than present as 'experts' imparting knowledge. No-one engages well with a trainer/teacher who is just 'showing off' what they know. Financial services have a plethora of jargon and complicated ideas that can put many lay people off. Exposing this sort of terminology and explaining it in simple terms – or deciding whether some of it needs exposure at all – is paramount to keeping your learner's trust and interest.

Appropriate level of difficulty. The degree of difficulty of your financial literacy program should be set high enough to expose all the essential elements of the topic and challenge learners to succeed, but not so high that they become frustrated by information overload. Too much financial industry terminology strung together can be a complete turn off for people who may already struggle with the fundamentals – is it really a necessary part of the skills they need?

So start with financial information and techniques that relate directly to the learner's own personal needs and wants. Personal budgeting is always useful and less complicated than say, comparing mortgage options. Don't make what could be a lesser used skill so important in the program it de-motivates the learners and loses their interest.

Motivational reward does not necessarily have to be in the monetary sphere; it can be simply a demonstration of social or workplace benefits to be realised from new financial management skills. Older participants could perhaps learn how to help their children with financial decisions. People could be shown how to utilise better financial planning in a club or society they belong to. Its about improving whole of life experiences not just direct monetary reward. The overall thrust of the program should be motivating and, like all good teaching and learning programs, course material should ensure other key adult learning elements are covered.

Reinforcement. As we know reinforcement is a very necessary part of any teaching/learning process. Through it, trainers encourage correct modes of behaviour and performance and discourage bad habits. Your program should use both reinforcement techniques throughout. Positive reinforcement is normally used when participants learn new skills. As implied, positive reinforcement is "good" and reinforces "good" (or positive) behaviour. Negative reinforcement is useful in trying to change bad habits or inappropriate modes of behaviour. The intention is extinction -- that is, the trainer uses negative reinforcement until the "bad" behaviour disappears or the learner understands why past practice is not

beneficial to them. Examples could be ensuring participants always compare different rates of interest available to them before signing up for any new debt (a positive reinforcement) and not considering credit purchases that leave them with no income safety net for unforeseen circumstances (negative reinforcement).

Retention. Learners must retain what the program delivers to them in order to benefit from the learning. In order for participants to retain the information taught, they must see a meaning or purpose for that information. They must also understand and be able to interpret and apply the information in their own real life contexts. Understanding includes their ability to assign the correct degree of importance to the material and its application in the future. The amount of retention is always directly affected by the degree of original learning. In other words if the learners did not learn the material well initially, they will not retain it well either. Retention by the participants is directly affected by their amount of practice during the learning. After the students demonstrate they can apply new financial skills, they should be urged to practice in their own time and for their own personal needs to retain and maintain the desired performance.

Transference. Transfer of learning is the result of training and is simply the ability to use the information taught in your program but in new settings and contexts. As with reinforcement, both types of transfer: positive and negative should be used in the program approach. Positive transference, like positive reinforcement, occurs when the learner uses the skill learnt in your program. It is very important for any learner's orientation to the new skills they develop that they can practice in their own situations. Using knowledge from financial literacy training to work out the best way to use (or not use) credit in their lives is an important tool that many participants could use immediately. Participants can check how much credit debt they have, what interest they are paying and what alternatives there may be. Negative transference, again like negative reinforcement, occurs when the learners applying the skill do not do what they are told not to do. This also results in a positive (desired) outcome. This means it's important to find out what the participants in your program have been using their new skills for. Check to see if they are applying the techniques properly or whether they have misunderstood a key aspect of the program. Once wrong information is absorbed and used again and again it simply becomes another bad habit that could make financial decision-making worse instead of better.

Transference is most likely to occur in the following situations:

- **Association:** participants can associate the new information with something that they already know. What skills have the learners already mastered that they can bring to bear on better financial planning for example? Perhaps they have a hobby where it is necessary to access information from written materials or the Internet and the same skills could be used to obtain and analyse better financial data to use in their budgeting.

- **Similarity:** the information is similar to material that participants already know; that is, it revisits a logical framework or pattern. Using calendars or electronic planners to plan future holidays, work shifts etc can be transferred to setting up a long-term budget planner for financial payments and income.

- **Critical attribute element:** the information learned contains elements that are extremely beneficial (critical) in personal life or in the workplace. Try to reinforce the importance of aspects of the financial literacy program to the learner's own goals, whether these are in their home life, getting a job or improving their prospects in work they already have. People can even start their own small business ventures if they have the financial skills to work out the costs and benefits first.

Results:

The local Agricultural Education program has a responsibility to provide up-to-date information, training, and retraining for all adults interested in agriculture.

The goals of the Adult Education Program are:

1. To assist adults in establishing personal and business goals.
2. To enhance the self-confidence and decision making skills of adults in agriculture.
3. To develop agricultural leaders.
4. To maintain the local agricultural knowledge and technology base.
5. To improve the home, living, and business conditions of persons employed in agriculture.
6. To encourage adults to participate in cooperative efforts.

The objectives for the local Adult Education program are:

1. To increase the net farm income of local agricultural producers.
2. To improve the safety practices of adults employed in agriculture in the local community.
3. To educate the public about the significant role in agriculture in the local economy.
4. To encourage the use of practices that protect and conserve natural resources to maintain a good environment for everyone.

5. To assist local producers in the development of marketing plans that are tailored to their individual needs.

6. To assist local producers in developing strategies to make optimum use of agricultural support agencies (e.g. FSA, MO Department of Agriculture).

A comprehensive program of adult education in agriculture includes three major components: (a) organized instructional classes for adults, (b) a Young Farmers/Young Farm Wives Chapter, and (c) Farm Business Management Analysis (FBMA). State Agricultural Education Program standards implemented in 1992 indicate that a minimum of 20 clock hours of organized adult education classes be provided. Many local agriculture programs will far exceed this minimum standard. Salary reimbursement Procedures for "Full Time" and Short Term adult programs are.

The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal.

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Distance learning in adult education

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Abstract: Adult who is able to recognize their needs. He is who knows what will. Refers to individual adults in their lives cross and understand their responsibilities and has accepted the role is social. Adult learners are often those that distinguish each other and have many different targets at the same time and will follow a common challenge to fulfill the goals of building self motivation vectors as educational materials to learn and use the forge. Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out.

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Keywords: distance learning, adult education

Introduction:

There are two types of programs offered by distance education schools: synchronous learning programs and asynchronous learning programs. With synchronous learning, distance education students must log on to the school's website at a set time. Often, they interact with their peers and professors via group chats, web seminars, video conferencing, and phone call-ins. With asynchronous learning, distance education students complete all coursework on their own time. They often learn via assignment sheets, message boards, email, pre-recorded video lectures, mp3s, and traditional mail correspondence. Many students find that distance education courses give them the freedom to complete a degree while meeting their personal and professional obligations. Motivated learners are often able to complete distance education degrees in a fraction of the time often required. Distance education courses also allow students to network with participants from all over the nation.

On the downside, distance education courses do not offer the face-to-face interaction found in traditional classrooms. Some students find that they struggle to stay motivated and meet deadlines due to the independent nature of distance education courses.

To be successful, the Commonwealth's strategies must energize and gain the commitment of all the state's political, education, business, and civic leaders. No strategy will succeed unless it engages leaders in each community and county to identify needs and develop programs and services appropriate

to the community's unique circumstances. The most serious challenge will be to motivate low-skilled, under-educated adults within the working age population to seek further education. Simply expanding the number of providers and programs will not necessarily increase demand from the populations and communities where the needs are greatest. Deepseated social, economic and cultural barriers—many dating back generations—lead people to undervalue education. In addition, in many counties it is difficult for people to see a direct relationship between better education and better-paying jobs. Either there are no jobs available or many existing employers do little to emphasize the connection between better education and the possibilities for getting a job, keeping a job, or earning a higher wage. For many, getting more education and earning a high school diploma or a college degree has little positive meaning.

Only the negative consequences are obvious: getting more education often means leaving one's family and community for jobs and opportunities for advancement somewhere else. The future of Kentucky depends on uplifting the quality of life and economy of all of Kentucky. The social and economic costs of neglect of large parts of the state will drag down the rest of the state and seriously hinder its capacity to compete in the global economy. The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular

methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal. Therefore, it is helpful to distinguish between at least these dimensions of the issue:

1. "Literacy" refers to the knowledge, skills, and competencies of individuals. The federal Adult Education and Family Literacy Act (Title II of the Workforce Investment Act)¹ defines literacy as "an individual's ability to read, write, speak in English, compute and solve problems, at levels of proficiency necessary to function on the job, in the family of the individual, and in society." Literacy is often defined in terms of specific domains such as "basic academic skills," "workplace skills," "life skills," "parenting skills," or skills

necessary to exercise one's rights and responsibilities for citizenship. Different dimensions of literacy are often categorized by terms that cluster several dimensions of literacy important for different clients. Examples include workplace literacy (combining both basic academic skills and workplace skills), and family literacy (combining basic academic skills and other skills essential for successful parenting).

2. "Education attainment" usually refers to the numbers of years of schooling completed or the level of credential (e.g., high school diploma or associate degree) an individual has obtained. Despite concerns about the meaning of credentials, there is a strong correlation between educational attainment and literacy.

3. "Literacy initiatives" often are defined in terms of the needs of a particular target group. These may be parents of young children, youth who have dropped out of high school without earning a high school diploma, welfare recipients, persons with limited English-speaking ability, incarcerated adults, or adults in the workforce.

Getting a college education can be difficult for people with inflammatory bowel disease (IBD). Frequent trips to the restroom, exhaustion, doctor visits, and medication side effects are all barriers to the traditional college experience.

What if you could get the degree without ever setting foot on a campus? You can do just that through distance or virtual learning.

Distance learning has been around for a long time (we've all seen the commercials on TV). While there is still prejudice surrounding some distance learning, it is increasingly being accepted as an alternative to traditional classroom learning. Courses can be offered via the Internet, where students are able to

interact with instructors and other students without physically being in the same room.

Before considering if distance learning is a viable option for you, there are several questions you should ask yourself:

- What course of study would you pursue?
- Are you interested in pursuing a degree?
 - Brushing up on existing skills?
 - Would your course of study require some traditional classroom time (such as laboratory or field work)?
- After obtaining a degree, would you be able to obtain employment that allows for your illness (such as telecommuting or flexible hours)?

Adult characteristics:

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

Operating speed:

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

Consciousness:

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak inhibitors of natural forces (mostly visual and auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability (which varies with the speed of learning) is not relevant.

Health:

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

Background of knowledge - skills and beliefs of adults:

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

The World of Distance Education:

Distance education programs are more popular than ever. College and high school students now have hundreds of legitimate distance education schools to choose from. If you're new to the idea of learning through distance education, this article will help you understand the basics.

Distance education is any type of schooling that takes place away from a physical campus. Distance education is also known as:

- distance learning
- virtual learning
- online learning
- e-learning
- online education
- web-based training

There are two types of programs offered by distance education schools: synchronous learning programs and asynchronous learning programs. With synchronous learning, distance education students must log on to the school's website at a set time. Often, they interact with their peers and professors via group chats, web seminars, video conferencing, and phone call-ins. With asynchronous learning, distance education students complete all coursework on their own time. They often learn via assignment sheets, message boards, email, pre-recorded video lectures, mp3s, and traditional mail correspondence.

Many students find that distance education courses give them the freedom to complete a degree while meeting their personal and professional obligations. Motivated learners are often able to complete distance education degrees in a fraction of the time often required. Distance education courses also allow students to network with participants from all over the nation.

On the downside, distance education courses do not offer the face-to-face interaction found in traditional classrooms. Some students find that they struggle to stay motivated and meet deadlines due to the independent nature of distance education courses.

When searching for a distance education program, the most important factor to consider is accreditation. Make sure the distance education school you choose is recognized by a regional accreditor or the Distance Education Training Council.

Choosing a Distance Learning Program:

Distance learning is one of the fastest-growing components of higher education. Almost 3.5 million students were enrolled in at least one distance learning course in the fall of 2006 and online enrollments are increasing every year. The convenience of taking classes at any time from any

location appeals to today's adult learner, especially those who work, have families or live in rural areas.

Today a growing number of paralegal and legal secretarial programs have a distance learning component (no law schools currently grant credit for distance learning studies). However, not all distance learning programs are of equal quality. Moreover, the increasing popularity of distance learning programs have led to "diploma mills" or "accreditation mills" that offer bogus degrees and certificates. Choosing a distance learning program requires careful research and evaluation. Below are several important factors to consider in choosing a distance learning program.

1. **Accreditation.** Accreditation is a means of ensuring the quality and effectiveness of higher education institutions and programs in the United States. Eight regional accrediting agencies accredit most of the colleges and universities in the United States. A host of national and professional accrediting organizations also exist, including the Distance Education and Training Council (DETC), an organization that identifies and accredits distance learning programs. These twelve questions outlined by the Council for Higher Education Accreditation are helpful in examining a distance learning program's claims of accreditation.

In evaluating distance learning paralegal programs, determine if the school is accredited by one of the regional accrediting bodies and by the American Bar Association (ABA). ABA-approval signifies that the school has met certain standards in terms of academics, facilities and instruction. Graduating from an ABA-approved school may give you an advantage in the legal job market.

2. **Reputation.** The reputation of the distance learning program you attend may hinder or enhance your post-graduate employment prospects. In evaluating the reputation of a distance learning program, you should not solely rely on the school's website or marketing materials. Other ways to investigate the reputation of a distance learning program include:
 - Visiting the school.
 - Talking to alumni (contact the career services department for alumni names and contact information).
 - Researching the distance learning program's record with the Better Business Bureau.
 - Talking to paralegals, attorneys and legal employers about the reputation of the school you are considering.
 - Researching the school in print publications, news articles and on the Internet.

1. **Academic Offerings.** When evaluating distance learning programs, it is also important to consider the program's academic offerings. A quality distance learning program offers a comprehensive curriculum with a variety of options, electives and advanced coursework. Talk to professors or an academic dean regarding the content and delivery of courses. The American Association for Paralegal Education (AAfPE) recommends that paralegal instructional content include courses in legal research and writing, litigation, ethics, contracts, business organizations and torts. In addition, courses should develop students' critical thinking, communication, computational, computer and organizational skills, and competency to handle ethical issues, according to the AAfPE. Legal programs should also offer an experiential learning component such as an internship, practicum, pro bono work or clinical experience. These are great resume-building opportunities and allow you to learn practical skills and gain real-world experience.
2. **Instructional Technologies.** Distance learning courses can be delivered in a variety of ways through a growing array of technological tools including audio tapes, CD or DVD ROM's, e-mail, telephone conferences and web-based delivery systems. Questions to ask include whether the program employs a mix of instructional technology? Is hands-on training and support provided? Can students preview courses online and try out the technologies before enrolling?
3. **Teaching Staff.** The faculty is the backbone of any distance learning program. Are the courses taught by professors or are the courses pre-taped correspondence instruction? If the courses are taught by instructors, what is the background and qualifications of the teaching staff? Are classes taught by paralegals, attorneys or a mix of both?
4. **Career Services.** Another important consideration in any distance learning program is the extent and quality of its career services program. Research indicates that the greater the resources offered by the career services department, the greater the program's job placement success. You might inquire as to what percentage of graduates find related employment following graduation and whether the career center offers personalized career counseling, job placement assistance, job search seminars, online job boards or resume assistance.

Conclusion:

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his.

Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills they will.

To ensure that science curriculum and educational aspects, according to community needs and audiences, application form is provided or not, the content selection criteria should be considered. These criteria is being include knowledge, effectiveness, flexibility, diversity, relevance and practical learning. Some research findings that can be a learning process for the Guidelines for training operations are applied, is given below:

1- intrinsic motivation, learning a deeper and make them sustainable. When the need is met directly by the learning itself, what is learned, but is complementary learning. Creating a training activity in adult learning needs, learning ensures stable

2- Positive reinforcement (reward) learning to reinforce the negative (punishment) is more effective. Many adults because of negative experiences at the beginning of schooling, are weak and afraid. Feeling of success in adult learning for continuous learning and adult participation is essential.

3- Learning, especially regarding skills development, will be added frequently.

4 - Duties and meaningful content than meaningless subjects are learned more easily and are later forgotten. This issue, especially for older adult learners is true. Challenges of adult learning facilitators by the way that content was significantly

associated with the experiences and needs of learners is.

5- Passive than active participation in learning activities, learning increases. Adult educators are allowed to participate actively in India, a stable and meaningful learning to help

The task force's policy recommendations are guided by these principles:

- Recognize that adult illiteracy is not an isolated problem but a fundamental barrier to every major challenge facing Kentucky. Without significant improvements in adult literacy the Commonwealth will be unable to make progress on issues such as early childhood education, education reform (elementary/secondary and postsecondary), economic development, and improving the health and well-being of Kentucky's families and communities.
- Shift from top-down implementation of a federal or state program to leading a statewide public campaign that depends fundamentally on a bottom-up commitment of communities, employers, and educational institutions. The campaign must engage all aspects of Kentucky life—all dimensions of state and local government, all education levels, the state's business and civic leaders, voluntary organizations, and all others whose work affects—or is affected by—the problem of adult illiteracy.
- The future of Kentucky depends on narrowing the disparities among counties by improving the adult literacy of the population in all regions of the state.

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Assessing process of Adult Learning in agricultural education

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Abstract: Adult illiteracy is like a disease that infects virtually every dimension of Kentucky life. Adult illiteracy saps the energy and capability of Kentucky's people and its economy. Adult illiteracy feeds the state's unemployment, its welfare rolls, and the correctional institutions. Adult illiteracy severely hinders the life chances of young children, undermines school reform, and limits the opportunities for postsecondary education. Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered. Curriculum content only from the training provided to learners or not, but put together their learning through activities that can inform or does, skills and attitude to achieve. In this case, apart from learning that the essays taught learners directly to sustainable and effective learning occurs in his. Another way of providing content that is educational activities outside the learning environment possible for learning more and better enables adult learners. For example, hits, field trip experiences for learners or transfer is provided, develop knowledge, insight and skills.

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Keywords: adult learning, education

Introduction:

Despite landmark reforms in public schools, too many Kentuckians continue to drop out of school, thereby perpetuating the chronic problem of adult illiteracy. Too many young Kentucky parents are unable to read and lack the basic literacy necessary to provide the necessary stimulating, supportive family environments for young children. It is known that children's literacy levels are strongly linked to the educational level of their parents and that children of parents who are unemployed and have not completed high school are five times more likely to drop out.

The field of adult education and literacy is plagued by confusion about definitions. Over the years definitions have evolved from provisions in federal law and initiatives of groups advocating particular methodologies or the needs of specific adult populations. The result is that definitions tend to merge statements about the goals to be achieved (e.g., improving the literacy of a particular population) with a particular means (e.g., adult basic education) to achieve the goal. Therefore, it is helpful to distinguish between at least these dimensions of the issue:

1. "Education attainment" usually refers to the numbers of years of schooling completed or the level of credential (e.g., high school diploma or associate degree) an individual has obtained. Despite concerns about the meaning of credentials, there is a strong correlation between educational attainment and literacy.

2. Other literacy initiatives are defined in terms of a particular educational service, strategy, or means to

address a target population's literacy problems. "Adult basic education" and "family literacy" are examples. These initiatives are often defined in terms of a particular configuration of services for the target population (e.g., assessment and information and counseling services).

Goal six of the National Education Goals illustrates a broadly stated goal that incorporates expectations about both adult literacy and the kinds of policies and services that should be in place to improve literacy. Goal six, "Adult Literacy and Lifelong Learning," states that, "By the year 2000, every adult will be literate and possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship."

Adult characteristics:

to understand the characteristics of adult learners, their mental and physical condition should be considered in the following referred to some of them.

Operating speed:

slow reaction in adults is natural that necessarily means reducing the logic and practice skills, not due to weakness and increased awareness of natural forces and their skills.

Consciousness:

no stimulus and incentives encouraging, despite inhibiting stimuli, slow transfer rate, mental, and weak inhibitors of natural forces (mostly visual and auditory) are factors that slow reaction affect individual mental and cognitive activities, but never able to understand, understanding and learning ability

(which varies with the speed of learning) is not relevant.

Health:

what is most age, longer duration is necessary to be heard by listening issue. Why is that when elderly people and old could not hear well, their confidence and vulnerable to the possibility that negative beliefs about their find, they are great. Visual abilities can be like other people, usually decreases with age.

Background of knowledge - skills and beliefs of adults:

adults, social experiences, many have already learned different values and beliefs in their pronouns have stabilized, so changes in the new act very cautiously. The idea of such a manner that skill and applying them older and longer life is, Similar resistance to accept new ideas will be more and more severe. Thus, the adult criteria for the built and paid for their ideas and beliefs that are forming. Because of these criteria and the beliefs that they are afraid of failure, Therefore, to prevent it, sometimes against the resistance of new phenomena are only the material taught and its face that make reinforced concrete and tangible interference situation is.

Classification of Adult Education

1. reading and writing literacy level
2. Technical and professional education, people are ready for work
3. in the field of health, behavior and health in the family
4. tutorials political, social, religious. Operating political social goals
5. to satisfy emotional needs and entertainment, like art, literature and the like

Adult education goals:

a) Literacy goals:

1. To provide primary education and to allow other adults to learn skills during childhood and youth have been deprived of them.
2. Increase the ability and skills for adults over the executive government and community programs.
3. Preparation of programs and classes that form the adult intellectual development is dedicated to the goal, get a job or degree is better.
4. Increased confidence in adults, through increased awareness and knowledge.
5. raising awareness of adult interest to participate in decision-making
6. to raise awareness of citizens rights, their duties and responsibilities
7. Adults develop abilities to solve problems of personal and social
8. to inform adults the skills and talents.

9. Spread knowledge about their heritage

b) vocational training objectives:

1. Adults equip the skills necessary for subsistence.
2. To provide staffing to promote industry and economy, the third
3. the elimination of class differences and achieve social equality
4. Training of workers with their employment conditions and industrial variables are consistent.

Principles of Adult Learning

1- DELIVERY STRATEGIES

in developing your program consider that adults have different personal and social lives than young people in formal schooling or college. Unlike children and teenagers, adults have many responsibilities that they must balance against the demands of learning. Because of these responsibilities, adults may have barriers against participating in learning. These barriers could include lack of time, money, confidence, or interest, lack of information about opportunities to learn, scheduling problems, "red tape," and problems with child care and transportation. Try to consider these factors when scheduling the program. If it is to be delivered to people in a workplace it should fit around their work times and not require them to come back hours later well after they have completed a hard day's work. Week-ends might seem like good free time to learn but many adult learners are conditioned to week-ends being for family pursuits and are likely to be reluctant to give up hours away from this for financial training. Try to identify groups of learners for each program that can support each other in transport to where the program is delivered, assistance in minding young children and common interests outside of the formal learning. Groups seeking employment or those soon to retire are obvious examples of participants who will have similar interests and motivations and can help each other to access the training and learn collaboratively to use the new skills.

2) ENGAGEMENT OF THE LEARNER

Good program strategies encourage real learning, where the learner increasingly:

- takes responsibility and ownership of their learning;
- engages in experiential learning;
- partakes in cooperative learning; and,
- engages in reflective learning.

By requiring or encouraging your learners to take a more directive and active role in the program as it is delivered you are encouraging them to engage in the critical processes of:

- making meaning out of the new financial management knowledge they have;
- distilling principles from the program, which will aid their transference of financial skills to new contexts; and,
- practising their financial planning skills and mastering processes to improve their money management.

In your financial literacy program learner directed activities can also encourage greater levels of motivation. The learning is more purposeful, because they have a sense of ownership over what they achieve and identify themselves as the key beneficiaries of the outcomes. An abstract exercise in developing a savings plan for an imaginary person or family may appear to introduce the right principles but it may not resonate with the individuals you are training. Think of your target group. What are their savings goals?

What aspects of their income are available to saving and how can they work this out?

What form of saving is best for them in terms of achievable targets, regular contributions and limited risk?

Teachers and trainers often develop example exercises based on imaginary situations because, frankly, they appear to put everyone on the same testing level and it is easier to assess because there are a common set of 'right' answers. This is not the way to make financial literacy learning work for the target groups. They should be encouraged to work on individual situations entirely relevant to them. This may mean more effort on the part of the trainer in assisting with the work each person is doing and assessing outcomes but the result will be practical exercises that keep the learners involved and motivated.

3) ASSESSING PROGRESS AND OUTCOMES

Good assessment is a collaborative process involving the assessor, learners and others, where appropriate. Your assessment process should be transparent and allow for ongoing feedback from and to the learners. Remember these adult learners want to improve their skills in managing money and are not necessarily interested in formal recognition or being ranked against their peers in the group. Where possible, presenters should emphasise from the start that no-one is going to 'fail' the program. Even where students are seeking formal certification of their achievement, presenters can advise that there is no competition between the learners in the group or between an individual and the topic material – it's all achievable and everyone can make it work for them. Make sure they understand that they will all leave with better financial skills than they have at the

beginning. If someone in the group is somehow 'better' or 'faster' at understanding superannuation than others that is their good fortune but makes no difference to the benefits everyone in the group gains from knowledge and skills in handling this important financial tool. Everyone will improve their life chances through participating in the program and outside of training for formal certification, assessment is to demonstrate this to them and no-one else.

If you want further Information on collaboration in the design of assessment materials and the role of learners in the assessment process this can be found in:

- Guide One – Training Package Assessment Materials Kit and Guide Five – Candidate's Kit in the Training Package Assessment Guides; and,
- Learning Circles Resource Manual for Facilitators and Learners (developed by Adult Learning Australia).

Conclusion:

In traditional programs that the principles of psychology and curriculum planning, less attention is the form of content presentation ie codification and providing books, original format and have the dominant form, while for adult content that could have valuable experience in addition to writing, other ways also be provided Affect the selection of pictures and images related to the concepts and content produced by including them.

Learning activities such as activities outside the classroom, dialogue, role playing and ... Another type of content is presented. Duties are placed on the learner, a resource for developing knowledge, skills and insights he considered.

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Utilization of micro-credit for rural women and improving livelihood¹ Fakhteh Ghahramani and ² Zahra Kaveie^{1,2} Damavand Branch, Islamic Azad University, Damavand, Iran

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Abstract: In the countries that credits are provided in a proper financial manner, not only it has increased production and income but also it has encouraged poor to save a part of their income. These savings can be an important support for the institutes providing micro-credits and can be a financial base for more loans and all these result in institutes' financial dependence. With the new way of micro-credit payments, in addition to covering poor's financial needs, a combination of other services and facilities are available for them; such as saving accounts, educational services, and cooperation possibilities. If rural women can work through receiving credits, loan and others finance facilities at favorite jobs and live through earned income (as it called "self-reliance and independence"), so undoubtedly we would see changes in social, economic and cultural relations of village. However these actions caused that women stand in good economic condition and also gain self reliance and rely themselves with no help from husbands, but dominant cultural space on villages may create some disorders. At most of villages in Iran, patriarchal with all features dominate and women's financial self reliance may not being pleasant for some human and rural groups.

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Keywords: micro-credit, rural women

Introduction:

By looking at women's history of economic and social life, we can find that this great group, continuously have played basic role in forming economic condition of country. This great group consistent with men have had active role at areas of social-economic activities and always have had major part on economic production of society. Nowadays, supporting family supervisor women is adopted by universal society, as politic, economic a social concern and nearly all countries applied related approaches, and however these efforts have resulted in failure, in so many cases (Banihashem, 1999). paying part of cost of life by government or charities, establishing forums to analyze family supervisor women's problems, supplying necessary facilities to grow and improve child's life quality and paying facilities to provide sustainable employment, are among most important approaches to support family supervisor women. Paying credit facilities to access sustainable employment with easy terms at limited time, is one of the most important approaches to support family supervisor women. Because alongside supplying their continues needs, their esteem wouldn't be marred. Currently, this approach is used at many countries and positive results have emerged. (Ghaffari, 2000).

Aforementioned plan, due to containing special advantage such as giving accessible loan with low commission fee and no interest rate and also long-term repayment, could provide chances for many farmers to release from dealers and broker jobbers. In this approach, giving micro-credits to rural women seems more effective. because alongside agricultures

activities that needed more investments, women by enjoying of very micro-credits not only could create remarkable creativities in rural productions but also gained worthy economic and social abilities, and even improved their field of social presence. (Lahsaeizadeh, 2000).

Increasing Suffrage, lack of relying on vast patriarchal families, increasing cultural acknowledgment, relation with newer institutions, having intellectual independence, making decision for marrying, occupation, emigration and etc are those rights that they gain. gaining aforementioned rights by women in context of cultural and social framework followed some changes that maybe lead to disfunctions and even create disorders and abnormalities at traditional, familial and kinship relations that dominated on villages (Fakhraee 2002). What that performing credits programs, has made in recent years, was on broad outlook with purpose to access to same results as above findings.

Thus, in one inclusive outlook, it is possible to use micro-credits programs to solve those issues which involved with rural women's economic limitations, so that lead them toward social empowerment, in the context of economic growth (Rahmani and alibi, 2001).

The major beneficiaries of micro-credit programs are rural women and low-income groups who use the micro-credits to improve their social and economic status. Bowman (1997) gives a short but clear definition of micro-credit in his book, which is as follows:

"Small, short, collateral-free"; In other words micro-credit means providing small loans without

any thing as security for low income people and they'll pay back the loan in a short period of time. (Arab Mazar and Motamed, 2005)

For the past two decades, micro-credit has been one of the solutions considered in order to expedite investment process and strengthen the financial bases in rural and deprived areas. Empowerment and poverty eradication in deprived communities through improving productivity are all results of micro-credit. Micro-credit has proven its value in development as an effective tool in struggling poverty and hunger. It has the ability to change and improve people's lives, especially people in need.

paying part of cost of life by government or charities, establishing forums to analyze family supervisor women's problems, supplying necessary facilities to grow and improve child's life quality and paying facilities to provide sustainable employment, are among most important approaches to support family supervisor women. Paying credit facilities to access sustainable employment with easy terms at limited time, is one of the most important approaches to support family supervisor women. Because alongside supplying their continues needs, their esteem wouldn't be marred. Currently, this approach is used at many countries and positive results have emerged.

In micro-credit programs there are some other parts like small saving accounts and deposits; that's why they are presented as a credit-saving program (Moazami and et al, 2005).

The two terms in "micro-credit" refer to two fundamental concepts that it is dealing with. The first term "micro" refers to inefficiency of classical economists' development methods. Focus on the term "micro" implies revising the market's economical recommendation in rural development. Small and micro-scale activities are the ones done within the local markets with goal of providing livelihood for households and with least link to the national and international economy. The second term "credit" refers to rural circumstances and lack of official sources which is a critical problem for them. By designing a micro-credit plan, the system is trying to provide credit sources for poor families and increase efficiency of rural market. In micro-credit system, production is mostly local and industrial, therefore economic surplus in these programs is relatively low. Micro-credit system is widely applied in countries that their national economic program is not capable of creating job and income generating opportunities for the majority of society. (Najafi, 2006)

Micro-credit characteristics:

1- Empowerment

Empowerment is one of the major goals of micro-credit and it's considered as a proper index to evaluate it. Creating self-reliance and self-confidence in people, empowerment is one of the important factors to deal with poverty. It also creates social capacity.

Empowerment plans include:

1. Forming financial groups and creating social capacity
2. Education as a supplementary factor of credit-saving
3. Assigning management of credit plans to members

2- Stability

Stability is a fundamental characteristic for a comprehensive development program and leads to continuance of the program and makes credit-saving plans different from others.

Stability indicators:

- reduce dependence on external financial resources
- reduce trading expenses
- cut the loan subsidies (Banihashem, 1999)

3- creating and expanding income generating activities

A study conducted by World Bank about micro financial institutions highlights three most frequent goals:

1. Creating employment opportunities for members
2. Increasing vulnerable groups' income and productivities
3. Reduce family's dependence on agriculture in droughts' prone areas

The role of micro-credits in Poverty Reduction:

The first application of micro-credit was about 20 years ago with the establishment of Grameen Bank in Bangladesh. This bank, providing credit for the poor (particularly women as 94% of its clients are them), has managed to increase income and economic welfare. Now the program is running in most parts of world especially Asia, Africa and Latin America. One interesting point is that unlike prior perceptions, the poor covered by micro-credit programs has been very successful in paying back their loans.

In the countries that credits are provided in a proper financial manner, not only it has increased production and income but also it has encouraged poor to save a part of their income. These savings can be an important support for the institutes providing micro-credits and can be a financial base for more loans and all these result in institutes' financial dependence.

With the new way of micro-credit payments, in addition to covering poor's financial needs, a combination of other services and facilities are available for them; such as saving accounts, educational services, and cooperation possibilities (Goetz and Sengupta, 2003).

Conclusion:

Woroniuk, Schalkwyk (1998) at their conducted research believe that now, micro credits, micro finance sources and small business unites are most effective mechanism to decrease poverty.

Plitt and others, conducted research as they called it "do credits programs, can empower women"? Results showed that corporation at credits programs helps empowering women.

Goetz, Sengupta (2003), presented negative image of credits effects on empowering women. They concluded that most women have minimum control on their loans. And when repayment period is short, this shortage of control has devastating effects on women welfare.

Hashemi and others (2004) found that joining to Gramin Bank, has meaningful positive affects on controlling women, and helps to family income.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive affects on their demand about health care.

Fiona Steele and etal (2008) in researches that conducted as called "influences of credits programs on empowering women at Bangladesh", found that women who joined to credits programs, have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash.

Ellen and her colleagues (2009) used approach called it "credits and education at Bolivia, Ghana, Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Shahnaj and chaudhury(2009) in research as "credits and its role on empowering women" concluded that there is meaningful relation between attending in credits programs and empowering women, at economical dimensions.

Ruhal amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't.

Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that

has increased their social, politic and economic ability.

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

Maybe the main challenges that threaten credits associations, is lack of necessary emphasizes on social dimensions and on reinforcing their basics, that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution.

In order to overcoming dominant consideration, experts believe that we should consider following in protection process of these social institutions.

- establishing and reinforcing through supporting without ant direct government involvement
- evaluating and constant modifying of financial management mechanisms
- improving organization effectiveness
- establishing constant relation and interaction with similar and equal systems.
- establishing local, regional and national networks
 - establishing support and cover systems in order to decrease risk
 - establishing balance and interaction with financial systems greater decision making include: capital market (local, regional, national) and governmental.

also following suggestions have been offered:

- helping to marketing and establishing many exhibitions for member's productions, credit programs, guiding and training them in line with group and workshop activity, can assist them on economic empowerment.
- since women have pointed to education deficiency as major barrier for empowering them, thus educating rural women at the field of exploiting different credits and channels of receiving credits, and also various educations, is so that lead to enabling them, that contain considerable importance.
- providing extension educations for men in order to believe economic role of their women, and give them chance of corporation on all economic, credits fields

- Since that base of credit association, forms base on People Corporation, so it's good chance to use these communities to expand extension-education activities. so it is better to consider special programs on different extensional filed such as agriculture , ranching , family health , housekeeping economy and other fields accordance to condition of region and rural women's needs .
- it is suggested that vast and exact programming happens at following fields:
 - a- extending insurance, facilities for amenities
 - b- educating women about awareness of their own individual and social rights
 - c- persuading rural women about importance of participating at cooperatives and other educational institutes
 - d- educating women about job management and income management

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Using Participatory Rural Appraisal (PRA) in rural research

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Abstract: Robert Chambers (2004) describes PRA as “a growing family of approaches, methods, attitudes and behaviours to enable and empower people to share, analyze and enhance their knowledge of life and conditions, and to plan, act, monitor, evaluate and reflect”. While RRA focuses on data collection or extraction, PRA focuses on empowerment. It needs to be noted that although RRA and PRA carry the term ‘rural’, they can both be and have been applied in urban settings. To make it more inclusive and to emphasize the empowerment aspect, the term Participatory Learning and Action (PLA) is used interchangeably with PRA. PRA has many sources. The most direct is rapid rural appraisal (RRA) from which it has evolved. RRA itself began as a response in the late 1970s and early 1980s to the biased perceptions derived from rural development tourism (the brief rural visit by the urban-based professional) and the many defects and high costs of large-scale questionnaire surveys. PRA has much in common with RRA but differs basically in the ownership of information, and the nature of the process: in RRA information is more elicited and extracted by outsiders as part of a process of data gathering; in PRA it is more generated, analyzed, owned and shared by local people as part of a process of their empowerment. The term Participatory Rural Appraisal (PRA) is being used to describe a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act.

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Keywords: Participatory Rural Appraisal (PRA), rural research.

Introduction:

PRA involves project staff learning together with villagers about the village. Much of the spread of participatory rural appraisal (PRA) as an emerging family of approaches and methods has been lateral, South-South, through experiential learning and changes in behavior, with different local applications. Rapid spread has made quality assurance a concern, with dangers from “instant fashion”, rushing, formalism and ruts. Promising potentials include farmers’ own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Changes in personal behavior and attitudes, and in organizational cultures, are implied. PRA parallels and resonates with paradigm shifts in the social and natural sciences, business management, and development thinking, supporting decentralization, local diversity, and personal responsibility.

PRA flows from and owes much to the traditions and methods of participatory research, applied anthropology, and field research on farming systems and has evolved most directly from a synthesis of agroecosystem analysis and rapid rural appraisal (RRA).

PRA techniques:

There are six popular techniques/methods that are used to facilitate PRA exercise that enables the

community to develop and compile a detailed profile of themselves and their situation.

• Venn Diagram

Venn Diagrams are drawn to help understand the current formal and informal institutions in the area under study and the nature of relationship between the communities and these existing institutions and structures. The community is led to identify their needs, analyze these needs and assess the **cause and effect** relationship. This process provides an opportunity for the community to arrive at the most pressing or priority need utilizing a logical format and this often culminates into a problems tree (Clayton, 1997).

• Time line

This technique describes chronologies of events, listing major remembered events in a village with approximate dates. The process involves elderly people in a village to narrate their life history, summarizing major events and changes that have taken place over a period of time. Major events and political regimes including their significance and influence to the change in the lives of the community over time are recorded. Time line shows a broad movement of different aspects in a village during the community’s lifetime (Chambers, 1994).

• Time trend

This is a technique where people given an opportunity to account about their past and discuss how things close to them have changed. Issues such as ecological history, changes in land-use, cropping

patterns, changes in customs, practices & trends in population, migration, education, health, prices, yields, etc. This technique is more precise in giving indication of change (increase or decrease) about a particular item/activity(KGVK, 1991).

• Mapping

This is where people use ground, floor or flip charts to map and draw the different aspects of their village e.g. social issues, demographic, resources, health, wealth, literacy, livestock, economic activities, water resources, trees, housing layout etc. This technique portrays the image dwellings in a village(Holland and Blackburn, 1998).

• Transect Walk

This is a systematical walk with the Community members through the village observing, discussing, identifying different forms, local techniques, introduced technologies, seeking their uses, problems, solutions and opportunities. It is done to ensure that the team fully explores the spatial differences in the community, assessing the infrastructure that exists and any possible activities that might be taking place within the village.

• Matrix

Matrix is a ranking & scoring technique that is used to discover local attitudes and perceptions about a particular resource. This may be about the land use, water conservation measures, seasons, weather conditions, rainfall pattern or rainfall distribution, intensity and efficiency. These are assessed to determine the extent they affect and influence the way of life within the community. This helps to provide a better understanding of constraints and opportunities for possible development interventions. A graph is usually drawn in a matrix format displaying these constraints and opportunities.

Steps in participatory planning

PRA has steps of planning:

1. Defining the objective of PRA
2. Site selection and clearance form local administrative officials. Fro programmed implantation (or) problem solving purpose. For site selection, use-ranking methods with local people and outsiders; then select the sites for intervention(Ekins, 1992).
3. Preliminary visit
 - Survey team visit
 - Extended discussion with local leaders
 - Agreement to do a PRA
 - Sharing responsibilities with the people
4. Data collection
 - Local people and survey team collect information
 - The data includes:
 - Spatial data
 - Time related information

- Data on institutions and social structures
- Technical information
- 5. Data analysis
 - PRA team spends days organizing information
 - Make large charts and tables of trends, maps transects etc
 - Compile a list of all the problems mentioned
 - Summarized the problems
- 6. Ranking problems
 - Present to the community data collected in a large meeting
 - Include line department staff DA s etc
 - Rank the problems by discussion and voting
- 7. Formulate and rank opportunities
 - From discussion groups on the solutions of the problems
 - Obtain advise from the technical officers on:
 - Feasibility
 - Sustainability
 - Productivity
 - Equity of the solutions
 - Rank opportunities
 - Set an action plans
- 8. Adoption of action plans
 - Look for technical information to develop a comprehensive plan
 - Specific expert join PRA team
 - Line ministry departments take part in the implementation
- 9. Implementation
 - All partners in development contributes to activities as:
 - Manpower allocation
 - Materials needed
 - Time needed
 - Funds required(Pretty, 1993)

PREPARATIONS BEFORE THE PRA:

Proper preparations determine the success of PRA for it involves learning-by-doing and depends on team contributions. In addition to selecting the site where PRA is to be conducted and collecting secondary information regarding the specific sites and their neighborhoods, it is necessary to:

- Establish a PRA Team;
- Establish a Kuset PRA Committee;
- Conduct Preliminary Visits to the Community;
- Developing PRA Schedule.

1. The PRA Team:

The PRA Team consists five faculty members of the faculty of business and economics.

Note that other member(s) already involved in development activities in or near the specified areas shall be included if found necessary, for in PRA, the Team is expected to have the necessary technical

know how in different areas (agriculture, health, education, infrastructure, credit, marketing, culture, etc.). It also needs to have a fair gender composition. Although every team member should be familiar with all aspects of the PRA, each team member is also designated for specific tasks which are described as follows(NCAER, 1993):

a. PRA team leader: One of the PRA Team members will be designated as a leader in each of the four PRAs. That is one team leader will be assigned for each of the four villages. The team leader will be selected in such a way that four members will alternatively serve as team leaders for each of the four PRAs. The role of the team leader is to(Scoones, 1993):

- Play the leading role in the formation of the village PRA committee;
- Ensure that all preparatory work has been done;
- Make sure that the objectives of each session are achieved;
- Coordinate preparation of the PRA report;
- Resolve any problems which may arise;
- Assign facilitators and note-takers for each session;
- Organize the reports from the note-taker/s into a coherent whole;
- Work as the principal editor of that particular PRA report.

Importantly, the PRA team leader is also responsible for ensuring that all technical areas are appropriately covered. Though not intended to do so, many PRA exercises may reflect the technical bias of the facilitators or note-takers as opposed to community needs and interests. This should be avoided at all costs, and the PRA team leader should ensure that.

b. Facilitator: For each PRA session, one individual should be designated as the lead facilitator (note that the team leader may also serve as a facilitator in some of the sessions). As a key objective of the PRA is to promote active community participation, the role of the facilitator is very important and includes:

Before the Session:

- Knowing the contents of their session very well in order that they rarely have to look at the manual for guidance
- Ensuring that the site is well prepared – that there are enough places to sit, that there is not too much noise close by, that the area is well shaded, etc.
- Ensuring that the seating arrangement is good – and that participants can be seated in a circle so that they can see the facilitator, other participants, as well as any flipchart or blackboard which may be

used. Important: if participants are not properly seated, have everyone get up and rearrange the meeting place. During the Session

- Ensuring that all participants understand and contribute to the discussions.
 1. If one participant is talking too much, thank him/her for his/her comments and ask another opinion;
 2. If some participants are not contributing at all, ask them directly what they think;
 3. Do not let only one person or a small group of participants dominate the discussions;
 4. Pay special attention to women and the poor who may not feel comfortable contributing.
- Ensuring that team members share their ideas only after the community members have provided their own, and that the team members avoid influencing the community's decisions.
- Managing the time available for the session to ensure that all objectives are achieved.
- At the end of the session, thank participants for their contributions and explain to them the next activity(Drummond, 1992).

Conclusion:

As a result of the PRAs, the communities are expected to attain many benefits including:

- Expressing their own ideas and concerns;
- Organizing their knowledge about the past and present;
- Identifying as a community their problems, the causes of these problems and possible solutions;
- Developing a common plan to address these problems;
- Developing the ability to use their own resources more effectively and attract more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following benefits:

- Developing better understanding of rural environments and social as well as economic dynamism taking place there;
- Appreciating the fact that communities are capable of analyzing their problems and outlining possible solutions to their problems;
- Participating in designing possible solutions to community problems;

- Utilizing the results of the PRA work as a research output for publications and presentations;
- Building their research and problem investigation capabilities;
- Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;
2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;
3. utilization of the research questions/problems identified during the PRAs for further investigation;
4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.

PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas. During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

The many different perspectives on daily reality and the visualisation offer good opportunities to go beyond the most obvious and dominant points of view in the community. The only warning here should be that too much attention to group discussions/ -activities might enable some groups to dominate the discussion. The methodology is open to modification; everybody can develop new tools and new ways of organising things. This makes PRA applicable in a very wide range of situations. Indeed, it has been used in both rural and urban areas, both in developing countries and industrial countries, in agriculture, in health care and in social programmes. PRA can also be used to collect data; local people are able to generate and/or collect reliable data which they themselves analyze and use for planning.

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The role of indigenous knowledge in Reaching to sustainable development

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Abstract: Indigenous knowledge is local knowledge that is restricted to one specific culture and/or certain society. Indigenous knowledge is different with scientific knowledge that was established by universities and scientific communities. This knowledge is basis for decision making at field of agriculture, health, education, food and natural sources. Indigenous knowledge is set of all knowledge and skills that people enjoy in one geographical area (in one environmental conditions) that most of their skills and knowledge be transmitted to next generation, and new generation would be adapted with them and add to it. Since, each knowledge is consequent of individual interaction with environment, so indigenous knowledge is consequent of indigenous people interaction with their environment. Chambers with emphasis on people's role at development process believes that "rural people's knowledge" term is more eloquent than other terms for indigenous knowledge. Our purpose of rural people are producer farmers, input buyers, agriculture production sellers and etc. "people" in above phrase emphasis that this knowledge is more verbal and less has been written. This word also referred to whole knowledge system which contains concepts, beliefs, and attitudes and also contains gain, store and transmitting knowledge process.

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Keywords: sustainable development, indigenous knowledge

Introduction:

In recently years, from Renaissance till now, as much as human had developed, they also had contradictions and collisions in their world (Azkia and imani, 2008). One of these contradictions is the contrast between tradition and modernism. Maybe we can find these contrast roots in colonial era, the time when colonists promote their innovation in their colonies. Mostly these techniques and innovations show their Indigenous knowledge and the way of their living is foolish and inefficient and tried to enter industrial ways in to their life to increase production efficiency through this way. Thus the way of their living which was been formed during thousands of years has gone to be forgotten little by little (Bouzarjmehri, 2004). We can say, agriculture part is bearing the most damage in this rapid industrialization process. Absolving old and compatible ways in agriculture part and replacing and using of implant, harvest patterns without any proportions with environment has caused decrease of production efficiency, soil erosion and hard destruction of environment during a long time. Finally, at the end of the 20th century decades, some solutions were suggested to solve these inconsistencies and problems. So the importance of Indigenous knowledge and effort in compilation of that with modern knowledge were considered and it was tried to make general and stable view in relation with environment and the way of living through this way (popzan, 2002).

By first of 21 century, world see some sings of great concerns about social, economic and environmental system sets. It is expected that world population reach to 8 billion people at 2025. Increased consumption and poverty have led to high pressure on environment. At so many areas, environment condition is more fragile than before. We have faced decay at environmental issues, especially at vast parts of developing areas of world, in spite of considerable improvement of rivers conditions and air quality at some area such as Europe and north of America. Increased consumption, rare sources and factors such as population growth and imbalanced growth, would endanger, development of different countries (Popzan, 2002). Obviously, economic development can follow unexpected social and environmental affections involving weather changes, using freshwater sources inordinately, decrease living diversity and increase inequality (Gigler, 2003). Sustainable development is outcome of development that follow multi dimensional economic activities with protect environment and its related social issues. So in current decade, presenting indigenous knowledge issue was reinforced in order to present modern approach of development, in which the issue of human-oriented of development would be insisted. In this modern attitude toward development process, environmental, social and cultural concerns were emphasized over economic interests. Indigenous knowledge is part of national capital of each nation which encompasses their beliefs, values, practices,

tools and local acknowledges. This is the same knowledge that , different nations had found their foods from nature , prepared their clothing , settled in home , educated their children , organized their society and kept health of themselves and poultries , during the centuries thereby(Eshraghi, 2004) .

Many experts believe that for making a sustainable development, Indigenous and modern knowledge should be combined. Nowadays, so much efforts have done to make use of Indigenous knowledge but main part of these efforts were done for derivation and making it scientific (Burger, 1997).

Amiri Ardakani and Shah vali (2003) believe that the undesirable outcomes of development on people and rural environment is the result of using new science by scientist, so by blending and making relation between modern and Indigenous knowledge we can solve this problem.

Millar believe that by combining Indigenous and modern knowledge we can make trust between researchers and rural people, because by using this way researchers and rural people know themselves as a partner that are responsible for a common process and product. Millar believe that the trust is the reason for future development (Penny, 2001).

Experts believe that there is no way to reach sustainable development except to combine Indigenous and modern knowledge.

Indigenous and modern knowledge will complicate when:

- 1- We solve structural barriers such as political, economical, cultural and social difficulties.
- 2- We correct the thoughts on educational systems by emphasizing on learning and thought process and also correct the thoughts on research systems by emphasizing on audience and beneficiaries needs.
- 3- We solve communication barriers that cause inactivity on relation process and steady and dynamic flow of knowledge between peasants, experts and scholars. (Emadi and Amiri Ardakani. 2004).

Sustainability and sustainable development:

Sustainability is meaning to make economic, social and environment's views in harmony with our constant needs. Sustainability includes widespread and comprehensive points and is depended on interference in social issues. It is concentrated on future and today's issues and is a world movement and in harmony with our authorities (Kolawopole, 2001).

The correct concept of Sustainability has followed a certainly and warranty of life satisfaction quality for

everybody. Of course for reaching to this constancy, it is not enough to decrease pollutant activities or prevent of increasing levels of consumption, but also we should make a suitable schematization for decreasing poverty and making activity for reaching to equanimity and improvement of chances in and out of countries. Sustainability had implication on steady and sustainable conditions. Steady condition encompasses distant horizons (Dewes, 1998).

The concept of sustainable development is a complicated concept that is explained by different people in different ways. From international viewpoint, the more famous definition of sustainable development is obtained through 1978 reports by Brandt land commission with this title" our common future" that is defined as fallow: sustainable development is a development that contain our modern needs without making any problems in providing future generation's needs.

Sustainable development recognize that social, economic and environmental results are related to each other and they should be equally in harmony for making decisions process. Decisions which are based on Sustainability will help future generation in reaching to a well environment and success economic (Box, 1999).

infrastructural information in sustainable development:

Ideal and infrastructural information in sustainable development consist of:

- 1- Environment and economic integration: economic decisions should be made according to their effect on environment.
- 2- Making guarantee between generations: decisions should be made according to their effect on future generation's environment
- 3- Social justice: all the people have this right to have an environment to grow on it and be successful
- 4- Environmental protection: it is needed to protect of natural sources and support plants and animals.
- 5- Quality of life: a widespread definition of human welfare should be given which is more important than economic welfare.

Reaching to sustainable development through Indigenous knowledge:

Dictated pattern's failure through western development countries to third world countries show that Indigenous knowledge is necessary to reach development.

Untrop believe that usage of local knowledge is efficient and useful in development and Indigenous knowledge's researchers believe that they achieved to

an important source for innovation in agriculture methods and a good farming production to improve the rural people's life. On his idea, some of researchers call Indigenous knowledge as a good supplement and replacement for modern knowledge and they have tried to spread the usage of this knowledge all around the world. These plans as a "communion research with farmers" or "first is the first" are introduced. In this research method, private organs and local groups have the main role and unlink the current research plans, the tests are done with the farmers attendance in their farms and not in research centers and far from environment condition. The ways that farmers and rural people use for management of their living environment are the most scientific ways, although we couldn't understand it at the first sight (Chambers, 2000).

Eshraghi (2000) explained that by introducing sustainable development model or development environmental model and according to world food organization (FAO), sustainable development will create when applied technologies in rural development are in proportion with rural people's knowledge and also are acceptable by them. Also he says that one the main ways to reach sustainable development in society is that to have enough and necessary attention to the rural's Indigenous or local knowledge (Merrewij, 1998). It is also explained that attention to this knowledge needs a complete recognition of rural people and their knowledge that through assembling of this knowledge we can find a correct way to reach a sustainable development and we should know that the movement toward sustainable development is not possible without correct using of Indigenous knowledge. Many development experts believe that the Sustainability of this concept is at the studying of this knowledge and in becoming popular in development. Indeed, Indigenous knowledge with its holist features had known the relation between nature's components better and had smoothed the way to Sustainability of development (Gigler, 2003).

We can summarize the usage of Indigenous knowledge in development as fallow:

- 1- Protection and maintenance of natural sources. Indigenous methods in management of natural sources are suitable pattern for managing natural sources in sustainable development.
- 2- The success of sustainable development plans is depended to rural people's communion at designing, schematization, performance and assessment. Use of Indigenous knowledge is necessary for rural people's communion.

- 3- Indigenous and modern knowledge should be combined because according to our needs and vulnerability of remained natural sources, none of them are able to remove our needs a lonely.
- 4- For recognizing development needs, trouble shooting problems should be polestar from rural people's view and recognizing problems and making efficient relation with rural people are possible through Indigenous knowledge.
- 5- In industrial countries, Indigenous methods are forgotten completely because of using modern knowledge in production process. As Indigenous methods are the most suitable way for achieving sustainable development goals so, many efforts were done to make this knowledge alive.

As a result not only we shouldn't forget the Indigenous knowledge but also we should use of this knowledge in developmental plans. Using Indigenous knowledge in developmental projects will help to have sustainable development in villages. So developing and not developing that were using of western development patterns for many year, should use of their Indigenous and local knowledge which is the result of many years experience and by helping these plans they can reach to a sustainable development (Brouwer, 1998).

Sustainable agriculture

Sustainable agriculture is kind of agriculture that is toward human's interests and has more efficiency of using resources, and also is in balance with environment. This definition is in harmony with changing social and politic factors at agriculture development .and also it referred to kind of agriculture that is enable to produce enough foods without destroying world sources or polluting environment. It is also kind of agriculture that is follow with social values, agriculture family's welfare and supplying needed foods.

Generally sustainable agriculture is every kind of production system which follows theses goals:

More complete mixing of natural processes such as food cycles, nitrogen fixation, and relation of pests and natural disasters with agriculture productions processes.

Decreasing use of that non-farming, outside and non-renewable inputs in order to reduce damage to environment or less damage to farmers and consumer's health.

More fair access to interests and productions opportunities and progress in order to access to forms of agriculture that is fairer, and also increasing self

reliance between farmers and villagers (Chambers, 2000).

Using more potential biologic and genetic aptitude of plant and animal species.

Using more local knowledge including innovative approaches that scholars didn't understand it completely or farmers didn't accept it extensively.

Combined agriculture would prepare this opportunity for common systems to apply needed reforms without creating inclusive changes in it toward organic systems. Therefore, aforementioned systems are considered as medium between common intensive agriculture and organic agriculture methods.

Two principles have especial importance at sustainable agriculture that is:

at early 1980's, with the emergence of new concepts, renewable agriculture and sustainable agriculture evolved and indeed it was based on "ecological interplay affect". now, this concept forms alter indigenous agriculture philosophy.

Sustainable agriculture presented from 1987 at global scale. In this principle, "agricultural interplay affects with society" is presented. Three issues are important about sustainability: first is enough income especially between poor people. Second is increasing access opportunity to food and its consumption. This means that more food should be prepared through increasing production and improving marketing. Third issue contains protecting and improving natural resources (Louise, 2000).

Conclusion:

Indigenous knowledge has been manifested at sustainable process and improving extension programs at industrial countries of world, very well. Indigenous knowledge related to agriculture, medicine, food and architecture has been widely used At European countries, USA, Canada, Australia, by new names.

At one research as a name of "analyzing position of indigenous knowledge at sustainable rural development" that was done by Buzarjomhore (2005) it was signified that although there are some differences between indigenous and formal knowledge, but they should not be compared, because they are complementary of each other and it is possible to gain successes by synthesizing them that is impossible lonely. Base on new paradigms of rural development in order to solve rural problems, we should first refer to indigenous solutions and if it was working, then we should reinforce it; if not we should test and use outside solutions. Findings of one research done by Emadi and Amiri (2004), as "Synthesizing indigenous knowledge and formal knowledge as necessity for accessing to sustainable rural development", has shown that dominated belief

among educated groups toward Indigenous and their knowledge is precondition of every interaction, synthesis and relation. Creating revolution in formal education systems in order to attending empirical knowledge area is considered as one of main necessity of this synthesis that is outcome of years of researches. Researchers attention to "exploiter's accumulated experimental and historical wisdom" is one of other necessities of this revolution by using cooperative, qualitative and filed methods. Also, applying mutual extension ways and creating revolution at communication system between governmental, education-extension centers and farmers and rural people so that they be interacting, was considered as precondition and necessities. At researches as "indigenous knowledge at development process" done by Karimi (2003), findings show that indigenous knowledge is principal factor and main source at the field of research of sustainable development, decreasing poverty, enabling local men and attracting their participation at activities and rural development programs, developing and producing appropriate technology, self-reliance of rural societies and country.

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Financial self-reliance of rural women through micro-credit¹ Maryam Nikmanesh and ² Mina Abarashi^{1,2} Damavand Branch, Islamic Azad University, Damavand, Iran*Corresponding author: allahyari121@yahoo.com

Abstract: If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live without dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes. Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

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Keywords: financial self-reliance, rural women

Introduction:

Rural women constitute% 50 of the workforce and they participate in the production of half of the foods in the agriculture section. As an example the rural women constitute about 70 to% 80 of agriculture workforce in sub-Saharan Africa, %65 in Asia, %45 in Latin American & Caribbean, %80 in Nigeria & Tunisia and %80 in India, but their role in production system is the men's supplements roles and this causes a big responsibility inside their mother & wife duties and it takes a great time and energy of them. Studies in this field show that women spend about two thirds of their time for production, management & organize of their house as the men spend only one third of their time for such things. (Varzegar & Azizi 1367).

Poverty spreading in village is a global issue. According to the Fao finding about % 75 of world's poor people that are more than 1 milliard people are living in rural zone and more than % 70 of this poverty people are women. As the most of the people who are poor are living in village and are women is the reason for insufficiency of rural development programs.

One of the other basic barriers in development of rural women is their independent inaccessibility to get credits for investment in their job. Although their illiteracy is the big barrier to use of bank credits, but this view that women are dependent people that their husband should decide about their financial decisions is the other reason that rural women couldn't access to official credits. Maybe these barriers are the reason

why rural women are happy about applying micro-credit thought in village. (Najafi, 2007).

It seems that experiences which are obtained from performing financial programs in some villages in the developing countries could answer clearly to such questions.

A glimpse to previous planning about rural development in the world shows that from 1950 many developing countries understood that the main reason for making their economic growth (development) slowly in their countries is the weakness of investment in the agriculture part. Although many countries by patterning from developed societies have proceeded to improve & develop their industrial agriculture part and by this action not only had irreparable damages to many traditional farmers but also the main problem (the lack of capital sources) is also remained in the rural regions. (Rahimi, 2001).

Women's self-reliance and independency were the outcome of giving credits to women and in some cases were the obstacle of receiving credits by women which is necessary to explain about them shortly.

Cultural & social effects of rural women's financial self-reliance

As it mentioned before the traditional culture in villages was the reason for weakening women rights and made them oppressed, it is possible that women's self-reliance & financial independency in villages

make some crudities (malformation) in the family and village for a short a short time, but we can't disregard it's positive outcome in the social & cultural occasions in the long time, here we will discuss about some of these outcomes (Goetz and Sengupta, 2003)

1- Preferment of women role and their social place:

Women's financial self-reliance can increase the women's social role & place in the villages. In the new condition some of their assignment roles could change to acquisitive roles. The women should use of all their power & energy for doing their acquisitive roles. Thus they can find active view to different functions. The people & groups could increase their social place in the village with improving their social role. If their role and social place preferment be accompanied with the increasing of social intelligence & knowledge, it can have more effect culturally. (Amiri, 2000)

2- Increasing self-confidence:

Self-reliance in different life aspects can increase people's self-confidence. Rural women who are financially independent can live peacefully. With decreasing their problems in life, their self-confidence will increase. And self-confidence is one of personality & mentally condition for being success in life.

3- Family consistency:

At the first, it seems that rural women's financial independency is not acceptable by their husband and this causes some gaps in their family's relations. But little by little these problems will be solved by increasing the rural people's knowledge. Usually poverty is one of the reasons which will destroy or decrease family's consistency. Women by working and having income can help their husband & family. (Fakhraee, 1381)

4- Change in family's relation:

The rural women with having a job and financial independency can change the viewpoint of people who live in villages and cities and they will not look at the rural women as a weak and dependent people. But also their title and place will increase among their families. So by changing people's view to the women, gently we can see some changes in their family's relation which will have respect to the women's right. By increasing women's knowledge and by introducing new rural institution which give financial & authority service to the women, their stimulus (motivation) for reaching their social rights will increase and they try more than before (Amiri, 2000).

5- Making patriarchy weak in the family:

Gently, with changing family's relation in the villages and by increasing rural people's knowledge,

we can make the men and women's right equal and also we won't have patriarchy in the family, although patriarchy has historic and olden root in our villages but with improving women's position and increasing their cultural and social know ledge we can destroy patriarchy in the rural families. . (Chowdhury, 2005).

6- Population and family adjustment:

The practitioner women's view about the number of the children is different; studies show that practitioner women are interested to fewer children to the house keeper women.

By decreasing families in the village and women's financial independency we are more hopeful to adjust family's population in the future because villages have important role in the population increase in Iran. (Shaditalab 75).

Conclusion & discussion:

The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live without dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Shahnaj and chaudhury(2009) in research as "credits and its role on empowering women " concluded that there is meaningful relation between attending in credits programs and empowering women , at economical dimensions .Ruhail amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't. Jameela

(2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability. Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society. Maybe the main challenges that threaten credits associations , is lack of necessary emphasizes on social dimensions and on reinforcing their basics , that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution .

In order to overcoming dominant consideration, experts believe that we should consider following in protection process of these social institutions

- Relating public established institutions with each other and networking established institutions
- Emphasis on stability and self reliance of management system of credits institutions from financial and economic dimensions
- Efforts to gain local confidence and credibility among contacts
- Effectiveness of costs and economic and financial efficiency inside established institutions

Also following suggestions has been offered:

- providing extension educations for men in order to believe economic role of their women , and give them chance of corporation on all economic , credits fields
- Since that base of credit association, forms base on People Corporation, so it's good chance to use these communities to expand extension-education activities. so it is better to consider special programs on different extensional filed such as agriculture , ranching, family health, housekeeping economy and other fields accordance to condition of region and rural women's needs.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Women by getting these rights can make change in the rural cultural & social issues which make disfunction & crudity in their family's relation. However, rural women's self-reliance has caused improvement in the economic, social & cultural issues. For solving women's self-reliance problems we can do these activities:

- Giving promotional services for increasing rural women's skills in various fields.
- Giving promotional instructions to men for believing their women's economic role & their women opportunity to participate in all economic, authority & ... aspects.
- Increasing rural women's knowledge in all social, political, cultural & economic fields.
- Making use of micro-credits programs to motivate & support women for doing economic affairs better & finally to make women self-reliance.

Its result is that, exploiter can't access to desirable condition of production efficiency at first. Secondly, he would incapable for loan repayment. Third, his activity doesn't contain consistency. Fourth, remarkable part of provided credits would exit from production cycle due to exploiter's incapability and lack of skill in exploiter. His technical and occupation skill would improve, if credit is being provided for exploiter as a credit program. and he knows and can applies loan properly and well timed for production and activity, so condition of production and level of income , level of life and ... would improve .

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Status of indigenous knowledge in rural (in developing countries)

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Abstract: Indigenous agriculture is based on farmer's cooperation with nature. Sustainable agriculture that inspired by indigenous systems would rectify most of deficiencies of modern agriculture. Indigenous agriculture systems is production of centuries of cultural and subsistence revolution. These systems are collections of farmer's experiences that haven't enjoy sources except inputs, capital and indigenous knowledge. And consequently they accessed to such sustainable agriculture that just is dependent on using restricted local resources and existing humane and animal power. At indigenous agriculture, culture diversity and frequency would minimize possibility of loss crops in spite of simple technology. These systems despite of limitation of sources enjoy merits of sponsors traditions and intelligent methods of using animals, fields, and compatible crop species. Thus ecological agriculture scholars consider these systems as unique samples to determine sustainability standards in agricultures activities. This knowledge would rise at different fields such as language, botanical and zoology and also skills and manual and agriculture professions that all are product of human efforts in his environment. This information contain best, useful and consistent collocation of exploiting methods and living in special environment which be transmitted through verbal and empirical way from one generation to another.

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Keywords: Indigenous knowledge, rural women

Introduction:

In recently years, from Renaissance till now, as much as human had developed, they also had contradictions and collisions in their world (Azkia and imani, 2008). One of these contradictions is the contrast between tradition and modernism. Maybe we can find these contrast roots in colonial era, the time when colonists promote their innovation in their colonies. Mostly these techniques and innovations show their native knowledge and the way of their living is foolish and inefficient and tried to enter industrial ways in to their life to increase production efficiency through this way. Thus the way of their living which was been formed during thousands of years has gone to be forgotten little by little (Bouzarjmehri, 2004). We can say, agriculture part is bearing the most damage in this rapid industrialization process. Absolving old and compatible ways in agriculture part and replacing and using of implant, harvest patterns without any proportions with environment has caused decrease of production efficiency, soil erosion and hard destruction of environment during a long time. Finally, at the end of the 20th century decades, some solutions were suggested to solve these inconsistencies and problems. So the importance of native knowledge and effort in compilation of that with modern knowledge were considered and it was tried to make general and stable view in relation with environment and the way of living through this way (popzan, 2002).

Maybe the main reason for inattention for native knowledge in third world countries is that colonist countries don't pay any attention to the people knowledge and information in these countries and always have reminded the people of these colonized countries as a stubborn, superstitious and retrogressive people (Karami and Moradi, 2003). On the other hand, the colonist countries attention to industrial productions and agriculture policies has caused to promote industrial and single product agriculture which will influence the native farmer's knowledge about different productions and will make it inconspicuous. Also, colonized plans and imported extension programs have intensified the alienation of native knowledge (Nowroozi and Alagha, 2000). In the middle of 1980 decade, there was a new view "giving priority to farmer" that increased the attention to native knowledge. This view that emphasized on "listen people and learn of them" emphasized on people's active communion on developing and searching process. Before using of this way, understanding rural society's culture was in another way and it was thought that rural people have failed in economic, politic, innovation and its transfer, creation of knowledge and using of that in rural societies. Before representation of this attitude "giving priority to farmer", it was thought that development need in other people management who are not living on that village. But in this way, we look rural people as the one who are able to solve their

problems with relying on their knowledge and experience (Eshraghi, 2000).

Different definitions were presented about indigenous knowledge by experts that each of them present their idea about this knowledge from their viewpoint. Each of them emphasis on a special aspect of indigenous knowledge according to their viewpoint. Oxford vocabulary define the word indigenous knowledge such this" it is created naturally in a region which is related to the people of that region. (Azkia and Imani, 2008). Indigenous knowledge is a knowledge that has been grown in a long time and has transferred from one generation to other generation in hereditary form (Karami and Moradi, 2003). Williams and Molina have defined indigenous knowledge such this: indigenous knowledge is the learning methods, understanding and attitude to the world which is the result of experience and solving problems according to test and error by the people who are active and have used their available resources on its suitable time. Chambers with emphasizing on people's role in development process, believed that the phrase rural people's knowledge is more sensible than the other phrase such ethnic ecology, ethnographic knowledge, ethnic classification. He also believed that indigenous knowledge is a knowledge that is created naturally and is emanated from geographical circle. (Chambers, 2000).

Characters of indigenous knowledge :

The characters of indigenous knowledge like the definition of this knowledge are presented by experts in different ways which we will explain about them as follow:

1- it is based on experience:

Indigenous knowledge is the result of people's experience during many centuries.

2- it was tested during centuries by working on it.

3- it is compatible with indigenous environment and culture:

Indigenous knowledge was created through native societies and it was formed according to their needs and during time the things which were not compatible with indigenous environment were omitted, so what was remained was compatible with the environment and culture of that society (Amiri Ardekani and 2003).

4- it is dynamic and is changing:

Simultaneously with changing indigenous culture, the indigenous knowledge was changing too.

5- the knowledge of rural people was not technical:

This knowledge was consisted of rural people's wishes, values and preferences.

6- the rural people's knowledge is not statistic:

This knowledge was formed according to people's culture, social and economic history. The history which was written by these rural people shows that their manner and activities were efficient in changing of their conditions.

7- rural people's knowledge is not enough.

Maybe the rural people are knowledgeable but they like to know more and more. Because they want to be powerful in their discussions with political, economical and social forces who made these people poverty before give them technology (Zare and Yaghoubi, 2003).

8- rural people's knowledge has root on their political economy and is more important in political field.

The advantages that rural people can get from indigenous knowledge are the knowledge that is created and released locally and is on their authority and also depends on main factors in regional politic economy (land distribution, marketing relations, and vertical links and ...). So improvement of their livelihoods depends on interferences which were made to pervade on these main factors.

9- most of the rural people are public-oriented

Mostly, they have a little information about many things which is in contrast with academic educations. Specialist people in universities have deep knowledge in little fields (of course some of these native people are specialist too) (Razavi, 1999).

10- indigenous knowledge systems are holist:

Local people consider the other people's problems as their problems and try to solve these problems in a whole frame with using their knowledge.

11- indigenous knowledge systems combine the culture and religious believes.

Religious believes as a part of indigenous knowledge are not separated from technical knowledge and these believes effect on people' do and don't

12- indigenous knowledge systems prefer the less risk to most profit

Escaping of risk is important for native people, for example a native person usually keeps some goats for possible cases such as disease of his children and he and he didn't expect any incomes of these cases.

Advantage of indigenous agriculture

It is more than one hundred century that is passed from anthropologist studies in farming societies and production systems and during the last thirty years, comprehensive reports were obtained of subsistence practices. These reports consist of important information about social relations of production, operational practices and environmental protection that includes indigenous methods for using of earth and rural people's encounter with their environment (Smita, 2003).

These studies have given new dimension to agriculture research. Now, in many countries the managers of agriculture resources are the people who are trained in western countries. So if the manager become familiar with the culture and environment roots of indigenous system of resource management, they won't do mistake. Indigenous agriculture is based on cooperation of farmer with nature. Recently researchers of ecological agriculture have more attention to these systems. The result of these studies is important from two sides:

1- At the first, in the process of agriculture renovation in the third world that is indeed unavoidable, the indigenous agriculture knowledge and local methods in management of agriculture resources is to be destroyed and simultaneity environmental regions are on the verge of destruction. Modern agriculture prefers huge profit from resources and didn't pay attention to environmental, cultural, social and economic varieties of traditional agriculture. So incongruities of agriculture development plans are not compatible with rural needs and talents and also rural conditions. By recognizing indigenous agriculture features such as traditional classification for identifying plant and animal species and using of indigenous practices like simultaneous cultivation of compatible crops, we can get useful information about suitable ways for agriculture. Surely these guidelines will be more compatible with rural needs and agriculture and environmental features of each region and won't be reckless to social, economic and environmental complex issues (Appleton and Jeans, 1995).

2- Second, with studying indigenous agriculture we can get points that will help us to design the same systems in industrial countries. Sustainable agriculture which is taken from indigenous systems will remedy the shortcoming of modern agriculture. In a single-product of modern farm, life circles of nature has changed by using chemical poison that give no chance for using principles of ecological agriculture. But completeness (evolution) of culture and environment is the result of local agricultural systems (Ahmed, 2000). In indigenous agriculture, variety and alternation of cultivation make minimize the possibility of farming products destruction. Although these systems have resources limitation, but they use of learning advantage and intellectual ways for use of animals, soil and compatible farm species. For this reason, researchers of ecological agriculture know these systems as

unexampled kinds to specify constant static scales for agriculture activities. In industrial countries they use of these scales for designing and managing ecological production systems (Emadi and Amiri Ardekani, 2004).

With all the advantage we account for native knowledge we should contemplate that for reaching a balanced understanding of this knowledge, we shouldn't indicate it very important or not very unmeaning as Chambers say. Also we shouldn't consider rural people an intellectual people. Because they can make mistake like any other people or group. And also this knowledge is not reliable forever. In some places this knowledge is combined with some superstition believes and we should not forget its spiritual and mental aspect (Warren, 1999).

Conclusion:

At sustainable human development, people are considered as "goal" of social and economic policies that their range of their selections would be extended in order to actively participate at decision making. Therefore, people's participation is one of tools of sustainable agriculture development. But active rural people's participation at extension programs as a form of sustainable would not be possible unless by believing role of rural people's knowledge, vision and skills .

So, effort and national commitment and multi-dimensional support is very critical for recording, valuing, extending and exchanging this rich source and also preparing mechanism and practical strategy for synthesizing this knowledge with new knowledge and agricultural development programs.

Agricultural extension was identified as one powerful IT focused area, due to role variation at knowledge system and agriculture information at one hand and at the other hand due to its dependence on various exchanges among farmers, that can has great affect on rural society and developing agriculture. So that work and productions of farmers would increase by farmer's access and use of Internet and subsistence farmers at all over the world are at developing by gaining needed knowledge and information that during time would becoming as commercial producers. Transmitting from system-cycle source of agriculture to technology-cycle system of agriculture placed more responsibility on agricultural extension because agriculture extension system is as vital technology transfer crossing to farmers at one hand and as crossing for referring feedbacks, needs and agriculture issues, researchers and policy makers of market.

What that is obvious is that extending and researching agriculture can help to sustainability

through close relation to farmers , attending to their experiences , gaining their information and logical understanding of agriculture activities , attending to their vital needs for doing “demand-base” researches and extension education efforts for developing agriculture , at process of improving agriculture development.

Finally native knowledge as a constant structure, with many years experience could attain a deep understanding and insight of the environment and ecologic exchanges. This knowledge is conveyed to next generation and the next conveyed it to their children. Native knowledge is on the verge of destruction like a curative prescription that has hidden a constant glamour on it. By dying each native person, the great treasury of knowledge will lay underground and these knowledge sources are destroying very speedily.

On the research which was done by Bozarjomhari (2004) with this title "analyzing native knowledge position on rural sustainable development". It was specified that although there are many differences between native and modern knowledge but they are not in contrast with each other, because they are each other's supplement and we can't be success when we use them separately. According to new parameters in rural development, for solving rural problems, at the first we should use of native solutions and if it was not efficient, we can use and test external solutions.

Research findings which was done by Emadi and Amiri (2004) with this title " compilation of native and modern knowledge is necessary for reaching agriculture sustainable development" signify that The believe of educated people to native people and their knowledge " precondition for making them close" is called combination and compilation. Making evolution in modern system for attention to tentative knowledge is the main necessity for this compilation. Another necessity for this evolution is the researcher's attention to experimental accumulated wisdom and historical exploit by using qualitative and communion methods. Also applying compilation methods and making evolution among government, educational centers, farmers and peasant is the necessity and pre condition for combination of modern and native knowledge.

Research findings that was done by Karimi with this title " native knowledge in development process" signify that native knowledge was a essential element and important source for realization of sustainable development, poverty reduction, making local people capable and motivate them to participate in activities for agriculture and rural development, developing and product suitable technology, rural society's self-reliance and self sufficiency. For this reason all side's try, partnership and protection for record and

registration, compatibility, distribution and promotion , exchange of this resources and also suitable and scientific guidelines for compilation of this knowledge with new knowledge and rural and agricultural development plans are needed.

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Importance of using information and communication technologies (ICT) in education

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Abstract: ICT provides access to only a small part of the action is created equal. Equal attention should also be applied to ensure the technology really "is used by learners and ways of how well their needs will cure. An educational program that reinforced this approach shows the overall program is bilingual. The program seeks to establish technology learning centers for bilingual teachers, students, teachers, parents and community members. Technical teams from each center three students, two teachers and the director of the Center with at least one female student and a teacher are female. Another example of a general approach to the application of ICT in education, radio education project Gobi Women of Mongolia, which seeks to provide professional and educational structure of women's favorite courses around the nomads and their opportunities for income generation. It contains topics such as livestock rearing, family support (family planning, health, nutrition and health) to create income in the application of local raw materials and basic skills for the job is a new market. Policy makers and service providers have increasingly come to view information and communication technologies (ICT), and particularly the Internet, as an important tool in providing disadvantaged groups and areas with access to information, services and markets that would otherwise be inaccessible. The concept of development of the rural, today, is not just project initiatives and governance; it is much more beyond that. This paper uncovers a whole plethora of ICT emergence as a technology of the new millennium.

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Introduction:

Direct or indirect application of ICT, in rural development sector has also been referred to as "Rural Informatics". Rural economies can be benefited from ICT by focusing on social production, social consumption and social services in the rural areas (Malhotra, 2001). The inculcation of a Citizen-to-Government (C2G) and Citizen-to-Citizen (C2C) interface would provide this link that would also lead to community participation in design and implementation of ICT interventions. This in return could promise better economic opportunities as well as social inclusion of rural people in the processes of governance. Such attributes in the social set up are essential prerequisites for good governance and rural development.

Concerns about educational quality and educational opportunities with the necessity of developing those most vulnerable are the accumulation of globalization is symbiotic. Generally, "the changes of globalization in developing countries, on low-income groups, especially women and girls and" low skill workers, as well as all groups applying for and obtaining new skills to press. (Bellamy and Taylor, 1998).

Technologies (ICT) during the past two decades have had many points of contact with education and training. The development of technology is placing new demands on expertise, and it is also leading to the increased use of information technology (IT) in

instruction and learning. As early as in the 1970s discussions of the future of school systems started to pay attention to the opportunities provided by ICT.

Now with the approach of the new millennium, IT is playing an increasingly central role in almost all future planning of schools and instruction. (World Bank, 1999).

The process of development in a country is to be aided by its governance. The goal of governance "should be to develop capacities that are needed to realize development that gives priority to the poor, and creates needed opportunities for employment and other livelihoods" (The World Bank, 1992, UNDP, 1994). Increased number of poor, hungry or marginalized people in a country represents decrease in its quality of governance. To promote development, various studies have proposed governance in the contextual realities of each country, including veritable participation of citizens in the governmental decision-making process (Grindle, 2004; Evans and David, 2006). Several Institutions and experts accept Governance as a reflexive process, wherein policies, institutions, outcomes and analysis interact, to maximize the process of participatory development (UNDP, 1997; Ludden, 2005; Mehta, 2006).

Information and communication technologies (ICT), including radio and television and the newer digital technologies like computers and the Internet as

potentially are introduced powerful tools and activators of educational reform and changes. different ICT, when properly applied can be developed to help access to education and the relationship between training and workshops to strengthen the increasingly digital, the quality of education also helped to create teaching and learning in an active process connected to real life high take. However, the experience of being raised by ICT in the classroom and other educational sites around the world during the last few decades proves that is not automatic fully realize the potential benefits of ICT training. (Gupta and et al, 2004)

But nowadays, ICT is more than a technology. Although the old technologies such as telephone, radio and television, will be less attention in the past but were used as educational tools. For example, "radio and television are used for over forty years to open and distance education. In this regard, although print remains the most expensive method and therefore available, but in developed and developing countries is provided the most prominent mechanism. Internet and computer use in developing countries still in early stages are spent and if they used are limited due to is expensive infrastructure and access to them.

1- The challenges to educational policy and planning:

To achieve promotion and reform in education through ICT, should be considered explicit and clear objectives, guidelines, mobilize the required resources and political requirements for understanding the primary goal in all levels. Some essential elements in planning for ICT are listed below:

1-1-A correct analysis of the current state of education system. ICT impacts should be considered institutionalized as current methods, respectively, and especially "those ICT to drive forward and the barriers should be recognized, as well as those related to education and training programs, infrastructure, capacity building, language and content and finance.(Collis, 2004).

1-2-Educational objectives at different levels of education, as well as various aspects of ICT applications that can best meet these goals in the state be used. Policymakers must understand the potential of ICT in various different goals when the concepts are used.

As well as may alert best practices around the world, about the priority educational needs, financial and Human resources and capacity bottlenecks the country and how these experiences can be adapted to

the specific needs of the country (Hakkarainen, 2000).

1-3- Identifying stakeholders and coordinating actions among different interest groups.

1-4- Conducting chosen model based on ICT, should are tested on a small scale, best design models or those who proved they can be used in other areas. Such guidance is essential for identifying, correcting, feasibility, etc.

1-5- Preparation of available financial resources and identify strategies to generate financial resources for strengthening the application of ICT in the long run. (Harris, 1999).

2- Infrastructural challenges in education of based on ICT:

Before any program of based on ICT to run, an Educational technology infrastructure is placed above infrastructure of information and telecommunications. Policy makers and planners should carefully take into account the following:

2-1- At first, is there suitable rooms and buildings for placing technology? Building schools in countries that they are too old, is required to ensure an extensive repair of electrical wiring system, building, cooling and heating, ventilation and safety.(Swaminathan, 2002).

2-2- are there electricity and phone? Developing countries, vast areas still lack adequate power and several miles away their nearest phone station. In some African countries are using wireless technology, although expensive approach, but other developing countries with poor telecommunications can try this solution.

2-3- Policy makers must are examined also attending a variety of ICT in the country in general and the educational system (all levels) in particular. For example, "a primary need in education of based on ICT (using a computer and via online) access to computer and Internet services at the community level, especially schools and host families (Virgo, 2008).

3- Challenges of Capacity building:

Various attempts should be occur throughout the educational system integration for success of ICT.

3-1- professional development of teachers should be have five-axis: (Dadgaran, 2002)

- Skills in specific applications
- merging in existing curriculum

- curriculum changes regarding the application of IT (including changes in instructional design)
- Changes in the teacher's role
- to support educational theories

Ideally these should be served in pre-service training of teachers and be upgraded in in-service. In some countries, like Singapore, Malaysia and England, is required to recognize the application of ICT training courses. ICT will change speedily technologies and in this regard even the most elite teachers need to promote ICT skills and are welcome the latest developments and best practices.

Although the first focus is skills with specific applications but other four focus is importance. Research on ICT application in different fields as education and uniform over the years show disability as a barrier to teachers successfully plan, understand why they should use ICT and how to properly get the best teaching aid. (Falk and Wolfmayr, 2008).

Unfortunately, most teacher professional development in ICT has been the emphasis on teaching tools and their application in education. If learning process being Student centered, anxiety of teachers from being struck by the technology or the loss of authority in the classroom, can be prevented and as a deep understanding and feeling a severe change in their role than do not have to be raised.

Whether ICT will replace teachers? Answer is "no". In fact, with promoting ICT in the classroom, teacher's role in learning process is even more important. What can and should change is the role of teacher. Likewise the role of students "developed since the ICT can be opened classroom doors to the outside world, the community could be a new role in class. (Mohseni, 2003).

Since education is transferred in model centered-teacher to centered-student model, the unique authority of teachers was low and are known more than as facilitators, observers and trainers (of the absolute ruler to guide the way).

Primary task of the teacher is teaching students how to ask questions and to discuss the issue, make hypotheses, and then if necessary to reach Information about finding the issues raised in relation to the assessment. (FAO, 2000).

Because of improved ICT training a new experience, even for teachers, teachers learn educational process and new things are discovered among the students.

Plus this is not unusual to see students in a class based on ICT undertake formal and informal roles of teacher to younger friends and students and sometimes even for teachers. (Saadan, 2001).

Teachers and students from different schools, experts, parents, community and business leaders,

politicians and other stakeholders are involved in the educational process areas as resource persons, critic, observer and encouraging.

They also are essential and general customers for student published work on the Web or other media. Not many teachers reluctant to use ICT are especially "computer and internet usage. Hannafin and Savenye were found several reasons for this reluctance:

- Poor design of software,
- pessimism towards Computer effects of increasing efficiency in teaching,
- lack of managerial support,
- the time and efforts to increase technology and learn how to use for training
- Fear of losing authority in the classroom, as class is centered student.

These are points that should be served in pre-service training and professional development programs in in-service training of teachers. In in-service training about professional development of ICT teachers, should in the long run, be flexible and possible. (Cecchini and talat, 2002).

For many teachers lack the necessary conditions, and with less rights in developing countries, adaptation of ICT effectively subject to granting the necessary opportunities for learning things that they need to learn according to their own experience. Motivation of teachers and supporting teachers to pursue professional development plan is necessary. That can be promoted as with ICT initiatives for teachers who are classroom teachers or ensure adequate access to technology is after training.

Results:

This paper emphasizes adoption of a more systematic approach for integrating Traditional Knowledge Systems (TKS) and ICT inputs to ensure sustainability of rural e-governance projects. The study of literature related to rural development and e-governance has indicated various issues impeding success of such initiatives. The main issues are lack of localization of content for rural communities and inadequate participation of rural communities in design of rural ICT initiatives. The study therefore suggests the use the systems-approach to integrate the relevant TKS along with ICT initiatives in the design of e-governance systems for rural development. This participatory approach can lead to creation of more acceptable and sustainable e-governance projects.

Regardless of the wide differences in ICT access between rich and poor countries and between different groups in the country, there are concerns that challenge the application of ICT in education with the existing differences among the lines of economic, social, cultural, geographic and gender will be broader. Everyone equal opportunities in

terms of suitability for participation are necessary, but access to various factors, either as users or as producers through their sources is difficult and heavy. Therefore, the primary differences enhance and even grow. Consequently, programmers' international education is faced with a difficult challenge and how to help solve the problem and its development.

Promoting ICT in education, when done without careful study, can lead to the marginalization of those with more favorable conditions are unknown. For example, "women compared with men, because of illiteracy, lack of higher education, lack of time and mobility and poverty, controlling access to ICT and fewer opportunities for training are relevant. Also, more boys than girls' access to computers at home and school are not strange to say that if more boys than girls are willing to work with computers. The report of the University Association of American Women is that "Although some girls have an important gender gap have been limited, but today's technology, technology club, and boys in public schools while its own problems and programs are settled girls use computers for word processing the brand". In an assessment in four African countries, the activities organized by World links remote international cooperation on projects between teachers and students in developing countries will promote, despite creating programs without regard to sex contacts, sexual inequalities remain Uganda and Ghana. In addition, while more girls than boys in relation to academic performance and advanced communication skills program will enjoy more than boys, but they were unable to perform their technological skills were. A set of economic factors, organizational and cultural differences involved in the social.

"The high ratio of students to computers and politics, whoever came first, the first is used in accordance with the girls wanted it." Girls travel restrictions in the early hours of daily work and home responsibilities are that this will limit their access. Also because local patriarchal beliefs dominate the boys are in the computer lab environment. Including proposed measures to address this discrimination, strategies to encourage schools to create "fair use" in the computer labs and the holding of meetings and sexual sensibilities conductivity decreased defense duties after school girls. ICT provides access to only a small part of the action is created equal. Equal attention should also be applied to ensure the technology really "is used by learners and ways of how well their needs will cure.

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Effect of K, P, Zn, S Fertilizer on cold tolerance on rapeseed genotypes (relay Cropping) in climatic region of Varamin

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Abstract: In order to study of different levels of fertilizer treatment (K , Zn, S) on increase tolerance to cold on quality characteristics on genotypes of rapeseed in delayed planting , an investigation was carried out with factorial in random complete block with three replications and 36 treatment ,in Varamin - Pishva university field research (Ghaleh – sin) in 2008-2009. Factors were genotypes in three levels(Hyola -42 , SLM046 , Zarfam) and fertilizer treatment in 4 levels (1-Control , 2- C+ K, 3- C, K+Zn, 4- C, K, Zn +S). Planted seed at 10th November were delayed planting .The highest grain yield achieved from (C,K,Zn,S,SLM046)with 6564.6 Kg/ha ,That had 72 % grain yield further of (Control, Zarfam) genotype with 1807.65 Kg/ha. Also the highest number of pods per plant, number of grain per pods and biological yield with 156.97, 20.7 and 17384.9 Kg/ha respectively was obtained from Hyola-42 Hybrid and use of C, K, Zn, S. In this research the lowest these amounts were achieved for Zarfam genotype with Control fertilizer. In conclusion Slm046 genotype with C, K, Zn, S fertilizers was suitable for delayed planting (Cold Stress) for Varamin condition.

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Keywords: Rapeseed; Genotype; yield and yield components cold tolerance

Introduction

Considering the high cold tolerance in canola and desirable agronomic traits, using side products and the high percentage of oils such as canola cultivation is the most important benefits that can be placed in rotation with cereals.

Adequate to cover the field and appropriate growth and increased tolerance to cold, canola should be grown on suitable planting, in general, canola should be six weeks before the first frost. Planting In the late fall, often resulting in increased seedling departure time due to reduced soil temperatures and reducing withdrawal and seedling cold damage (Starnier et al., 2002).

In most cases what the delay in planting in the spring and in autumn will reduce performance. Combined with accelerated development by reducing plant growth after flowering (especially in late genotypes clay) is the main cause of yield loss (Mendham et al., 1995). In a research, with three genotypes of Canola Okapi, Orient, Colvert, the four planting dates (15th September, 25th September, 4th October and 14th October) at the research station, Miami and Florida was about concluded that planting on September 15 and 25 significant difference in terms of yield are not, while planting on October 14 produced the lowest yield (Afridi et al., 2002). Habekotte (2003) in the adaptation and comparison of quantitative and

qualitative characteristics of 11 genotypes of autumn-type rapeseed genotypes were the result of two genotypes Zarfam zero tolerance to cold and maximum grain weight is greatest and most seed oil to genotype Yantar Most growth and oil yield was related to genotype SLM046 (Gupta and Daws, 2008).

Mendham (1995) concluded that late planting dates before flowering time to receive radiation and there is a growing shortage of lower saddlebag number per square meter through more number of seeds per pod greater amount of compensation and performance.

In a study on determining the best planting date in the three species B. Rape, B. Juncea, B. Carinata was announced that delays in planting can make the required amount of heat (GDD) in the plant growth period to reach needs to be reduced, but the number of days elapsed, the total increase (Mulkurasi, 2006). Mendham and Scott (1995) showed that early planting dates, and grain losses portmanteau of lower canopy layers are more, but cultures later on, the mortality rate is the same throughout the canopy. Hierarchical arrangement of branches, portmanteau shows that the earlier lower saddlebag on the main stem and branches will be formed first from the standpoint of timing, development and access to material raised leaves, lower stems have the advantage.

Curtis (2006) also believes that potassium no effect on the rate increase hydrocarbon oils and

proteins are increased in this way to cold stress tolerance of canola. Sulfur tolerance of plants against environmental stresses and increases in winter rapeseed grown are using sulfur due to long period planting to harvest increased protein yield and seed oil content (Torsswel, 2004). Marschner (2002) believes that rapeseed is taking on increased plant mass and thus be used to increase hydrocarbon production and finally also because increased oil percent increase tolerance to cold stress.

In order to study the compatibility of the modified rapeseed in 24 genotype weather was cold country and slm046 Hyola -42 genotypes respectively 3852 and 3656 kg / hectare produced the highest yield (Grom bacher and Nelson, 2001). Since the units will try to use the maximum agronomic practice in the region comes after Varamin can delay harvest corn planted canola be grown using fertilizer is hoped to be some increase in cold tolerance in canola so that no Canola yield reduction, efficient use of farm land, the following research aim was to achieve such a major.

Material and Methods

To investigate the effect of potassium fertilizer, sulfur and zinc on quantitative characteristic on early planted canola, as a factorial experiment in randomized complete block design in three replications third decade of November 88-87 did at the farming year in the Agricultural Research Station Varamin. Experiment location, geographic coordinates of 39 and 51 and 19 along the east, 35 north latitude and altitude of 1000 meters above sea level is located in the experimental treatments included: genotype 1-Hyola-42 2 - Slm046 3 - Zarfam and second treatment Fertilizer: 1 - control (N + P) 2 - control + potassium sulfate 3 - Control + potassium sulfate + zinc sulfate II 4- control + potassium sulfate + zinc sulfate II + sulfur treatments. Treated fertilizers were selected according to soil test results. 200 kg/ ha urea, 50 kg/ ha triple superphosphate and 50 kg /ha potassium sulfate and 25 kg ha zinc sulfate and 30 kg ha sulfur were used. All fertilizer and 1.3 Nitrogen were used at planting and the other Nitrogen in two ways at the stage of rapid growth and stem elongation in spring. Each replicate

included 12 treatments and each treatment consisted of nine lines. Fight weeds manually in the third decade of April and early May 1388 was done to combat the toxin *Mtasytostoks* cabbage aphid wax ratio 1.5 was used in thousands. At physiological maturity used to determine yield components of five plant randomly selected in each treatment plant that the number saddlebag. To determine the yield: portmanteau of each plot area 3.20 m² 18 June 1388 harvest. For final drying and the humidity reaching 12 percent for one week and put in the air then manually separate seeds from the wallet and the seeds were harvested separately every plot with accurate laboratory scales and weighing data had been extended to the whole performance. The end of the experiment, the results of each of the characters, after expansion to hectare and with the help of computer software SAS (9) analysis of variance and comparison of data were drawn with the help Duncan test at 1 and 5 percent was conducted by the computer program Excel charts.

Results and Discussion

Number of silique per plant based on data from this study on the interaction effects and simple, and fertilizer treatments on the number of genotypes in plant satchel at 5 and 1 percent was significant. Treatment A2B4 (SLM046, C, K, Zn, S) with 156.7 numbers, highest levels and treatment A3B1 with 94.3 numbers lowest to allocated. Corelation line has been reported between the numbers portmanteau plant dry matter production and cumulative to the end *B.napus* L. flowering species (Habekotte, 2003). So it seems that cold stress on photosynthesis compared with restricting the number of actual satchel reduces potential. Perhaps this ratio index, influenced by the amount of stress Submit product on the plant. In this study, using oligo-elements and element sulfur, potassium, zinc and increased grain stored hydrocarbons in the synthesis of proteins that share the pollen tube and cause the storage protein is a member of the leading to increase pollination and fruit set is more seeds (Marschner, 2002).

Table 1. Analysis of variance of yield component as affected by Genotype and fertilizer treatment in rapeseed

S.O.V	df	No.ofsilique per plant	No.of grain per silique	1000grain weight(g)
Replication	2	3.02 ns	25.81 *	0.021 ns
Genotype	2	101.41 **	918.25 **	6.08 *
Fertility	3	89.52 **	654.03 **	9.41 *
Genotype*Fertility	6	221.48 **	384.41 **	13.25 **

**Significant difference (=1%), *significant difference (=5%), ns: No significant difference

Total grain satchel data showed that genetic differences between genotypes in terms of seeds per genotype SLM046 satchel is delayed planting conditions could produce 18.1 the number of seeds the best rates from the wallet to its genotype and Zarfam 14.7 minimum number of seeds in the wallet. Fertilizer treatments also caused changes 26.3 percent in the trait and the number 14 in the control treatment to 19 the number increased in the treated B4. The interaction between the genotype and fertilizer treatments on the number of seeds in the satchel was a significant level of 1 percent. Satchel of seeds per 11.8 numbers in the treatment A3B1 20.7 reached the number in treatment A2B4 genotype and fertilizer treatments affected about 43 percentage. Feeding Canola zinc, is due to increased hydrocarbon stored pollen, pollen longevity increases and the resulting increase in pollen grains and the formation of more wallet (Sharma et al., 1999). Any factor that increases the dry weight during the growth period is like planting date and the elements, number of seeds increases the saddlebag. Mendham (1995) concluded that late planting dates before flowering time to receive radiation and there is a growing shortage of lower saddlebag number per square meter through more number of seeds per pod to get some extra compensation and performance.

Table 2. Means comparison of yield component as effected by Genotype and fertilizer treatment in rapeseed

Treatment	No. of silique per plant	No. of grain per silique	1000grain weight(g)
Hyola-42 (A1)	132.85 a	16.7 ab	3.7 a
SLM046 (A2)	140.17 a	18.1 a	3.6 a
Zarfam (A3)	112.7 b	14.7 b	3.38 b
C (B1)	112.4 b	14 c	3.42 b
C, K (B2)	122.7 b	15.5 c	3.52 b
C,K,Zn (B3)	134.8 ab	17.5 b	3.59 ab
C,K,Zn,S (B4)	145.1 a	19 a	3.69 a

Means with the same letter in each column have not statistically significant difference

The study treated A2B4 (C, K, Zn, S, SLM046) than treatment A3B1 (Zarfam, C) superior 35.2 had shown that the effect of the elements used on rapeseed genotypes that could have negative effects that cause planting delays rapeseed plants weaken and fall due to reaching the appropriate LAI able to produce enough sap to fill the raised beads formed, especially in the seeds on the wallet is not sub-branches. The interaction was significant between genotype and fertilizer treatments on grain weight at =1%. A1B4 treated with the highest average amount of 3.8 g and the lowest average 3.18 g was obtained from A3B1 treatment.

Table 3. Means comparison of yield components as affected by Genotype and fertilizer treatment in rapeseed

Treatment	No. of silique per plant	No. of grain per silique	1000grain weight(g)
Hyola-42*C(A1B1)	117.2 c	14.4 e	3.6 bc
Hyola-42*C,K(A1B2)	125.6 bc	15.9 d	3.68 b
Hyola-42*C,K,Zn(A1B3)	138.4 b	17.6 c	3.71 ab
Hyola-42*C,K,Zn(A1B4)	150.2 ab	18.9 b	3.8 a
Slm046*C (A2B1)	125.6 bc	15.8 d	3.49 cd
Slm046*C,K(A2B2)	134.4 b	17.2 c	3.57 c
Slm046*C,K,Zn(A2B3)	146.4 ab	18.9 b	3.64 bc
Slm046*C,K,Zn,S(A2B4)	156.7 a	20.7 a	3.7 ab
Zarfam*C(A1B1)	94.3 d	11.8 f	3.18 f
Zarfam*C,K(A3B2)	108.2 cd	13.4 e	3.31 e
Zarfam* C,K,Zn(A3B3)	119.7 c	15.9 d	3.44 d
Zarfam* C,K,Zn,S(A3B4)	128.5 bc	17.6 c	3.58 bc

Means with the same letter in each column have not statistically significant difference

Mulkurasi (2006) reported that planting later than the deadline, number of seeds per plant decreased and increased grain weight plant is canola seed weight, but this increase has not been able to reduce other components of grain yield to compensate, also increases the duration between increased germination to flowering. In the present study with genotype Hayvla -42 SLM046 Zarfam to excellence has been treated using elements of potas, zinc and sulfur content increases in leaf and stem carbohydrates during the formation of which appear to be portmanteau facilitate the flow carbohydrates to the reproductive organs and ultimately increase product quality seed. This action due to the impact on various stages and elements mentioned enzymes such as carbonic anhydraz and dhydvnaz (Tandon, 2001). Therefore able to use these elements much about the negative effects of cold stress to control and

prevent severe grain weight. The highest grain weight of the treated was obtained for A1B4 (Hayvla -42; control, potash, zinc and sulfur).

Interaction between genotypes and fertilizer treatments was significant on yield ($\alpha=1\%$) 1807.65 kg per hectare of treated A3B1 to 6579.6 kg per hectare, which was treated A2B4 has increased 72 percent.

Canola yield in fact is balance between vegetative growth and the potential number of flowers and seeds, research shows that low temperatures during flowering through pollen grains thwarting the main factor is to reduce grain products (Torsswel, 2004). To so that the tension during flowering and pollination role are in distinguishing genotypes of rapeseed yield and yield components (Smith and Gallway, 2008). In order to study the compatibility of the modified rapeseed in 24 genotype weather was cold country and SLM046 Hyola -42 genotypes respectively 3852 and 3656 kg per hectare produced the highest yield (Tandon, 2001).

In this study the use of fertilizers, potas, zinc and sulfur increased root growth, the branches and eventually (Grewal and Graham. 1997) (Smith and Gallway, 2008). Researchers in their research are showed that taking zinc and other micronutrients is to increase grain yield (Srinivasan and Morgan, 2006). Srinivasan and Morgan (2006) expressed in their reports that the consumption of oligo-elements before planting, the yield increases to 56 %. Sulfur used with nitrogen, phosphorus and potassium increased yield to 51.3%.

Table 4. Analysis of variance of yield and HI as affected by Genotype and fertilizer treatment in rapeseed

S.O.V	df	Grain yield(Kg/ha)	Biological Yield(Kg/ha)	HI (%)
Replication	2	12.85 ns	9.45 ns	6.48 ns
Genotype	2	254648.2 **	334417.2 **	1845.3*
Fertility	3	195521.6 **	195673.6 **	1492.01 *
Genotype*Fertility	6	408092.5 **	250426.5**	23814.8 **

**Significant difference ($\alpha=1\%$), * significant difference ($\alpha=5\%$), ns: No significant difference

Performance of biological functions biologically from 8420.6 kg per hectare in genotype Zarfam to 13063 kg per hectare in genotype SLM046 hit. Fertilizer treatments had significant effect on yield biologically and biological yield from 7198.8 kg per hectare in the control treatment reached to 14405.9 kg per hectare in the B4 treatment. Curtis(2006) believes that late planting reduced biological function .But the result showed that taking elements such as potash, zinc and sulfur plant height and branch number scheme and eventually saddlebag and ultimately grain yield per plant and biological yield increases and has not killed late than too early influence on biological function.

Table 5. Means comparison of yield and HI as affected by Genotype and fertilizer treatment in rapeseed

Treatment	Grain yield(Kg/ha)	Biological Yield(Kg/ha)	HI (%)
Hyola-42 (A1)	4175.7 b	11034.5 b	37.75 a
SLM046 (A2)	4874.4 a	13063 a	37.12 a
Zarfam (A3)	3000.82 c	8420.6 c	35.42 b
C (B1)	25573d	7198.8 d	35.7 b
C, K (B2)	3491.3 c	9445 c	36.7 ab
C,K,Zn (B3)	4800 b	12307.8 b	37.1 ab
C,K,Zn,S (B4)	5414 a	14405.9 a	37.4 a

Means with the same letter in each column have not statistically significant difference

The interaction was significant between genotype and harvest index of fertilizer treatments on the harvest index at $\alpha=1\%$. A1B4 had the highest harvest index of treatment with 38.1 %, and the lowest harvest index was obtained for A3B1 treatment with 33.9 %. Although SLM046 genotype has the highest biological yield and grain yield, but in terms of harvest index was the second; genotype Hayvla -42 due to less difference between grain yield and biological will be non-Vrs more efficient and effective use of nutrient elements, able, with greater harvest index. In this study, fertilizer quality genotypes and their genetic characteristics, which caused the highest harvest index of treatment A1B4 (-42 Hayvla and control, potash, zinc and sulfur), respectively. Loffe(2008) and the results In this study the delay in planting resulted in a significant reduction in harvest index but Srinivasan and Morgan(2006) stated that the delay in planting no effect on harvest index.

Table 6. Means comparison of yield and HI as affected by Genotype and fertilizer treatment in rapeseed

Treatment	Grain Yield(Kg/ha)	Biological Yield(Kg/ha)	HI (%)
Hyola-42*C(A1B1)	2794.5 f	7469.6 g	37.4 ab
Hyola-42*C,K(A1B2)	3699.7 de	9824.7 e	37.6 ab
Hyola-42*C,K,Zn(A1B3)	4722.2 c	12457.1 c	37.9 a
Hyola-42*C,K,Zn(A1B4)	5486.3 b	14386.7 b	38.1 a
Slm046*C (A2B1)	3129.7 ef	8695.3 f	36 b
Slm046*C,K(A2B2)	4286.6 cd	11473.8 d	37.3 ab
Slm046*C,K,Zn(A2B3)	5501.7 b	14698.1 b	37.4 ab
Slm046*C,K,Zn,S(A2B4)	6579.6 a	17384.9 a	37.8 a
Zarfam*C(A1B1)	1807.65 g	5431.7 h	33.9 c
Zarfam*C,K(A3B2)	2487.5 f	7036.5 g	36.7 b
Zarfam* C,K,Zn(A3B3)	3531.9 e	9768.2 e	37.1 ab
Zarfam* C,K,Zn,S(A3B4)	4176.1 d	11446.1 d	37.4 ab

Means with the same letter in each column have not statistically significant difference

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Prevalence of Adrenocortical Insufficiency in Patients with Liver Cirrhosis, Liver Cirrhosis with Septic Shock and in Patients with Hepatorenal Syndrome

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Abstract: Critical illness is accompanied by the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which is highlighted by increased serum corticotropin and cortisol levels. In patients with severe sepsis, the integrity of the HPA axis can be impaired by a variety of mechanisms. These patients typically have an exaggerated proinflammatory response and are considered to be relatively corticosteroid insufficient. This complex syndrome is referred to as critical illness-related corticosteroid insufficiency (CIRCI) which manifests with insufficient corticosteroid mediated down regulation of inflammatory transcription factors. Similar to type II diabetes (relative insulin deficiency), CIRCI arises due to corticosteroid tissue resistance together with inadequate circulating levels of free cortisol. Numerous papers have reported a high incidence of adrenal failure in critically ill patients, including those with end stage liver disease and liver transplant recipients. The term hepatoadrenal syndrome e.i., Adrenocortical insufficiency in patients with liver cirrhosis has been used to describe such an association between liver disease and adrenal failure and the definition of this term extends beyond the occurrence of sepsis, which is a frequent complication of liver failure. Aim of work to assess: The prevalence of hepatoadrenal syndrome (HAS) among the Egyptian cirrhotic patients, the prevalence of HAS among those complicated with septic shock or hepatorenal syndrome and to find significant predictors for HAS. Patients and methods: Our study was a cross sectional study, conducted on 45 patients admitted to the liver intensive care unit and hepatology ward of Theodor Bilharz Research Institute (TBRI) in the period between November 2009 and February 2010, who were fulfilling the criteria of Child Pugh classification. Patients were divided into three groups. Group A included 15 patients with liver cirrhosis, with neither septic shock nor hepatorenal syndrome, Group B included 15 patients with liver cirrhosis and septic shock, but not associated with hepatorenal syndrome, Group C included 15 patients with hepatorenal syndrome. The adrenal function of all patients was assessed by the conventional dose, short synacthen test (250 ug.iv) which was performed within the first 24 h of admission. Blood samples to measure plasma cortisol levels were obtained before and 30 minutes after synacthen administration. Results: Our study revealed that adrenocortical insufficiency (ACI) was found in 33 patients out of the 45 patients subjected to this study (73.3%). Receiver Operating Characteristic (ROC) curve was done and showed that the MELD score may be a good predictor for ACI in liver cirrhosis patients. ROC curve showed also that the serum bilirubin may be a good predictor for ACI in liver cirrhosis patients. Conclusion: Adrenocortical insufficiency is common in patients with cirrhosis and in patients complicated with hepatorenal syndrome. According to our study MELD score and serum bilirubin level may be good predictors for Hepatoadrenal Syndrome. Recommendation: We recommend To make further studies with greater number of patients to detect hepatoadrenal syndrome and to study its effect on the prognosis, the complication of liver cirrhosis and mortality.

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Key words: Liver cirrhosis, child classification, hepatoadrenal syndrome, hepatorenal syndrome, adrenal dysfunction, adrenocortical insufficiency, relative adrenal insufficiency, MELD score

1. Introduction

Critical illness is accompanied by the activation of the hypothalamic pituitary-adrenal (HPA) axis, which is highlighted by increased serum corticotropin and cortisol levels [1-3].

The activation of the HPA axis is a crucial component of the host's adaptation to severe stress. Cortisol is essential for the normal function of the immune system, maintenance of vascular tone, and various cellular functions. In patients with severe

sepsis, the integrity of the HPA axis can be impaired by a variety of mechanisms [1-4].

These patients typically have an exaggerated proinflammatory response and are considered to be relatively corticosteroid insufficient. Until recently, the exaggerated proinflammatory response that characterizes patients with systemic inflammation has focused on suppression of the HPA axis and adrenal failure. However, experimental and clinical data suggest that corticosteroid tissue resistance may also

play an important role. This complex syndrome is referred to as critical illness-related corticosteroid insufficiency (CIRCI) which is defined as inadequate corticosteroid activity for the severity of the illness of a patient. CIRCI manifests with insufficient corticosteroid mediated down regulation of inflammatory transcription factors. Similar to type II diabetes (relative insulin deficiency), CIRCI arises due to corticosteroid tissue resistance together with inadequate circulating levels of free cortisol [5].

Recently, the concept of relative adrenal insufficiency (RAI) has been used to describe a subnormal adrenal response to adrenocorticotropin in severe illness, in which the cortisol levels, even though high in terms of absolute value, are inadequate to control the inflammatory situation [1].

The short corticotropin stimulation test i.e the short synacthem test (SST), is most commonly used to evaluate the appropriateness of the adrenal response in this setting. Numerous papers have reported a high incidence of adrenal failure in critically ill patients, including those with end stage liver disease and liver transplant recipients [6].

The term *hepatoadrenal syndrome* has been used to describe such an association between liver disease and adrenal failure and the definition of this term extends beyond the occurrence of sepsis, which is a frequent complication of liver failure [6].

Aim of the work

- To detect the prevalence of hepatoadrenal syndrome (HAS) in patients with live cirrhosis and in those complicated with septic shock or hepatorenal syndrome.
- To find out significant predictors for hepatoadrenal syndrome (HAS)

2. Patients and Methods

Our study was a across sectional study, conducted on 45 patients (21 males and 24 females) admitted to the liver intensive care unite and hepatology word of Theador Bilharz Research Institute (TBRI) in the period between November 2009 and February 2010, who were fulfilling the criteria of child Pugh classification. Patients were divided into three groups. **Group A** included 15 patients with liver cirrhosis, with neither septic shock nor hepatorenal syndrome, **Group B** included 15 patients with liver cirrhosis and septic shock, but not associated with hepatorenal syndrome, **Group C** included 15 patients with hepatorenal syndrome.

All patients were subjected to:

1. Full clinical evaluation,
2. Routine lab. Investigation,
3. Model for End stage Liver Disease (MELD) scoring.

The adrenal function of all patients was assessed by the conventional dose, short synacthem test (250 ug,iv .), which was performed within the first 24 hrs of admission.

Informed consent for participation in the study was obtained according to the guidelines of the institutional review boards for human subjects at the participating study centers.

Inclusion criteria:

1- Liver cirrhosis patients by:

- I. Full clinical assessment.
- II. Child. pugh classification.
- III. Abdominal ultrasonography

2-Cirrhotic patient with septic shock is considered present when:

I: Two or more of the following criteria are met :

1. Body temperature > 38°C or < 36°C
2. Tachycardia >90/minute
3. Hyperventilation: respiratory rate >20/minute or arterial hypocapnia < 32 mmHg
4. White blood cell count > 12,000/dL or <4,000/dL or immature forms > 10%

II: Source Of Infection.

III: Sepsis associated with circulatory failure characterized by persistent arterial hypotension (decrease of systolic blood pressure below 90 mmHg or >40 mmHg from baseline, or mean arterial pressure <60 mmHg, despite adequate fluid resuscitation) unexplained by other causes. [7]

Refractory circulatory failure was defined as a persistent or growing metabolic acidosis despite adequate vasoactive support over an observation period of 6–12hours, and was judged to be present if there was a base excess below 5 mmol/l at the end of this period [8].

3- Hepatorenal syndrome:

Diagnostic Criteria of Hepatorenal Syndrome in Cirrhosis [9]

- Cirrhosis with ascites
- Serum creatinine > 1.5 mg/dL
- No improvement of serum creatinine e.g decrease to a level of 1.5 mg%, after at least 2 days with diuretic withdrawal and volume expansion with albumin; the recommended dose of albumin is 1gm/kg/d up to maximum of 100 g/day.
- Absence of shock
- No current or recent treatment with nephrotoxic drugs
- Absence of parenchymal kidney disease as indicated by proteinuria >500 mg/day, microhematuria (>50 red blood cells per high-power field), and/or abnormal renal ultrasonography.
- Urine volume <500 mL/day [10]

-Urine sodium <10 mEq/L [10]

Exclusion criteria:

- History of long term steroid therapy.

All patients were subjected to the following:

- 1- Child–Pugh classification and score using full detailed history and clinical evaluation (Table 1 & 2).
- 2- MELD (Model of End stage Liver Disease) score using full detailed history and clinical evaluation. $MELD = 3.78 [Loge \text{ serum bilirubin (mg/dL)}] + 11.2 [log_e \text{ INR}] + 9.57 [Loge \text{ serum creatinine (mg/dL)}] + 6.43$
- 3- **Full chemistry** including total lipid profile, liver function tests, renal functional tests Complete blood count, Prothrombin time (PT), Prothrombin Count (PC) and INR.
- 4- Urinary Na.
- 5- Abdominal ultrasonography

6- Synacthen test was performed within the first 24 hours of admission.

Synthetic adrenocorticotrophic hormone (250 µg, Synacthen), was given intravenously. Blood samples to measure plasma cortisol levels were obtained before and 30 minutes after synacthen administration.

According to the serum cortisol level one of the following three conditions could be detected:

1. Baseline serum cortisol level >35 g/dL, this means that functional hypoadrenalism is unlikely.
2. Baseline serum cortisol level <15 g/dL, this means that functional hypoadrenalism is likely.
3. If the baseline serum cortisol level is between 15-35 g/dL, at this situation the increase in plasma cortisol will be the determining factor, as if the increment is ≤ 9 mg/dL, hypoadrenalism is likely, while if the increment is ≥ 9 mg/dL, functional hypoadrenalism is unlikely (**II**).

Table (1): Showing Child Pugh Score (12, 13)

Measure	1 point	2 points	3 points	Units
Bilirubin (total)	<34 (<2)	34-50 (2-3)	>50 (>3)	mol/l (mg/dL)
Serum albumin	>3.5	2.8-3.5	<2.8	g/L
INR	<1.7	1.7-2.2	>2.2	-
Ascites	None	Improved by medication	Refractory	-
Hepatic encephalopathy	None	Grade I-II (or suppressed with medication)	Grade III-IV (or refractory)	-

Note: The Child-Pugh score is calculated by adding the scores of the five factors and can range from 5 to 15. Child Pugh class is either A (a score of 5 to 6), B (3 to 9), or C (10 or above). Decompensation indicates cirrhosis with a child Pugh score of 7 or more (class B). This level has been the accepted criterion for listing for liver transplantation.

Table (2): Child Pugh Score Interpretation (12, 13)

Points	Class	Life expectancy	Preoperative Mortality
5-6	A	15-20 years	10%
7-9	B	Candidate for transplant	30%
10-15	C	1-3 years	82%

3. Results :

Demographic Data:1. Age distribution:

The mean age of **group A** patients was 52.8 ± 10.97 year, **group B** patients was 60.2 ± 8.99 year, and **group C** patients was 59.33 ± 8.65 year. There was no significant statistical difference in age between the three group (Table 3).

2. Adrenocortical insufficiency distribution:

Our study revealed that adrenocortical insufficiency (ACI) was found in 33 patients out of

the 45 patients subjected to this study (73.3% vs 26.7%) respectively (Figure 1).

Table (3): Showing age distribution

Group	No. Of Patients	Age (years)	P-Value
A	15	52.8 ± 10.97	0.081
B	15	60.2 ± 8.99	
C	15	59.33 ± 8.65	

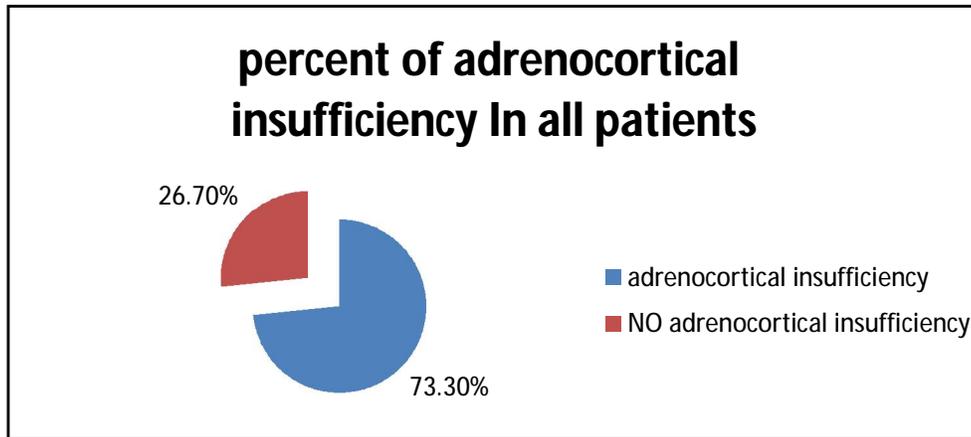


Fig (1): Percentage of adrenocortical insufficiency In all patients

The prevalence of adrenocortical insufficiency (ACI) varied between the three groups, being found 53.5% in *group A* patients, 86.7% in *group B*, and 73.3% in *group C*. there was no significant statistical difference in adrenocortical insufficiency between the three groups (P: 0.092), also there was no statistical difference between each two groups as follow, between group A and group B (P: 0.54), between group A and group C (P: 0.123) and between group B and group C (P: 0.5) as seen in table (4).

Table (4): adrenocortical insufficiency–distribution

Adrenocortical insufficiency		Group A	Group B	Group C	total
		No.	7	2	3
Yes	%	46.7%	13.3%	20%	26.7%
	No.	8	13	12	33
No	%	53.3%	86.7%	80%	73.3%

3. Child-pugh classification distribution:

According to child pugh classification, *group A* had 6 patients (40%) with child A, 4 patients (26.7%) with child B and 5 patients (33.3%) with child C, regarding patients in both *group B* and *C* they were all fulfilling the criteria of child C classification (Table 5).

Table (5) child-pugh classifications –distribution

	CHILD A		CHILD B		CHILDC	
	No.	%	No.	%	No.	%
<i>Group A</i>	6	40%	4	26.7%	5	33.3%
<i>Group B</i>	0	0%	0	0%	15	100%
<i>Group C</i>	0	0%	0	0%	15	100%

4. MELD score distribution:

Regarding MELD score, the mean score was highest in *group C* patients (33.93±3.08), followed by *group B* patients (28.67±5.23), and in *group A* patients it was (15.87±8.25).

There was a statistically significant difference in MELD score between each two groups of the three groups, group A and B < 0.001, group A and C < 0.001, and group B and C P: 0.003 (Table 6) .

Table (6): showing MELD score distribution

Group	Number of Patients	Mean ± SD	P-Value
A	15	15.87± 8.25	A,B<0.001
B	15	28.67 ±5.23	A,C<0.001
C	15	33.93 ±3.08	B,C=0.003
Total	45	26.16±9.6	

II. Relation between significant predictors and Adrenocortical Insufficiency:

1. Child Score and adrenocortical insufficiency:

There was a statistically significant relationship between child score and adrenocortical insufficiency (ACI), as the 33 patients diagnosed to have ACI had child score of 12.52±2.35, while the other 12 patients who did not have ACI, had a child score of 9.75±3.91 with a P value: 0.049 (Table 7).

Table (7): Mean±SD of Child score in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number of patients	Mean ± SD Of Child Score	P-Value
Yes	33	12.52± 2.35	0.049
No	12	9.75± 3.91	

2. MELD score and adrenocortical insufficiency:

There was a highly statistically significant correlation between MELD score and ACI, as the 33

patients diagnosed to have ACI, had a MELD score of 28.66 ± 8.05 , while the other 12 patients who did not have ACI, had a MELD score of 19.25 ± 10.45 , with a P value: 0.008 (Table 8).

Table (8): Mean \pm SD of MELD score in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number Of Patients	Mean \pm SD Of Meld Score	P-Value
No	12	19.2500 ± 10.45	0.008
Yes	33	28.66 ± 8.05	

3. Serum Bilirubin level and Adenocortical Insufficiency:

There was a highly statistically significant correlation between serum bilirubin level and ACI, as the 33 patients diagnosed to have ACI, had a serum bilirubin level of 50.1 ± 3.072 mg/dL, while the other 12 patients who did not have ACI, had a serum bilirubin level of 2.04 ± 1.35 mg/dl with a p value: 0.002 (Table 9).

Table (9): Mean \pm SD of serum Bilirubin level in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number Of Patients	MEAN \pm SD Of Serum Bilirubin Level Mg/Dl	P-Value
No	12	2.40 ± 1.35	0.002
Yes	33	5.01 ± 3.072	

4. Serum creatinine level and adrenocortical insufficiency:

There was a highly statistically significant correlation between serum creatinine level and ACI, as the 33 patients diagnosed to have ACI, had a serum creatinine level of 3.033 ± 1.45 mg/dL while the other 12 patients who did not have ACI, had a serum creatinine level of 2 ± 1.5 mg%, with a P value of 0.027, (Table 10).

Table (10): Mean \pm SD of serum creatinine level in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number OF Patients	MEAN \pm SD Of Serum Creatinine Level mg/dL	P-Value
No	12	2 ± 1.5	0.027
Yes	33	3.0333 ± 1.45	

5. Serum SGOT/AST and adenocortical insufficiency:

On evaluating the relationship between serum SGOT/AST and ACI in patients subjected to this study, it was found that the 33 patients diagnosed with ACI, had serum SGOT/AST level of 82.848 ± 93.34 mg/dL,

while the 12 patients who did not have ACI had serum SGOT/AST level of 31.66 ± 13.79 mg/dL with a highly significant statistical P value of 0.003 (Table 11).

Table (11): Mean \pm SD of serum SGOT/AST level in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number of Patients	MEAN \pm SD Of Serum SGOT Level mg/dL	P-Value
No	12	31.66 ± 13.792	0.003
Yes	33	82.848 ± 93.34	

6. Serum albumin level and adrenocortical insufficiency:

On evaluating the relationship between serum albumin level and ACI, it was found that the 33 patients diagnosed to have ACI, had albumin serum level of 2.433 ± 0.612 mg/dL, while the 12 patients who did not have ACI, had albumin serum level of 2.958 ± 0.59 gm/dL with a significant P value: 0.014 (Table 12).

Table (12): Mean \pm SD of serum albumin level in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number of Patients	Mean \pm Sd Of Serum Albumin Level mg/dL	P-Value
No	12	2.9583 ± 0.59766	0.014
Yes	33	2.4333 ± 0.612	

7. Blood urea nitrogen (BUN) and adrenocortical insufficiency:

The 33 patients diagnosed to have ACI, had a BUN level of 50.9 ± 24.08 gm/dL, while the 12 patient who did not have ACI, had BUN level of 30.83 ± 22.43 mg/dL with a P value: 0.012., (Table 13).

Table (13) Mean \pm SD of serum BUN level in patients with and without adrenocortical insufficiency

Adrenocortical Insufficiency	Number Of Patients	Mean \pm Sd Of Serum Bun Level mg/dL	P-Value
No	12	30.83 ± 22.433	0.012
Yes	33	50.9 ± 24.089	

III. Logistic regression analysis:

In statistics, logistic regression is used for prediction of the probability of occurrence of an event by fitting data to logic function e.i logistic curve. This study was done to find out the most significant predictor for ACI from the obtained data as child classification, serum SGOT/AST, serum bilirubin, Ascidsis, serum creatinine, serum albumin, and MELD score.

All these data were analyzed by the logistic regression analysis and only MELD score was found to

be a very significant predictor for ACI with a P value: 0.007 (Table 14).

Tab (14): Showing logistic regression analysis for significant variables

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 MELD	.107	.040	7.193	1	.007	1.113
Constant	-1.598	.994	2.584	1	.108	.202
				Score	df	Sig.
Step 1 Variables	Ascites			.058	2	.972
	Ascites (1)			.015	1	.901
	Ascites (2)			.054	1	.816
	Creatinine.0.61.3mgdl			.439	1	.508
	Albumin3.55.5gdl			..622	1	.430
	CHILDClassification			.082	2	.965
	CHILDClassification(1)			.064	1	.801
	CHILDClassification(2)			.055	1	.815
	SGOT737mgdl			2.012	1	.156
	Bilirubin0.21			2.219	1	.136

IV. Receiver operating characteristic (ROC) curve for adrenocortical insufficiency:

ROC curve is a graphical plot of sensitivity by plotting the fraction of true positives out of the positives (TPR= true positive rates) vs. the fraction of

false positives out of the negatives (FNR= false negative rate), in other words sensitivity vs specificity. It was found that MELD score and serum bilirubin could be good screening tests for ACI in patients with liver cirrhosis, (Figure 2).

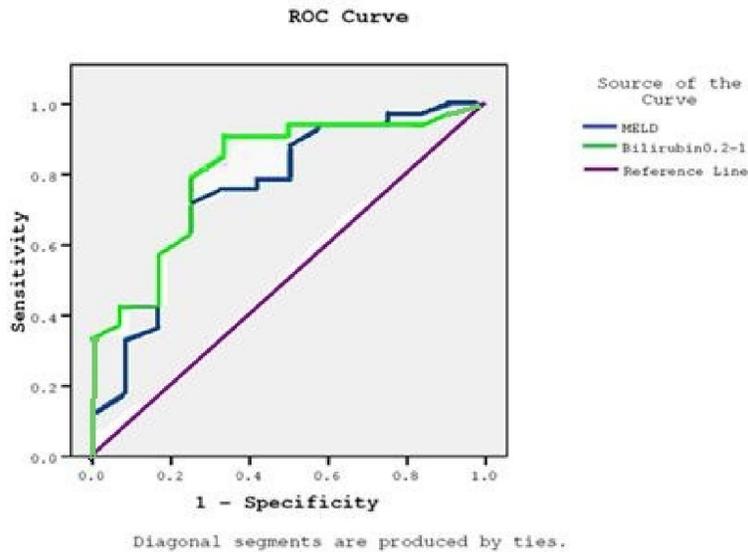


Figure (2) ROC curve for adrenocortical insufficiency the area under the MELD score curve was 0.761, and that under the serum bilirubin curve was 0.811.

Cutoff level interpretation:

1. MELD Score:

Regarding MELD cut off score of 18.5, it had a sensitivity for predicting ACI of 0.879, and a specificity of 0.5. But with a higher MELD cutoff score of 25.5 the sensitivity declined to 0.727 and the specificity raised to 0.75 (Table 15).

2. Serum bilirubin levels:

The interpretation of the serum bilirubin level, showed a cutoff level of 2.75mg/dL, it had a sensitivity for predicting ACI of 0.909 and a specificity of 0.667. But with a higher cutoff serum bilirubin level the sensitivity declined to 0.788 and the specificity raised to 0.75 (Table16).

Table (15) Showing MELD score cut off levels

Positive if Greater Than or Equal To	Sensitivity	Specificity
18.5000	.879	.500
22.5000	.788	.583
24.5000	.758	.667
25.5000	.727	.750

Table (16) Showing bilirubin cut off levels

Test Result Variable(s)	Positive if Greater Than or Equal To	Sensitivity	Specificity
Bilirubin0.2-1	2.7500	.909	.667
	2.9500	.788	.750

3.The serum cortisol level before and 30 minutes after the conventional-dose (250 g IV) short synacthen test:

The whole population of patients had a mean serum cortisol level before synacthen test of 17.9 ± 6.94 , g/dL, P value: 0.44, while the mean serum cortisol level 30 minutes after synacthen test was 22.65 ± 8.96 g/dL P value: 0.539, with a median increment 4.1 g/dL (Table17).

From the previously mentioned data, there was no significant statistical difference between the three groups of patients.

Table (17): Showing synacthen tests results and shows P value between serum cortisol 0 min and 30 min after synacthen test

The whole population of patients	Serum cortisol	Mean±SD g/dL	P value	Median increment g/dL
	0 min.	17.9±69.4	0.44	
30 min. after ACTH	22.65±89.6	0.539		

4. Discussion:

Our study was a cross sectional study, conducted on 45 patients diagnosed to have liver cirrhosis admitted to the hepatology intensive care unit & hepatology ward at Theodor Bilharz Research Institute (TBRI) they included 21 males (46.7%) & 24 females (53.3%).

- Group A included 15 patients with liver cirrhosis neither complicated with sepsis nor hepatorenal syndrome.
- Group B included 15 patients with liver cirrhosis complicated with septic shock.
- Group C included 15 patients with hepatorenal syndrome.

All patients had been subjected to full history taking, clinical examination, several

laboratory investigations, and statistically comparative studies.

Our study found that the prevalence of adrenocortical insufficiency (ACI) was 73% in all patients. The prevalence of adrenal insufficiency varied between the three groups, being found 53.5% of patients with liver cirrhosis only, 86.7% in liver cirrhosis associated with septic shock and 73.3% in patients with hepatorenal syndrome.

This goes with what Marik et al., found in 2005, as they conducted a study on 340 patients suffering for liver disease. Adrenal insufficiency was found in 72 % of the patients. The prevalence of ACI varied between the groups, being seen in 66% of ACLF (acute on top of chronic liver failure) patients, 33% of ALF (acute liver failure) patients, and 61% of patients who had undergone liver transplantation in the past [6]. In the study conducted by Harry et al., (14) on 20 patients, 69% of the patients had adrenal insufficiency. In another study conducted by Harry et al., (15) in they found that out of the 45 patients subjected to the study, 62% patients had ACI. In 2006 Fernandez et al.,(16) studied 25 patient's with liver disease, they found that 63% had ACI .

But in another study conducted by Tsai et al., (17) on 101 patient with liver cirrhosis complicated with severe sepsis and septic shock, they found that not more than 51.4% of the patients had ACI. This difference in ACI prevalence between our study and that one, might be due to the type of patients population subjected in both studies as we included patients with hepatorenal syndrome while Tsai et al., (17) studied only cirrhotic patients complicated with severe sepsis and septic shock.

Our study found that patients who had ACI, had a mean child score of 12.52 ± 1.6 , compared to 4.75 ± 3.9 in those who did not have ACI, P value: 0.049. This goes with what Tsai et al., (17), as patients with ACI had a mean child score of 12.7 ± 2.2 , while those who did not have ACI, had a mean child score of 11 ± 2.7 with a statistical significant P value: 0.022. Also they found a relation between the cortisol increment and Child-Pugh scores, suggesting that adrenal dysfunction is related to liver function reserve.

Regarding MELD score, our study found that patients with ACI had a mean MELD score of 28.6 ± 8 compared to 19.2 ± 10 in those without ACI (statistically significant P value: 0.008). This is in agreement with Tsai et al.,(17). who found that patients with ACI had a mean MELD score of 15.2 ± 5.2 and in patients without ACI the mean MELD score was 10.4 ± 6 with statistically significant P value < 0.001.

Logistic regression analysis was done to search for significant predictors ACI, only MELD

was found to be a significant predictor for ACI with a P value of 0.007.

ROC curve was done and showed that the MELD score may be a good predictor for ACI in liver cirrhosis patients. The area under the MELD curve was 0.76 and a MELD cutoff score of 25.5 had a sensitivity of 0.727 and specificity of 0.75, was shown while a MELD cut off score of 18.5, had a sensitivity of 0.879 and specificity of 0.500. This differs from the study Tsai et al., [17] who found in 2006 that MELD cutoff level of 12 had a sensitivity of 72.22% and specificity of 65.95%. Despite the difference in MELD score cutoff levels, MELD score could be a good predictor with a considerable sensitivity and specificity as with high score values the specificity in detecting ACI increase as the MELD score gets higher the ACI could prevail.

On evaluating serum blood urea nitrogen we found that patients with ACI had a mean serum BUN level of 50.9 ± 24.089 mg/dl, compared to 30.03 ± 22.43 in patients without ACI who statistically significant P value of 0.012. This does not go with Tsai et al. [17], who found in 2006, that patients with ACI had a mean serum BUN level of 58.1 ± 47.5 mg/dL, and in patients without ACI, the mean was 43.6 ± 40.3 mg/dL with no statistical significant p value: 0.103.

Regarding serum creatinine level, our study found that patients with ACI had a mean serum creatinine level of 3.03 ± 1.45 mg/dl, compared to 2 ± 1.5 in patients without ACI, with a statistically significant P value of 0.027. These findings are in agreement with Tsai et al., [17] who found that the patients with ACI had mean serum creatinine level of 3.2 ± 2.7 mg/dl and in patients without ACI the mean was 1.9 ± 1.6 mg/dl which showed statistical significant P value: 0.004.

On the other hand Fernandez et al., [18], found that the mean serum creatinine level in patients without ACI was 2.5 ± 2.4 mg/dL compared to 1.9 ± 1.1 in those suffering from ACI. This disagreement might be due to the number of patient in their (25 patients vs 45 patients in our study). Also it may be due to the patients clinical status in our study, as most of them were complicated with hepatorenal syndrome while in Fernandez et al.,(18) study patients were complicated with septic shock.

On evaluating the serum Bilirubin level, our study found that there was a correlation relation between ACI and Bilirubin. Patients with ACI had a mean serum bilirubin level of 5.01 ± 3.072 mg/dl compared to 2.4 ± 1.35 in those without ACI statistically significant P value of 0.002. This is agreement with Tsai et al., [17] who found a significant relation between ACI and serum Bilirubin $P < 0.001$.

ROC curve was done and showed that the serum bilirubin may be a good predictor for ACI in liver cirrhosis patients, as the area under the curve of bilirubin was 0.811. With a serum bilirubin cutoff level of 2.75 mg/dl a sensitivity of 0.909 and specificity of 0.667 were shown. When the bilirubin had a cutoff level of 2.95 mg/dl, the sensitivity was 0.788 and specificity was 0.75. This is in agreement with Tsai et al., [17], the that serum bilirubin was an independent factor in predicting adrenal insufficiency in critically ill patients with cirrhosis and severe sepsis.

Evolutionary endocrinology provides an example of tissue corticosteroid resistance. New world monkeys (eg, squirrel monkey and cotton-top tamarin) over-express FK binding protein-51 (a GR chaperone), resulting in decreased nuclear translocation of the glucocorticoid-GR- complex [19, 20]. In addition, these monkeys have a transcriptionally incompetent GR [20]. To overcome this inherent corticosteroid resistance, these primates have elevated circulating levels of both free and total cortisol relative to those in old world monkeys (eg, humans) [19]. Tissue corticosteroid resistance is a well known manifestation of chronic inflammatory diseases such as COPD, severe asthma, systematic lupus erythematosus, ulcerative colitis, and rheumatoid arthritis [21-24]. Emerging data suggest that corticosteroid tissue resistance may develop in patients with acute inflammatory diseases, such as sepsis and acute lung injury (ALI) [25].

In a sheep model of ALI induced by *Escherichia coli* endotoxin, Liu et al [26] demonstrated decreased nuclear GR- binding capacity and increased expression of phospholipase A2 (PLA2) despite increased serum cortisol levels. These authors demonstrated similar findings in the liver cytosol following a burn injury in rats, which were partially reversed by TNF- and IL-1 neutralizing antibodies [27]. Kino et al [28] and Kino and Chrousos [29] have demonstrated that TNF- inhibits the transcriptional activity of the GR- by interfering with its interaction with p160 type nuclear receptor coactivators. In an ex vivo model, Meduri et al [25] compared the cytoplasmic to nuclear density of the GR-complex in patients with ARDS whose conditions improved with that in patients that did not improve. These authors demonstrated a markedly reduced nuclear density of the GR-complex in patients who did not improve, while the cytoplasmic density was similar in patients who improved and in those who did not. This experiment provides further evidence that the nuclear glucocorticoid-GR activity may be impaired in critically ill patients despite adequate cytoplasmic (serum) levels of cortisol.

Conclusion:

Adrenocortical insufficiency (hepatoadrenal syndrome), is commonly present in patients with cirrhosis and in patients complicated with hepatorenal syndrome. In patients with liver cirrhosis adrenal dysfunction is associated with renal dysfunction, it occurs more frequently in patients with more severe liver disease and correlates with disease severity scores. According to our study MELD score and serum bilirubin level may be good predictors for hepatoadrenal syndrome.

Recommendation:

1. We recommend making further researches on hepatoadrenal syndrome and to study its effect on prognosis and complication of liver cirrhosis.
2. Further clarification is needed in terms of whether glucocorticoid supplements in this subset of patients can improve hemodynamic impairment, multiple organ dysfunction and outcomes.

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Design and Development of a Portable Banana Ripeness Inspection System

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Abstract: Automatic control of environmental conditions is an important problem of banana ripening treatment. In this study, a capacitive sensing system was designed and developed. In this method banana fruit is placed in the capacitive sensor as a dielectric material and then the capacitance of sensor is measured. Experiments were carried out with 10 kHz to 10 MHz sinusoidal frequencies. A consistent decrease of ϵ_b had occurred at 100 kHz and 1 MHz frequencies when banana had been ripened. A high correlation was observed between ϵ_b and ripening period ($R^2 = 0.96$) at 100 kHz frequency. This system has the following characteristics: rapid response, simple operation, non-destructive measurement, and low cost.

[Mahmoud Soltani, Reza Alimardani and Mahmoud Omid. **Design and Development of a Portable Banana Ripeness Inspection System.** Journal of American Science 2011; 7(6):401-405]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Banana fruit, Dielectric constant, Electronic circuit.

1. Introduction

Recently, capacitive sensors have been used for property determination of agricultural products. The earliest use of capacitive sensor in agriculture as a function of a sensor refers to 80 years ago. The earlier application of this type of sensor was in sensing grain moisture content. The next application of capacitive sensor is qualification of agricultural products. Kato (1997) investigated the relationship between density and internal quality of watermelon. He developed a new electrical method for density sorting of spherical fruits, which measured the volume of fruit by electric capacity and mass by electronic balance. Jarimopas et al. (2005) designed and developed an electronic device with a cylindrical capacitive sensor to measure the volume of selected fruits and vegetables. They reported the electronic device volume measurements of a calibration set of 30 samples correlated very well with those produced by the water displacement method. The R^2 values for watermelons, large cucumbers, wax gourds and guavas were 0.999, 0.957, 0.999, and 0.99, respectively. Rai et al. (2005) designed and developed an electronic device with a parallel plate capacitor to measure the moisture content of selected grain. They reported that the developed instrument was working satisfactorily for all practical purposes in the range of 5-25 % of grain moisture with an accuracy of $\pm 1\%$. Ragni et al. (2006) used a sine wave radio frequency oscillator with parallel plate capacitor sample probe to predict the quality of egg during storage period. They noted the suggested models enabled to classify samples of shell eggs,

while they were not useful to assess with accuracy a single egg. Kumhála et al. (2009) tested a capacitive throughput sensor for potatoes and sugar beets. The principle of the sensor was based on the fact that the dielectric constant of an air/material mixture between two parallel plates increases with material volume concentration. They developed theoretical model for a capacitive throughput sensor. Soltani and Alimardani (2011) investigated correlation between moisture content and dielectric constant of pea and black-eyed pea. They obtained best results at 1 MHz frequency for pea and black-eyed pea with R^2 of 0.994 and 0.999, respectively.

To control the condition of banana ripening treatment and having a good ripened banana fruit, an expert person is needed for determining the level of banana ripeness. Sometimes, banana fruits do not reach to full-ripe step and so the green spots remain on the peel of banana. This problem is because of manual controlling of ripening treatment. To achieve a good ripening, an online controlling system is essential. This work aims to design and develop a device to monitor the ripeness level of banana fruit during ripening treatment and control ripening conditions such as temperature, air moisture content and ethylene concentration.

2. Materials and methods

Sample preparation

The Cavendish variety of banana fruits transported from the Ecuador was used. The banana fruits have been stored at 14°C temperature when they were transferred. Forty three fingers of banana

were randomly selected from banana boxes in a ripening room of Damirchiloo warehouse located in Karaj city, Alborz state, Iran. The experiment was carried out at the airtight ground-warehouse with storage humidity level of 85% - 88% for five days, the time needed for completing the ripening treatment of fruits. At this site, ripeness is currently assessed visually by comparing the peel color of banana with standardized color charts that describe various stages of ripeness. In trade market, seven ripening stages of bananas are usually discerned (Figure 1). Color stage is judged visually by using a chart scale provided to categorize banana based on its level of ripeness. On the first day, banana fruits were at stage one (0% ripened) and on the fifth day, they were at stage six (100% ripened). Ethylene gas with 1000 ppm concentration was treated about 24 hours on first day. It is very important to control temperature, humidity and ethylene gas concentration in the ripening room. In order to give a good artificial climacteric rise of banana fruits during the ripening, electrical measurements were performed in the ripening room. The experiments were conducted in controlled temperature room at 15.5 °C. To measure capacitive properties of banana, a rectangular parallel plate capacitor with 25 cm in length and 10 cm in width was constructed as a standard hardware instrument. The conductive plates were selected from aluminum materials because of its consistency that would not be easily ionized, as a factor that will ruin the results of experiments.

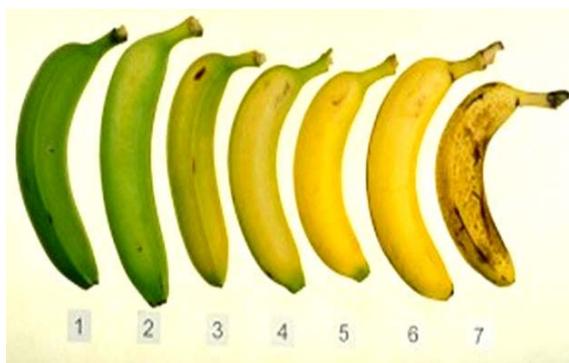


Figure 1. Color chart of banana fruit to recognize the stage of ripeness [1].

Electrical measurements

To study the feasibility of this method, an experimental electronic measuring system was developed. The system is composed of a function generator, data acquisition card and a personal computer. To extract the dielectric constant (ϵ_r) of the material in the sensor, an AC current was needed, because the DC current is not able to pass through the

capacitive sensor. A sinusoidal function generator (Model: AM-1300, Korea) was used to generate sweep sine wave from 10 kHz to 10 MHz. To measure the output voltage of sensor, a data acquisition card (Model: APC-40, Korea) with 100MS/s data sampling rate was used. Figure 2 shows the block diagram of ϵ_r measuring system. To avoid any conduction of fruit because of the banana being in contact with capacitor plates, samples were suspended between the sensor's plates.

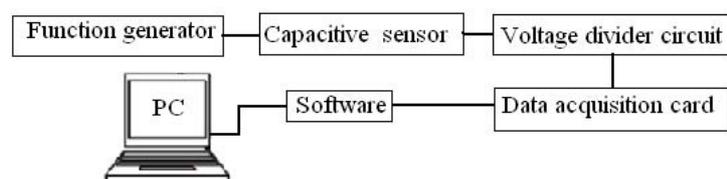


Figure 2. The block diagram of experimental measurement system.

Estimation of banana fruit dielectric constant

When a banana sample is suspended through the sensor, an air gap is introduced between banana fruit and plates, therefore the dielectric material through the capacitive sensor is a mixture of air/banana fruit, and in fact, a series-parallel capacitor is formed. To estimate the banana fruit dielectric constant (ϵ_b), a model was proposed by Soltani et al. (2011). In their proposed model, the projected area and thickness of banana fruit is needed. Soltani et al. (2010) developed a new method to predict the projected area of banana as functions of fruit dimensions.

Design of capacitive sensing unit

In order to predict the ripeness percent of banana fruit in warehouses, an electronic unit was designed and developed. The electronic device for ripeness measurement has four components: two rectangular parallel plate capacitor, electronic circuitry, microcontroller, and display (Figure 3). Measuring of ϵ_b initiates after the banana is placed through capacitive sensor on two small brackets. All voltage measurements, calculations and analysis operations are done by microcontroller and then results of ripeness estimation are shown on the display.

The circuit diagram for predicting the ripeness stage of banana fruit is shown in Figure 3. The ATmega 32 microcontroller is the principal part of the system. The ATmega 32 converts analog voltage to digital voltage, estimates ϵ_b and hence of banana ripeness level. The main components of

sinusoidal signal generator circuit are IC-XR2206, resistors R1 and R3. R1 at pin 7 provides the desired frequency tuning and R3 at pin 3 adjusts the amplitude of signal. The output voltage from sensor is converted to DC current by a diode bridge, and then the A/D unit of ATmega 32 measures the output voltage. The system had been calibrated by standard capacitors previously and relation between measured voltage and capacitance was extracted. The dimensions of banana fruit are entered to microcontroller by a 4×4 keypad, finally the results of banana ripeness prediction is displayed on a 16×2 characters LCD (Figure 4). Figure 5 shows the flow diagram of banana ripeness sensing program.

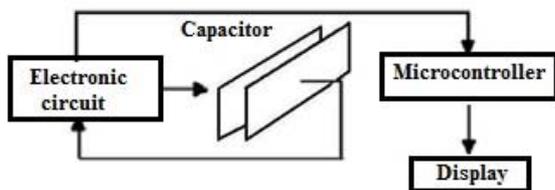


Figure 3. Schematic diagram and designed system for ripeness level prediction.

3. Results and discussion

Relation between percent of ripeness and ϵ_b was investigated at 10 kHz, 100 kHz, 1 MHz and 10 MHz frequencies. Results of linear regression are presented in Table 1. The highest value of R^2 (~0.96) was obtained at 100 kHz. Therefore, the 100 kHz sine wave was selected for production of AC current and calibration of designed system. Relation between percent of ripeness and ϵ_b at 100 kHz is shown in Figure 6.

Table 1. Linear regression between ripeness percent and ϵ_b .

Frequency	R^2	Linear regression
10 kHz	0.811	$P_r = -75.45 \epsilon_b + 350.3$
100 kHz	0.96	$P_r = -178.5 \epsilon_b + 804.47$
1 MHz	0.937	$P_r = -304.8 \epsilon_b + 1374$
10 MHz	0.6	$P_r = -198.6 \epsilon_b + 998$

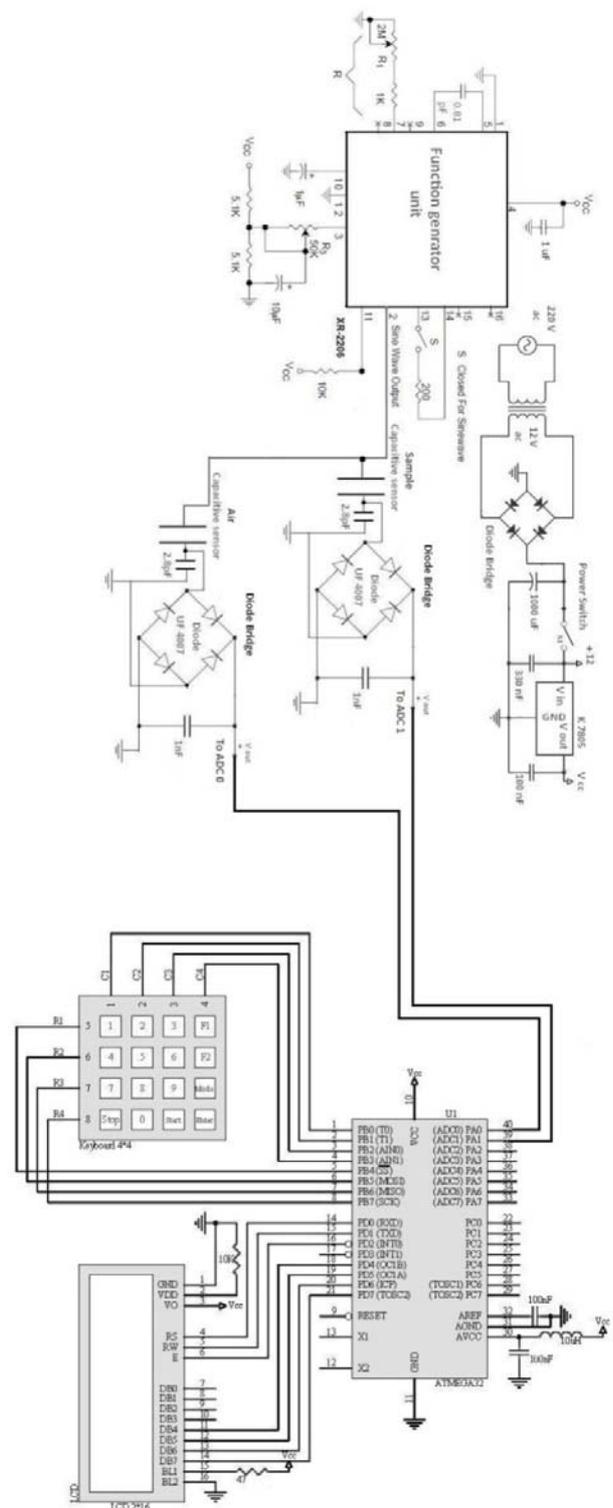


Figure 4. Electronic circuit diagram of the device for banana ripeness measurement.

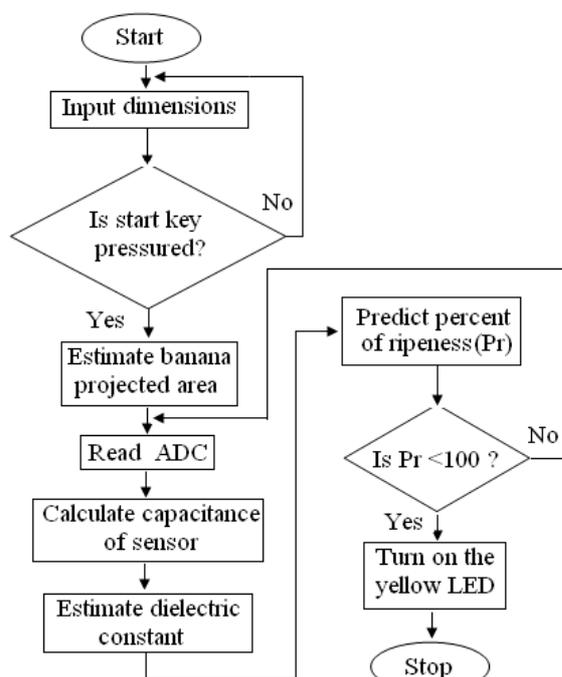


Figure 5. Flow chart of banana ripeness predicting program.

The slope of line was found by means of regression analysis. Since the initial values of dielectric constant differed among samples, to obtain calibration equation for each sample, the first day's dielectric constant, ϵ_{b0} , was used as the abscissa. The level of ripeness is computed by Eq. (1):

$$P_r = -178.5(\epsilon_b - \epsilon_{b0}) \quad (1)$$

Where P_r is the percent of ripeness, ϵ_b is dielectric constant of banana, and ϵ_{b0} is the dielectric constant of banana in first measuring and -178.5 is the coefficient of calibration.

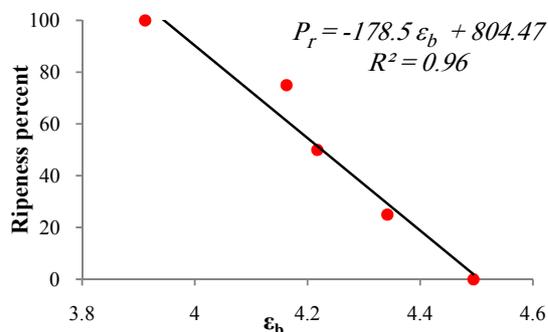


Figure 6. Correlation between percent of ripeness and ϵ_b .

4. Conclusion

A low cost device for predicting the ripeness level of banana fruit was designed and built. This unit estimates the ripeness level of banana by its dielectric constant. The designed system can predict the ripeness level of banana fruit reliably. By this unit, the condition of ripening room such as temperature can be controlled automatically. Dimensions of sample had a direct effect on ϵ_r . The proposed model aiming to eliminate the effects of banana mass and air gap needs to dimensions measurement operation, so the operator need to measure dimensions of banana and inter into the system.

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Effect of Chitosan on Oxidative Stress and Metabolic Disorders Induced In Rats Exposed to Radiation

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Abstract: Radiation is one of the most widespread sources of environmental stress in living environment which cause oxidative stress and metabolic changes. Chitosan is widely distributed in nature as a component of bacterial cell walls and exoskeletons of crustaceans and insects. The present study aims to evaluate the antioxidant effect of chitosan against gamma rays induced oxidative stress and metabolic disorders in rats. The study was conducted on forty eight (48) female rats which were classified into four equal groups. Group1: Control group, rats administrated orally 1.0 ml vehicle solution for forty days Group. 2: Chitosan group, rats administrated orally (intragastric intubation) 1.0 ml of chitosan solution (100mg/kg b.wt. / day for 40 days).Group3: Irradiated rats, rats were subjected to whole body –irradiation to dose 4 Gy delivered as single exposure dose. Group 4: Combined treatment: rats administrated orally 1.0 ml of chitosan solution (100mg/kg b.wt. / day) for 40 days. At day 35 of chitosan treatment the rats were irradiated at dose level of 4Gy. Rats inspected after 1th and 5th days post irradiation and liver, spleen, lung and blood samples were collected. The animals exposed to gamma radiation had significant increase in TBARS, LDH, glucose, cholesterol, triglycerides, LDL-C, copper, iron, urea, creatinine, AFP and non significant increase in Mg. Also, significant decrease in GSH, CAT, HDL-C and estradiol was recorded. Administration of chitosan to rats prior and post gamma radiation improved the tested parameters so it is a therapeutic alternative for oxidative stress, hyperlipidaemia and hormonal changes. In this way, chitosan may be contributed to the prevention of atherogenic processes and contribute as safe functional fiber food.

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Key words: Chitosan, - irradiation, Antioxidant, Lipid profile, Kidney function, Hormones, Rats.

1. Introduction:

Human exposed to ionizing radiation has become inevitable with its vast application in diagnosis and industry. Everyone on earth exposed to radiation either natural background radiation or some of the population has the occasional medical or dental X-ray (Stevenson, 2001). Radiation damage, is to a large extent caused by over production of reactive oxygen species(ROS) which cause disruption of membrane lipids leading to subsequent formation of peroxide radicals(Rajakpase *et al.*,2007). Oxygen free radicals are highly reactive and may cause cell and tissue damage by interacting with cell membranes and organelles, lipid peroxidation is a ubiquitous phenomenon in the body under the influence of oxidative stress (Ozturk *et al.*, 2003). Reactive oxygen species are constantly generated in aerobic organisms during normal metabolism and in response to both internal and external stimuli as a result of water radiolysis (Kamat *et al.*, 2000). ROS have been implicated as major initiators of tissue damage and can up regulate enzyme activity, signal transcription, and gene expression (Massafra *et al.*, 2000).

Evidences have shown that over production of ROS in both intra and extra cellular spaces results as an imbalance between pro-oxidants and antioxidants that cause ROS production exceed the activity of

endogenous antioxidants which increase oxidative stress. Once this imbalance takes place cellular molecules such as nucleic acids, proteins, structural carbohydrates, and lipids may be damaged by oxidative modifications (Ornoy, 2007). Also,ROS play a causative role in numerous disease pathologies such as cancer, ischemia, and degenerative disease such as aging, atherosclerosis, arthritis and neurodegeneration (Nelson and Melendez,2004)and cytotoxicity, metabolic and morphologic changes in animals and humans(Fang *et al.*,2002).

Marine organisms produce many bioactive substances, which are having a lot of potential applications. Chitosan, is the deacetylated form of chitin of marine origin is extracted from the shells of crustaceans (Sini *et al.*, 2005).

Chitosan (CS), is non toxic copolymer consisting of -(1, 4)-2- amino-2 deoxy-D-glucose (1, 4-linked polymer of glucosamine) and lesser amounts of N-acetylglucosamine. It is a naturally occurring biodegradable and biocompatible cationic polysaccharide derived from the N-deacetylation of chitin which is the most abundant natural structure polysaccharide after cellulose. It can be found in exoskeleton of crustaceans which can be obtained from the shell waste of the crab, shrimp and craw fish during processing industries and in fungal cell walls (Shahdat *et al.*, 2007). As a natural renewable

resource, chitosan has both reactive amino and hydroxyl groups that can be used under mild reaction for biomedical application. Chitosan is an attractive agent for drug development given its function in the gastrointestinal tract and its intrinsic safety when taken orally (Murata *et al.*, 2009).

Chitosan is the most abundant natural amino polysaccharide and is being used as a new source of dietary fiber (Liao *et al.*, 2007). Chitosan has a number of unique properties such as clarification, purification, antimicrobial activity, non toxicity, biocompatibility and biodegradability, which attract scientific and industrial interest in fields of biotechnology, pharmaceuticals, waste water treatment, cosmetics, agriculture, food science nutrition, paper and textiles to use it (Hua and Wang, 2009). Also, it combined with calcium phosphates for use as bone graft substitutes (Geffre *et al.*, 2010). Chitosan has many advantages due to its nontoxicity and biodegradability without damaging the environment. It is a biocompatible material that breaks down slowly into a harmless product, glucosamine, which is absorbed completely by the body (FDA, 2002).

Chitosan has been reported to possess immunological (Mori *et al.*, 1997), antibacterial (Tokura *et al.*, 1997) and wound healing (Okamoto *et al.*, 1993) properties. Both hard and soft contact lenses can be made from chitosan (Santhosh *et al.*, 2006). Sapelli *et al.* (1986) studied the application of chitosan in dentistry.

The present study designed to establish the putative protective, antioxidant and restorative effect of chitosan against gamma radiation induced oxidative stress which alternate the antioxidant status in hepatic, spleen and lung tissues and metabolic disturbances in serum.

2-Material and Methods

2.1.1-Materials

Chitosan with high molecular weight, Brookfield viscosity 800.000 cPS (Aldrich product of USA) was dissolved in 1% glacial acetic acid solution.

2.1.2- Animals

Female albino rats (130-140g) were obtained from the animal breeding house of Nuclear Research Center, Atomic Energy Authority, Inshas, Egypt. The animals were kept in isolated cages, under standard laboratory conditions including all hygienic measures with constant illumination and ventilation and normal conditions of temperature and humidity. Animals were maintained on a standard laboratory pellets containing all nutritive elements and free access to tap water was available. The animals were allowed to acclimatize for two weeks before the experiment.

2.1.3- Radiation Facility:

Whole body gamma irradiation was performed using gamma cell -60 (Cobalt-60) unit at the Middle Eastern Regional Radioisotopes Center for The Arab Countries (MERRCAC), Dokky, Cairo, Egypt. Animals were exposed to 4.0 Gy applied as a single shot dose.

2.1.4-Experimental design

The animals were randomly assigned into 4 groups (12 rats for each group). Group1: Control group, rats administrated orally 1.0 ml vehicle solution (1% glacial acetic acid in distilled water) for forty days. Group 2: Chitosan group, rats administrated orally 1.0 ml of chitosan solution contains dose level of 100mg/kg b.wt. / day for forty days using stomach tube. Group3: Irradiated rats, rats were subjected to whole body - irradiation to dose 4 Gy delivered as single exposure dose. Group 4: Combined treatment: rats administrated orally (intra-gastric intubation) 1.0 ml of chitosan solution contains dose level of 100mg/kg b.wt. / day for 40 days. At day 35 of chitosan treatment the rats were irradiated at dose level of 4Gy.

2.1.5-Sample Collection

Animals were fasted overnight prior to sacrificing. Six rats from different animal groups sacrificed at 1st and 5th days after the irradiation. Blood samples were collected in two types of tubes the first contain sodium fluoride for glucose determination and the second plain tube to separate serum. Liver, spleen and lung were rapidly excised, washes with physiological saline solution, dried, weighed and homogenized in phosphate buffer (pH7.4) and kept frozen until used for biochemical assays.

2.2- Biochemical parameters

Lipid peroxidation content was determined by quantifying thiobarbituric acid reactive substance (TBARS) in tissue homogenates according to the colorimetric method described by Yoshioka *et al.* (1979), Catalase (CAT) activity was determined according to the method described by Johansson and Hakan Borg (1988). Determination of reduced glutathione (GSH) content was performed according to Beutler *et al.* (1963). Serum lactate dehydrogenase (LDH) estimated according to Young (2001). Serum levels of total cholesterol, triglycerides and high density lipoprotein (HDL-C) according to Allain *et al.* (1974), Fossati and Principe (1982) and Demacer *et al.* (1980) respectively. Low density lipoprotein (LDL-C) according to Friedewald *et al.* (1972). Serum urea and creatinine were estimated according to Young (1990) and Henery (1974) respectively. Serum copper, iron and magnesium determined

colorimetrically using commercial spectrum diagnostic kits (Germany). Plasma glucose determined according to Teitz (1986). Estimated sera and plasma parameters were colorimetrically methods performed by using spectrophotometer (Milton Roy Spectronic 1201). Serum alpha feto protein (AFP) and estradiol (E2) were determined using radioimmunoassay kit purchased from Immunotech A Bechman Coulter Company ,France ,using solid phase radioimmunoassay technique(RIA). The day before the animals were sacrificed vaginal smear was done to determine the oestrus cycle stage, so the data of estradiol (E2) represent the mean values of different oestrus cycle.

2.3-Statistical analysis

Data were recorded as mean \pm SE. The results were submitted to one way analysis of variance(ANOVA) according to Snedecore and Cochran(1989) and means were compared between groups by Duncan multiple range test(Duncan,1955).

3. Results

There were no significant differences in behavior or external appearance and food consumption between control and rats administrated chitosan. In addition, no significant difference in blood biochemistry was found in both control and treated rats with chitosan.

In the present study the TBARS levels in hepatic, spleen and lung tissues were significantly ($P<0.05$) increased, while GSH content and CAT activity significantly ($P<0.05$) decreased in irradiated rats group, when compared to control. The TBARS levels in hepatic, spleen and lung tissues showed a significant ($P<0.05$) decrease in rats treated with chitosan prior and post whole body - irradiation, when compared to irradiated group. In addition, significant ($P<0.05$) increases in the GSH content and the activity of CAT were observed in hepatic, spleen and lung tissues in rats administrated chitosan prior and post irradiation as compared to irradiated rats (Table 1).

Table (1): Effect of chitosan on lipid peroxidation (TBARS), reduced glutathione (GSH) content and catalase (CAT) activity in hepatic, spleen and lung homogenate tissues in different groups(M \pm SE).

Parameters	Experimental Period (days)	Groups(n=6)			
		Control	Chitosan	Irradiated	Chitosan+Irradiated
Liver TBARS ($\mu\text{mol/g}$ wet tissue)	1	9.74 \pm 0.83 ^c	9.46 \pm 0.49 ^c	17.38 \pm 0.82 ^a	14.27 \pm 0.48 ^b
	5	10.57 \pm 0.17 ^c	8.43 \pm 0.37 ^d	13.28 \pm 0.36 ^a	11.98 \pm 0.22 ^b
GSH (mg/g wet tissue)	1	19.21 \pm 0.43 ^a	19.66 \pm 0.74 ^{ab}	15.89 \pm 0.72 ^c	17.82 \pm 0.44 ^b
	5	18.55 \pm 0.98 ^a	19.14 \pm 0.78 ^a	14.38 \pm 0.34 ^c	17.78 \pm 0.79 ^a
CAT (U/g wet tissue)	1	17.37 \pm 0.44 ^a	18.43 \pm 0.42 ^a	12.65 \pm 0.87 ^c	14.95 \pm 0.47 ^b
	5	17.29 \pm 0.59 ^{ab}	18.38 \pm 0.53 ^a	13.69 \pm 1.01 ^c	16.98 \pm 0.16 ^b
Spleen TBARS ($\mu\text{mol/g}$ wet tissue)	1	28.35 \pm 2.08 ^c	26.59 \pm 1.49 ^c	53.32 \pm 2.84 ^a	39.75 \pm 2.92 ^b
	5	28.90 \pm 1.53 ^c	24.40 \pm 1.41 ^c	43.17 \pm 1.90 ^a	35.88 \pm 2.33 ^b
GSH (mg/g wet tissue)	1	18.59 \pm 0.60 ^a	19.09 \pm 0.55 ^a	13.65 \pm 0.67 ^b	17.62 \pm 0.49 ^a
	5	19.24 \pm 0.96 ^a	20.10 \pm 1.09 ^a	14.94 \pm 0.50 ^b	18.43 \pm 0.77 ^a
CAT (U/g wet tissue)	1	16.25 \pm 0.38 ^a	17.31 \pm 0.63 ^a	10.42 \pm 0.44 ^c	13.45 \pm 0.74 ^b
	5	16.55 \pm 1.56 ^a	17.92 \pm 1.14 ^a	12.28 \pm 1.11 ^b	15.75 \pm 1.08 ^a
Lung TBARS ($\mu\text{mol/g}$ wet tissue)	1	14.37 \pm 1.10 ^c	13.55 \pm 0.81 ^c	35.19 \pm 1.21 ^a	28.32 \pm 1.14 ^b
	5	13.40 \pm 1.13 ^c	12.59 \pm 0.98 ^c	29.33 \pm 1.48 ^a	20.88 \pm 1.05 ^b
GSH (mg/g wet tissue)	1	17.65 \pm 0.56 ^a	17.73 \pm 0.57 ^a	13.33 \pm 0.53 ^c	15.65 \pm 0.67 ^b
	5	16.98 \pm 0.23 ^b	18.25 \pm 0.51 ^a	14.80 \pm 0.28 ^c	17.44 \pm 0.38 ^{ba}
CAT (U/g wet tissue)	1	18.10 \pm 0.78 ^a	19.24 \pm 0.47 ^a	12.06 \pm 0.65 ^c	15.71 \pm 0.49 ^b
	5	17.10 \pm 0.41 ^b	19.55 \pm 0.34 ^a	13.08 \pm 1.08 ^c	16.48 \pm 0.57 ^b

Data are presented as mean \pm SE

The different small letters in the same row are significantly differ at $P<0.05$

The results presented in Table (2) showed that the serum activities of LDH was not significantly ($P>0.05$) affected by chitosan administration compared to the control group. However, - irradiation leads to significant ($P<0.05$) increase in the serum levels of these myocardial injury marker

compared to the control group. The prior administration of chitosan for thirty five days before whole body - irradiation and five days post irradiation at dose of 4 Gy maintained the activities of this enzyme close to their normal activity as compared to control group (Table 2).

Table (2): Effect of chitosan on serum lactate dehydrogenase(LDH),plasma glucose and serum levels of lipid profile in different groups(M±SE).

Parameters	Experimental Period (days)	Groups(n=6)			
		Control	Chitosan	Irradiated	Chitosan+Irradiatd
LDH U/L	1	364.69±34.06 ^b	361.25±15.86 ^b	484.97±23.22 ^a	399.98±29.58 ^b
	5	355.12±33.81 ^b	349.50±26.73 ^b	469.12±24.04 ^a	378.84±21.34 ^b
Glucose mg/dL	1	103.09±3.27 ^c	99.11±4.87 ^c	138.45±5.33 ^a	121.43±2.65 ^b
	5	101.36±3.80 ^c	92.74±7.09 ^c	127.56±3.28 ^a	116.07±3.17 ^b
Cholesterol mg/dL	1	105.51±2.85 ^c	90.75±3.56 ^d	136.52±2.96 ^a	124.54±4.48 ^b
	5	109.33±3.39 ^b	91.45±5.44 ^c	128.25±5.12 ^a	112.91±2.62 ^b
Triglycerides mg/dL	1	93.78±3.62 ^c	90.02±2.58 ^c	137.32±1.62 ^a	129.24±1.79 ^b
	5	90.13±3.44 ^c	71.09±4.46 ^d	125.85±3.81 ^a	107.61±4.92 ^b
LDL-c mg/dL	1	72.48±2.19 ^c	55.69±0.82 ^d	100.82±1.98 ^a	81.61±2.23 ^b
	5	76.25±1.87 ^b	59.73±3.78 ^c	94.49±3.92 ^a	75.69±5.18 ^b
HDL-c mg/dL	1	14.27±1.89 ^a	17.05±1.64 ^a	8.24±1.95 ^b	17.08±1.41 ^a
	5	15.05±1.43 ^a	17.50±1.13 ^a	10.59±1.29 ^b	15.69±1.08 ^a

Data are presented as mean ±SE

The different small letters in the same row are significantly differ at P<0.05

As shown in (Table 2), - irradiation significantly (P<0.05) increase plasma glucose and altered serum lipid profile. The levels of total cholesterol, triglycerides and LDL-C were significantly (P<0.05) increased and HDL-C was significantly decreased in the irradiated rats group when compared to control group. The prolonged administration of chitosan prior and post exposure to single shot dose body - irradiation showed significantly (P<0.05) lower the alteration in the plasma glucose and lipid profile levels when compared to the irradiated rats.

Results in Table (3) show that irradiation caused significant (P<0.05) increase in serum Cu, Fe, urea, creatinine and non significant increase in Mg as compared to control group. Chitosan administration prior and post irradiation discerned significantly

(P<0.05) lower levels than irradiated group and non significant decrease in Mg as compared to control group.

Table (4) show no significant changes in serum AFP and E2 levels in rats treated with chitosan when compared to control group. A significant (P<0.05) increase was observed in serum AFP level in the irradiated group compared to control group. While the irradiated group discerned significant (P<0.05) decrease in E2 compared to the control group. The prolonged administration of chitosan prior and post whole body exposure to single dose of 4 Gy - irradiation showed significant (P<0.05) decrease in AFP and significant (P<0.05) increase in E2 levels as compared to the irradiated group

Table (3): Effect of chitosan on serum levels of copper (Cu),iron(Fe), magnesium(Mg), urea and creatinine in different groups(M±SE).

Parameters	Experimental Period (days)	Groups(n=6)			
		Control	Chitosan	Irradiated	Chitosan+Irradiatd
Cu µg/dL	1	90.73±1.82 ^c	86.37±1.44 ^c	109.44±1.29 ^a	100.87±1.67 ^b
	5	84.16±1.06 ^c	84.65±1.73 ^{cb}	94.49±1.29 ^a	89.37±1.87 ^b
Fe µg/dL	1	323.74±0.51 ^c	325.87±1.24 ^c	418.42±2.49 ^a	376.00±1.79 ^b
	5	368.73±3.08 ^c	372.07±2.34 ^{cb}	392.50±1.94 ^a	378.14±2.79 ^b
Mg µg/dL	1	2.29±0.29 ^a	2.32±0.22 ^a	2.89±0.16 ^a	2.51±0.39 ^a
	5	2.33±0.20 ^a	2.36±0.21 ^a	2.69±0.11 ^a	2.42±0.15 ^a
Urea mg/dL	1	44.61±1.32 ^{bc}	41.89±0.44 ^c	55.12±2.19 ^a	47.51±1.55 ^b
	5	40.06±1.88 ^b	38.52±2.00 ^b	48.07±1.02 ^a	42.55±1.56 ^b
Creatinine mg/dL	1	0.73±0.02 ^c	0.71±0.01 ^c	1.10±0.06 ^a	0.89±0.03 ^b
	5	0.75±0.03 ^b	0.72±0.03 ^b	0.89±0.04 ^a	0.74±0.02 ^b

Data are presented as mean ±SE

The different small letters in the same row are significantly differ at P<0.05

Table (4): Effect of chitosan on serum alpha feto protein (AFP) and estradiol (E2) levels in different groups(M±SE).

Parameters	Experimental Period (days)	Groups(n=6)			
		Control	Chitosan	Irradiated	Chitosan+Irradiatd
AFP IU/mL	1	0.35±0.09 ^c	0.30±0.04 ^c	0.94±0.09 ^a	0.65±0.08 ^b
	5	0.33±0.03 ^c	0.34±0.09 ^{cb}	0.75±0.07 ^a	0.46±0.04 ^b
E2 ng/mL	1	16.61±1.07 ^a	16.75±1.17 ^a	13.19±1.04 ^b	16.98±0.92 ^a
	5	19.47±0.50 ^a	19.93±0.45 ^a	15.18±0.71 ^c	17.63±0.58 ^b

Data are presented as mean ±SE

The different small letters in the same row are significantly differ at P<0.05.

4. Discussion

Lipid peroxidation, a process induced by free radicals leads to oxidative deterioration of polyunsaturated lipids (Català, 2009). Under normal physiological conditions, only low levels of lipid peroxides occur in body tissues. The excessive generation of free radicals leads to peroxidative changes that ultimately result in enhanced lipid peroxidation (Joshi *et al.*, 2007). Radiation exposure has been reported to be associated with increased disruption of membrane lipids leading to subsequent formation of peroxide radicals (Rajapakse *et al.*, 2007).

In the present investigation, such a disruption of membrane lipids possibly accumulated for the observed increase in TBARS levels in the hepatic, spleen and lung tissues of irradiated rats. In addition, insufficient levels of antioxidants to scavenge peroxy-radicals during radiation could also have contributed to the elevated level of TBARS in irradiated rats (Manda *et al.*, 2007).

Glutathione is the most abundant nonprotein sulfhydryl containing compound and constitutes the largest component of the endogenous thiol buffer (Holmgren *et al.*, 2005). Assessment of GSH in biological samples is essential for evaluation the redox homeostasis and detoxification status of cells in relation to its protective role against oxidative and free radical mediated cell injury (Rossi *et al.*, 2005). The present study recorded a significant depletion of GSH content in hepatic, spleen and lung tissues in irradiated animals as compared to control group due to oxidative stress. The depletion of GSH content in irradiated rats might be due to enhanced utilization during detoxification process. The resultant reduction in GSH level may thus increase susceptibility of the tissue to oxidative damage including lipid peroxidation. However, Glutathione has diverse cellular functions in addition to its antioxidant properties including enzymatic conjugation through the glutathione-S transferase family of proteins and non enzymatic conjugation to cytotoxic compounds. Glutathione may react with

H₂O₂ and lipid peroxides by action of GSH-PX to reduce their toxicity (Davis *et al.*, 2001).

Depletion in GSH level after radiation exposure might be resulted from diffusion through impaired cellular membranes and / or inhibition of GSH synthetase. Also, the decrease in the content of organs GSH might result from a diminished activity of glutathione reductase and a deficiency of NADPH which is necessary to change the oxidized glutathione to its reduced form (Pulpanova *et al.*, 1982). GSH can function as an antioxidant in many ways. It can react chemically with singlet oxygen, superoxide and hydroxyl radicals and therefore function directly as a free radical scavenger. GSH may stabilize membrane structure by removing acyl peroxides formed by lipid peroxidation reactions (Price *et al.*, 1990).

The prolonged administration of chitosan prior irradiation induced significant decrease in TBARS and significant elevation in GSH content and CAT activity in all tissues investigated as compared to irradiated group throughout the experiment. These results became in accordance with (Jeon *et al.*, 2003) who reported that chitosan administration significantly decreased liver thiobarbituric acid reactive substances (TBARS) and increased antioxidant enzyme activities catalase and superoxide dismutase

Antioxidants are necessary for preventing the formation of free radicals and they inhibit some of the deleterious actions of reactive oxygen species on lipids, DNA and proteins (Boojar and Shockravi, 2007). The observed reduction in the TBARS level in irradiated rats following administration of chitosan is one indicator of the antioxidant activity of chitosan as illustrated by (Chiang *et al.*, 2000).

Animals treated with chitosan alone did not record any abnormal changes as compared to the control group (Table 1). Xie *et al.* (2001) showed that the scavenging effect of chitosan on hydroxyl radicals inhibits lipid peroxidation of phosphatidylcholine and linoleate liposomes *in vitro*. Harish *et al.* (2007) reported that chitosan showed scavenging of ·OH and O₂⁻ radicals and offered

protection against calf thymus DNA damage. The free radical quenching property of this marine polysaccharide has been reported (Xing *et al.*, 2005). The results obtained are in agreement with De Jesuse Valle *et al.* (2008) who reported a protective effect against oxidative stress in lung tissue which might even be attributed to chitosan inhalation.

The decrease in the activities of CAT could be due to a feed back inhibition or oxidative inactivation of enzyme protein caused by ROS generation (Ohta *et al.*, 2004) the current study recorded significant depletion of CAT activity in irradiated rats. However, CAT is one of three families of primary antioxidant enzymes in mammalian cells which are critical to peroxide removal. So the recorded depletion of enzymatic activity of CAT may be due to the increased utilization of this antioxidant to counteract lipid peroxidation production, however CAT removing H₂O₂ which occurred (Kalpana and Menon, 2004). Also, the decrease in the activity of CAT might be attributed to excess of ·OH resulting from water radiolysis after exposure to ionizing radiation which causes oxidative damage to enzymes that lead to the modification of the activity of CAT (Kregal and Zhang, 2007).

Radiation is associated with a decrease in antioxidants and an increase in oxidant free radicals resulting in increased oxidative stress which is followed by development of a variety of sub cellular changes in the myocardium, typical of radiation induced cardiac injury (Diniz *et al.*, 2003). The results obtained showed significant elevations in the activities of LDH in the serum of irradiated rats which indicate the severity of radiation induced necrotic damage of the myocardial membrane and the release of LDH enzyme from damaged heart tissue into the blood stream and an alterations in dynamic permeability of cardiac cell membranes due to the excessive production of free radicals and lipid peroxides that caused cellular membrane damage and leakage of cytosolic enzymes (Sridharan and Shyamaladevi, 2002).

In the present study, the prior- administration of chitosan was found to significantly lower the radiation induced elevation in the levels of diagnostic marker enzyme. This could be due to the free radical scavenging property of chitosan (Santhosh *et al.*, 2007).

Major precursors of atherosclerosis (hyperglycaemia, hypercholesterolaemia, hypertriglycerolaemia and even the process of aging) all induce mitochondrial dysfunction. Chronic overproduction of mitochondrial ROS leads to destruction of pancreatic β -cells increased oxidation

of LDL-C and dysfunction of endothelial cells. Factors that promote arteriosclerosis (Nageswara *et al.*, 2007). In the present study, the elevated level of plasma glucose in - irradiated group may be correlated with hepatic gluconeogenesis and glycogenolysis (Verspohl *et al.*, 2003).

Radiation induced hyperglycemia could be attributed to the diminished utilization of glucose by irradiated tissues. Irradiation could induce the transport of certain amino acids and thus increased glucose formation through the processes of deamination and transamination (Alhersova *et al.*, 1981) as well as acceleration of gluconeogenesis, which resulted as an indirect effect of radiation exposure (Sedlakova *et al.*, 1998). The increase in glucose level may also be related to endocrine abnormalities induced by irradiation which promote the secretion of biologically active peptide as ACTH which has well documented relation to carbohydrate metabolism by promoting gluconeogenesis in the liver (Harper *et al.*, 1977). Elevated glucose levels in the blood causes the sugar to chemically react with proteins of the blood vessel walls and form glycosylated proteins that subsequently causes the capillaries to swell and get easily broken (Jean-Luc and Schmidt, 2004).

Administration of chitosan prior and post irradiation cause significant decrease in plasma glucose level. This result became in accordance with Yao *et al.* (2008). Other study demonstrated that oral chitosan microcapsulated insulin has the antihyperglycemic effect on the blood glucose level of streptozotcin diabetic rats (Huang *et al.*, 2001).

The hyperlipidaemic state observed after irradiation could be attributed to the mobilization of fats from the adipose tissue to the blood stream (Chajek-Shaul *et al.*, 1989), in addition to mitochondrial dysfunction (Nageswara *et al.*, 2007). Hypercholesterolaemia is an important risk factor for cardiovascular disease (Bokura and Kobayashi, 2003). Oxidation of LDL-C accelerates the growth of fatty streaks in blood vessel walls and the formation of plaque (Klebanov *et al.*, 1998). Toxic aldehydes formed in lipid oxidation react with the apo lipoprotein B of the LDL particle to produce a novel epitope that is recognized by macrophage receptors, resulting in the formation of foam cells and arteriosclerotic plaques and increased risk of heart disease and stroke (Burcham *et al.*, 2002).

Irradiation induces hyperlipidemia through cell membrane destruction, enhancement of lipid metabolism, cholesterol release and triglycerides synthesis (Bodwen *et al.*, 1989). Free radicals destruct cell membranes and enhance cholesterol release and increase lipid peroxidation (Karbownik and Reiter, 2000).

Increased triglycerides after irradiation might result from inhibition of lipoprotein lipase activity leading to reduction in uptake of triglycerides by adipose cells (Sedlakova *et al.*, 1998). The hypercholesterolemia and hypertriglyceridemia might be attributed to an increase in the activity of 3-hydroxyl methyl glutaryl COA, as an early reaction necessary for the restoration of biomembranes (Kolomijtseva, 1986). In addition to decreased fatty acid oxidation (Clark, 2001). Moreover, radiation enhanced the process of lipid peroxidation which results in cell membrane damage and the release of fats from peripheral and adipose tissues to the blood (Sedlakova *et al.*, 1998). This increase may be due to increased lipolysis of depot triglycerides liberates free fatty acids from adipose tissue stores and the free fatty acids liberated by the adipose tissue are also, taken up by the liver tissue, leading to the hypertriglyceridemic condition (Sedlakova *et al.*, 1998).

The data obtained demonstrated that chitosan administration to rats prior and post gamma irradiation resulted in amelioration of hyperlipidemic status. Such a protective effect was ascribed by Ylitalo *et al.* (2002). One mechanism by which CS might decrease cholesterol levels is by adsorption of bile acids (BAs) (Shields *et al.*, 2003). BAs are secreted in the gastrointestinal tract, primarily as glycine or taurine conjugates (primary BAs), after which secondary BAs, such as deoxycholate are produced from primary BAs by intestinal microorganisms. BAs are re-cycled via the enterohepatic circulation. Chitosan combined bile acids in the digestive tract and combined its products (primary bile acids, cholic acid and chenodeoxycholic) was excreted into the feces. Therefore, the oral administration of an anion – exchange resin, such as cholestyramine, inhibits the enterohepatic circulation of BAs, thereby decreasing serum cholesterol levels (Homma *et al.*, 1997). Also, Murata *et al.* (2009) reported that hypercholesterolaemic rats fed a diet containing chitosan significantly had increased fecal fat and cholesterol excretion, reduced the lipid level in plasma and liver and tended to relieve the degenerated fatty liver tissue. These results suggest that chitosan reduced the absorption of dietary fat and cholesterol *in vivo* and could effectively improve hypercholesterolemia in rats.

Animals administered chitosan did not alter the plasma glucose concentration as compared to the control group. This result became in agreement with (Yao *et al.*, 2006), who reported that diabetic rats administered chitosan had lower levels of plasma glucose, cholesterol, higher fecal cholesterol concentration and plasma TBARS was significantly

decreased in diabetic rats. Also, Xia *et al.* (2010) reported that the supplementation of chitosan to rats fed on high fat diet reduced effectively the serum lipid levels such as total cholesterol, LDL-c and triglycerides which were regarded as to cause the cardiovascular disease moreover it elevated effectively HDL-c value which was regarded protect cardiovascular diseases. This result suggested that chitosan could effectively prevent hypercholesterolemia with a high fat diet and a longer treatment time brought a greater hypercholesterolemic effect. These results are in agreement with Zhou *et al.* (2008) who reported that chitosan was thought to possess hypocholesterolemic properties. Xu *et al.* (2007) suggested that chitosan improve lipid metabolism by regulating cholesterol and LDL by upregulating of hepatic LDL receptor mRNA expression, increasing the excretion of fecal bile acids.

The results obtained suggest that the lipid lowering effects of chitosan may be mediated by increases in fecal fat and / or bile acid excretion resulting from the binding of bile acids and by a decrease in the absorption of dietary lipids from the small intestine as a result of the inhibition of pancreatic lipase activity. These results are in agreement with Santhosh *et al.* (2007). Other study by Shahdat *et al.* (2007) suggested that dietary chitosan decreases the atherogenic lipid profiles of both normocholesterolaemic and hypercholesterolaemic rats and reduces the body weight gain of hypercholesterolaemic rats.

Increased cholesterol levels in the liver might be due to increased uptake of LDL from the blood by the tissues (Kissler *et al.*, 2005). The abnormal cholesterol deposition is favored by the dangerous tendency of cholesterol to passive exchange between the plasma lipoproteins and the cell membranes (Brown and Goldstein 1986). The hepatoprotective effect of chitosan is probably related to its ability to inhibit the lipid accumulation in the liver tissue by its antilipidemic property (Xing *et al.*, 2005). Moreover, Anraku *et al.* (2011) reported that chitosan reduces the levels of pro-oxidants such as cholesterol and uremic toxins in the gastrointestinal tract, thereby inhibiting the subsequent development of oxidative stress in the system circulation.

Copper is absorbed into the intestine and transported by albumin to the liver. Copper is carried mostly in the blood stream on a plasma protein called ceruloplasmin. Exposure to gamma irradiation is associated with an increase in serum levels of Cu as compared to control rats. Hepatic Cu overload leads to progressive liver injury and eventually cirrhosis (Dashti *et al.*, 1992). Increased Cu level

may due to oxidative stress inducing proteolytic modification of ceruloplasmin (Kemal *et al.*, 2003).

In the present study the increased iron level in irradiated rats may be due to oxidative stress inducing proteolytic modification of ferritin and transferrin (Trinder *et al.*, 2000). Iron overload is associated with liver damage characterized by massive iron deposition in hepatic parenchymal cells, leading to fibrosis and eventually to hepatic cirrhosis. Accumulation of iron induced hepatotoxicity might be attributed to its role in enhancing lipid peroxidation. Free iron or low molecular iron or chelatable iron pool facilitates the decomposition of lipid hydroperoxides resulting in lipid peroxidation and induces the generation of $\bullet\text{OH}$ radicals and also accelerates the non enzymatic oxidation of glutathione to form $\text{O}_2^{\bullet-}$ radicals (Pulla and Lokesh, 1996).

Administration of chitosan prior and post irradiation was observed to prevent the generation of strongly oxidating hydroxyl radical by chelating of transitional metals ions, Cu and Fe. Furthermore, chitosan was shown to act as antioxidant (Chiang *et al.*, 2000) and prevent lipid peroxidation of cell membranes (Santhosh *et al.*, 2007).

Peroxidation of lipids can disturb the assembly of the membrane, causing changes in fluidity and permeability, alterations of ion transport and inhibition of metabolic processes (Nigam and Schewe, 2000). The serum level of magnesium was decreased in irradiated rats supplemented with chitosan. This results in agreement with Liao *et al.* (2007) who reported that chitosan supplementation over 8 weeks lowered blood lipids and maintain normal calcium, magnesium and iron status in elderly hyperlipidemic patients.

The exposure to single dose of γ - radiation leads to a significant increase in serum urea and creatinine levels due to the increased protein breakdown as the urea is the end product of protein catabolism however, the degradation of protein by exposure to ionizing radiation is accompanied by an increase in the serum urea and different tissues free ammonia (Moulder *et al.*, 2002). Also, ionizing radiation induce extensive retention in daily excreted urine that lead to increased creatinine and urea levels in the blood (Robbins *et al.*, 2001) and increased production of ROS and oxidative stress (Ogeturk *et al.*, 2005). The findings of Robbins *et al.* (2002) indicated that kidney irradiation clearly leads to a progressive reduction in function associated with concomitant glomerulosclerosis and / or tubulointerstitial fibrosis with many of pathologic changes. The results obtained indicated that water soluble chitosan did not cause liver, spleen, lung or kidney damage so that it is safe functional food

(Sumiyoshi and Kimura, 2006) and improve kidney function due to its antioxidant effect (Chiang *et al.*, 2000).

The serum level of AFP was significantly increased after irradiation which may be due to hepatic damage as a result of lipid peroxidation increased after irradiation. In the present study AFP showed significant increases in irradiated animals group concomitant with increased level of TBARS, marker of lipid peroxidation have high toxicity and an inhibitory action on protective enzyme and so it acts as a tumor promoter and carcinogenic agent (Taysi *et al.*, 2002). Alpha- feto protein (AFP) may be elevated due to hepatocellular carcinoma, as well as chronic hepatitis and liver cirrhosis (Kawai *et al.*, 2005).

Also, estradiol decrease in irradiated animals due to damage effect of radiation on gonad. The treatment with chitosan prior irradiation revealed significant modulatory effect of the studied parameters. A high molecular weight water soluble chitosan had significant effects on the ovulation rate, both the *in vivo* and *in vitro* fertilization rates and embryonic development. These results indicate an improvement in the ovarian and oviduct dysfunctions caused by obesity and suggest an adjustment in the internal secretions and metabolic functions (Choi *et al.*, 2002).

All rats appear healthy and remain active after oral administration of chitosan therefore chitosan is safe dietary fibers to inhibit hypercholesterolemia. The results obtained are in agreement with Tao *et al.* (2011).

In conclusion, the results of the present study indicate that the administration of chitosan prior and post irradiation may prevent the deleterious effects of irradiation. The overall hepatoprotective effect of chitosan is probably due to a counteraction of free radicals by its antioxidant nature which decrease TBARS production and increase antioxidant GSH content, enzyme CAT activity and / or to its ability to inhibit lipid accumulation by its antilipidemic property. Therefore, it is greatly recommended to incorporate chitosan in the diet as a nutritional fiber supplement before and during radiotherapy to prevent the oxidative daily damage induced by radiotherapy.

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On Early Discovery of Mathematically Creative Children using Artificial Neural Networks Modeling (with a case study)

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Abstract: Learning creativity is an interesting educational phenomenon usually observed at children classrooms. Early discovery of individual children having mathematical creativity is a challenging interdisciplinary research issue. This piece of research focuses on quantitative analysis and evaluation of mathematical learning creativity on the basis of acquired “Subjective Domains of Experiences” (SDE) inside children's brain. Acquisition of (SDE) assumed to modify a children's stored experience via application of various multimedia Computer Assisted Learning (CAL) packages (modules). Accordingly, fairly assessment of mathematical learning time response has been adopted herein for analysis and evaluation of learning creativity acquired by (SDE). By some details, early discovery of creativity could be performed well in accordance with obtained learning assessment results. That is after solving correctly a suggested mathematical topic (at children classrooms). Furthermore, interactive interference between Reflective and Spontaneous Vorstellungen* during mathematical education has been simulated using supervised and autonomous Artificial Neural Network (ANN) learning paradigms.

* The German word Vorstellungen is used in replacement of the vague English expression “internal representation” [H.M. Mustafa On Early Discovery of Mathematically Creative Children using Artificial Neural Networks Modeling (with a case study). Journal of American Science 2011;7(6):418-429]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Learning Creativity Phenomenon ,Artificial Neural Network, Vorstellungen, subjective domain of experiences, Computer Assisted Learning.

1. Introduction

The field of educational sciences is represented by a growing community internationally. Many educational experts now recognize that conventional ways of conceiving knowledge, educational systems and technology-mediated learning are facing increasing challenges [1]. That is due to rapid technological and social changes arise in this time considering modified educational field applications [1-3]. Quantitative evaluation of learning creativity phenomenon is an interesting, challenging, and interdisciplinary research issue associated with educational field applications and activities [4&5]. So, for long time ago and till recently, educationalists as well as psychologists have been cooperatively interesting in systematic searching for quantified analysis, and evaluation of that interdisciplinary issue. Accordingly, for quantifying learning creativity phenomenon, an interdisciplinary research work integrating : cognitive and educational sciences, with educational psychology and neurobiology has been adopted recently [3&4]. More specifically , this piece of research focuses on quantified analysis, and evaluation of mathematically creative children using a novel interdisciplinary approach. That is by adopting application of realistic Artificial Neural Network (ANN) modeling of acquired children's “Subjective Domains of Experiences” (SDE) [6]

,which build up mathematical learning creativity (at children classrooms). Furthermore, presented ANN models simulate realistically two types of internal children's brain representations Reflective and Spontaneous (Vorstellungen). Respectively these two types have been modeled by ANN as supervised and autonomous learning paradigms. Interestingly, both types of “Vorstellungen” together form individual children's (SDE). It is worthy to note that: intuitive “common-sense” and a conscious knowledge of rules and facts are basically considered in order to perform well development of (SDE) [6]. By some details, both presented ANN models are simulating two types of internal children's brain representations (Vorstellungen) Reflective and Spontaneous.

Referring to Meissner [6], it is announced by words that (“Reflective Vorstellungen” may be regarded as an internal mental copy of a net of knowledge, abilities, and skills, a net of facts, relations, properties,..... etc. The development of "reflective Vorstellungen" certainly is in the center of mathematics education. To reflect and to make conscious are the important activities). Moreover, spontaneous Vorstellungen mainly develop unconsciously or intuitively. Consequently, both presented ANN models are inspired mainly by realistic request to statistical analysis of learning response time according to dynamical internal representations of children's brain, (See Appendices

I&II). By more details, that analysis obtained in accordance with response time assessment results, after solving correctly the presented mathematical topic problem "How to solve long division problem?". Its correct solution is performed well following sequential steps: Divide, Multiply, Subtract, Bring Down, and repeat (if necessary) (See appendix III). A special attention has been developed herein towards comparison between two types of children's brain internal representations (Vorstellungen) considering statistical average of learning response time, and learning rate values.

Conclusively, obtained simulation results revealed the superiority of Spontaneous Vorstellungen over Reflective Vorstellungen in improvement of quantifying mathematical learning creativity provided by (SDE). Moreover, two ANNs design parameters: gain factor (of neuronal sigmoid activation function), and learning rate value, proposed for quantified assessment of mathematical learning creativity. Additionally, effective impact on creativity improvement observed by neurons' number increase via dynamical synaptic connectivity (internal brain Plasticity) during interactive learning process.

The rest of this paper is organized as follows. The basic concept of creativity and its close relation with human brain cells (neuronal and Glial) is presented at the second section. At the third section, general model illustrating concepts of Vorstellungen its relation with diverse ANN learning paradigms are presented. The obtained results for brain functions (number of neurons) in addition to the effect of design ANN parameters on learning performance are illustrated at the fourth section. At the fifth section, some interesting conclusive remarks are introduced.

Finally, by the end of this paper, four attached illustrative Appendices are given as follows. At APPENDIX I, a simplified macro level flowchart describing algorithmic steps for simulation learning programs is presented. Two lists of simulation programs for both Vorstellungen types (Reflective and Spontaneous) are shown at APPENDIX II (A&B). At APPENDIX III, a simplified flowchart for Computer Assisted Learning (CAL) packages for suggested mathematical topic problem "How to solve long division problem?" is presented. Furthermore, three print screens samples representing obtained results after running of designed time response assessment program, are shown at APPENDIX IV.

2. Creativity and Brain Function

This section is dedicated to introduce a general clarification about what is meant by creativity and its close relation with human brain. According to recently published article by Dr.Linda Karges-Bone,[7], it is announced that "creativity is the spark

that never burns out". Functionally, true creativity is defined to have a goal, a purpose, and an outcome [8]. Both declared evidences are well supported by more recent research results suggests that fresh neurons arise in the adult brain every day and that the cells ultimately help with learning complex tasks—and the more they are challenged, the more they flourish [9]. By more details, thousands of new cells are generated in the adult brain every day, particularly in the hippocampus, a structure involved in learning and memory. Moreover, during a period of two weeks, most of those newborn neurons will die, unless the animal is challenged to learn something new that is a learning task. In other words, by more neural interconnections learning creativity emerges. That is resulting in more extended brain capacity for neural plasticity over time [10]. Recently, some research papers are published describing quantifying of main brain functional phenomena (learning and memory)[11-16]. Moreover, researchers need essentially to know how neurons synapses inside the brain are interconnected together and communication between brain regions,[17].

In some details, at any instant brain state (synaptic weight pattern) in neural systems leads to some expected spontaneous behavioral response to any of external stimuli. So, dynamically changes of weight synaptic pattern (vector) measures the learning convergence process in consequence with internal / stored level of intelligence. Consequently, the initial brain state of synaptic connectivity pattern considered as pre-intelligent creativity parameter.

In addition to above clarifications about neurons at hippocampus brain area, interesting analysis for the effect of brain Glial cells on learning performance (convergence time factor) is shown at Fig.1, in below. It illustrates mutual inter-communication among Glial cells and typical neuronal brain cells. Noticeably, increasing of synaptic connectivity value is measured as ratio between number of Glial cells versus number of typical neuronal cells. This ratio leads to improvement of learning performance time factor [4][15][16] that considered as number of training cycles. For more details, it is referred to[4],and other references therein is recommended.

3. Effect of Gain factor values on Learning Performance

3.1 Effect of Gain factor values on Learning Convergence time

The obtained results for various gain factor values are comprehensively shown (in a statistical graphical form) at Figure 2.

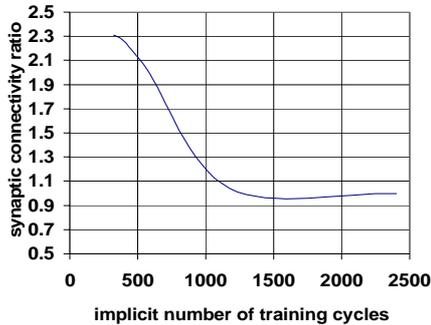


Fig.1: Illustrates the relation between number of training cycles during learning process and the synaptic connectivity (weights) values (adapted from [4]).

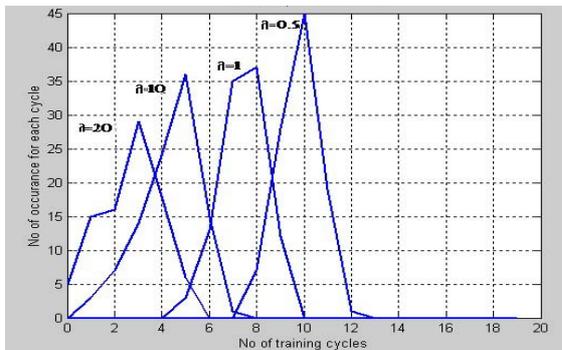


Fig.2. Illustrates improvement of average response time (no. of training cycles) by increase of the gain factor values (adapted from[13])

The above results illustrate gain factor effect on improving the value of time response measured after learning process convergence [13]. These four graphs depicted at Fig.2 are concerned with the improvement of the learning parameter response time (number of training cycles). That improvement observed by increasing of gain factor values (0.5, 1, 10, and 20) that corresponds to decreasing respectively number of training cycles by values (10, 7.7, 5, and 3) cycles, (on approximate averages). Conclusively, Learning creativity is virtually improved by such increase of gain factor values.

3.2 Effect of Gain factor values on Learning Achievement (Scores)

At Fig.3, the effect of increasing number of neurons contributing to learning process_(Inside a child's brain) on learning achievement (scores) is illustrated. That is considering Spontaneous

Vorstellungen for different gain factor values (0.5, 1, 2).

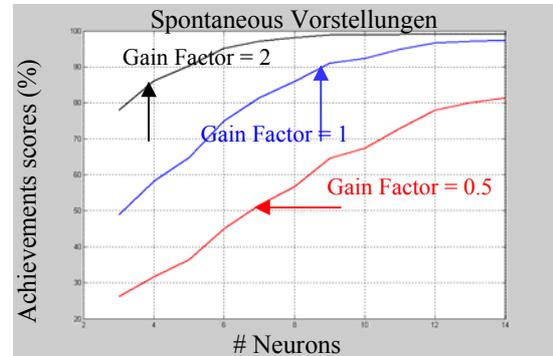


Fig.3 Illustrate learning performance accuracy versus different gain factor values. Shown results obtained at #cycles = 300 and Learning rate = 0.3 (adapted from Hassan & Ayoub [18]).

4. Modeling of Vorstellungen

4.1 General Interactive Block Diagram

Generally, practical performing of interference between Reflective and Spontaneous Vorstellungen utilizes two basic and essential brain cognitive functions[18-21]. Firstly, pattern classification /recognition function based on visual /audible interactive signals stimulated by CAL packages. Secondly, associative memory function is used which originally based on Pavlovian classical conditioning motivated by Hebbian learning rule[19]. Referring to Fig.4, it illustrates a generally modeled block diagram that well qualified to perform simulation of internal brain cognitive functions. At this figure, inputs to Vorstellungen learning model are provided by spontaneous environmental stimuli (autonomous learning).The correction signal, in case of learning under supervision is given by responsive output reflective action of the model. It would be provided to ANN model by either spontaneous (autonomous) learning signal (environmental conditions)or by teacher's reflective (supervision) signal. Interestingly, tutor plays a role in improving the input data (stimulating learning pattern), by reducing noise and redundancy of model pattern input. According to obtained realistic simulation results; tutor's experience concerned with either conventional (classical) learning or CAL provide educationalists with relevant analysis of acquired children's (SDE). Acquiring of experience seems to be tightly related to the increasing number of neurons (inside a child's brain), contributing to learning process as illustrated by simulation results given at the fifth section.

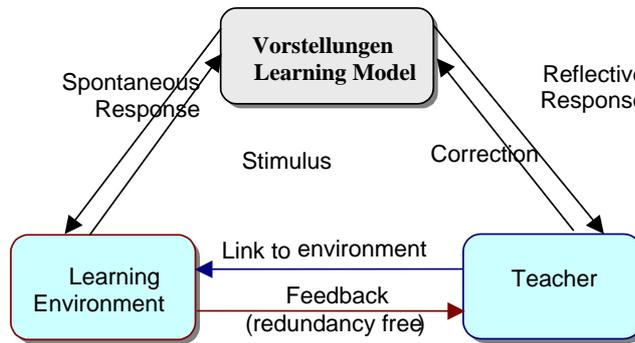


Fig.4: A generally modeled block diagram for interactive interference between Reflective and Spontaneous Vorstellungen in mathematical education.

4.2 Basic ANN Model

Searching for an optimal Reflective and Spontaneous Vorstellungen is inspired by realistic cognitive simulation of classical mathematical teaching as well as computer assisted learning (CAL) performance. By using relevant Artificial Neural Network (ANN) learning model, fairly learning assessment for adopted mathematical topic problem topic has been performed. Consequently, optimal evaluation of mathematical creativity via analysis of fairly obtained simulation results.

At Fig.5, a general block diagram for an ANN learning/teaching model is depicted. It presents realistic simulation of two diverse learning paradigms. Both concerned with interactive tutoring / learning process as well as self-organized learning. The first paradigm is concerned with classical (supervised by tutor) learning observed at our classrooms (face to face tutoring). Accordingly, this paradigm proceeds interactively via bidirectional communication process between a tutor and his learner(s) [18]. The second paradigm performs self-organized (unsupervised) tutoring process [19]

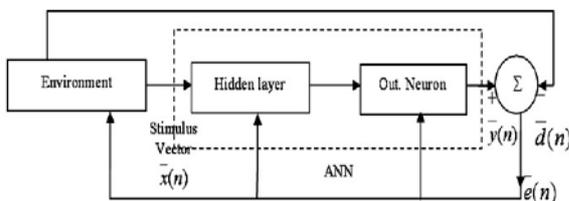


Fig.5: Generalized ANN block diagram, adapted from Hassan [5].

Referring to Fig.5, the error vector at any time instant (n) observed during learning processes is given by:

$$\bar{e}(n) = \bar{y}(n) - \bar{d}(n) \tag{1}$$

Where $\bar{e}(n)$ is the error correcting signal controlling adaptively the learning process, $\bar{x}(n)$ is the input stimulus, $\bar{y}(n)$ is the output response vectors, and $\bar{d}(n)$ is the desired numeric value(s).

The following equations are easily deduced:

$$V_k(n) = X_j(n) W_{kj}^T(n) \tag{2}$$

$$Y_k(n) = \varphi(V_k(n)) = (1 - e^{-\lambda V_k(n)}) / (1 + e^{-\lambda V_k(n)}) \tag{3}$$

$$e_k(n) = |d_k(n) - y_k(n)| \tag{4}$$

$$W_{kj}(n+1) = W_{kj}(n) + \Delta W_{kj}(n) \tag{5}$$

Where X is input vector, W is the weight vector, φ is an activation (odd sigmoid) function characterized by λ as gain factor and Y as its output. e_k is the error value, and d_k is the desired output. Noting that $\Delta W_{kj}(n)$ is the dynamical change of weight vector value connecting the k^{th} and j^{th} neurons. Eqs. (2-5) are commonly applied for both the supervised (interactive learning with a tutor), and the unsupervised (learning through students' self-study) paradigms. The dynamical changes of weight vector value for supervised phase are given as following:

$$\Delta W_{kj}(n) = \eta e_k(n) X_j(n) \tag{6}$$

where, η is the learning rate value during learning process. However, for unsupervised paradigm, the dynamical change of weight vector value is given by:

$$\Delta W_{kj}(n) = \eta Y_k(n) X_j(n) \tag{7}$$

Noting that $e_k(n)$ in (6) is substituted by $y_k(n)$ at any arbitrary time instant (n) during learning process. At next section, some previously published simulation results are given, after running of two MATLAB programs. Their general common

flowcharts are shown at APPENDIX I. Furthermore, the two program listings are given at APPENDIX II (A&B).

5. Results

Referring to previously published work [20] that deals with analysis and evaluation of learning convergence time using ANN modeling. Therein, it is declared that application of technologically improved educational methodologies implies increasing of learning rate values. More recently, an interactive realistic educational model is presented for assessment of children's response time as learning convergence time parameter[21].

That results in better learning performance quality by minimizing of learning convergence (response) time. Therefore, application of presented three teaching methodologies (classical , CAL multimedia modules with visual and with simultaneous auditory and visual tutorial materials).That could be considered as three deferent educational technology levels (representing three teaching methodologies). Consequently, those three methodologies may be mapped (virtually) into three analogous learning rate values. More specifically, the

three values(η) =0.05, 0.1, and 0.3 present virtually analogues mapping of the three levels of children's acquiring (SDE): Reflective (classical) , Partially Reflective/ Spontaneous (CAL with visual) ,and Spontaneous (CAL with simultaneous auditory and visual materials) . At Fig.6&7, graphical illustration of obtained simulation results for learning performance considering two case of Vorstellungen (Reflective and Spontaneous). The simplified flowchart of computer simulation program for assessment of time response values (at three different learning rates (η) =0.05, 0.1, and 0.3) is given at APPENDIX I . The comparison between Reflective & Spontaneous Vorstellungen for learning time response is presented at Fig.8. Moreover, tabulated comparative results are given at Table.1. Furthermore, at Table. 2., comparison between considering Output Achievements and Responsive Learning Rate .Finally, Relative improvement of Responsive Learning Rate ratio fulfilled by Spontaneous versus Reflective Vorstellungen is given at Table 3.

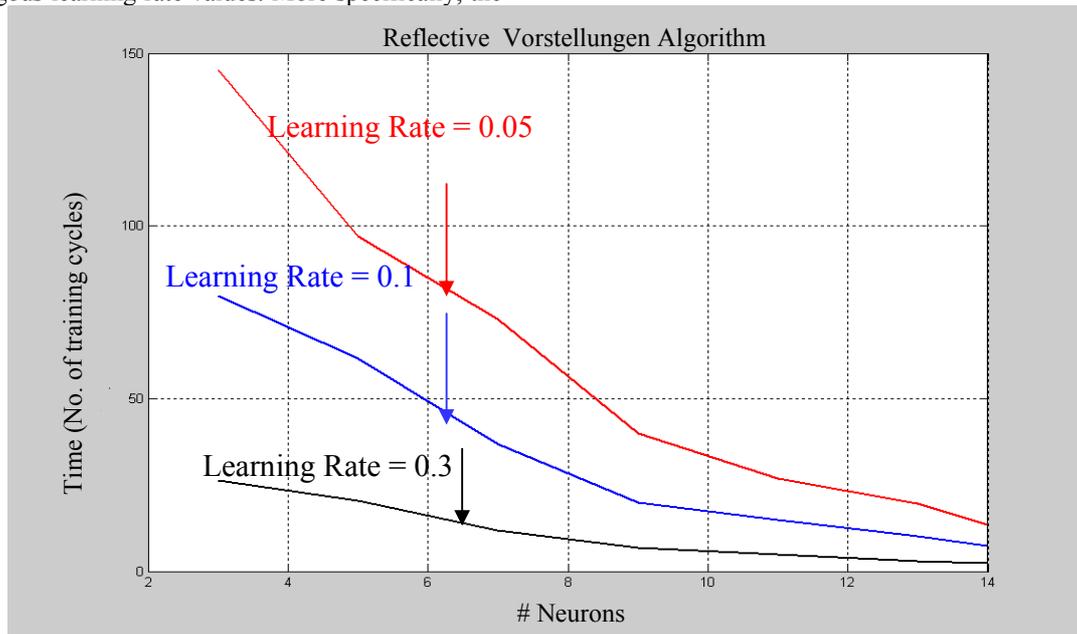
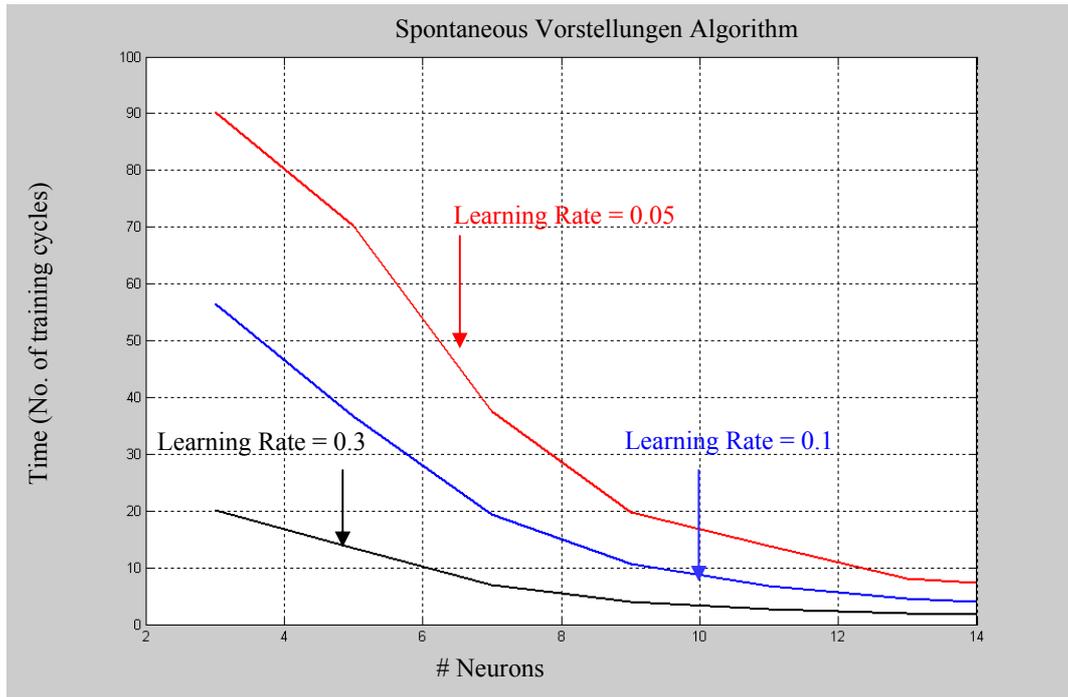


Fig.6: Illustrates Reflective Vorstellungen performance & time factor with considering three different learning rates: 0.05,0.1, and 0.3 for gain factor = 0.5.



•Fig.7: Illustrates Spontaneous Vorstellungen performance & time factor with considering three different learning rates: 0.05,0.1,and 0.3 for gain factor = 0.5.

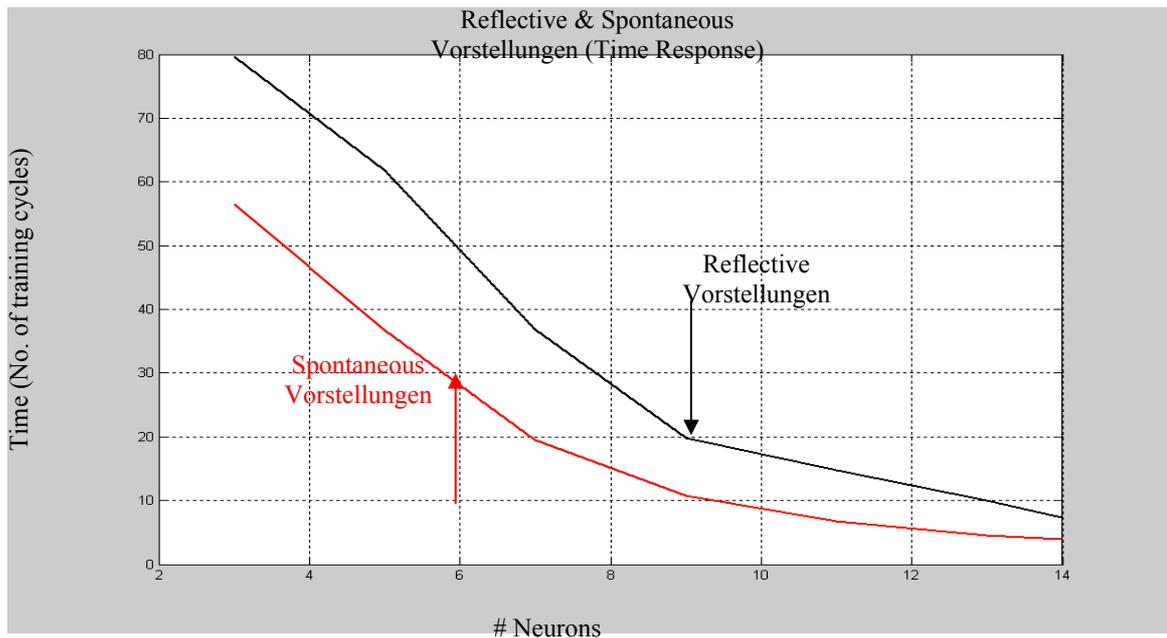


Fig.8: Illustrates comparison between Spontaneous and Reflective Vorstellungen performance associated with learning response time.

Table 1. Illustrates time response comparison between Spontaneous and Reflective Vorstellungen for different number of neurons contributing in learning process.

Number of Neurons contributing in learning	3	5	7	9	11	14
Reflective Vorstellungen	79.7	61.8	36.9	19.8	14.8	7.3
Spontaneous Vorstellungen	56.5	36.7	19.5	10.7	6.7	3.9
Relative Response Time Gain factor	1.41	1.68	1.89	1.85	2.21	1.9

Table 2. Illustrates comparison between Spontaneous and Reflective Vorstellungen considering Output Achievements and Responsive Learning Rate provided that: Gain Factor = 1.5, Learning Rate=0.05, #Learning Cycles=500.

# Neurons	Output Achievements (Scores)		Responsive Learning Rate	
	Spontaneous Vorstellungen	Reflective Vorstellungen	Spontaneous Vorstellungen	Reflective Vorstellungen
2	50.31	49.3	0.87	0.62
3	63.39	62.76	1.21	0.82
4	74.47	71.5	1.55	1.02
5	79.9	78.53	2.28	1.38
6	87.04	86.74	3	1.73
7	92.07	90.92	4.65	2.48
8	94.52	93.28	6.3	3.22
9	96.61	95.9	8.57	4.3
10	97.43	96.83	10.83	5.38
11	98.34	97.83	15.23	6.78
12	98.81	98.49	19.62	8.21
13	98.84	98.69	22.18	10.28
14	98.93	98.79	24.73	12.35

Table 3. Illustrates Relative improvement of Responsive Learning Rate ratio fulfilled by Spontaneous versus Reflective Vorstellungen for different number of neurons contributing in learning process.

# Neurons	2	3	4	5	6	7	8	9	10	11	12	13	14
Spontaneous Vorstellungen	0.87	1.21	1.55	2.28	3	4.65	6.3	8.57	10.83	15.23	19.62	22.18	24.73
Reflective Vorstellungen	0.62	0.82	1.02	1.38	1.73	2.48	3.22	4.3	5.38	6.78	8.21	10.28	12.35
Relative improvement of Responsive Learning Rate (Ratio)	1.4	1.48	1.52	1.65	1.71	1.88	1.96	1.99	2.01	2.25	2.39	2.16	2

6. Conclusion

This interdisciplinary research work motivated mainly by two recently published research results: firstly, about internal brain representation (Vorstellungen)[6] and secondly, about the study Einstein's brain based on other half of the brain Glial cells effect in providing creative performance[14]. Moreover, the analysis and evaluation virtual improvement of learning creativity obtained of

performance quality for any CAL module is frequently measured after investigational analysis of obtained educational field results [13].

Above presented assessment approach provides educationalists with unbiased fair judgment tool for quantitative measurement of learning creativity based on comparison between Spontaneous versus Reflective Vorstellungen. The obtained results seem to be promising for future extension research work to

get more elaborate investigational analysis and evaluation of issues related to learning creativity phenomenon. Furthermore, it is worthy to adopt using realistic implementation of ANNs modeling, as a relevant simulation tool for evaluating other observed educational field phenomena issues.

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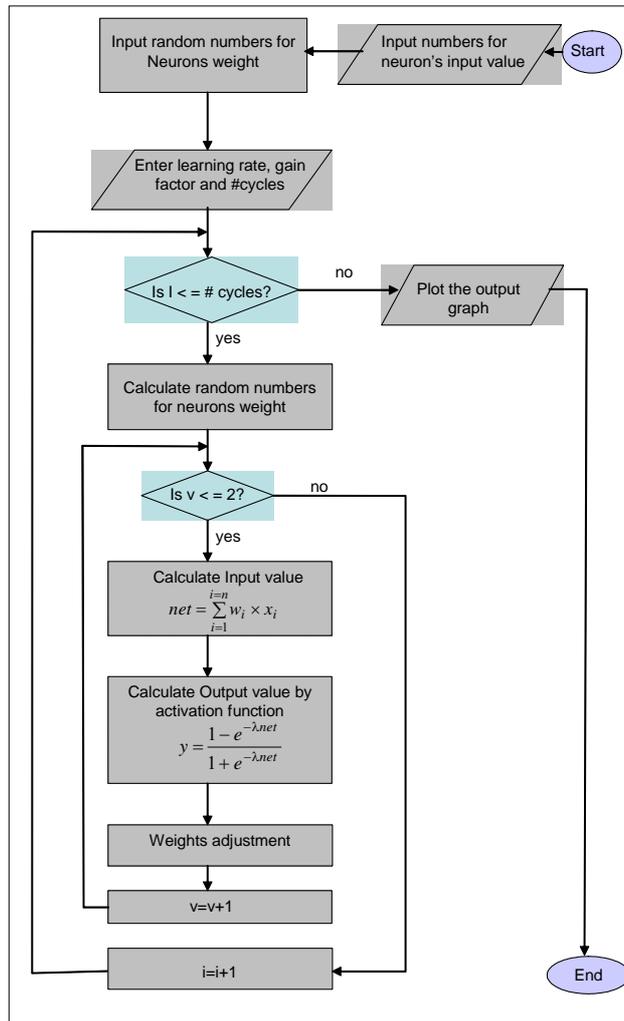
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APPENDIX I

The shown simplified macro-level flowchart in below briefly describes algorithmic steps for realistic simulation learning program using Artificial Neural Networks. The results are shown in three figures (6, 7, and 8) after running the program.



APPENDIX II

Listing of two simulation programs written using MATLAB-VER.5. These programs designed to measure learning response time for both Vorstellungen types (Reflective and Spontaneous) are shown at (A&B) respectively.

A- Reflective Vorstellungen

```
w = rand(3,1000);
x1 = 0.8; x2 = 0.7; x3 = 0.6;
L = 0.5; eata = 0.3;
h = 0; s = 0; f = 0; m=0;

for i=1:100
w1=w(1,i); w2=w(2,i); w3=w(3,i);
net=w1*x1+w2*x2+w3*x3;
y=(1-exp(-L*net))/(1+exp(-L*net));
e=0.8-y;
no(i)=0;
while e>0.05
no(i)=no(i)+1;

w1=w1+eata*e*x1;
w2=w2+eata*e*x2;
w3=w3+eata*e*x3;

net=w1*x1+w2*x2+w3*x3;
y=(1-exp(-L*net))/(1+exp(-L*net));
e=0.8-y;
end
end
for i = 1:100
nog(i) = 0;
for x = 1:100
if no(x) == i
nog(i) = nog(i) + 1;
end
end
end
for i = 1:99
h = i * nog(i);
s = s + h;
F = f + nog(i);
end
m = s / f;
i = 0:99;
plot(i,nog(i+1),'linewidth',1.5,'color','blue')
plot((i+1)/100,nog(i+1),'linewidth',1.5,'color','black')
xlabel('Time (No. of training cycles')
```

```
ylabel('No of occurrences for each Time)
title('Reflective Vorstellungen algorithm')
grid on
hold on
```

B- Spontaneous Vorstellungen

```
w = rand(14,1000);
x1 = 0.8; x2 = 0.7; x3 = 0.6;
h = 0; s = 0; f = 0;
cycles = 200;
L = 1;
eata = 0.3;
for g = 1:100
nog(g) = 0;
end

for i = 1:cycles
w1 = w(1,i); w2 = w(2,i); w3 = w(3,i);
for v = 1:2
net = w1*x1 + w2*x2 + w3*x3;
y = (1-exp(-L*net))/(1+exp(-L*net));
e = 0.9-y;

w1=w1+eata*y*x1;
w2=w2+eata*y*x2;
w3=w3+eata*y*x3;

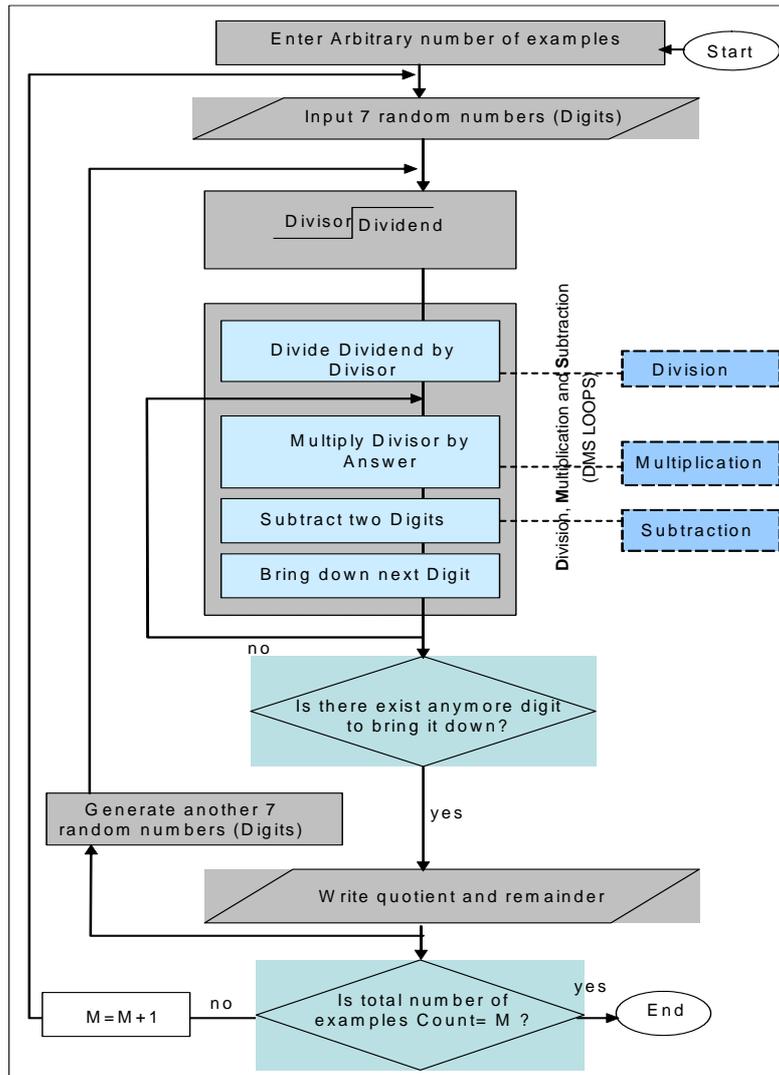
end
P = uint8((y/0.9)*90);
nog(p) = nog(p)+1;
end

for i = 1:99
h = i * nog(i);
s = s + h;
f = f + nog(i);
end
m = s / f;

i = 0:99;
plot((i+1)/100,nog(i+1),'linewidth',1.5,'color','black')
xlabel('Accuracy')
ylabel('No of occurrences for each Accuracy value')
title('Spontaneous Vorstellungen algorithm')
grid on
hold on
```

APPENDIX III

The figure shown below illustrates a simplified macro level flowchart which describes briefly basic algorithmic steps considered by suggested Computer Assisted Learning package. It is designed to perform fairly unbiased assessment process of learning a mathematical topic. After the running of the program, children time response (scores) are obtained, (samples of print screens is shown at APPENDIX II). These samples are obtained in accordance with steps of long division process: Divide, Multiply, Subtract, Bring Down, and repeat (if necessary) as given in reference [].



APPENDIX IV

Three Print Screen samples are shown in Figures (A, B, and C) to illustrate three different output phases of mathematical creativity assessment package

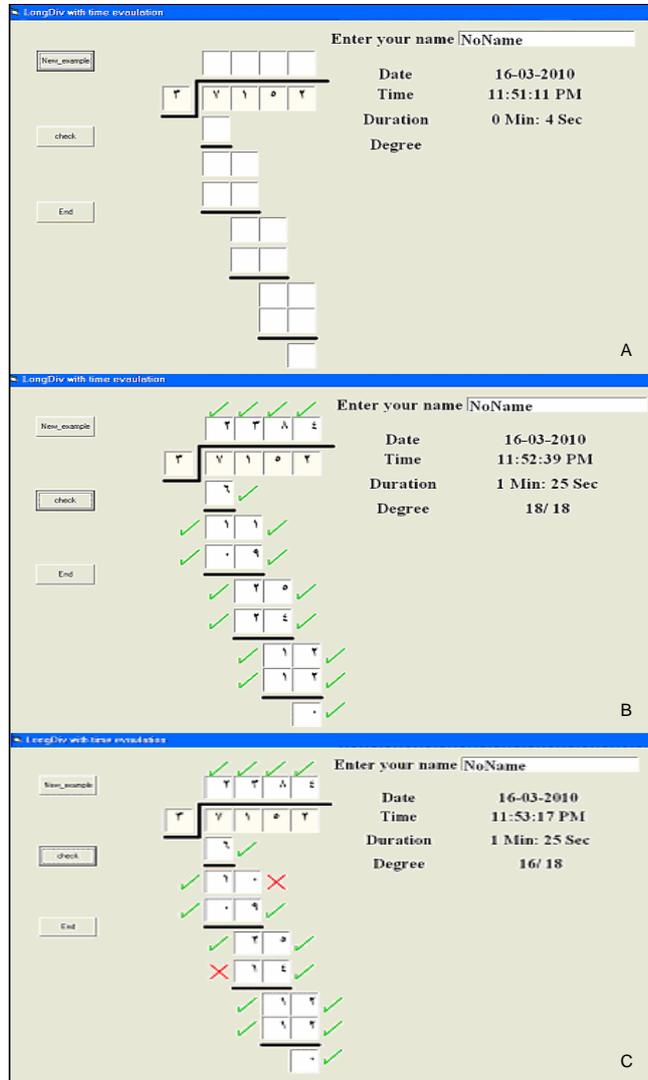


Figure 2: A) Basic print screen sample for initial mathematical Long Division process. B) For fairly solving of Long Division problem (detecting no mistake). C) A print screen for fairly assessment processes results with two mistakes.

5/15/2011

The study of food preference of *Sitophilus oryzae* L. on common cultivars of rice in Guilan province

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Abstract: Rice product after wheat has special importance as the second agriculture strategic product. Rice weevil as one of the most important stored pest has the main role in losses of stored product. So in this research, the pest effects was studied on 4 common varieties of rice in Guilan province "Taroum, Hashemi, Ali kazemi and Dylamani" in two conditions of facultative and obligatory nutrition. Results showed that Taroum variety was the most sensitive variety in conditional of facultative and obligatory nutrition and after it Hashemi variety was in the second category and had significant difference with Taroum variety. Ali kazemi and Dylamani varieties didn't have significant difference with together and had the lowest sensitive.

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Key words: Rice weevil, Food preference, Rice varieties

1. Introduction

Regarding production, rice is the second important agricultural product after wheat. Paddy lands under cultivation are approximately 628000ha. Province of Guilan with 200000ha land under cultivation has the second rank regarding rice production after Mazandaran which has 201000ha land under cultivation. Rice is traditionally the main food in Iran which meets 13% of required calorie. Mean per capita consumption of rice in the world equaled to 81.3 Kg in 2003 per capita, consumption of rice in developing countries is 98.5 Kg whereas per capita consumption of rice in Asia equals to 119Kg and Iran equals to 53.5 Kg. National organization of rice research has performed measures in the area of preservation and increasing rice production which resulted in performance increase from 2-4 ton/ha. Some of these measures are as follows: 1-Introducing high yield varieties which resulted in 7 ton performance increase in some varieties such as Sepidrood, Amol3, Khazar, Neda, Nemat and so on. 2- Creation and development of mound brook reservation in order to decrease seed density as well as proper control of reservoir irrigation, using plastic cover at reservoirs in order to prevent damage of early spring cold. 3- Useful recommendation about amount, time and application way of fertilizer based on soil properties and the needs of cultivated varieties. 4- Introduction, planting, preserving and harvesting and keeping performance at storage conditions by decreasing damages to pest. Recent investigation has shown that paddy storage loss contains a high percent. Based on research result, proper storage management can have a basic role in decreasing storage loss and most of the wastage in due to weak storage conditions

and lack of protective qualifications against rodents and birds attack. Result has shown that usually there is 4% of paddy loss at current stores (Anonymous, 2000). Weevils of wheat and rice are cosmopolite insects which are most spread worldwide due to international exchanges. However distribution of wheat weevil is limited to cold and moderate areas whereas rice weevil is seen at tropical and semitropical areas. These pests feed on grains such as wheat, barley, rye, corn, sorghum and cause heavy loss (Bagheri-Zenouz, 1996). Storage pests attack as well as ignoring principles of stored products protection sometimes results in quality loss. Consequently chemical composition, color and taste of such products change and become low quality and sometimes completely useless. In general keeping storage preparations either economically or sanitarly based on technical and scientific principles is very important. In this regard not only establishment of proper stores but also recognizing pests and prevention ways is necessary (Anonymous, 1989). The most important damage caused by rice and wheat weevils is related to their larvae. Adults feed on seeds during life (Bagheri-Zenouz, 1996). Cogburn (1978) investigated viability of rice weevils as well as two other pests of these products against six varieties of rice and concluded that seed content is a determining factor in different insect's responses (Cogburn, 1978). Bernabe and Bernardo (1976) have done food preference tests on rice weevils in order to determine resistance mechanisms of ten varieties of corn against them. They observed differences in the seed varieties regarding spawning point and found that feeding on some varieties resulted in decreasing reproduction of adults, body weight and the number of progeny (Bernabe et al.,

1976). Singh and Thapar (1998) investigated resistance of six varieties of rice against rice weevil and realized that varieties Jaya and IR8 had lower senility compared to PR107, PR109, PR103 and PR108 and growth duration of rice weevil on Jaya and IR8 was respectively 41 and 42 days and on varieties of PR was 35.6-36.8 day (Singh et al., 1998). Investigating effective factors in survival and growth of rice weevil on outer layers of rice grain, Haryadi and Fleurat-Lessard (1982) observed that removing outer layers while peeling off rice had an effect on growth time of weevils so that lack of some of the outer layers such as fetus layer affected growth life of the these insects (Haryadi et al., 1982). Sarup (1991) examined the relationship between some of the food ingredients and different parameters for measuring resistance of 24 varieties of corn against *Sitophilus oryzae*; they found that percent and rate of corn loss showed a negative correlation with fat ingredients and positive correlation with sugar ones as well as tryptophan amount of rice (Sarup, 1991). Balbasi (2001) investigated food preference of rice weevil on the growth duration and least progeny of weevil during one year was the most vulnerable ones and Neda ranked average (Balbasi, 2001). Asemi (2002) examined food preference of rice weevil on different varieties of rice and found that Neda and Tarom were the most sensitive varieties to this pest (Asemi, 2002). The objective of the present study were as follow: 1- Decrease in loss due to activity of storage pests 2- Increase in farmers benefit 3- Keeping product quality during storage time and protecting seeds and their nutritious value 4- Selection and introducing the best native variety among examined varieties with respect to storage.

2. Materials and Methods

This experiment was done in two obligative and facultative food preference conditions of *Sitophilus oryzae* at fully randomized design with three replications in the fall of 2008. Means comparison was performed using multirange Duncan test by SAS and MSTATAC software. Treatments in this research contained the most common native varieties in Guilan such as Hashemi, Alikazemi, Musa Taroum and Dylamani which were exposed to obligative and facultative conditions of food preference. Experimental procedures are explained in the following section respectively:

2.1. Mass production of *Sitophilus oryzae*

Some pest damaged rice was collected to product rice weevil on different native varieties of Guilan rice. Hashemi variety was selected as the main variety and 200g of this grain was scattered at glass containers.

Some pores created at the containers lids for air ventilation and gauze was sticked on the pores. Forty pairs of male and female insects collected from rice native varieties were randomly released at the containers. In this way a lot of insects were collected during 28- 30 days before beginning of the respected experiments.

2.2. Investigation of food preference of *Sitophilus oryzae*

Rice used in this experiment was prepared from standard varieties produced by national rice research organization. These varieties included Hashemi, Alikazemi, Musa Taroum and Dylamani. Each variety was placed at single line bags. In order to disinfect the varieties, bags were placed under a large plastic cover containing pesticide pill to prevent pollution. Then the bags were opened for air ventilation. Finally rice grains were saved and sound grains were separated from damaged ones. After separating the said varieties experiment was done in two different following ways.

A- Investigation of food preference in facultative food conditions:

The objective of this experiment was to consider insect tendency for selecting the aforesaid rice varieties completely facultative so that only the insect tendency and the grain variety were effective factors in selection. In this regard a cylindrical container made from transparent polystyrene with diameter of 20 cm and high of 10 cm was selected. Then the container circumference was partitioned by four equal parts using cardboard walls. A cylindrical space was regarded for releasing insects at the center of the container. 50g of grain per experimental unit was randomly scattered inside each part. Then hundred male and female insects of 1-3 days were released at the center of experimental container. After twenty days the insects were returned to the original stub with the help of an aspirator. Since the laid eggs on the grains surface were not recognizable, the number of hatchings was considered as food preference criteria. In order to count the insects of f1 generation, every grain of different varieties was transferred to single glass containers. Containers containing f1 insects were controlled every day and the numbers of exited insects were determined followed by separating males from females and noting their counts. This experiment was performed at the temperature of $27 \pm 1^{\circ}\text{C}$ and relative humidity $65 \pm 5\%$.

B- Investigation of food preference in facultative food conditions:

The objective of this experiment was to know that whether forcing insects to feed on a special variety of

rice will change food preference. Again in this research some glass containers were regarded for four varieties of rice followed by removing 50g of rice grains and scattering them at the containers. Eight pairs of male and female 1-3 days insects were released at the containers using an aspirator and after twenty days feeding, these insects were transferred to the original stub.

3. Results and Discussion

A-Investigation of feeding and spawning in facultative food conditions:

1-3 days insects and counting f1 insects within 25 days, we observed that Taroum and Hashemi rice prevalently had the most average insects count. On the other hand Taroum rice was approached to its most count regarding adult insect number compared to other

rice varieties, i.e. Hashemi, Ali Kazemi and Dylamani needed more time to reach their peak regarding adult insect counts. In order to further investigate food preference on different rice varieties hatching or the numbers of male and female insects appeared on rice grains were determined and analysis of variance of data of male and female insect count in facultative releasing conditions showed a significant difference at probability level of $\alpha=1\%$. Results showed the most count of the male insects were placed on Taroum at "A" group, on Hashemi at "B" group and on Dylamani at "C" group. Similarly the most count female insects were placed on Taroum at "A" group, on Hashemi at "B" group and on Ali Kazemi and Dylamani at "C" group. These results are in line with Balbasi observations.

Table 1. Analysis of variance of male insects count appeared on different rice varieties in facultative releasing conditions

SOV	df	SS	MS	F
Treatment	3	159.427	53.142	7.407**
Error	8	1.084	0.135	-
Total	11	162.354	-	-

Table 2. Comparing means of regarded parameters for determining food preference on rice weevil in facultative releasing conditions

Variety	Mean number of male insects	Classification
Taroum	68.47	A
Hashemi	59.27	B
Ali Kazemi	19.31	C
Dylamani	17.54	C

Table 3. Analysis of variance of female insects count appeared on different rice varieties in facultative releasing conditions

SOV	df	SS	MS	F
Treatment	3	179.354	59.784	456.366**
Error	8	1.051	0.131	-
Total	11	181.451	-	-

Table 4 Comparing means of regarded parameters for determining food preference on rice weevil in facultative releasing conditions

Variety	Mean number of female insects	Classification
Taroum	84.31	A
Hashemi	72.53	B
Ali Kazemi	29.43	C
Dylamani	26.54	C

Based on analysis of variance and comparing the means of different treatment a significant difference was observed between treatments. In the facultative food conditions, the most percent of weight loss was related to Taroum followed by Hashemi, Ali Kazemi and Dylamani ranked lower but there wasn't any significant relationship between them.

Table 5. Analysis of variance of the percent of weight loss of different rice grain in the facultative food conditions

SOV	df	SS	MS	F
Treatment	3	51.471	17.157	22.024**
Error	8	6.235	0.779	-
Total	11	61.422	-	-

Table 6. Comparison between the means of percent of weight loss of different rice grain in the facultative food conditions

Variety	Rate of weight loss	Classification
Taroum	5.21	A
Hashemi	3.27	B
Ali Kazemi	1.42	C
Dylamani	1.01	C

B- Investigation of feeding and spawning in obligative food conditions:

Investigation of adult insects was observed at Taroum variety with the average of 47 insects follow by Hashemi, Ali Kazemi and Dylamani with the average of 38, 29 and 27 insect respectively. In Taroum variety the number of insects reached to its peak earlier compared to the other varieties. Female insects were counted and analyzed too. Results showed that the most count of the male insects was seen at Taroum variety followed by Hashemi while there wasn't any significant difference between the two other varieties.

Table7. Analysis of variance of male insects count appeared on different rice varieties in obligative releasing conditions

SOV	df	SS	MS	F
Treatment	3	154.421	51.473	411.784**
Error	8	1.005	0.125	-
Total	11	160.325	-	-

Table 8. Comparing means of regarded parameters for determining food preference on rice weevil in obligative releasing conditions

Variety	Mean number of male insects	Classification
Taroum	79.27	A
Hashemi	57.41	B
Ali Kazemi	27.22	C
Dylamani	25.41	C

Table 9. Analysis of variance of female insects count appeared on different rice varieties in obligative releasing conditions

SOV	df	SS	MS	F
Treatment	3	175.437	58.479	467.832**
Error	8	1.005	0.125	-
Total	11	179.223	-	-

Table 10. Comparing means of regarded parameters for determining food preference on rice weevil in facultative releasing conditions

Variety	Mean number of female insects	Classification
Taroum	95.41	A
Hashemi	84.21	B
Ali Kazemi	22.11	C
Dylamani	19.47	C

Based on classification of experimental treatments the most count of female insects was appeared on Taroum variety which showed a significant difference with other varieties and after that Hashemi variety differed significantly from the other varieties. However Ali Kazemi and Dylamani varieties were in the same group and didn't show significant difference.

Table 11. Analysis of variance of the percent of weight loss of different rice grain in the obligative food conditions

SOV	df	SS	MS	F
Treatment	3	48.274	16.091	21.744**
Error	8	5.927	0.740	-
Total	11	51.231	-	-

Table 12. Comparison between the means of percent of weight loss of different rice grain in the obligative food conditions

Variety	Rate of weight loss	Classification
Taroum	6.01	A
Hashemi	4.23	B
Ali Kazemi	1.47	C
Dylamani	1.23	C

4. Conclusion

Sitophilus oryzae L. was an important stored pest. Based on this research Taroum variety was the most sensitive variety in conditional of obligative and facultative nutrition. On the other hand Ali Kazemi and Dylamani varieties had the lowest sensitive.

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5/22/2011

Investigating the Strategies to Achieve Success in Human Resource Planning

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Abstract: Human resource planning has traditionally been used by organizations to ensure that the right person is in the right job at the right time. Under past conditions of relative environmental certainty and stability, human resource planning focused on the short term and was dictated largely by line management concerns. Increasing environmental instability, demographic shifts, changes in technology, and heightened international competition are changing the need for and the nature of human resource planning in leading organizations. Planning is increasingly the product of the interaction between line management and planners. In addition, organizations are realizing that in order to adequately address human resource concerns, they must develop long-term as well as short term solutions. As human resource planners involve themselves in more programs to serve the needs of the business, and even influence the direction of the business, they face new and increased responsibilities and challenges.

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Keywords: Human Resource, Planning, Organizations, Line Management Concerns.

1. Introduction

Human resources planning refer to classic HR administrative functions, and the evaluation and identification of human resources requirements for meeting organizational goals. It also requires an assessment of the availability of the qualified resources that will be needed. Human resources planning should be a key component of nearly every corporation's strategic business planning. To ensure their competitive advantage in the marketplace, organizations must implement innovative strategies that are designed to enhance their employee retention rate and recruit fresh talent into their companies. Effective human resources planning strategies are those that include having sufficient staff, with the right mixture of talent, and who are in the appropriate locations, performing their jobs when needed. It moves beyond the traditional role of human resources as primarily an administrative control function. (DeLuca, J. R., 1988) In today's corporate environment, it is viewed as a valuable component for adding value to an organization. Both employees and the company will often realize many benefits of planning over the long-run. In uncertain business settings, the significance of strategic human resources planning can become obvious very quickly. A company that reacts to circumstances by cutting staff as a measure to reduce short-term overhead can create unwanted repercussions. What initially looked like a smart and necessary move to economize in lean times can end up costing the company much more in the long-run. The resources that will be needed to subsequently recruit, hire, and train new employees may well exceed any short-term cost savings.

Forward-looking human resources planning typically anticipates future staffing requirements. It can help organizations avoid cost errors. Strategies are formulated to not only anticipate their needs over time, but to consider optimal solutions for the long term and under challenging economic conditions. This approach minimizes the chance of short-sighted and reactive choices being implemented by decision-makers. Organizations with a plan in place, and a keen understanding of their long-range objectives, may instead decide to weather the economic storm and keep trained, talented, and dedicated staff in place for the inevitable business uptrend. (Dyer, L., 1982).

2. Practical benefits

When it concerns human resources, there are the more specific criticisms that it is over-quantitative and neglects the qualitative aspects of contribution. The issue has become not how many people should be employed, but ensuring that all members of staff are making an effective contribution. And for the future, the questions are what are the skills that will be required, and how will they be acquired. There are others, though, that still regard the quantitative planning of resources as important. They do not see its value in trying to predict events, be they wars or takeovers. Rather, they believe there is a benefit from using planning to challenge assumptions about the future, to stimulate thinking. For some there is, moreover, an implicit or explicit wish to get better integration of decision making and resourcing across the whole organization, or greater influence by the centre over devolved operating units. (Fleishman, E.

A., & Quaintance, M. K., 1984) Cynics would say this is all very well, but the assertion of corporate control has been tried and rejected. And is it not the talk of the process benefits to be derived self indulgent nonsense? Can we really afford this kind of intellectual dilettantism? Whether these criticisms are fair or not, supporters of human resource planning point to its practical benefits in optimizing the use of resources and identifying ways of making them more flexible. For some organizations, the need to acquire and grow skills which take time to develop is paramount. If they fail to identify the business demand, both numerically and in the skills required, and secure the appropriate supply, then the capacity of the organization to fulfill its function will be endangered.

3. Planning: A business strategy

There are numerous considerations that the human resources professionals must take into account. For instance: "Inconsistencies between culture and strategy can severely impair the successful pursuit of a given course of action." Often the political aspects of producing a viable plan are insurmountable obstacles to overcome; as are other primary factors such as the process itself or the plan measurements. Only the most seasoned corporate politician often has enough sensitivity and negotiating skill to achieve the pre-planning buy-in of the critical powers. The concept of planning boiled down is that in order to determine the direction for human resource plans you must have "a series of questions that your organization needs to answer in order to predict and perhaps control some of the major change areas for the future. This means that you begin by asking the right questions – the questions which, if asked regularly and systematically, will force you to produce answers of maximum value in shaping your future human resources."

It is also important to look at the planning activity from an activity standpoint. From an operational view human resources planning is the analysis of human resource requirements of organizations and the related needs for management policies, programs and resources to satisfy these requirements. (Odiorne, G. S., 1981, July) As is shown by Figure 1, human resources planning is critically interdependent with all aspects of the business. "A human resource strategy is a critical component of the firm's corporate and business strategies, comprising a set of well-coordinated objectives and action programs aimed at securing a long-term, sustainable advantage over the firm's competitors. A human resource strategy should be consistent with the firm's corporate and business strategies, as well as with the other managerial

functional strategies." The primary objective of people responsible for doing human resources planning is to acquire, develop and implement the technology, tools, expertise and resources necessary to effectively do Human Resource Planning and Development as an integral part of the business planning processes. It must not be done in a vacuum. "Human resource strategies should be developed within a company's strategic business planning process." The strategy that is often the basis for the planning process is to build networks of internal human resources professionals and external human resources professionals that will promote the sharing of information, technology and tools to be applied to the Human Resource Planning and Development activities; Collect, evaluate and implement tools, processes and resources; integrate tools and resources into a consistent strategy which uses existing resources whenever possible. Again and again it is important to make sure that the process is a legitimate piece of the company plan. "Human resource strategic planning takes place within the overall corporate / total organization strategic planning model. "They will consult with and to human resource managers and line management to achieve a high utilization of tools and resources to achieve functional goals. Those goals include creating and implementing a workforce inventory and forecasting tool customized for Line Organizations; and creating and consulting on custom management planning tools and strategies for line Organizations. (Walker, J. W, 1988)

Figure 1 is an overview of human resource planning from a strategic planning viewpoint. The model shows the relationship of internal factors and external factors as they relate to the human resources issues. They are factors that not only create; but also shape and change the issues. The business plan usually establishes the basic environment within which other variables impact in order to determine those issues. Out of those issues grow the human resources strategies and plans that are most often developed and implemented by and with the assistance of the human resources department. (Hay Group, 1988, April 3).

4. Long-Term Planning for Short-Term Success

Often, however, operating pressures move all of the planning from a longer-term focus to a short-term one. That normally tends to create an environment within which the plan cannot be fully successful. "Over-reliance on short-term planning can be quite costly. Ample lead time is required to recruit or develop talented personnel, and reaction management that responds to short term events or needs will usually limit the choices of options or

endanger longer-range economic plans.”As most planning models would indicate, the planning processes need to be circular and connected dynamically. “The link between human resource planning and business strategic planning is vital if personnel programs and systems are to be attuned to the changing needs of an organization.”The relationship between short and long-term planning goals and activities are shown in Figure 2. This is a dynamic model. If you consider each of the four boxes as analogous to the legs of a four-legged stool, you can see the impact of removing one leg of the process. The impact of not doing long-term human resources planning is to cause the overall business plan to be limited to current human resources in trying to accomplish the plan. To achieve most long-term business plans requires some change in human resources from current state to the necessary state. The business goals achieved are often less than those possible with successfully implemented human resource plans.

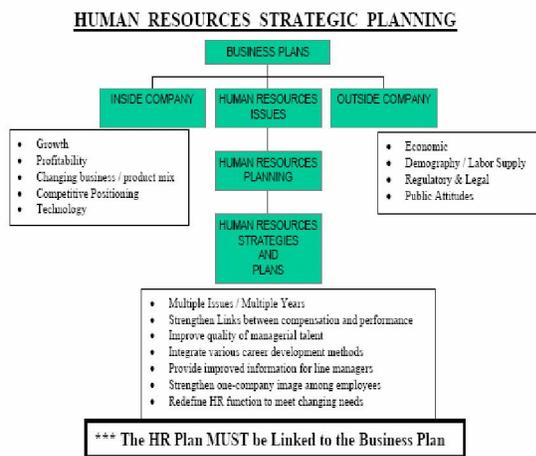


Figure 1: an overview of human resource planning

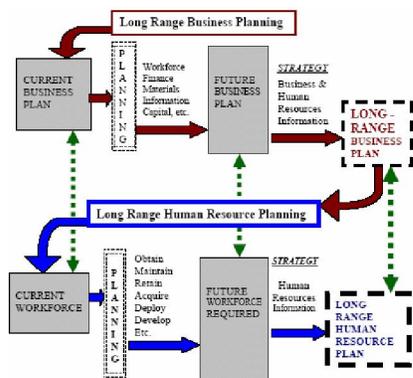


Figure 2. The relationship between short and long-term planning goals and activities

6. Factors Underlying Increased Interest in Human Resource Planning

Undoubtedly, there are many factors that account for the increased attention directed to human resource planning, but environmental forces-globalization, new technologies, economic conditions, and a changing work force-seem particularly potent (Dumaine, 1989; Dyer & Heyer, 1984; Greenhalgh, McKersie, & Gilkey, 1986). These create complexity and uncertainty for organizations. Uncertainty can interfere with efficient operations, so organizations typically attempt to reduce its impact; formal planning is one common tactic used by organizations to buffer themselves from environmental uncertainty (Thompson, 1967). The changing characteristics of the work force, which is but one important environmental factor, make the need for planning evident. Between 1976 and 1980, the labor force grew an average of 2.8%, but between 1991 and 1995, the rate of growth will drop to 1.1%. Additionally, whereas more than 3 million people joined the labor force in 1978, less than 2 million people are projected to enter the labor force each year from 1987 to 1995. Comparatively, the proportion of younger people (aged 16 to 24) and older people (aged 55 and over) in the work force will decline. People aged 25 to 54 will constitute a greater percentage of the labor force, increasing from 61% in 1975 to 73% in 1995. The number of mothers in the work force with children under one year old increased from 42% in 1980 to 55% in 1989. The ethnic mix of the labor force is also changing. The Bureau of Labor Statistics estimates that ethnic minorities will account for 57% of the growth in the labor force between now and the year 2000. Of the approximately 25 million workers added to the work force between 1985 and 2000, 42% are expected to be native White women and only 15% are expected to be native White men. Fully 22% are expected to be immigrants (Glickman, 1982; Johnston & Packer, 1987; "Managing Now," 1988; "Needed," 1988; Nelton, 1988). All of these demographic projections have significant implications for managing human resources, thereby increasing the importance of human resource planning (Coates, 1987; Davis & Associates, 1986) (Hennecke, M., 1984).

7. Short-Term Human Resource Planning

Many psychologists work on activities related to designing and implementing programs (e.g., recruitment, selection systems, and training programs) to meet short-term organizational needs. Such activities generally involve an element of planning in that they are future-oriented to some extent. Even projects for which objectives are

expected to be achieved in as little time as a few months have, ideally, been designed with an understanding of how the short-term objectives are linked to the achievement of longer term objectives. For example, an aeronautics company engaged in a recruitment campaign to hire 100 engineers should have a clear understanding of how this hiring goal will help the company achieve long-term goals such as becoming the world's most innovative company in that industry. This hypothetical company also might have a college recruiting drive designed to find 75 college graduates to enter a training program in recognition of the fact that a growing company needs to prepare for the middle managers it will need 5 to 7 years hence, as well as the top level managers it will need in 10 to 15 years. As this hypothetical example highlights, in order for a clear linkage to exist between human resource planning and strategic business planning, it is essential that an organization's top executives have a fully articulated vision for the future, which has been communicated and accepted by managers throughout the organization. (Milkovich, G. T., & Phillips, J. D., 1986)

8. Intermediate-Term Human Resource Planning

As we have noted, planning is used by organizations to buffer production or service delivery processes from sources of uncertainty. Human resource programs for the recruitment, selection, training, and motivation of employees help reduce uncertainty by ensuring that a sufficient number of people with the required characteristics and skills are available at all levels in the organizations. When the planning horizon is short, there is little uncertainty about which skills and how many people will be needed, and it is relatively easy to predict supply. (Page, R C., & Van De Vroot, D. M., 1989).

However, rapid and ongoing changes in today's business environment mean that the future cannot be easily anticipated by simply projecting past trends. As the focus of planning moves from short term to intermediate term, the question "What will we need?" is less easily answered and so becomes more dominant. For intermediate-term planning, there is also more uncertainty related to the question, "What will be available?" Consequently, human resource planning for the more distant future quickly raises the question, "How can we determine what will be needed and what will be available?" In other words, more technical attention must be given to the problem of forecasting. As in short-term human resource planning, the twin problems, of forecasting, demand and forecasting supply both must be addressed before objectives can be established and programs developed. With increased uncertainty, interaction between the human resource planner and

line managers is even more critical for making accurate demand and supply forecasts.

10. Conclusion

Human resource planning is probably one of the most critical elements in linking the work of the human resources function to the business goals of the company. "It is important to recognize that certain aspects of human resource management tend to have potentially high strategic consequences." Especially in the areas of policy development and implementation it is "obvious and difficult to refute advice that effective human resource policies require human resource planning, which in turn, requires effective integration with an organization's strategic planning process." It is evident that human resources planning is becoming more and more important in business circles. "Because business profits are squeezed by inflation and a weakened economy, management is also concerned with personnel costs and is seeking to achieve increased output with the same or fewer staff." Productivity concerns and material constraints also add to the emphasis on the ability to plan and fully utilize all of a company's resources. The human resources are right on the top of the list in most enterprises. (Burack, E. H., 1988) "The current demands on the world's material resources and their spiraling cost are building pressure to increase the productivity of human resource." Government at all levels both nationally and internationally (Federal, state, local, etc.) is interested in how employers treat their employees. They, therefore, add factors that must be considered in any human resource plan (work and wage laws, labor laws, etc.). (Dyer, L., & Heyer, N. D., 1984) "The net impact of the expanding government intervention has been an increase in the attention given to human resource planning in all of the problem areas." So, while the principles and processes of planning have not changed much, the complexity and timeliness have. Information technology enables the collection and analysis of more data than was even dreamed of in the 1980s. The complexity of planning across countries, cultures, economies, and new technologies is almost infinite. This makes the art, the gut feeling, the best guess, that much more important. The best that can be accomplished is to predict the probability of multiple successful solutions. Because the purpose of human resource planning is to ensure that the right people are in the right place at the right time, it must be linked with the plans of the total organization. Traditionally, there has been a weak one way linkage between business planning and human resource planning. Business plans, where they exist, have defined human resource needs, thereby making human resource planning a reactive exercise.

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A Survey on the Human Resource Management Perspectives as an Emerging Managerial Function

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Abstract: Human resource management can be defined as the process of acquiring, training, developing, motivating, and appraising a sufficient quantity of qualified employees to perform the activities necessary to accomplish organizational objectives; and developing specific activities and an overall organizational climate to generate maximum worker satisfaction and employee efficiency. While the owner-manager of a small organization is likely to assume complete responsibility for human resource management, larger organizations use company specialists called human resource managers to perform these activities in a systematic manner. The position is becoming increasingly important because of increased competition, government intrusion, emphasis on cost control, complex wage and benefit programs, and a changing work force. This article reviews the perspectives and the important considerations over the HR management and what HR managers should care about to achieve better Performance Measures.

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Keywords: Human Resource Management, Performance Measures, Maximum Satisfaction, Managerial Function.

1. Introduction

A Human Resource Management System (HRMS) or Human Resource Information System (HRIS) refers to the systems and processes at the intersection between human resource management (HRM) and information technology. It merges HRM as a discipline and in particular its basic HR activities and processes with the information technology field, whereas the programming of data processing systems evolved into standardized routines and packages of enterprise resource planning (ERP) software. On the whole, these ERP systems have their origin on software that integrates information from different applications into one universal database. The linkage of its financial and human resource modules through one database is the most important distinction to the individually and proprietary developed predecessors, which makes this software application both rigid and flexible. (Paauwe, J., 2009)

Human resource managers, also known as personnel managers, assume primary responsibility for forecasting personnel needs and recruiting and aiding in selecting new employees. They also assist in training and evaluation, and administer compensation, employee benefits, and safety programs.

2. Human Resource Management (HRM)

Human resource management: the management of the people and the staff policies and practice that enable an organization to carry out its work. This affects staff from the moment an

individual contacts the organization in response to a job advertisement, to the time they leave the organization. Human resource management is about enabling staff to use their qualities in order to fulfill their role and contribute to the organization's mission and purpose. Good human resource management is essential if organizations want to attract and retain good staff. If people see that an organization values its staff, they are more likely to apply for a job with the organization and more likely to stay once they are recruited. Good human resource management means that an organization reduces risk to its staff and reputation. It can do this by considering issues such as employment law, child protection and health and safety. Good human resource management can also reduce costs for an organization. For example, good recruitment policies and processes mean that organizations can efficiently recruit people who will carry out their jobs effectively. (Odiorne, G. S. 1981) Good systems for performance management mean that organizations can ensure that they are getting the best from their staff. It should be noted that volunteers are an important resource for many organizations. Some sections of this book, such as salaries and employment contracts, are not relevant to volunteers. However, sections such as benefits, performance management and staff development are relevant to volunteers. Development organizations should consider carefully which policies and practices should also be used with volunteers. (Golding, N., 2010)

3. Human Resource and HR managers

Human resource managers are well positioned to play an instrumental role in helping their organization achieve its goals of becoming a socially and environmentally responsible firm – one which reduces its negative and enhances its positive impacts on society and the environment. Further, human resource (HR) professionals in organizations that perceive successful corporate social responsibility (CSR) as a key driver of their financial performance can be influential in realizing on that objective. While there is considerable guidance to firms who wish to be the best place to work and for firms who seek to manage their employee relationships in a socially responsible way, there is a dearth of information for the HR manager who sees the importance of embedding their firm's CSR values throughout the organization, who wish to assist the executive team in integrating CSR into the company's DNA. And as high profile corporate failures such as Enron make all too clear, organizations that pay lip-service to CSR while neglecting to foster a CSR culture run the risk of damaging their corporate reputation if not their demise. Indeed, HR's mandate to communicate and implement ideas, policies, and cultural and behavioral change in organizations makes it central to fulfilling an organization's objectives to "integrate CSR in all that we do." That said, it is important to understand that employee engagement is not simply the mandate of HR. Indeed people leadership rests with all departmental managers. HR can facilitate the development of processes and systems; however, employee engagement is ultimately a shared responsibility. (Walker, J. W, 1988) The more the HR practitioner can understand their leverage with respect to CSR, the greater their ability to pass these insights along to their business partners towards the organization's objectives in integrating CSR throughout their operations and business model.

As human resources influence many of the key systems and business processes underpinning effective delivery, it is well positioned to foster a CSR ethic and achieve a high performance CSR culture. Human resource management can play a significant role so that CSR can become "the way we do things around here". HR can be the key organizational partner to ensure that what the organization is saying publicly aligns with how people are treated within the organization. HR is in the enviable position of being able to provide the tools and framework for the executive team and CEO to embed CSR ethic and culture into the brand and the strategic framework of the organization. It is the only function that influences across the entire enterprise for the entire 'lifecycle' of the employees who work there – thus it has considerable influence if

handled correctly. HR is poised for this lead role as it is adept at working horizontally and vertically across and within the organization, so important for successful CSR delivery. Of course, for effective CSR deployment, it needs to become a Board and C-suite imperative first. Should such an organizational gap exist, the senior HR leader can champion, lead and help drive a CSR approach if necessary. In the coming years as CSR increasingly becomes part of the business agenda and the fabric of responsible corporations, it will become a natural agenda for the HR practitioner. The following is an overview of the key trends and business drivers for fostering this CSR-HR connection, followed by a proposed roadmap or pathway for human resource leaders seeking to make a substantial contribution to sustainability, CSR and their firm's business goals. A companion CSR-HR Checklist is available which summarizes the roadmap at a glance.

4. Purpose

The function of Human Resources departments is generally administrative and common to all organizations. Organizations may have formalized selection, evaluation, and payroll processes. Efficient and effective management of "Human Capital" progressed to an increasingly imperative and complex process. The HR function consists of tracking existing employee data which traditionally includes personal histories, skills, capabilities, accomplishments and salary. To reduce the manual workload of these administrative activities, organizations began to electronically automate many of these processes by introducing specialized Human Resource Management Systems. HR executives rely on internal or external IT professionals to develop and maintain an integrated HRMS. Before the client-server architecture evolved in the late 1980s, many HR automation processes were relegated to mainframe computers that could handle large amounts of data transactions. In consequence of the high capital investment necessary to buy or program proprietary software, these internally-developed HRMS were limited to organizations that possessed a large amount of capital.

5. Human Resource Concerns in the 1990s

Two issues will continue to grow in importance during this final decade of the twentieth century: encouraging employees to remain on the job rather than retiring early and corporate responses to the needs of two-career couples.

6. Encouraging Late Retirement

Less than two decades ago, concerns about age discrimination in employment led to the passage

of laws ending mandatory employment for most workers. Today, many firms use financial incentives to encourage voluntary retirement by workers nearing the traditional retirement age. The worker buyout plans grew out of the recession of the early 1980s as firms attempted to reduce their payroll expenses, while avoiding morale-stunting layoffs. A financial package including a cash bonus, continuation of such employee benefits as insurance coverage, and higher-than normal monthly retirement benefits (to cover the gap between retirement and the onset of social security payments) prompted thousands of employees at such companies as Monsanto and Eastman Kodak to retire early. Worker buyouts reduced company payrolls by eliminating the typically above average wages and salaries of older, more experienced workers. Also, they contributed to the morale of remaining workers who saw tangible evidence of management's attempts to maintain job security by resorting to a buyout rather than a layoff. Finally, unclogging job and promotion opportunities improved the upward mobility of younger employees. (Armstrong, Michael, 2006) The programs were extremely successful: only 32 percent of workers age 55 and older hold jobs today, compared with 45 percent in 1930. And the median retirement age for men keeps sinking—to about 62 today, from 65 in 1963. As the ranks of younger employees thin, and shortages of workers and skills increase, astute companies are bending over backward to keep older employees. By the end of the century, only 39 percent of the work force will be under age 35, compared with 49 percent now. The number of people age 50 to 65 will increase at more than twice the rate of the overall population. Firms such as Corning Glass Works are beginning to create so-called platinum handcuffs in the form of shorter hours, company-paid vacation trips, and bonus plans that reward employees for staying on past a certain age or period of service.

By redesigning the job of store clerk to eliminate heavy lifting, Builders Emporium, a chain of 121 home improvement centers, was able to attract older workers as store clerks. Today, 15 percent of these 5,000 jobs are performed by employees age 55 or older. In general, the older staff knows the merchandise better and has more experience in dealing with people.

7. Two-Career Couples

By the year 2000, 62 of every 100 women will hold jobs outside the home. Already, 73 percent of all mothers with school-age children are employed. Two career households have specific job-related needs that must be addressed by employers. These issues frequently arise when a manager, professional

staff member, or highly skilled employee is hired from another geographic area. Relocation services for the spouse are often required to attract the new employee. For example, IBM reimburses spouses for up to \$500 in job-search expenses. Other firms aid by providing employment leads and financial assistance until the spouse locates a job in the new city. Flexible work arrangements may be important for two-career couples, especially those with children. Child-care facilities and parental leave programs for both mothers and fathers may be determinants in retaining highly qualified employees. (Pierce, M., and Madden, K., 1999) For example, Colgate-Palmolive's 12-week unpaid leave program allows salaried women or men to take time off for birth, adoption, family illness, or elderly care. Shoe manufacturer Stride Rite Corporation became the first large corporation to provide intergenerational day care in 1989 when it opened its elder-care facility.

8. The HR management module

The HR management module is a component covering many other HR aspects from application to retirement. The system records basic demographic and address data, selection, training and development, capabilities and skills management, compensation planning records and other related activities. Leading edge systems provide the ability to "read" applications and enter relevant data to applicable database fields, notify employers and provide position management and position control. Human resource management function involves the recruitment, placement, evaluation, compensation and development of the employees of an organization. Initially, businesses used computer based information systems to:

- produce pay checks and payroll reports;
- maintain personnel records;
- Pursue [Talent Management](#).

9. Human Resource Management as an Emerging Managerial Function

A hundred years ago, companies hired workers by posting a notice outside their gate, stating that a certain number of workers would be hired and the day of hiring. The notice might have listed skills, such as welding or carpentry; or it might simply have listed the number of workers needed. On hiring day people would appear at the front gate—a small number in prosperous times, large crowds during periods of unemployment—and the workers would be selected. The choices were often arbitrary; the company might hire the first four in line or the four people who looked the strongest or the healthiest. Workers operated under a precise set of strict rules. (Fleishman, E. A., & Quaintance, M. K., 1984)

10. Two Perspectives on Human Resource Management

Human resource management can be viewed in two ways. In a narrow sense, it refers to the functions and operations of a single department in a firm: the human resource or personnel department. Most firms with 200 or more employees establish a separate department with the responsibility and authority for selecting and training personnel. In a broader sense, human resource management involves the entire organization. Even though a special staff department exists, general management is also involved in training and developing workers, evaluating their performance, and motivating them to perform as efficiently as possible.

The core responsibilities of human resource management are the following:

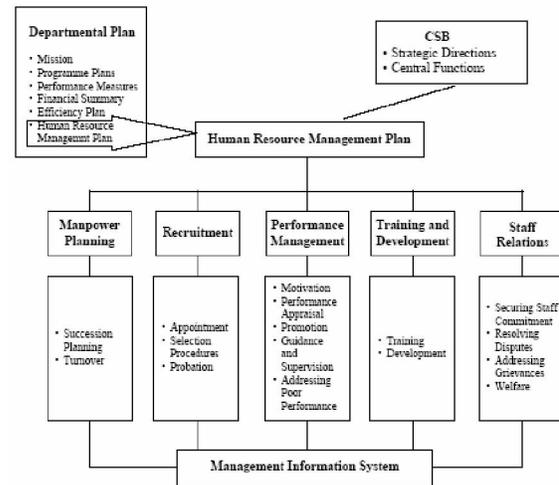
- Human resource planning
- Recruitment and selection
- Training/management development
- Performance appraisal
- Compensation and employee benefits.

Trained personnel from the human resource department are typically involved in carrying out each of these responsibilities. However, the responsibilities are typically shared with line managers, ranging from the company president (who is involved in overall planning) to first-line supervisors (who may be involved in preliminary interviews with applicants and in employee training). By accomplishing these critical tasks, the human resource management department achieves its overall objectives of (1) providing qualified, well-trained employees; (2) maximizing employee effectiveness in the organization; and (3) satisfying individual employee needs through monetary compensation, employee benefits, advancement opportunities, and job satisfaction. (Burack, E. H., 1988)

11. Departmental human resource management plans

Departmental human resource management plans are used to link together the overall policies of the Civil Service Branch, the mission, objectives and values of the department, and any specific Human Resource Management activities being undertaken at line management level. The plans thereby provide clear policies and guidelines for staff and managers. (Hay Group, 1988)

Table 1: Departmental Human Resource Management Plans



12. Human resource management at organizational level

There are many aspects of human resource management. Some organizations may feel overwhelmed and unsure about where to start making improvements. This is particularly the case for organizations that do not have a team or department specifically responsible for human resource management. (Hennecke, M., 1984)

Where there is no specific team, it is worth considering giving someone responsibility for aspects of human resource management as part of their entire role. There are many benefits of having a member of staff with ownership of human resource management. For example:

The organization can be kept up-to-date on legal issues.

A coordinated approach can be taken with regard to strategy, policy and practice. This helps to ensure that the organization has a fair and consistent way of treating its staff.

Staff have access to good advice on issues relating to staff.

Salaries are fair and consistent.

Good policy and practice can be put in place.

Job descriptions can be kept up-to-date. Staff and line managers then know what to expect and performance can be measured successfully.

Recruitment procedures can be thorough and enable the best people to be recruited.

Staff briefing and induction is planned and well organized.

As the organization shows it thinks human resource management is important, staff feel valued and encouraged to stay with the organization. Some organizations may be large enough to establish their own team that is responsible for human resource management. In this case, it is important to gain permission from the leadership of the organization first, including the Chief Executive Officer and the board. It may be necessary to inform them of the benefits of human resource management in order for them to understand its importance. It is worth noting that some donors will provide funding for activities related to human resource management.

13. Conclusion

Human resource managers are well positioned to play an instrumental role in helping their organization achieve its goals of becoming a socially and environmentally responsible firm – one which reduces its negative and enhances its positive impacts on society and the environment.

Herein, effective monitoring depends on having the right performance measures in place.

Human Resource Management performance measures should therefore relate to all aspects of Human Resource Management. However, management information will not always be statistically quantifiable and measurable data, but it should be as objective as possible and based on observable quantifiable measures wherever possible.

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A Critique of Richard Rorty's Paradigmatic View: Avicenna's Practical Philosophy as a CounterexampleMohsen Mahmoudi¹ Musa Akrami²¹ PhD Student, Department of Philosophy, Islamic Azad University, Science and Research Branch, Tehran, Iran² Associate Professor, Department of Philosophy of Science, Islamic Azad University, Science and Research Branch, Tehran, IranMohsenmahmoodi97@yahoo.com

Abstract: The aim of this article is to criticize Richard Rorty's view on epistemic gap between philosophical paradigms, being done through a comparison between Avicenna's view on moral statements and pragmatic reasons on the one hand and Rorty's view on the other hand. Avicenna's view concerning pragmatic reason has some similarities to Rorty's view, while each of these two views belongs to one of two different philosophical paradigms. Authors argue that there is not so epistemic gap between different philosophical paradigms preventing us to compare them with each other. Rorty's views have consequences, such as breaking off the relations and conversations among cultures, that he didn't accept them. According to the central role of the concept of conversation in Rorty's ideas, on the one hand, and its coming to stop, on the other hand, Rorty's philosophy encounters contradictions in such consequences.

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Keywords: paradigm, epistemic gap, conversation, practical reason, moral statements, consensus

1. Epistemic Gap among Paradigms and Its Consequence

According to Rorty's critique of epistemology and his analysis of the history of philosophy, we are observing different philosophical paradigms. Because of special historical circumstances, philosophical paradigms are created in special historical contexts and are fully different from each other. Rorty accepts Thomas Kuhn's thesis of incommensurability of paradigms and expands it to the whole of human learning and culture (Rorty, 1980, 324).

Whatever is important in Kuhn's view is the shift between paradigms. Kuhn believes that paradigm difference is so fundamental that we cannot make an epistemic relation among them. Really, according to Kuhn's view, it is not merely the scientists' interpretations of observation that change with paradigm shifts, but, rather, they live in different worlds, experiencing different things (Kuhn, 1962, 149).

As a preliminary note, one must pay attention to the fact that the doctrine of paradigm shift as set forth by Kuhn and used by Rorty is more ambiguous to be applied in analysis and explanation of some principles of practical ethics. One of the important questions here is that what is the criterion on the basis of which we would be able to realize the borders between paradigms? How is it possible for two paradigms having no common part to enter into dialogue with each other? How is it possible to decide between two different statements belonging to different paradigms if, according to Rorty, there is no

impartial objective ground for any judgment? (Rorty, 2000, 2) Moreover, how is it possible to conclude that an epistemic gap exists between paradigms? Recognition of an epistemic gap presupposes a determination of the limits and borders of the paradigms. How it is possible to determine such limits and borders if, according to Rorty, there is no objective foundation and impartial ground? One needs a meta-paradigm if (s)he wants to recognize the limits and determine the limits of the paradigms.

In addition, one of the necessary consequences of Rorty's thesis of epistemic gap between paradigms is that conversation between various cultures and thought paradigms is not possible, while conversation has an important role in Rorty's philosophy. Presenting both Sellar's behavioristic critique of the "whole framework of givenness" and Quine's behavioristic approach to the necessary-contingent distinction as forms of holism, Rorty argues that their holistic doctrines sound pointlessly paradoxical as long as knowledge is conceived of as accurate representing, because such accuracy requires a theory of privileged representations. He argues "that their holism is a product of their commitment to the thesis that justification is not a matter of a special relation between ideas (or words) and objects, but of conversation, of social practice." (Rorty, 1980, 170). To the extent that conversation between cultures or paradigms is possible, one must recognize a connection between them, denying the gap.

2. Avicenna on Practical Philosophy and Moral Statements

Avicenna has recognized moral propositions consisting of "goodness and evil" of events and behaviors on the one hand and "ought and ought not" on the other hand. He has good comments on some propositions called *Mashhūrā* (indemonstrable, generally accepted) which are not certain and their validity is not based on any conformity with reality, rather, their validity is depended upon thinkers and their consensus. From his point of view, the cause of accepting these propositions is the fame that among people, who generally accept them.

Avicenna, following Aristotle, divides reason into two types: theoretical and practical. According to him, practical reason has no faculty of understanding and is the impulse for excitation of the faculties of the body. From his point of view, the realm of practical reason and moral statements are of the type *Mashhūrāt* in which the criterion of truth is the consensus (general opinions) of the intelligentsia (or learned men) not the real world. Moral statements have no reality other than conformity to that consensus. He, in logic, divides syllogism into five types: 1) demonstration, 2) dialectics, 3) rhetorics, 4) poetics, 5) paralogism (*moghāleteh*). These five types are called "five techniques" (*Sanā'āt-e-Khamsah*). Each of them is based on premises. Demonstration is formed of theorems and certain premises. (*Al-Ishārāt wa-'l-tanbihāt (Remarks and Admonitions)*, part 1, P. 341-343 and p. 460) Preliminaries of demonstration technique are: 1) first principles, 2) sensible data (observations), 3) data of experience (empirical premises), 4) *hadsyat* (accumenalia, conjectures), 5) *mutawatirat* (successive hearsays), 6) *fitriyyāt* (innate data). The premises of the second technique, i.e. dialectics, are of the kinds of *Mashhūrāt* (indemonstrable, generally accepted) ones. (*ibid.* e, p. 460-461). In *Kitāb al-Shifā' (The Book of Healing)*, Avicenna believes that the demonstrative syllogism is certain and its aim is discovering the truth, while, in contrary, dialectics does not give the certainty, its aim being to silence the opponent. (*Kitāb al-Shifā' (The Book of Healing)*, vol. 3, p. 51)

From Avicenna's point of view, moral propositions such as "justice is delightful", "oppression is immoral", and "theft is ill-favored" are not certain and human reason is not able to prove their truth. Avicenna believes that if a man, having the faculty of recognition and discrimination, assumes that has been born suddenly and has no habit and education to accept moral statements, having no judge except reason to judge moral affairs, without any shame to be excited to state a moral judgment, and there being no expediency to state moral judgment, now if such a man decides to fall into

suspicion regarding propositions such as "justice is delightful" and or "oppression is ill-favored", (s)he recognizes that it is possible for him/her to hesitate; if these propositions are true, their truth is not recognized by (theoretical) reason (*Kitāb al-Shifā' (The Book of Healing)*, p. 66)

In summary, in Avicenna's view, the propositions of practical philosophy are formed in relation with behaviors of the intelligentsia and specific customary rules of each region. One may see some relativism regarding such propositions, so that one may believe that each society has its own specific morals and policies. Therefore, Avicenna gathers together and combines absolutist and relativist approaches: in the section of theoretical philosophy, with its own metaphysics, he reaches to fixed, absolute and universal principles, while in the section of practical philosophy with its own pragmatism far from such metaphysics and foundationalism; he reaches to changeable particular propositions. In practical reason, Avicenna, very similar to Rorty, denies the objectivity of moral propositions, though Rorty completely denies the objectivity.

3. Comparison of Avicenna and Rorty

Now, the question is this: is there so deep epistemic gap between philosophical paradigms, as unrelated islands, that one cannot find similarities between two philosophers belonging to two different paradigms? Is it possible that there is a relation between two philosophical paradigms on the one hand and one cannot absolutely compare them on the other hand?

As an example for the separation and conflict between Rorty's philosophical theses and their consequences, we compare the theses of Eastern Iranian Muslim philosopher Avicenna (980-1037) and Western American neo-pragmatist philosopher Rorty to show and explain their similarities, while they have different metaphysical and epistemological attitudes. Avicenna's view on moral judgments and statements in the realm of practical reason is similar to Rorty's ideas in this field, while Avicenna belongs to metaphysical paradigm and Rorty belongs to language paradigm. In spite of belonging to two completely different cultural-philosophical contexts and traditions, one could find a possibility of conversation and understanding between Avicenna and Rorty with so many similarities in views and recommendations.

According to Rorty, it is impossible to achieve the objective reality, the possibility of which has been accepted in Aristotelian (peripatetic) tradition from West to East. In Rorty's view, it is not possible to justify our recognition claims by appealing to their objectivity. If the justification of our recognition

claims through appealing to objectivity is not possible, which way remains to justify them? It is here that Rorty, as a nonfoundationalist in epistemology, sets forth his "solidarity" thesis. Social cohesion (as well as trust and reciprocity) is the only way for people to justify and support their recognition claims. In other words, a speech is not defensible and justified according to its truth and in its correspondence with external reality, but it is defensible on the basis that people of a society can reach to "consensus" and intersubjective agreement (Rorty 1996, 23).

Rorty emphasizes on social cohesion and conversation of the people living in a society to the extent that he sees the root of morals in conversation and its consequent, i.e. consensus. In other words, it is not possible to attribute some objective or real root to morals; rather, social norms are the only bases of moral truths. Social cohesion among some people belonging to a society with its own norm leads to an ethnocentrism, justifying moral statements on such relativistic grounds. Any judgment concerning the truth or falsity of propositions refers to their consistency or inconsistency with other accepted propositions or beliefs. A proposition is regarded to be true if people could reach consensus on it. Thus truth or justifiability of a moral proposition is itself a moral concept, leading to more expansion of consensus on moral propositions. The criterion for truth of moral statements is to be understood on the basis of social cohesion and solidarity in a society organized by some people living with each other (ibid. 21).

4. Conclusion

It is true that we cannot do a point-by point comparison between Rorty's and Avicenna's philosophy as probably two philosophical paradigms; but this doesn't mean that we cannot find any common ideas and common language between them to have conversation concerning the statements in practical affairs. There are many examples to show this claim, but, of course, we need another article to give more examples. Besides Avicenna and Rorty, there are many philosophers and thinkers in West and East to be compared.

Rorty not only holds that moral propositions are related to the agreement of the group, but he has such an idea regarding all human knowledge. He, as a pragmatist (or neo-pragmatist) does not believe in separation of theory and practice, and, of course, he argues that practice is prior to theory. Avicenna, instead, holds that theory is prior to practice, though he reaches to some relativism in practical reason. Of course, Rorty's pragmatism is completely ethnocentric and relativistic.

Accordingly, contrary to Rorty, it is possible to do some comparison between different philosophical paradigms, so that there is home for their conversation and reaching to some agreement. We have argued, against Rorty, that it is not true that there are unbridgeable gaps among paradigms in all cases, but rather, they may have interference and overlap with each other in spite of differences in metaphysical or philosophical foundations (if there is a belief in some philosophical foundation at all). If there is similarities and possibility of conversation among paradigms, then it is possible for them to understand each other. Avicenna's practical philosophy is a good example to contradict Rorty's claims concerning the impossibility of philosophical foundations in theoretical philosophy on the one hand, and the impossibility of similarity and conversation between ideas belonging to different philosophical paradigms on the other hand. And as we observed, this claim, specially, about Avicenna and Rorty in practice reason part is true. Moreover, we are allowed to speak of both intrinsic interconnection and discontinuity between theory and practice.

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Evaluation of Damages on Arc Frames of Reinforced Concrete by using Pushover

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Abstract: Qualification the scope of damage on structures is of the most important categories recently has been considered very much by researchers. For this purpose, different researchers by consideration of different aspects of structures have paid to presenting indexes. Depending most of these indices to nonlinear dynamic analysis performance which is very complex and time consuming has caused that using of these indices more be restricted to research project. The aim of this research is representing a simple and effective index on the basis of increasing load analysis and proportionate with operation point of structures which can represent a fair estimation of the scope of damages on structures.

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Keywords: Damage, Reinforced Concrete, Arc Frames, Pushover.

1. Introduction

However, in last earthquakes of the world, designed structures on the basis of existent seismic criteria, have performed fairly in preserve of individuals' safety, but the scope of created destructions in structures and entered economic damages has been very extended and unexpected. Nowadays, it has been specified well that designed structures on the basis of this criteria, against hard earthquakes will bear heavy damages. Thus, designing on the basis of operation as a method which is based upon acceptance of displacement and expected transformation (and according to anticipated level) was considered. From the most categories in operational designing, is having clear image of scope of damages entered on designed structure in different level of hazard. For this purpose in instructions such as FEMA and AAATC40 [1, 2] different level of damages entered on structures have been represented. Determinant criteria of structure situation in these instructions are on the basis of lateral transformation; however in some researches it has been indicated that using this standard as only standard of destruction is considerable [3].

We can investigate damage in various aspects, but generally, damaged entered on a structure is decreasing structure capacity in sustaining types of entered loads relative to safe structures before occurrence of earthquake or each another criterion which caused decreasing capacity of structure. For determining scope of entered damages on structure, researchers have introduced many indices which of them in a manner, estimate damages entered on

structure. These indices can be categorized in three category: The first category are indices on the basis of most experienced transformation of structure, such as most relative displacement of stories[4] and the most ratio of transforming of stories[5]. Second category are indices on the basis of aggregate damage among it we can refer to Gobara damage index which is based on pushover analysis[6] and Chai and Fejfer damage index which is based on entered energy[7]. In third category there are indices that are combination of maximum transformation and aggregate damage, among them we can refer to damage index of Park and Ang [8] Venchzo and Banon [9]. From other damage indices introduced by researchers in recent years we can refer to Falerbo, et al research which by using of plastic energy in plastic joints they paid to representing an index for evaluation of scope of damage entered on reinforced concrete frames, of course it is necessary to mention that in this research idea of centralized plastic joint is used that in the case of reinforced concrete structures because of cracking phenomena can not to model real behavior of structure in a desired form [10]. Jang, et al. by using of method of force analogy and the combination of energy and displacement of structure (3rd category) introduced an index and paid to comparison of results from this index by using of time history analysis and combination of square root of sum of squares resulted from considering three first mode of structure for two Elcentro and Northrij earthquakes[11].

Study of literature of subject indicates that however some referred indices have suitable compatibility

with observed damage on structures, but calculation of most of them needs to performance of nonlinear dynamic analysis which time consuming and complexity of this method and also uncertainty about specifications of future earthquakes has caused that these indices less be used in common designing of building frames and more delicate to activities and research projects. Nowadays, pushover analysis as a model which can model capacity of structure and in any case has not complexity of nonlinear dynamic analysis is considered very much. Now if we can define an index based on performance of this analysis and proportionate with operation point of structure which have suitable computability with real behavior of structure and also by using it we can estimate real damage rate, we can have an important pace in aspect of more practically of determining the rate of damage entered on structures in categories such as designing and strengthening. In this research, at first it is paid to investigation of lateral transformation criterion accuracy (emphasized by standard such as FEMA273 and ATC40) in evaluation of rate of damages entered on structures and in the following it is paid to effective strategies in evaluation of rate of damages entered on structures. For this purpose, by considering 7 record of earthquake, it is paid to nonlinear modeling of several arc frames and index of Park and Ang damage is calculated for them. Then by comparison of results of this modeling with results of damage indices suggested in pushover analysis, a new criterion is introduced.

2. Indices of Evaluated Damage in this Research

1-2- Index of Park and Ang Damage

In present research, this index which was suggested by Park and Ang in 1984, as index of base is used for comparison with other indices. Main advantage of this index is in its compatibility with experimental results and also its simpleness and grading proportionate with observed damage. This index is given by relation below:

$$DI_{P\&G} = \frac{\theta_m - \theta_r}{\theta_u - \theta_r} + \frac{\beta E_h}{M_y \theta_u} \quad (1)$$

there, θ_m is the most created circulation in element in history of loading, θ_u is the most capacity of cross circulation, θ_r recovering circulation after loading, M_y yielding anchor, β constant of model and E_h is wasted energy in cross. In table 1 proportionate of real damage entered in structure with amounts of this index which has been by Park, is shown:

Table 1: Details of damage, proportionate to Park Index (8)

Degree of Damage	Apparent Sight	Index of damage	Situation of Building
Collapsing	Local or general collapsing of	>1	Demolition
Hard	Crushing of concrete spread, appearing of ricocheted armatures	0.4-1.0	Un-repairable
Average	Big and expanded cracks, laminating of concrete in weaker elements	0.25-0.4	Repairable
Little	Small cracks, local crushing of concrete in columns	0.1-0.25	Repairable
A few	Appearance of scattered cracks	<0.1	Repairable

2-2- Lateral Deforming Damage Index

This index is the most famous indices in classification of general indices of structure which is calculated by equation below:

$$DI_{Drift} = \frac{\Delta_m}{H} \quad (2)$$

there, Δ_m is maximum movement of roof (corresponding to operation point) and H is height of structure. In present research this index is calculated by using push over analyzing and is compared with results of Park and Ang damages (dynamic).

3-3 Index of Energy Damage

Using of wasted energy by structure in many researches for determining the rate of entered damages on structure most of which were on the basis of dynamic analyses. Kaeo and Akiyama considered wasted accumulated energy by hysteresis attenuation as acceptable index for estimation of structure damage [12]. Jang and et.al used entered energy and plastic energy of structure for determining the rate of damage entered on structure [11], etc. By referring to energy equilibrium of energy equation for a nonlinear system, under stimulation of an earthquake:

$$\int_0^u m \ddot{u}(t) du + \int_0^u c \dot{u}(t) du + \int_0^u f_s(u, \dot{u}) du = - \int_0^u m \ddot{u}_g(t) du \quad (3)$$

Or
KE+DE+SE+PE=IE

There in, $KE = \int_0^u mu(t) \cdot du$ is kinetic energy,

$DE = \int_0^u cu(t)du$ is attenuation energy,

$SE = \frac{f_s^2}{2k}$ is strain energy,

$PE = \int_0^u f_s(u, \dot{u})du - SE$ is plastic energy and

$IE = -\int_0^u m\ddot{u}_g(t)du$ is the energy entered into system.

As we consider, entrance energy to a structure is wasted by four mechanisms. In general condition, kinetic and strain Mechanisms generally undertake little share of rate of wasted energy by structure and most of energy is wasted by attenuation and yield mechanisms. In these two mechanisms, whatever structure enters into nonlinear phase, share of yield energy of attenuation energy is more which is explaining of lower speed of non-elastic systems to elastic systems. The aim of this section is representing an index on the basis of absorbed energy by structure in pushover analysis. With regard to this point that, curve of capacity resulted from pushover analyzing is structure Hysteresis ring push, then we can know low surface of this curve in operation point indicator of absorbed energy of structure in the biggest Hysteresis ring of it under a special square mostly has the large share of absorbed energy by structure. This index is calculated by relation bellow:

$$E_{pp} = a_y d_p - d_y a_p$$

There in,

d_p and a_p is coordinates of operation point.

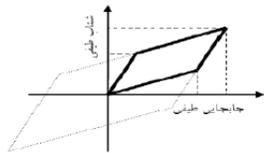


Figure 1- Hysteresis ring of structure in operation point

In definition of this index initial point which is entrance of structure to nonlinear phase and is considered beginning of structure damaging, a point of capacity curve corresponding to the first cracking of structure member has been considered and amount of damage index in this point is zero and whatever structure behavior enters into nonlinear phase, structure element is more damaged and the amount of this index is more to finally in a point final capacity of structure, the amount of this index would be reached to unit number. In purpose of determining final capacity of structure, different definitions have been brought up by researches. But in this research final capacity point of structure is considered a point

of curve of structure capacity in which by little increase of lateral force, structure causes to very big sudden deformation to the previous phase and so-called in curve of capacity structure cutting occurs. Phase of calculation of E_{fp} also is similar to E_{pp} . E_{fp} is the area related to sub-curve of capacity in the point of first cracking. It should be mentioned that, this index hereinafter is called under title of index of energy damage.

3. Modeling of Frames

In this section in purpose of evaluation of introduced damage indices in last sections, the number of 14 reinforced concrete frame were considered which be concluded of large level of stories number and spans. All frames have selected from reference [13]. Four span frames have number storeys of 5, 8 and 12 and 15, 5 span frames have storeys number of 2, 4, 6, 8 and 10 and 2 span frame have storeys number of 1, 3, 5, 7 and 9. Height of all storeys is 3.2m and length of all spans also is 4m. In modeling of these frames it is assumed that all frames there are in stone bed and by average risking according to loading 2800 standard and according to ABA by-law have been designed for the region (in designing these frames all standards such as restriction of lateral transformation in 2800 by-law has been observed). Frames have loader wide of 4m and in all storeys having dead load of 760 and live load of 200 km/m^2 . Importance of frames are assumed of middle type according to standard 2800. In process of analyzing and designing of these frames specified strength of concrete equal to 30 MP, elasticity module of concrete equal to 2386 MP, corresponding strain with maximum strength of concrete equal to 0.002, final strain of concrete equal to 0.003, strength of flowing steel 300 MP and steel elasticity module equal to 200000 MP have been assumed. General scheme of these frames has been indicated in figure 2 and details related to their designing are indicated in table 2.

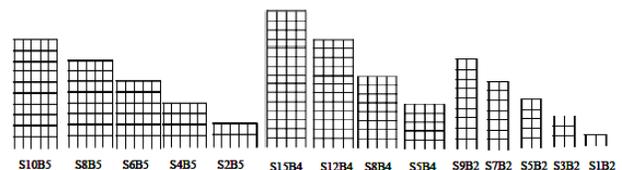


Figure 2- General View of Under-study Frames

Table 2- General Specification of Under-study Frames

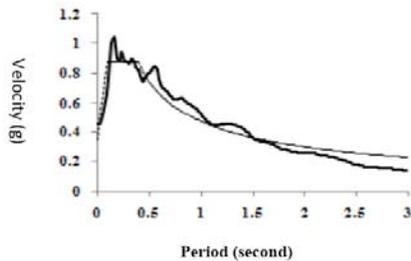
No. of Frame	S3B4	S8B4	S12B4	S15B4	S2B5	S4B5	S6B5	S8B5	S10B5	S1B2	S3B2	S5B2	S7B2	S9B2
G. Height (m)	16	25.6	38.4	48	6.4	12.8	19.2	25.6	32	3.2	9.6	16	22.4	28.8
Structure Period	0.56	0.79	1.07	1.27	0.28	0.47	0.64	0.79	0.941	0.167	0.38	0.56	0.72	0.87
Base Shear (K Newton)	159.8	202.1	247.6	276.8	114.1	173.5	215.2	248.3	277.76	22.83	73	94.3	111.8	105.5

4. Choosing Earthquakes

For performance of nonlinear dynamic analyzing it is necessary that some velocity writer proportionate to geo-technique specification and conditions of soil of establishment of project place being chosen and these velocity writers be compatible with spectrum of designing of region. As it was mentioned, modeled frame in this project are designed on stone bed and as a result, registered records also have chosen on stone bed. In this research 7 records earthquakes from collection of existent records in FEMA440[14] registered on stone bed, in a manner have been chosen from data base PEER and according to principles of bylaw 2800 have been scaled which average spectrum resulted of them in range of 0.03 to 2.4 second which upon bylaw 2800 is an important limit for designed frames in this research (limits between 0.2T and 1.5T), have the least difference with spectrum of plan of 2800 bylaw, which specification related to these records and average spectrum resulted from them in sequence are indicated in table 3 and figure 3.

Table 3- General Specification of Earthquakes

No. of Earthquake	1	2	3	4	5	6	7
Name of Earthquake	Imperial Valley	Landers	Loma Prieta	Loma Prieta	Loma Prieta	Northridge	Northridge
Station No.	286	21081	58131	58151	58338	23590	90019
Component (degree)	135	90	270	90	45	90	180
Maximum velocity (g)	0.195	0.146	0.06	0.09	0.084	0.056	0.256



5. Numeric Study

In this section initially we pay to comparison of Park and Ang damage indices and lateral transformation index and then we will pay to evaluation suggested index of this research. For this purpose, considered frames are modeled and pushover and nonlinear dynamic analyses is performed on model. Pushover analysis in this research by using of loading model of existent sequence in reference [1] has been performed which diagram of shear base-displacement roofs of considered frames are shown in figure 4. For performance of all analyses DARC V6.1 has been used which is the very powerful software in analyzing reinforced concrete structures [15]. For calculation of damage indices in pushover analyzing, firstly operation point of structure by capacity spectrum method determined and then amount of

these indices were calculated in operation point of structure [16]. In the following for this purpose that relation between explained indices be determined in a vast level, for each of frames 5 operation point was calculated which in order are related to spectrum of average response indicated in figure 3 and spectrums which by co-efficient of 1.5, 2, 2.5 and 3 equal to first spectrum are scaled and then amounts of damage indices in these points are calculated. In the following, for calculation of damage indices in dynamic condition, existent compatible records, became compatible with scaled spectrums and it was paid to performance of nonlinear dynamic analysis. Analogous to each calculated damage in operation point in pushover analysis, by averaging of results related to 7 earthquakes being compatible with scaled spectrum, damage related to nonlinear dynamic analysis was calculated. In presented forms in this section, triangular point are related to damage correspond to average spectrum in figure 3 and are correspond to planning earthquake of 2800 bylaw; square points are analogous to 1.5fold of average spectrum in figure 3, which approximately can be analogous to hazard level of M.E. in ATC40 which indicates probability of 5% occurrence in 50 year, (however, determining of this level needs to more investigations, but by referring to reference [2], this level nearly is 1.25 to 1.5fold of designing level spectrum which with regard to this subject, for explaining relative estimation of damages in this level, the most limit of this approximation i.e. 1.5fold of average spectrum, has been selected) and other points have been specified by square points. In the following in this research these points are mentioned by their figure.

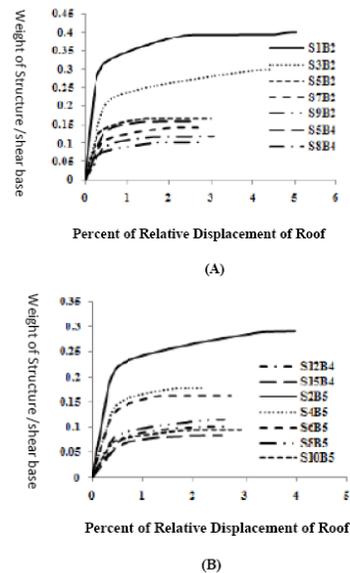
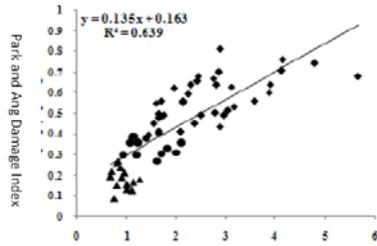


Figure 4- Base shear curve – Displacement of frames roof

6. Comparison of Park and Ang Damage Index with Index of Lateral Transformation

In this section we have paid to comparison of Park and Ang damage index in dynamic analysis and index of lateral transformation in pushover analysis results of which are shown in figure 5.



Criterion of damages of relative displacement of roof (%)
 Figure 5- Comparison of Park and Ang Damage Index and Relative Displacement of Roof with Linear interpolation

As we see in figure 5, these two criteria have many scattering to each other. From this point we can result that displacement criterion cannot be suitable index for assessment of operation of structure. We can know this subject relevant to non-consideration of final capacity of structure in this index because in this criterion only in this criterion only the rate of lateral displacement of roof has been considered and general capacity of structure in bearing this displacement is not considered. In consideration of triangular points which are correspond to designing spectrum and are indicating of hazard level of 10% in 50 year, it is observed that amounts of Park damage index, changes from 0.841 to 0.27. By referring to table 1, this range of changes, is indicating without damage and a few damage situations with regard to specification of operation levels which with regard to indicated operation level specifications, can considered operation level of OP and IO. This subject is indicating suitable operation of ABA bylaw and 2800 in restriction of damaged entered on designed structures by using of standards of these bylaws and upper hand operation of them. Also by referring to circle point which are indicating of hazard level of 5% in 50 year, it is observed that range of changes of these points is from 0.27 to 0.42 which by referring to table 1, indicating of average damage level and by referring to operational level, it can be indicating of operational level of LS. This subject again indicates suitable operation of ABA bylaws and 2800. Results show that for triangular points, range of relative displacement changes from is 0.673 to 1.25 and for circle point is from 0.915 to 2.1 which with regard to specifications of operational levels, defined in reference [1] on the basis of amounts of this criterion, is indicating suitable operation of structures. Among other considerable points of these figures we can

refer to this point that to relative displacement limits of %1.7, amounts of Park and Ang index is less than 0.4 which is border of repairable and un-repairable damage levels.

7. Comparison of Park and Ang damage Index and Index of Energy Damage

In this section, amounts of Park and Ang damage index in dynamic analysis, by amount of index of energy damage which is calculated in operation points, have been compared. Results from this comparison are shown in figure 6.

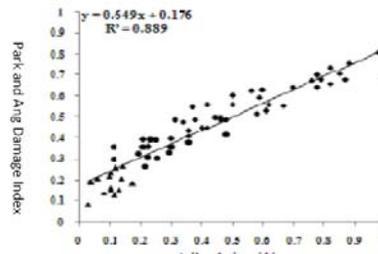


Figure 6- Comparison of Damage Indices with Linear interpolation

As it is seen in figure 6 the least amount of achieved damage is related to a point by coordinates of (0.841 and 0.027) and the most amount is related to a point by coordinates of (0.683 and 0.94) and is observable that at the first of this diagram the amounts of Park and Ang damage index are more and whatever we go to end of diagram, this difference will decrease which we can now this subject because of increasing of hysteresis energy share from wasted energy by structure, by evermore entrance of structure into nonlinear phase. Also, average amount of energy damage index is 0.4 which is very close to index of Park damage. From other considerable cases in this diagram, scope of changes of energy damage index for limit of triangular and circle point is as 0.027 to 0.176 and 0.11 to 0.36. Now if the aim is preparation a table such as provided table by Park (Table 1) but is according to lateral transformation of roof and energy damage index we can represent a table as table 4.

Table 4- Various level of damage, proportionate to amounts of damage index of transforming of plastic and relative displacement of roof.

Amounts of Relative Displacement of Roof %	D<0.67	0.67<D<1.15	1.15<D<1.8	2.1<D
Amounts of Energy Damage Index	D<0.076	0.076<D<0.165	0.165<D<0.38	0.38<D<1
Details of Damage	Without Damage: Existence of crack in few and little number	Little damage: Small crack in length of element	Average damage: Hard crack and existence of split	Hard damage: hollowing of concrete and appearin

Conclusion:

In this research, at first it was paid to criteria of relative displacement by using of Park and Ang damage index. Results state that using this criterion of lateral transformation of roof, as the only criterion of recognition operation of structure is not suitable. Comparison of Plastic transformation damage index in pushover analysis and index of Park and Ang damage index in dynamic analysis, is indicating of more suitable operation of transforming index to the relative displacement criterion. On the basis of resulted nearly much points that each of them is result of two analysis of damage in nonlinear dynamic and nonlinear static conditions, relations for estimation of dynamic index amount in account of static results were extracted. Evaluation of damage entered on designed structures on the basis of ABA bylaw and 2800 of Iran, showed that in earthquake of planning level of 2800 bylaw and level of hazard M.E. in ATC40 a, ABA and 2800 bylaw of Iran in limitation of damage entered on structures has a suitable operation of life safety. Represented table in this research, on the basis of suggested index, give simple and effective criteria for prediction of operation level and damage of reinforced concrete arc frames, without need to performance of complex and time consuming nonlinear dynamic analyses to designers.

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Could Preeclampsia Affect The Maternal Serum Chorionic Gonadotrophin and Plasma Adenosine Deaminase Levels?

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Abstract: The current work aimed to study the effect of preeclampsia on maternal serum level of beta subunit of human chorionic gonadotropin and maternal plasma level of adenosine deaminase. Ninety pregnant women with gestational age 24 - 26 weeks were selected for this study, they were classified into three groups: group 1 consists of 30 women with normal pregnancy, group 2 consists of 30 patients with mild preeclampsia and group 3 consists of 30 patients with severe preeclampsia. Maternal serum level of beta subunit of human chorionic gonadotropin, and maternal plasma adenosine deaminase level were measured. Maternal serum level of beta subunit of human chorionic gonadotropin was significantly higher in severe preeclampsia compared with the mild preeclampsia group and normal pregnancies. Maternal plasma adenosine deaminase level was significantly higher in the severe group compared with the mild preeclamptic and normal groups. Maternal serum level of beta subunit of human chorionic gonadotropin and maternal plasma level of adenosine deaminase might be useful as markers of the severity of preeclampsia.

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Key words: Preeclampsia, human chorionic gonadotropin, adenosine deaminase.

1. Introduction

Preeclampsia (PE) remains a major cause of prenatal morbidity and mortality worldwide (Harskamp et al., 2007). Early identification of pregnant women at risk for **preeclampsia** is a priority to implement preventive measures (Giguère et al., 2010). The etiology and pathogenesis of PE are not fully understood, but two important components have been identified: the role of trophoblast cells and an accelerated maternal systemic response to trophoblastic tissue (Sargent et al., 2003).

The production of human chorionic gonadotropin (hCG) by the placenta in early pregnancy is critical for implantation and maintenance of the blastocyst (Reisinger et al., 2007). Since it is postulated that PE is likely to be a trophoblastic disorder, it may be essential to investigate the pathologic and secretory reaction of the placenta to understanding the disease. Twin pregnancy and molar pregnancy produce higher levels of B-hCG and they are associated with a higher incidence of PE than uncomplicated singleton pregnancy (Long and Oat, 1987).

Adenosine deaminase (ADA) is a cytosolic enzyme, which has been the object of considerable interest mainly because a congenital defect in this enzyme in humans causes severe combined immunodeficiency disease (Franco et al., 1987). ADA participates in purine metabolism where it

degrades either adenosine or 2-deoxyadenosine producing inosine or 2'-deoxyinosine respectively. Further metabolism of these deaminated nucleosides leads to hypoxanthine. ADA could have an extraenzymatic activity through binding directly to different cell surface molecules including CD-26 (a lymphocyte activation marker), so it is regarded as a cellular inflammatory indicator. ADA presents in all human tissues with highest level in lymphoid system. It may play a central role in the differentiation and maturation of the lymphoid system (Herrera et al., 2001).

The objective of the present study is to evaluate the correlation between maternal serum B-hCG level, maternal plasma ADA level and severity of PE which may reflect a different trophoblastic severity response of the disease.

2. Patients and Methods

This study was carried out on 90 pregnant women classified into 3 groups: group 1 consists of 30 normotensive non proteinuric pregnant women; group 2 consists of 30 women with mild PE; and group 3 consists of 30 women with severe PE. Women were recruited from the Obstetrics and Gynecology Outpatient Clinic of Benha University Hospital from June 2009 to June 2010. Inclusion criteria were singleton fetus, normal fetal anatomy, non-smoker and gestational age of 24-26 weeks

assessed by ultrasonography. Women with chronic hypertension, systemic disease as diabetes mellitus, collagen disease and recent infections were excluded.

Mild PE was defined as a combination of (1) systolic blood pressure (SBP) ≥ 140 and < 160 mm Hg or a diastolic blood pressure (DBP) ≥ 90 and < 110 mm Hg on two consecutive measurement six hours apart (2) proteinuria of ≥ 0.3 g and < 2 gm per 24 hours urine specimen or > 1 and $< 3+$ on dipstick testing of two random urine samples four hours apart. Severe PE was defined as (1) SBP ≥ 160 mmHg or DBP ≥ 110 mmHg on two consecutive measurement at least six hours apart on bed rest and (2) proteinuria ≥ 2 gm per 24 hours urine specimen or $\geq 3+$ on dipstick testing of two random urine sample four hours apart. In addition, any patient with oliguria (>400 ml in 24 hours), cerebral or visual disturbances, epigastric pain, pulmonary edema, abnormal edema, abnormal platelet count or abnormal liver function profile was included in the severe PE group (ACOG, 2002).

- For -hCG estimation, the random venous 2cc blood samples were centrifuged at 2000 g for 10 minutes at 4 °C. Sera were collected and stored at -20°C until analysis. Serum level of (-hCG) were measured by enzyme immunoassay according to Ozturk, et al., 1988 using free beta-hCG ELISA Kit (purchased from IBL - Hamburg GmbH, Flughafenstr, 52A, D-22335 Hamburg, Germany) and ELISA Reader (SLT-Spectra, Mode-III, Austria).
- For ADA estimation, the random heparinized 2cc blood samples were centrifuged for 10 minutes at 3000g and the plasma was separated and frozen at -70°C until analyzed. (ADA) activity was measured spectrophotometrically (Spectronic

3000 Array, Milton-Roy, USA) in the maternal plasma using the method described by Giusti and Galanti, 1984, based on direct measurement of the ammonia produced when ADA acts in excess of adenosine.

Statistical analysis:

The data were reported as mean and standard deviation (SD). For statistical analysis, analysis of variance (ANOVA) and correlation coefficient (r) were used and p values < 0.05 were considered statistically significant. Statistical package for social science (SPSS) version 10 was used for data analysis.

3. Results

The mean maternal age was significantly higher in group 3 than in group 2 and group 1 ($p < 0.05$). The parity was lower in group 3 than in group 2 and group 1 but the difference was not statistically significant. Maternal serum -hCG was significantly higher ($p < 0.05$) in group 3 than in group 2 and group 1. Maternal plasma ADA was significantly higher ($p < 0.05$) in group 3 than in group 2 & 1 (table 1).

The maternal age, maternal serum levels -hCG and maternal plasma ADA showed a significant positive correlation with SBP/DBP and albuminuria. Parity showed significant negative correlation with SBP/DBP and albuminuria in group 2 (Table 2).

The maternal age, maternal serum levels -hCG and maternal plasma ADA showed a significant positive correlation with SBP/DBP and albuminuria. Parity showed significant negative correlation with SBP/DBP and albuminuria in group 3 (Table 3).

Table (1): Characteristics of study participants in the 3 groups

Data \ Groups	Group 1 (n=30)	Group 2 (n=30)	Group 3 (n=30)	p
Age (y)	25.4 ± 0.27	27.73 ± 0.36	31.20 ± 5.54	< 0.05
Parity	3.07 ± 0.30	2.60 ± 0.32	2.0 ± 0.32	< 0.05
-hCG (mIU/ml)	16708.67 ± 1380.1	22504.67 ± 1161.40	29306.0 ± 1283.56	< 0.05
ADA (IU/l)	8.99 ± 0.46	12.95 ± 0.69	14.95 ± 0.52	< 0.05

-hCG = maternal serum beta subunit of human chorionic gonadotropin.
 ADA = maternal plasma adenosine deaminase $p < 0.05$ = significant.

Table (2): Correlation Coefficient (r) between systolic, diastolic blood pressure albuminuria, age, parity, maternal serum -hCG, maternal plasma adenosine deaminase (ADA) in group 2.

Data \ Parameters	Systolic blood pressure (SBP)		Diastolic blood pressure (DBP)		Albuminuria	
	r	p	r	p	r	p
Age (y)	0.92	<0.05	0.53	<0.05	0.85	<0.05
Parity	-0.88	<0.05	-0.54	<0.05	-0.84	<0.05
-hCG (mIU/ml)	0.92	<0.05	0.58	<0.05	0.84	<0.05
ADA (IU/l)	0.92	<0.05	0.54	<0.05	0.85	<0.05

-hCG = maternal serum beta subunit of human chorionic gonadotropin.
 ADA = maternal plasma adenosine deaminase p<0.05= significant.

Table (3): Correlation Coefficient (r) between systolic, diastolic blood pressure albuminuria, age, parity, maternal serum -hCG, maternal plasma adenosine deaminase (ADA) in group 3.

Data \ Parameters	Systolic blood pressure		Diastolic blood pressure		Albuminuria	
	r	p	r	p	r	p
Age (y)	0.88	<0.05	0.88	<0.05	0.83	<0.05
Parity	-0.70	<0.05	-0.63	<0.05	-0.89	<0.05
-hCG (mIU/ml)	0.89	<0.05	0.94	<0.05	0.79	<0.05
ADA (IU/l)	0.91	<0.05	0.83	<0.05	0.71	<0.05

-hCG = maternal serum beta subunit of human chorionic gonadotropin.
 ADA = maternal plasma adenosine deaminase p<0.05= significant.

Discussion

The normal placenta differentiates during pregnancy with dominance of cytotrophoblast in early gestation and syncytiotrophoblast in late gestation. It is well known that cytotrophoblasts are undifferentiated stem cells and that syncytiotrophoblasts are differentiated from the cytotrophoblast (Kliman, et al., 1987).

Although the mechanism of regulation of gestational hCG remains largely unknown, it is generally accepted that hCG is secreted only by the syncytiotrophoblast (Fox, 1970). Remzi et al showed that early placental vascular damage leading to decreased oxygen supply might result in increased hCG production by hyperplastic cytotrophoblastic cells (Remzi, et al., 2000). Also, hCG production has been shown to increase when normal placental villi in organ culture were maintained under hypoxic condition. Typically the placenta is the affected tissue in PE (Correa, et al., 2007). In PE, placental pathologic examination reveals focal cellular necrosis in the syncytiotrophoblast and increased mitotic activity with cellular proliferation in the cytotrophoblast. In addition, the proliferating cytotrophoblast in severe PE is rapidly transformed into syncytiotrophoblast within 72 hour (Hoshina, et al., 1982).

In recent years, many studies have been conducted to determine the relation between maternal serum hCG levels and subsequent development of

PE. Most studies indicated that an unexplained elevation of maternal serum B-hCG is significantly correlated with the occurrence of PE (Benn et al., 1996 and Luckas et al., 1998). By contrast Morssink et al., (1997_a) and Pouta et al., (1998) demonstrated no association, while Ashour et al., (1997) showed that significant association was reached only among multiparous women.

Regarding the relation between the levels of maternal serum B-hCG and the severity of PE, Hsu et al demonstrated that a significantly raised serum B-hCG level was only associated with severe PE (Hsu et al., 1994). Long-chien et al demonstrated multiple determining factors for severe PE including elevated mid-trimester B-hCG, multiparity, advanced maternal age and high basal body mass index; BMI (Long-chien et al., 2000). This study showed a significant positive correlation between maternal serum -hCG and the severity of PE. However significant negative correlation was found between the severity of PE and parity. This agrees with Basirat et al and may suggest an earlier occurrence of pathologic changes of the placenta among women at risk for later development of severe PE (Basirat et al., 2006).

The enzyme ADA is mainly located in haemopoietic cells such as Th1 cells, monocytes and macrophages. Beside ADA, Th1 cell produce the basic proinflammatory cytokines interleukin (IL2), tumor necrosis factors & (TNF- α) and interferon- α

(INF- α). Insufficient arterial remodeling and shallow trophoblastic invasion are characteristic placental pathologies in PE (Merviel et al., 2004). An unbalanced inflammatory reaction at the placental implantation site is a proposed causative mechanism. There is biological and histological evidence supporting the existence of a proinflammatory reaction including Th1 cytokine dominance within and around the spiral arteries that separate them from trophoblast cells (Sargent et al., 2003). PE is characterized by enhanced cell-mediated immunity, thus serum ADA activity tends to increase in PE (Yoneyama et al., 2002).

Initial studies of maternal and fetal plasma ADA demonstrated a significant increase in PE patients, compared with normal pregnancy⁽²⁴⁾. Kafkasli et al demonstrated higher increase in ADA activity in placental tissue compared with maternal or fetal plasma level in both mild and severe PE. This study shows a significant positive correlation between maternal plasma ADA and severity of PE (Kafkasli et al., 2006).

It could be concluded that maternal serum - hCG and maternal plasma ADA increase in cases of mild and severe PE.

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On the Invertibility Preserving Linear Maps

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Abstract: In this paper we show that the essentiality of the socle of an ideal B of the algebra A implies that any invertibility preserving linear map $\Phi: A \rightarrow A$ is a Jordan homomorphism. Specially if A is a preliminary algebra then any such Φ is an algebraic homomorphism.

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Key words: Invertibility preserving, Banach algebra, Socle, Jordan homomorphism.

1. Introduction

Linear invertibility preserving maps of algebra were noteworthy from years ago, for example, the famous theorem of Glason-Kahane-Zelasco which asserts that any invertibility preserving linear isomorphism in to the scalar field is product preserving [1,14]. This problem has been discussed in different algebras previously [3,4,7,8,10,11]. Generally, A and B are two Banach algebras and we consider $\Phi: A \rightarrow B$ linear map, we know that if be a homomorphism algebra, it necessary would be invertibility preserving.

Kaplansky presented the issue as following question:

If the preserving would be invertible, is it necessarily the Jordan homomorphism? So, the main question of this paper is as Kaplansky question and we will answer it in the essential ideal of semi-simple Banach algebras.

Definition 1: the inverse of an invertible element $a \in A$ is denoted by a^{-1} and the set of all invertible elements of unitary algebra A is denoted by $Inv(A)$.

Definition 2: Let $\Phi: A \rightarrow B$, linear map between functional algebras, Φ is invertibility preserving if

$$a \in Inv(A) \Rightarrow \Phi(a) \in Inv(B) \quad (a \in A) .$$

Theorem 1: Let $\Phi: A \rightarrow B$ be a linear mapping with B commutative and semi-simple. Suppose $\varphi(Inv(A)) \subseteq Inv(B)$ and unitary maps. Then Φ is continuous and multiplicative, i.e.

$$\Phi(xy) = \Phi(x)\Phi(y) \text{ for all } x, y \in A .$$

Proof.

Let L be a multiplicative linear functional on B different from the zero functional. Then L and $L \circ \Phi$

are continuous. We show that Φ is multiplicative. It suffices to consider only the case where $B = \mathbb{C}$ since the multiplicative linear functional on B separates its points.

Thus, given $x \in A$, define $f(\lambda) = \Phi(\exp(\lambda x))$, then $f: \mathbb{C} \rightarrow \mathbb{C}$ is an entire function having no zeros since every value of the exponential function on a Banach algebra is invertible. Hence there exists an entire function with $f(\lambda) = \exp(g(\lambda))$ for all $\lambda \in \mathbb{C}$.

Moreover, $g(0) = 0$ and $\operatorname{Re}(g(\lambda)) \leq |\lambda|$ for all $\lambda \in \mathbb{C}$ and it follows from a Schwarz Lemma that $g(\lambda) = \alpha\lambda$ for some complex constant α . Thus,

$$\Phi(e + \lambda x + \frac{\lambda^2 x^2}{2!} + \dots) = 1 + \alpha\lambda + \frac{\alpha^2 \lambda^2}{2!} + \dots \quad (\lambda \in \mathbb{C})$$

Comparing coefficients, we see that $\Phi(x) = \alpha$ and $\Phi(x^2) = \alpha^2$ so $\Phi(x^2) = \Phi^2(x)$. Define $[x, y] = xy - yx$ and $x \circ y = xy + yx$. Since Φ is a Jordan homomorphism, for any $x, y \in A$:

$$\Phi(x \circ y) = \Phi(x) \circ \Phi(y)$$

$$\Phi([x, y])^2 = \Phi([x, y]^2) = [\Phi(x), \Phi(y)]^2 = 0.$$

Because B is commutative, hence $\Phi([x, y]) = 0$ so

$$2\Phi(xy) = \Phi([x, y] + x \circ y) = 2\Phi(x)\Phi(y).$$

In the above theorem, complex field and commutative is the main provision.

Example 1: Let A real Banach algebra of all continuous real-valued functions f is on $[0,1]$, we define

$$\Phi : A \rightarrow R$$

$$\Phi(f) = \int f(t)dt$$

Clearly A_m is all function of non-zero in A and $\Phi(I) = I$, so Φ is confirmed in the above theorem, whereas Φ is not isomorphism.

Example 2: Let M_n be algebra of $n \times n$ matrices on the complex numbers, transpose function, maps will be linear and invertible, while multiplicative

$$\Phi : M_n \rightarrow M_n$$

$$\Phi(A) = A'$$

because $\Phi(ZA) = (ZA)' = A'Z' = \Phi(A)\Phi(Z)$.

Remark: Example 2 shows that an onto condition is needed.

$$\Phi : M_2 \rightarrow M_4$$

$$\Phi(Z) = \begin{bmatrix} Z & Z-Z' \\ 0 & Z \end{bmatrix}$$

It is observed that

$$\Phi^2(Z) - \Phi(Z^2) = \begin{bmatrix} 0 & (Z-Z')^2 \\ 0 & 0 \end{bmatrix} \neq 0$$

In the next example, it is observed that if bijective map be invertibility preserving, semi-simple provision of algebras can not be removed.

Example 3: If Φ is bijective map and A, B Banach algebras of semi-simple, then Φ is not a Jordan isomorphism

$$\Phi : M_2 \rightarrow M_4$$

$$\Phi \left(\begin{bmatrix} W & X \\ 0 & Y \end{bmatrix} \right) = \begin{bmatrix} W & X \\ 0 & Y' \end{bmatrix} \quad (W, X, Y \in M_2)$$

In this case, Φ is unitary linear map, while

$$\Phi^2(Z) - \Phi(Z^2) = \begin{bmatrix} 0 & X(Y-Y') \\ 0 & 0 \end{bmatrix} \neq 0$$

Corollary: In 1995, Marcus-Purves showed that maps of invertibility preserving on M_n matrices are isomorphism.

2. Jordan isomorphism

In 1986, Jafarian-Souroor proved this subject on space of linear functions of $B(X)$ [7]. In 1970, Kaplansky in order to explain Theorem 1, removed commutative assumption of B . This case caused that in 1996 Kadison regarding Jafarian-Souroor's theorem being $B(X)$ semi-simple Banach algebra [7,15], tried to find answer of Kaplansky theorem through expressing following assumption on c^* -algebras in special manner.

Assumption: Suppose that A, B are two c^* -algebras with the same element of c and $\Phi : A \rightarrow B$ is bijective unitary map, then is $\Phi : A \rightarrow B$ isomorphism Jordan? Solution: While B is commutative, the first theorem proves the accuracy of above assumption.

Moreover, if B is finite of $B = L(H)$ (H is Hilbert space) or c^* -algebra, compact operator on H as be the same self-addition, the above assumption will be correct.

Also, Aupetit asserts assumption in ideal that A, B be Von algebras.

Lemma 2.1: Let A be a semi-simple Banach algebra and $a \in A$, then

(i) $a \in \text{soc}(A)$ if and only if $\|\sigma(xa)\| < \infty$ ($x \in A$)

(ii) $a \in \text{soc}(A)$ if and only if there exists $n \in \mathbb{N}$ such that

$$\bigcap_{t \in F} \sigma(x+ta) \subseteq \sigma(x) \quad (x \in A)$$

for which F is the set of n -tuples of $\mathbb{C} \setminus \{0\}$.

Lemma 2.2: Let Φ be an automorphism on a semi-simple Banach algebra A , then

(i) $\Phi(\text{soc}(A)) = \text{soc}(A)$

(ii) $\Phi^{-1}(\Phi(a^2)) - \Phi^2(A) \cdot \text{soc}(A) = 0$

Proof. (i) Let $a \in A$, there exists $b \in A$ such that $\Phi(b) = a$, since Φ is spectrum preserving, then $\Phi(y) = x$ implies that

$$\sigma(\Phi(y) + ta) = \sigma(y + tb) \quad (t \in \mathbb{C})$$

so

$$\bigcap_{t \in F} \sigma(x + t\Phi(a)) = \bigcap_{t \in F} \sigma(\Phi(y + tb)) = \sigma(x)$$

therefore, $\sigma(a) \in \text{soc}(A)$ due to part 2.3. So $\Phi(\text{soc}(A)) \subseteq \text{soc}(A)$. Now we show that $\Phi(\text{soc}(A)) \supseteq \text{soc}(A)$. If $x \in A$ then there exists $y \in A$ such that $\Phi(y) = x$ and

$$\int_{t \in F} \sigma(x + tb) = \int_{t \in F} \sigma(\Phi(x) + t\Phi(b)) \subseteq \sigma(y) = \sigma(x)$$

which implies that $b \in \text{soc}(A)$ due to part (ii) of Lemma 2.1.

(ii) Let $\Phi(a) = 0$ then

$$\sigma(a + x) = \sigma(\Phi(a + x)) = \sigma(x) \quad (x \in A)$$

So $a \in \text{Rad } A = \{0\}$ due to Zernank theorem. Now the rest of proof is hold by Lemma 2.1.

Recall that every minimal left ideal of A is of the form Ae where e is a minimal idempotent. The sum of all minimal left ideal of A is called the socle of A and it coincides with the sum of all minimal right ideal of A . An ideal I of A is said to be essential it has a nonzero intersection with every nonzero ideal of A . If A is a semi-simple algebra, then I is essential if and only if $a.I = 0$ implies $a = 0$, where $a \in A$.

Example 4: Let H be Hilbert space and $K(H)$ be a compact operator in $B(H)$, then $K(H)$ is a essential ideal of $B(H)$.

Lemma 2.3: Let B be an ideal of A , and $\text{soc}(B)$ is an essential ideal, then $\text{soc}(A)$ is an essential ideal.

Proof. For every $a \in A$, if $a.B = 0$ then $a.\text{soc}(B) = 0$ which implies $a = 0$. Let $b \in B$ and bB be a minimal right ideal of B . Since $bB \neq 0$, there exists $b_1 \in B$ such that $bb_1 \neq 0$, we have $bb_1B \subseteq bb_1A \subseteq bB$. Because $bb_1B \neq 0$ and bB is a minimal right ideal in B , so $bb_1B = bb_1A = bB$.

If $a \in A$ and $bb_1a \neq 0$, we have $bb_1aB \subseteq bb_1aA \subseteq bb_1A \subseteq bB$ as well, because $bb_1aB \neq 0$ and bB is a minimal right ideal in B , then $bb_1aA = bb_1A = bA$. So bb_1A is a minimal right ideal in A , which implies $\text{soc}(B) \subseteq \text{soc}(A)$, if $a.\text{soc}(B) \subseteq a.\text{soc}(A) = 0$.

We know that a must be equal to zero, so $\text{soc}(A)$ is an essential ideal.

Theorem 2.3: Let B be an ideal of the semi-simple Banach algebra A and $\Phi : A \rightarrow A$ be a unitary linear isomorphism. If $\text{soc}(B)$ is an essential ideal then Φ is a Jordan isomorphism.

Proof. Let $\text{soc}(B)$ is essential, so $\text{soc}(A)$ is also an essential ideal, if A is unitary then Φ is a Jordan isomorphism by Lemma 2.2. If A is not unitary then $\tilde{A} = A \oplus \mathcal{C}$ is unitary semi-simple Banach algebra. Let $\tilde{\Phi}(a, \lambda) = (\Phi(a), \lambda)$ for $(a, \lambda) \in \tilde{A}$. Then $\tilde{\Phi}$ is a well defined unitary linear isomorphism. If $\text{soc}(A) = k$ and $(a, \lambda).\text{soc}(\tilde{A}) = 0$ then $\text{soc}(\tilde{A})$ is an essential ideal, since $(\text{soc}(A), 0) \subseteq \text{soc}(A, 0) \subseteq \text{soc}(\tilde{A})$ then $(a, \lambda)(k, 0) = 0$ i.e. $ak = -\lambda k$ therefore $\lambda = 0$, because $\lambda \neq 0$ implies that $-\frac{a}{\lambda}k = k$ moreover

$$\left(-\frac{a}{\lambda}b - b\right)k = 0 \text{ if and only if } -\frac{a}{\lambda}b = b \text{ for all } b \in A,$$

so $-\frac{a}{\lambda}$ is a left unit of A . Let d be left unit of A then

$$\left(-\frac{a}{\lambda} - d\right)A = 0 \Rightarrow \left(-\frac{a}{\lambda} - d\right)k = 0 \Rightarrow -\frac{a}{\lambda} = d$$

so $-\frac{a}{\lambda}$ is left unit and A is unitary which contradicts Sour hypothesis, therefore $ak = 0$. Since K is an essential ideal then $a = 0$ and Lemma 2.2 implies that

$$\tilde{\Phi}^{-1}(\tilde{\Phi}(a, \lambda)^2) - \tilde{\Phi}^2(a, \lambda) \in \text{soc}(A) = 0$$

Φ is bijective

$$\tilde{\Phi}(a, \lambda)^2 = (\Phi(a^2) + 2\lambda\Phi(a), \lambda^2) \Rightarrow \Phi^2(a) = \Phi(a^2).$$

Corollary: If $\Phi : A \rightarrow A$ is a unitary linear isomorphism on the semi-simple Banach algebra A , and A has minimal ideal then $\Phi|_{\text{soc}(A)}$ is a Jordan homomorphism.

3. Conclusion

In primitive algebras every nonzero ideal is essential, and from a well-known theorem of Herstein on Jordan homomorphisms onto prime rings it follows easily that Jordan isomorphism or an anti-isomorphism.

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Decentralization of agricultural extension

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Abstract: Agricultural extension is one of the main institutional components of agriculture as it promotes the transfer and exchange of information that can be converted into functional knowledge. It is better to say that extension is the instrument, which is helpful in developing enterprises that promote productivity and generate income in the present climate of change, which ultimately reduce poverty in developing as well as developed countries. Unfortunately in developing as well as low income countries agricultural extension has failed in diffusing new technology to its ultimate users and further deterioration witnessed with the passage of time. The failure of agricultural extension services for last decades is under constant pressure to be responsive to ever-growing challenges of food production. Agricultural extension is a non-formal type of education that provides advisory services by the use of educational approach in acquiring knowledge and skills to deal with the growing needs of global world. Diverse agricultural extension funding and delivery arrangements have been undertaken since the mid-1980s by governments worldwide in the name of "privatization." When agricultural extension is discussed, privatization is used in the broadest sense – of introducing or increasing private sector participation, which does not necessarily imply a transfer of designated state-owned assets to the private sector. In fact, various cost-recovery, commercialization, and other so-called privatization alternatives have been adopted to improve agricultural extension. The form and content of decentralization has dominated development discourse and public sector reform agenda in Kenya in the last two decades.

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Introduction:

Over the past two decades many countries have undertaken to decentralize government functions and transfer authority and responsibilities from central to intermediate and local governments, and often to communities and the private sector. Decentralization is potentially important to agricultural knowledge and information systems, but decentralization is not an end in itself, and successful decentralization strategies must address three challenges—establishing a national framework for decentralization, developing subsector approaches, and enhancing capacities of various participants for coproduction of decentralized goods and services. Agricultural extension services are under increasing pressure to become more effective, more responsive to clients, and less costly to government. Decentralization is an increasingly common aspect of extension reforms. Field extension advisory services are well suited to decentralized approaches, but a comprehensive extension system requires a range of extension support services and programs, some of which (strategy formulation, training, monitoring and evaluation, specialized technical support) are often best carried out at the central level.

The prime challenges in the traditional public extension systems enlisted as outdated, top-down, paternalistic, inflexible, subject to bureaucratic inefficiencies that results less ability to cope with the

dynamic demands of modern day agriculture (World Bank, 2002; Obaa et al., 2005). In some countries the change is occurring with its natural pace but in many developing countries these have been accelerated by structural adjustment reforms (Chapman & Tripp, 2003).

Like other developing country Pakistan is also an agrarian country, whose economy is highly dependent on agriculture having 23% share to GDP (Government of Pakistan, 2005). But still the performance of agriculture sector at the farm level remains significantly below the potential and limited due to the weak institutional formwork in disseminating agricultural technology to the farmers (Farooq, 2005). Research scientists evolving new methods and technologies to meet the challenges of new era and the farming community also has a potential and courage to adopt but the third component i.e. agricultural extension, which serves as a technology transfer vehicle and play a significant role in increasing the productivity, farm incomes and ensure food security has been very much weak since independence (Luqman et al., 2004; Farooq, 2005). The extension services in the country have not been able to achieve their goals effectively, because of a number of bottlenecks. These include weak research-extension linkages, lack of adequate resources for on-farm demonstrations, poor mobility, inadequate research and training in extension methodology and

lack of an effective system of continuing education for extension personnel at various levels (Sandhu, 1993). Among major field crops wheat, rice, cotton and sugarcane accounts for 90.4% of the value added in major crops and 37.1% of the value added in overall agriculture (Government of Pakistan, 2005). The low production of these crops depends upon a number of factors including ineffective and isolated agricultural extension system.

All over the world agricultural extension assists the rural population of remote areas to up-lift their living standard through increase in crop production. The Government of Pakistan is well aware of this fact therefore from the Day of Independence different extension and rural development programs at national level launch by her e.g. Village Agricultural and Industrial Development Programme (Village-AID), Basic Democracies System (BDS), Integrated Rural Development Programme (IRDP) and Training and Visit System (T & V). Unfortunately all these programmes were abolished one after the other because of their conventional, top down nature and inherited less effective technology transfer model (Williamson, 2002; World Bank, 2003). The last efficient extension programme was (T & V) that became ineffective due to its rigidity, top down orientation, non-responsiveness to farmers' needs, much expensive, least effective in feed back communication with farmers and un-able to meet the challenges of changing circumstances. To overcome the weaknesses and shortcomings in (T & V) system Government introduced Decentralization of Agricultural Extension reforms with the name Devolution of Power Plan to up-lift the local people's economic status through pooling all the national sources and resources at grass root level. Devolution is the complete, permanent (SPDC, 2000) and advanced form of decentralization and also helps in strengthening the functions of and empowering with more authority to the elected representatives (FAO, 2001). With the promulgation of this new system, institutional reforms have been introduced almost in all the line departments including Agricultural Extension (Luqman et al., 2004). The new system of agricultural extension, works under the supervision of district Government in which each district is managing its agricultural extension activities, where the functions of all sister organizations such as Water Management, Fisheries, Livestock, Soil conservation, Forestry, etc; are put under single manager called as Executive District Officer of Agriculture (EDO) (World Bank, 2003). The administrative changes in the setup of agricultural extension department affect the working efficiency of Extension Field Staff (EFS) in their area of jurisdiction having both positive and negative impacts (Luqman et al., 2005), while on the

other hand Farooq (2005) conducted a research study in two districts of North West Frontier Province (NWFP) and observed the difficulties faced by the extension staff in post devolution framework. The major hurdles in creating difficulties for EFS in the research area were multifarious duties, double chain command and lack of administrative staff and burden of increased paper work.

Principles in Decentralization Reform:

Decentralization takes many forms with varied mixes of fiscal, administrative, and political decentralization. Privatization, deconcentration, and delegation initiatives can complement and reinforce an overall decentralization policy, but these do not constitute, and can in some cases work against, effective decentralization (FAO, 2001).

Four requirements for successful decentralization are:

- Providing local people with substantial real influence over the local political system and local developmental activities;
- Ensuring availability of financial resources adequate for decentralized institutions to accomplish their tasks;
- Ensuring adequate administrative capacity in local units to carry out their tasks; and
- Establishing reliable mechanisms for accountability of politicians and bureaucrats to local people.

Deconcentration is nearly always the first—and necessary—step in any process of decentralization. This puts staff from central administrations in closer contact with local people, problems, and conditions and provides a channel for local interaction with government. Unfortunately, decentralization reforms frequently stop at this point with central authorities retaining control over deconcentrated administrative structures (World Bank, 2003).

Administrative decentralization, represents a more fundamental reform that replaces existing centralized structures with a new administrative structure of local government. Transfer of power to decentralized offices increases local participation in decisionmaking and allows programs to be tailored to local needs.

Political decentralization, makes decentralized bureaucracies accountable to locally elected officials and officials accountable to the people. Elections, referenda, and local participatory decisionmaking arrangements give people direct control over government programs, but short of these formal political processes, a variety of mechanisms (reflecting “participation” more than “decentralization”) can give people influence over government programs. These include: incorporating local representatives into governance and advisory

boards, client surveys, polls, and program “report cards,” and rapid rural appraisal techniques (Luqman et al., 2005).

Fiscal decentralization, is often seen as a way to reduce central government budgets by off-loading tasks a central government can no longer finance. In practice, however, decentralization is likely to result in higher costs for central budgets. Fiscal decentralization may transfer authority for expending funds, raising taxes, or borrowing, but intergovernmental fiscal transfers (IGFTs or “grants”) are usually the key means of financing decentralized programs.

Concern over local administrative capacity frequently leads central governments to impose controls that are costly to administer and that restrict local flexibility in managing funds. Experience would indicate that local governments are generally capable of assuming substantial responsibility, and decentralized programs can provide different financing packages to communities with different levels of capacity (Williamson, 2002).

Many programs are best implemented through “coproduction” or partnerships between various actors—central government, local government, private sector, civil society, and the individual—each providing the good or service for which it has a comparative advantage. Coproduction requires clarity in division of labor and clear “contracts” between different partners. (Sandhu, 1993).

Privatization, delegation, and devolution strategies complement decentralization and, like decentralization, broaden the institutional base for administration and execution of technology programs; reduce the burden on central governments for provision of services (responsibilities

in which they have been less than fully successful); and increase stakeholder participation and influence over programs. Advantages of these complementary strategies are that:

- Full privatization relieves government of responsibility for production of private goods and services with few externalities. Extension services for commercial crops grown by wealthier farmers, information on postharvest handling and processing technologies, and marketing of machinery or production inputs often fall in this category.

- Private provision of publicly financed services takes advantage of private providers’ greater efficiency and flexibility in executing programs. Government contracting of NGOs or private extension providers is a common example.

- Delegation and devolution maintains some government authority and financing, but gives implementing institutions operational flexibility and ability to specialize. Governments may delegate

extension responsibilities to research institutes or devolve responsibility for commodity extension to a commodity group (Farooq, 2005).

Decentralization of Public Sector Extension:

Public extension services are being forced to change. In the 1990s agricultural extension services were attacked for being inefficient, irrelevant, ineffective, and poorly targeted. The need for reform was obvious and national systems responded with three major strategies—privatization, decentralization, and program revitalization. Although cost reduction has been the force behind many changes, the principal objective of reforms should be an attempt to improve quality of services to clients. Decentralizing extension services, when implemented effectively, can transform extension and address a range of generic problems.

Decentralized extension brings decisionmaking processes closer to clients and makes programs more responsive to user needs. Service providers become more accountable to clients and better oversight increases efficiency of operations. Decentralization itself can introduce a new dynamism in programs and can promote diversity in service providers and program approaches, thus serving as a first step toward privatization. In addition, reforms to revitalize and privatize programs can accompany decentralization reforms, which generally involve: (World Bank, 2003).

- Administrative decentralization—moving responsibilities for extension to local levels of government;
- Political decentralization—expanding user influence on program priority setting, planning, and management; and
- Fiscal decentralization—giving financial management responsibility to local governments or requiring cofinancing from local governments and producer groups.

Extension services differ from research in two important ways that affect their potential for decentralization. First, extension advisory services (field extension services) come in direct contact with clients and provide services that have a high private-goods content. These characteristics make field extension services a much better candidate for decentralization than research, which typically has a longer-term payoff. Local producers are more willing to commit resources to pay for effective extension services from which they realize immediate direct benefits. Still, there remains a need for other extension services to address “externalities”—environmental problems, food quality or safety concerns, or social equity issues (that is, special

needs of small farmers)—that are in the public interest, but are not a priority for individual producers or decentralized institutions. This requires continued central support for extension. A second difference between research and extension is the scope and scale of programs. (Williamson, 2002).

Research institutions are generally smaller and more concentrated. Extension programs typically operate across the country, provide information on a wide range of technologies from various sources, and draw on traditional knowledge and farmer innovation to improve producer organization, management, production, and marketing functions. The broad demands on extension require strategies that incorporate a variety of approaches to providing services.

Despite the apparent suitability of extension service provision to be decentralized, they are often highly centralized. A World Bank study of 19 countries found that in the early 1990s 13 countries or regions showed almost no evidence of decentralization of extension services. Colombia, Jiangxi (China), the Philippines, and Nusa-Tenggara-Timor (Indonesia) were relatively highly decentralized, and Poland and Tunisia showed some decentralization. The study found that:

- When extension is decentralized there is a fairly good balance in fiscal, administrative, and political decentralization;
- Political decentralization (the role of elected officials) lags other elements of decentralization; and
- NGO involvement is moderate and farmer participation is significant in extension.

Underlying these conclusions was the fact that institutional development and civil society provide important support to decentralizing extension services. (FAO, 2001).

Administrative Decentralization:

Deconcentration is intrinsic to extension services that are provided in dispersed fields and communities throughout a country. Cropping systems, markets, agroecological zones, and ethnic and cultural characteristics of farmers can vary widely within a country, and moving administration closer to field services can substantially improve program management through better understanding of local conditions. Administrative decentralization goes further by making extension programs directly responsible to local authorities. The challenge in any successful decentralization reform is that of maintaining overall program quality and coherence. Decentralized extension programs are limited if the decentralized administration lacks awareness of new technologies, sources of assistance, and extension methodologies. Although decentralized

administrations can effectively integrate local institutions, organizations, and technologies into an extension system, major benefits from formal extension often come from integrating external knowledge into the local system. Lack of coordination between local administrations can be a problem. If many localities promote a single commodity, the result might be overproduction and low prices. Similarly, separate localities might finance the same feasibility studies, training programs, or extension materials. Implementing an integrated watershed or regional development plan might prove impossible if programs in each administrative region are completely independent. Other potential problems include the lack of career opportunities for extension staff in decentralized programs, and difficulties with monitoring and evaluation when local administrative units lack ability to compare targets, results, and achievements with other areas. (Khan, 2002).

Extension program quality depends fundamentally on good linkages with other programs—specialized training for extension agents and farmers, technical backstopping by subject matter specialists and information services, other extension services (mass media, fairs), and other development programs (credit programs, market development programs, input supply).

Some of these linkages can be maintained at the local level, but many require higher level coordination to ensure efficiency and quality support.

Decentralized Governance -Introducing Accountability:

Decentralizing extension by involving farmers and local government in governance of programs can improve program accountability, increase user ownership of programs, ensure relevance to local needs, improve planning and information flows, and strengthen user capabilities. Transferring program responsibilities to locally elected officials directly decentralizes program governance and accountability to local people. Perhaps equally important are alternate mechanisms that increase user participation and influence over program content and operations. Reforms that enhance farmer influence over program governance include: incorporating farmers into governance and oversight committees; adopting participatory extension approaches; involving farmers in identifying priorities, planning, and monitoring; working through farmer groups; and using participatory evaluation and feedback mechanisms for program evaluation. Decentralizing governance holds particular promise for making extension programs (and agents) accountable to users. Farmers know whether they are receiving

valuable services and should have the power to demand good performance by their service providers. When farmers have authority to influence decisions on program funding, hiring and dismissing staff, and staff incentives, they are truly empowered to improve services. At a minimum, all extension programs should seek farmer feedback on the relevance, quality, and usefulness of extension services. (Chapman & Tripp, 2003).

A concern in decentralized extension systems is the degree to which governance mechanisms are representative of all farmers in an area. Women, small farmers, and ethnic or cultural minorities are often underrepresented in governance groups, but may be more in need of public services than those actually representing local interests. Disadvantages of farmer governance are the high up-front costs of participatory approaches, difficulties in ensuring true representation of participating groups, risk of aggravating conflicts or unduly raising expectations, and the possibility of program capture by elites (Farooq, 2005).

As the traditional view of extension as a function of government agencies gives way in the face of multiple service providers, an expanding agenda, and a better understanding of farmer information and innovation systems, decentralized governance of extension services should become both easier and more important.

Fiscal Decentralization of Extension Services:

Government inability to sustain financial support for large extension systems has been a motivation for the many reforms that attempt to reduce public sector funding, introduce private financing, or eliminate government programs that compete with the private sector. Typically, these strategies tend to decentralize extension financing. Although an objective of many decentralization reforms has been to reduce government expenditures, local governments generally have limited resources and limited ability to raise funds. Central governments therefore must usually continue financing for extension services through intergovernmental financial transfers (IGFTs), and must also finance the considerable costs of reform and local capacity development. This increases total financing requirements for extension, at least over the short term. Over the longer term, decentralizing extension services might reduce government financing requirements by: (1) increasing efficiencies through better oversight and greater flexibility in funding decisions and (2) increasing cofinancing by being more responsive, and demonstrating greater benefits, to users. Cofinancing grants (IGFTs) to local governments or farmer groups are an important

element of fiscal decentralization, but they present two significant problems: (Chapman & Tripp, 2003).

- Many local organizations lack capacity to plan, manage, and evaluate extension programs and lack the contacts and financial management capacity to procure needed services; and

- Resource-rich farmers are better able to cofinance services and capture program benefits, even if program objectives are to assist weaker elements of rural society. Still, many new initiatives are using subgrants of various types for local subprojects, and future program design can draw on this experience. Decentralization programs must address these two problems. Training and orientation, program promotion, and support services are critical to enable target clients and local organizations to take over extension responsibilities under new decentralized systems. Later, as programs are implemented, a strong monitoring and evaluation system is needed to provide management with information necessary to understand who is benefiting from the program and what real impact it is having (Farooq, 2005).

Conclusion:

Decentralize extension services where possible, with emphasis on giving users control over program planning, implementation, and evaluation.

- Provide for adequate centralized support systems for decentralized extension services, especially support for training, subject matter specialists, and production of extension materials.
- Adapt strategies to local institutional environments to accommodate country legal frameworks, political traditions, administrative structures, and social and agroecological conditions. Extension strategies can emphasize decentralization when there is already a strong political decentralization in the country, but should proceed cautiously when decentralization is not yet well established.
- Determine on a case-by-case basis whether decentralized services should be managed by local governments, community/producer organizations, or local governments in conjunction with producer/community organizations.
- Provide clear division of responsibilities between the different levels of government and other program participants.
- Develop procedures for policy formulation and priority setting in mixed systems to reconcile central government financing and policy objectives (poverty alleviation, food security, and environmental conservation) with local peoples' priorities that emerge from the decentralized program governance.
- Provide for needed fiscal transfers from central government to decentralized implementing agencies

to finance decentralized extension services, recognizing that over the short term decentralization rarely reduces requirements for central government financing.

- Structure fiscal transfers to give users maximum influence over programs and to promote institutional pluralism in service provision. This empowers users and develops capacities in a range of public and private providers, such that the most competent institutions are able to provide the services.

- Provide for extensive planning, promotion of the rationale and principles behind reforms, and training in new operational procedures before launching decentralization reforms.

- Provide for needed investments in development of local capacity (local governments, executing agencies, community or producer groups), as such implementation capacity is critical to success of decentralization reforms.

- Establish effective systems to monitor and evaluate decentralized programs, and ensure that the data are available at all appropriate levels. Central monitoring should be sensitive to equity issues and the possibility of local elites capture of programs, thus excluding services to the poor or women.

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5/7/2011

Sperm nuclear deoxyribonucleic acid denaturation in diazinon/diazoxon sprayer men

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Abstract: Objectives: Excessive exposure of agrochemical male workers to organophosphate (OP) pesticides may induce morphofunctional changes in their sperms. The aim of this study was to explore sperm nuclear deoxyribonucleic acid (DNA) reaction to in vitro incubation with or in vivo chronic exposure to diazinon or diazoxon. **Methods:** Fixed volumes of every semen sample of ten healthy volunteers were incubated at 37°C for one hour with rising serial volumes of 60% of either diazinon (DZ) or diazoxon (DZO). Induced sperm morphological alterations were determined by microscopic examination of direct fresh, Papaniclaue stained and eosin-Y exclusion smears while, sperm nuclear cytotoxicity was assessed by DNA fluorometric examination. On the other hand, sperms of 20 chronic agriculture DZ/DZO spraying workers were directly examined for their quality and DNA denaturation state. **Results:** Normal human spermatozoa showed unfavorable increasing alterations in their quality and DNA integrity after their incubation with serially rising volumes of either diazinon or its oxon. Induction of sperm nuclear DNA denaturation by DZO was more severe both qualitatively and quantitatively than after DZ treated testing. Similar alterations but to lesser extent were found in sperms' DNA of chronic DZ/DZO spraying workers without exogenous OP treatment. **Conclusion:** In vivo DZ/DZO chronic exposure induced unfavorable effects in seminal quality and sperm DNA integrity but were lesser in strength than in vitro testing.

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Key words: diazinon, diazoxon, DNA fragmentation index, sperm chromatin structure analysis.

Introduction:

Organophosphates (OPs) are among the most world-wide used agrochemical pesticides. Among them, diazinon [O, O-diethyl O-2-isopropyl-6-methylpyrimidine 4-yl-phosphoro-thioate] is a synthetic highly toxic OP compound with broad-spectrum pesticide activities. Diazinon (DZ) spraying workers intoxication occurs through its oxon metabolite diazoxon (DZO) which inhibits acetyl cholinesterase (AChE) bioactivity resulting in accumulation of acetylcholine. This latter compound induces pathophysiological manifestations mainly at nerve synapses⁽¹⁾. In addition, non-neurotoxic OP harmful bioactivities are noted in several tissues among which are the testes⁽²⁻⁵⁾. Since DZO has alkylating and clastogenic activities, it can induce genetic, mutagenic and carcinogenic pathologies⁽⁶⁾. However, the potential toxicity of many OPs on somatic and germinal cells are not yet completely settled⁽⁷⁾.

Normal sperm nuclear DNA integrity is naturally preserved by its highly compacted structure, but it may be denatured after extensive or prolonged exposure to organophosphates⁽⁸⁾. Chromatin condensation in the sperm nucleus is a relevant factor for reproduction and a sensitive indicator of male fertility. Altered sperm chromatin structure has been reported in some OPs

exposed agriculture workers^(2,3,7-9) and experimental animals^(2,4,10). However, Salazar-Arredondo and colleagues⁽¹¹⁾ reported that, incubation of human spermatozoa with diazinon, chlorpyrifos and methyl parathion or their oxons (up to 750 micromol concentration) did not induce sperm cytotoxicity or DNA fragmentation. Moreover, the noted untoward spermatozoal cellular membranes reactions in such toxicity are related to their high content of polyunsaturated fatty acids and lack of intracellular antioxidants and nuclear DNA-repair systems⁽¹²⁾.

Organophosphate exposure can induce sperm nuclear chromatin de-condensation and cell membrane lipid peroxidation along sperm passage through the male genital tract⁽¹²⁾. Clinically, exposure to organophosphate insecticides may compromise male fertility and induce anomalies or diseases in the off springs. When the extent of DNA damage is small, the affected spermatozoa can undergo self-repair. Also the oocyte is capable of repairing damaged DNA in these spermatozoa. Alternatively, if the damage is extensive, apoptosis, fragmentation and losses of the embryos can occur^(13,14).

Aim: To explore sperm nuclear deoxyribonucleic acid (DNA) reaction to in vitro

incubation with or in vivo chronic exposure of their donors to diazinon or diazoxon.

Subjects and methods:

The subjects of the present study comprised:

(1) Twenty spraying workers in northern Nile-Delta States of Egypt, with intermittent (three times/week) DZ-DZO spraying duties for > 5.0 years.

(2) Ten healthy fertile individuals with no history of OP direct exposure. Their semen samples were used as a normal unexposed reference material and for in vitro determination of sperm vitality and DNA fragmentation index (DFI%) after incubation with rising concentrations of DZ/DZO. Normal semen should have normal quantitative and qualitative parameters⁽¹⁵⁾ and their donors fathering children.

After obtaining an informed signed consent from each participant in both groups, a semen sample per individual was collected by masturbation into a sterile container with 3-4 days abstinence before sampling. Thereafter, all semen samples were subjected to the following:

(a) Morphofunctional examination:

Each semen sample was examined within an hour of collection by using a Computer Assisted Sperm Analyzer [Weili Color Semen analysis System – ALTY – 9000, China].

(b) In vitro effect of rising DZ/DZO concentrations on sperm vitality %:

A designed volume of each ejaculate obtained from every healthy fertile individual was diluted with saline to get 50 000 sperm/ml. Then 20 µl of each diluent, which contained 1000 sperms were distributed into different tubes in two separate rows, each comprised 10 tubes. One row for DZ (60% w/v active DZ ingredient) while, the second row for DZO after its dilution by saline to obtain 60% solution. To each of the first eight tubes of either row, one of the OP compound was added in serial rising volumes of 100, 200, 300, 400, 500, 600, 700 and 800 µl. Then to all these tubes in the two rows, 0.15% DMSO (Sigma) solution was added to complete their final volumes to 900 µl. Also to each tube within the two rows, 0.6 ml bovine albumin suspensions (3.5 mg/ml) were added. All these tubes were incubated for 1.0 hr in a water bath at 37°C. Morphofunctional characteristics of the spermatozoa after their incubations were evaluated according to the WHO guidelines⁽¹⁵⁾. Also, sperm vitality% using 0.5% eosin Y was assessed and expressed as percentage by counting dye excluded sperms among 100 spermatozoa.

A negative control (tube 9) for each semen sample containing 1000 spermatozoa diluted to 900 µl with 0.15% DMSO solution and completed to 1.5 ml by 3.5 mg/ml bovine albumin was prepared without DZ or DZO addition. Then these seminal preparations were

managed as above. Also, a positive control (tube 10) containing similar constituents as in the test tubes but instead of the organophosphate, H₂O₂ (100 micromol) was added and similarly managed.

(c) In vivo and in vitro assessment of DZ-DZO toxic effects on spermatozoal nuclear DNA by sperm chromatin structure analysis (SCSA)⁽¹⁶⁻¹⁹⁾:

Within 4 hours from ejaculation, aliquots of the different semen samples, each contained 2.0 million spermatozoa were kept frozen at -70°C. On the day of DNA analysis, the stored samples were thawed in a 37°C water bath. It is established that analysis of frozen/thawed semen samples gave equivalent results to those from fresh samples.

Sperms were analyzed using FACSsort flow cytometer (Beckton Dickinson, San Jose, Canada), equipped with an argon ion laser (488nm). The flow cytometer was calibrated for each measurement session (10 semen samples) using reference frozen semen samples for flow cytometer set up and as an internal quality control, with a variation coefficient <5% and a low level sperm DNA damage (the red and green photo-multiplier yielded the same red and green fluorescence levels i.e 130/1000 and 500/1000 channels ± 5.0).

Semen samples were diluted with TNE buffer (0.01 mol Tris HCl, 0.15 mol NaCl and 1 mmol EDTA) to obtain 1000000 sperms/ ml. Then 200 µl aliquots of each diluent (containing 200 000 sperms) were mixed with 400 µl of a low pH (pH 1.2) detergent solution containing 0.1% Triton X 100, 0.15 mol NaCl, and 0.08 mol HCl and left for 30 seconds. This was followed by staining with 1.2 ml of 6 µg/ml chromatographically purified acridine orange (AO) [Polysciences, Washington, PA] in a phosphate-citrate buffer (pH 6.0). Three minutes after staining, specimens were analyzed by the flow cytometry. Measurements were performed in duplicates; each contained 5000 sperms (45 µl of the final specimen) at a flow rate of less than 200 sperms/second. The fluorochrome AO that, intercalated into double-stranded DNA (native) fluoresced green (515-530nm), while AO that intercalated into single-stranded DNA (denatured) emitted red fluorescence (<630nm).

The extent of DNA denaturation was quantified by the DNA fragmentation index (DFI) which represented the shift from green to red fluorescence i.e. the ratio of red to total (red + green) fluorescing sperms. The calculated DNA fragmentation index% (DFI%) is a reliable measure of fertility⁽¹⁹⁾.

Statistical analyses:

The Statistical Package for Social Scientists (SPSS) for windows program Version 11 (SPSS Inc., Chicago, USA) was used for statistical calculations.

In vitro DZ or DZO treated semen samples of healthy volunteers were compared by analysis of variance with t-test. Similarly, native semen of DZ-DZO spraying workers was statistically analyzed. Sperm DNA fragmentation index% (DFI%) of the in vitro DZ/DZO treated and in vivo DZ-DZO chronically exposed sprayers as well as in the native healthy untreated sperms were assessed. $P < 0.05$ values were considered statistically significant.

Results:

Table (1) shows seminogram of OP-unexposed (normal volunteers) and DZ/DZO exposed sprayers. Only 20% of patients had normal semen characteristics while, the remaining 80% had one or more seminal abnormality of the standard semen parameters.

Table (2) shows the percentage of forward motility% (viability or vitality %) of sperms. It was significantly decreased after sperms incubation with rising volumes of DZ/DZO. Also, SCSA measurements are shown in this table. Sperm DNA structure was

altered in samples obtained from the OP agriculture spraying workers.

Among the DZ/DZO sprayers, 20% of the examined semen samples present infertility potential ($\geq 30\%$ DFI percent), whereas the remaining cases were potentially subfertile ($< 30\%$ DFI percent). However, two wives suffered from miscarriage when pregnancy occurred.

In vitro testing (using sperms of OP-unexposed healthy volunteers) declared that the percentage of sperms showing DNA denaturation (fragmentation index %) was significantly higher with DZ treated ($14.0 \pm 4.0\%$ - $36.6 \pm 11.8\%$) than native untreated sperms ($10.8 \pm 3.7\%$). The degree of DNA damage increased according to the DZ concentration. DFI% (s) range after sperm incubation with DZO (14.7 ± 4.1 - $39.6 \pm 10.5\%$) was not significantly different from those incubated with DZ similar concentrations (Table 2 & Figure 1). Clinically the severity of sperm toxicity was higher among chronic sprayers with DZO than those using DZ.

With exception of seminal volumes and counts, significant positive correlations were observed between percent of other change of conventional semen quality parameters and SCSA determined DFI%.

Table (1): Semen analytical parameters (X±SD) of the two investigated groups (OP non exposed volunteers as control versus DZ/DZO spraying workers) within one hour after ejaculation.

Variables	Non exposed volunteers (n:10)	Spraying workers (n:20)
Volume (ml)	3.3±0.9	2.9±0.6
Viscosity	Normal	Less than normal
Count (million/ml)	56.3±14.8	40.5±12.1*
Progressive motility (viability) %	77.8±10.6	59.7±11.6*
Abnormal Morphology %	19.5±4.1	28.7±5.6*
Round head	8.9±1.5	14.1±2.2*

* Significant difference from normal values.

Data: mean ± SD

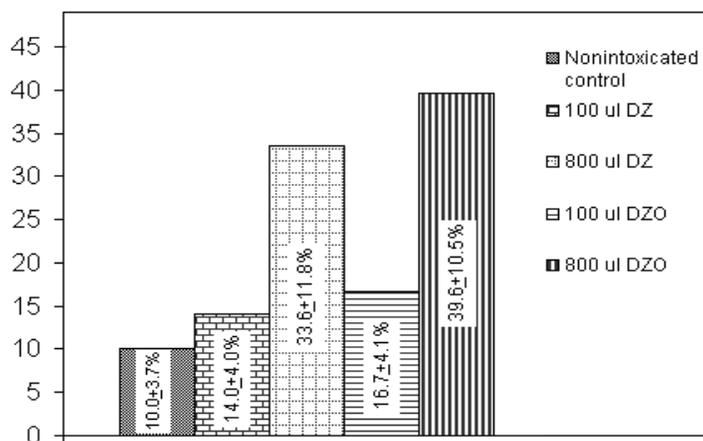


Figure (1): Minimal and maximal DFI% by DZ/DZO in vitro testing.

Table (2): Spermatozoa vitality % and DFI% values non exposed (native) control, DZ/DZO spraying workers and after incubation with rising volumes of DZ or DZO for one hour.

Semen donors	Sperm vitality %	DNA fragmentation index % (DFI%)
(1) Non-intoxicated healthy control (10 individuals)	77.8±10.6	10.8±3.7
(2) Chronically exposed spraying workers (20 workers; of them 4 cases had DFI% ≥ 30%)	59.7±11.6	18.0±5.6*
(3) In vitro incubation of normal semen with 60% DZ/DZO:		
100µL	DZ	61.0±11.9
	DZO	58.0±13.5*
300µL	DZ	56.9±15.1*
	DZO	46.5±11.0*
500µL	DZ	50.5±14.7*
	DZO	40.8±11.3*
700µL	DZ	44.6±13.0*
	DZO	33.1±10.6*
800µL	DZ	35.4±10.8*
	DZO	30.9±9.9*
		39.6±10.5**

* Significant difference compared to the control (p < 0.05).

** Significant difference between DZ and DZO and control (p : <0.001).

Discussion:

Organophosphates can affect spermatogenesis through altering sperm chromatin structure and DNA integrity. Increased sperm DNA denaturation in situ reflects DNA strand breaks and nuclear maturity delay^(4,6,8,10). In male reproductive system, sperm DNA susceptibility to OP denaturation and potential mutagenicity are dependent on the spermatogenic cell stage at time of exposure⁽⁵⁾. Toxicity of different OPs on somatic cells showed contradictory results and OP effects on human male germinal cells need extended investigations^(8,12).

The present study showed that, only 20% of the evaluated patients had normal semen characteristics while the remaining had one or more abnormality of the standard semen parameters (Table 1). In vitro DZ-induced cytotoxic effects on mature sperm cells were quantitatively and qualitatively less than those noted after DZO similar concentrations (Tables 1&2). This difference reflected the rate of conversion of the biologically inactive DZ to its active DZO intermediate. In this respect, it has been reported that agriculture OP spraying men had high concentrations of OP pesticides in their blood and body organs including the reproductive system^(3,5). Moreover, this later system can generate highly toxic reactive oxygen species (ROS) in situ^(20,21) which could intensify testicular dysfunction. In the epididymis, spermatozoa of OP exposed individuals are subjected to induced oxidative stress due to increased ROS and lipid

peroxidation with reduced antioxidant enzymes and glutathione^(4,6,20-23).

The present study showed that induced sperm DFI% by in vitro DZ or DZO treatment was significantly higher than that with OP unexposed control testing. These in vitro DZ/DZO effects on DFI% were dose dependent (Tables 2 and Figure 1). However, DFI% after in vitro sperm incubation with rising DZO content were higher but not significant than the corresponding DZ activity. It has been reported that injection of mice with a single dose of DZ (8.12 mg/kg) increased DFI and DFI% values due to decreased sperm chromatin condensation and increased DNA denaturation during spermatid differentiation⁽⁴⁾. On the other side, in vitro incubation of sperms with DZ/DZO for one hour was more deleterious than the corresponding intermittent chronic OP exposure of spraying workers (Table 2). This may be due to natural human biological responses such as degradation and clearance of OPs. However, Salazar – Arredondo et al.,⁽¹¹⁾ found that incubation of normal spermatozoa with DZ or DZO at different concentrations could not induce significant sperm cytotoxicity as evaluated by eosin-Y exclusion.

Chronic exposure to OP oxons can alter sperm chromatin quality and even induce its damage in agriculture OP sprayers^(3,5,7-9) and experimental animals^(2,4,10). These spermatozoal reactions were related to their high content of polyunsaturated fatty acids particularly arachidonic acid in their plasma

membranes and relative lack of intracellular antioxidants and nuclear DNA-repair systems⁽¹²⁾.

Incubation of semen samples with $\geq 700\mu\text{l}$ DZ or $500\mu\text{l}$ DZO for one hour induced $\geq 30\%$ of DFI% (Table 2) as shown by high proportion of red fluorescence (denatured single strand DNA) with concomitant low green fluorescence (native double strand DNA). So, OP oxons alter sperm DNA integrity at higher degree and faster rate than their parent compounds. In this respect, OP toxic activity varies from one OP to another. However, the toxic potential of DZO was considered of moderate severity level compared with other OP insecticides^(4,10).

Sperm axonemal protein phosphorylation induces reduction of membrane fluidity that is necessary for sperm-oocyte fusion. Oxidative stress can lead to sperm damage, deformity and eventually male infertility. The tight packaging of sperm nuclear DNA and the physiological antioxidants content in seminal plasma protect spermatozoal DNA from oxidative stress induced damage. The high frequencies of single- and double-strand DNA breaks, gene mutation and polymorphism, result in decreased semen quality and increased DNA denaturation and DNA base – peroxidation^(13,14).

Infertile men possess substantially more sperm DNA damage than do fertile men. Such damage may impact negative reproductive outcomes⁽²⁴⁾. DNA damage involves an error in chromatin remodeling during spermatogenesis, leading to generation of spermatozoa with subnormal protaminated nuclear DNA. Close relationships exist between the efficiency of chromatin remodeling and oxidative DNA damage and fragmentation in human spermatozoa⁽²⁵⁻²⁷⁾.

Conclusion:

In the present study, significant negative correlations were observed among the clinically important absolute semen quality values (sperm forward motility % and vitality %) and SCSA DFI %. Alternatively, significant positive correlation between DFI% and absolute abnormal morphology% was found.

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1/5/2011

Temperature distribution in porous fins in natural convection conditionSeyfolah Saedodin¹, Mehdi Olank²¹ Assistant professor, Department of Mechanical Engineering, Science and Research Branch, Islamic Azad University, Semnan, Iran, s_sadodin@iust.ac.ir² MS.C student, Department of Mechanical Engineering, Science and Research Branch, Islamic Azad University, Semnan, Iran, mehdi.olank@gmail.com

Abstract: This paper investigates the temperature distribution in porous fins in natural convection condition and compares it with temperature distribution in conventional fins. To formulate the heat transfer equation, the energy balance and Darcy's model used. This study is based on finite-length fin with insulated tip. The porous fin allows the flow infiltrate through it. The theory section addressed the derived governing equation. The effect on porosity parameters "S" and convection parameter in porous fin "n", and convection parameter in conventional fin are discussed. The result suggests that by increasing "S" the heat transfer increase but in some cases it has exemption. [Seyfolah saedodin, Mehdi olank. Temperature distribution in porous fins in natural convection condition. Journal of American Science 2011;7(6):476-481]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: porous fin, Darcy's model, temperature distribution, heat transfer, natural convection

Nomenclature c_p : Specific heatDa: Darcy number, $\frac{k}{t^2}$

G: gravity constant

Gr :Grashoff $\frac{g\beta(\theta_b - \theta_\infty)}{\nu^2}$ k_r : Thermal conductivity ratio, k_{eff}/k_f

K: permeability of the porous fin

L: fin length

Nu: Nusselt number, hL/k_f Pr: Prandtl number, $\frac{\nu}{\alpha}$

q :Heat transfer rate

Ra: Rayleigh number, Gr Pr

 $\theta(x)$:Temperature at any point θ_b : Temperature at the fin base $v_w(x)$:velocity of the fluid passing through the fin at any point

R: Radius of the fin

X: Axial coordinate

P: perimeter of the fin

Symbols α : Thermal diffusivity β : Coefficient of volumetric thermal expansion Δ : Temperature difference ε :Porosity or void ratioT: Dimensionless temperature, $T = \frac{\theta(x) - \theta_\infty}{\theta_b - \theta_\infty}$ θ_b : Base temperature difference, $(\theta_b - \theta_\infty)$ μ :Dynamic viscosity ν :Kinematics viscosity ρ :Density**Subscripts**

s :Solid properties

f :Fluid properties

eff :Porous properties

1. Introduction

In the design of heat exchanger, finned surfaces are often employed to improve performance. In the other hand, for many years reduction of the size and cost of fins are the main targets of fin industries. Some engineering applications also require lighter fin with higher rate of heat transfer where they use high thermal conductivity metals in applications such as airplane and motorcycle applications. However, cost of high thermal conductivity metals is also high. Thus, the enhancement of heat transfer can be achieved by increasing the heat transfer rate and decreasing the size and cost of fin. The major heat transfer from surface to surrounding fluid takes place by convection process. Increasing the heat transfer mainly depend on heat transfer coefficient (h), surface area available and the temperature difference between surface and surrounding fluid.

Fins are frequently used in many heat transfer applications. Meyer [1] in his famous book with a simple manner describes the temperature distribution in conventional fins. But in the recent years, porous fins consider as a potential field for increasing heat transfer. The basic philosophy behind using porous fins is to increase the effective area through which heat converted to ambient fluid.

Extensive research has been done in this area and many references are available especially for heat transfer in porous fins.

1.1 Review of the literature

Kiwan [2] conducted thermal analysis of natural Convection porous fins. He grouped all the geometric and flow parameters that influence the temperature distribution in to one parameter called " s_h ". Korla [3] investigate thermal analysis of natural convection and radiation in porous fins. Abu-Hijleh [4] investigates numerically the effect of using porous fins on the forced convection heat transfer from a horizontal cylinder. Yo and Chen [5] performed a study on optimization of circular fin with variable thermal parameter. Nguyen and Aziz [6] compare the heat transfer rates from convecting-radiating fins for different profile shapes. An Analysis for Y-shaped fins for determining fin efficiency by a new approach has been demonstrated by Lorenzini and Moretti[7]. Kundu and Bhanja [8] have determined analytically the performance and optimum dimensions of T-shape fin with variable thermal conductivity and convective heat transfer coefficient. Also Kundu and Bhanja [9] investigate an analytical prediction for performance and optimum design analysis of porous fin. Mobedi and Sunden [10] study the Natural convection heat transfer from a thermal heat source located in a vertical plate fin.

In this study it is intended to use the simple approach for finding the temperature distribution in porous fin and compare it with the temperature distribution in conventional fins. The cylindrical fins attached to a vertical surface, have been used.

2. Governing equations

As shown in Fig.1 a cylindrical fin profile is considered. The dimensional of the fin are length L and the radius R. the cross-sectional area of the fin is constant.

For the conventional fin, the defining equation obtain by making an energy balance on element of the fin of thickness Δx as shown in the Fig.1.

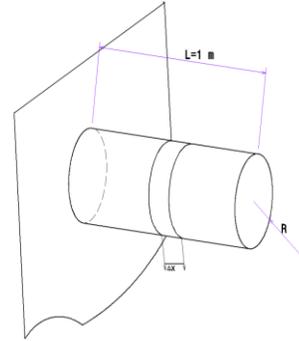


Figure 1. Schematic diagram for the problem under consideration

Figure 1. The defining equation obtain by making an energy balance on element

Energy in left face=energy out right face+ energy lost by convection (1)

The defining equation for the energy lost by convection heat transfer is

$$q = hp\Delta x(\theta(x) - \theta_{\infty}) \quad (2)$$

$$\text{Energy in left face} = q_x = -kA \frac{d\theta}{dx} \quad (3)$$

$$\text{Energy out right face} = q_{x+\Delta x} = -kA \left(\frac{d\theta}{dx} + \frac{d^2\theta}{dx^2} \right) \quad (4)$$

By substitution the equations 2, 3, 4 in the equation 1, the energy balance yields

$$\frac{d^2\theta}{dx^2} - \frac{hp}{kA}(\theta(x) - \theta_{\infty}) = 0 \quad (5)$$

Let $\theta = (\theta(x) - \theta_{\infty})$ the equation (5) becomes

$$\frac{d^2\theta}{dx^2} - \frac{hp}{kA}\theta = 0 \quad (6)$$

One boundary condition is

$$\theta = \theta_0 = \theta_b - \theta_{\infty} \text{ at } x=0 \quad (7)$$

The other boundary condition is the end of fin is insulated so that

$$\frac{d\theta}{dx} = 0 \text{ at } x=L \quad (8)$$

If $m^2 = \frac{hp}{kA}$ the solution can be written (9)

$$\theta - \theta_{\infty} = (\theta_b - \theta_{\infty}) \frac{\cosh[m(L-x)]}{\cosh mL} \quad (10)$$

If $\frac{\theta(x) - \theta_{\infty}}{\theta_b - \theta_{\infty}} = T$ the solution may be written

$$(11)$$

$$T = \frac{\cosh[m(L-x)]}{\cosh mL} \quad (12)$$

For the porous fin, Due to this fact that the fin being porous, It allow for the flow to infiltrate through it. In This study to simple the governing equations the following assumptions are considered: (1) length=1(m), the porous medium is homogeneous, isotropic, (2) both the fluid and the solid matrix have constant physical properties. (3) the surface radiant exchanges are ignored,(4) the temperature inside the fin is only function of x, (5) no temperature variation across the fin thickness, and (6) the interaction between the porous medium and the clear fluid can be simulated by the Darcy formulation(7).

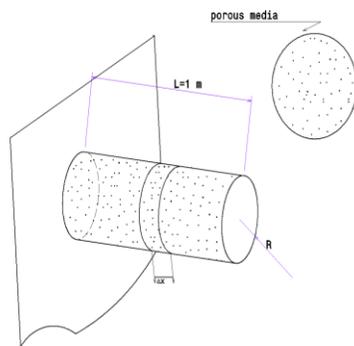


Figure 2. Schematic diagram for the problem under consideration

Figure 2. The energy balance to the slice segment

The energy balance to the slice segment of the fin of thickness Δx , shown in Fig.2, requires that

$$q(x) - q(x + \Delta x) = \dot{m}c_p(\theta(x) - \theta_{\infty}) + h(p \Delta x)(\theta(x) - \theta_{\infty}) \quad (13)$$

In the right hand of equation, the second terms represent the natural convection around the fin and the first term represents the heat transfer lost to the fluid passing through the porous media. This fluid is induced by the buoyancy force created due to the temperature difference between the fin and the

surroundings. It should be noted that Equation (13) assumes that the fluid enters the fin at θ_{∞} and leaves at $\theta(x)$.

The mass flow rate of the fluid passing through the porous material can be written as,

$$\dot{m} = \rho_v v_w 2 \pi R \Delta x \quad (14)$$

The flow in the porous medium shall be considered next to account for the value of v_w . Referring to assumption (7) above, Darcy's model gives,

$$v_w = \frac{gk\beta}{\nu} (\theta(x) - \theta_{\infty}) \quad (15)$$

By substitution of equations (14) and (15) into equation (13), the result is:

$$\frac{(q(x) + q(x + \Delta x))}{\Delta x} = \frac{\rho_c g k \beta 2 \pi R}{\nu} (\theta(x) - \theta_{\infty})^2 + hp(\theta(x) - \theta_{\infty}) \quad (16)$$

If $\Delta x \rightarrow 0$, equation (16) transfer to

$$\frac{dq}{dx} = \frac{\rho_c g k \beta 2 \pi R}{\nu} (\theta(x) - \theta_{\infty})^2 + hp(\theta(x) - \theta_{\infty}) \quad (17)$$

According to Fourier's law of conduction,

$$q = -k_{eff} A \frac{d\theta}{dx} \quad (18)$$

In this equation, A is the cross-sectional area of the fin ($A = \pi R^2$) and k_{eff} is the effective thermal conductivity of the porous fin.

Substitution Equation (18) in to Equation (17) yields,

$$\frac{d^2 \theta}{dx^2} - \frac{2 \rho_c g k \beta}{R \nu c_p k_{eff}} (\theta(x) - \theta_{\infty})^2 - \frac{hp}{k_{eff} A} (\theta(x) - \theta_{\infty}) = 0 \quad (19)$$

By introducing the non-dimensional temperature function,

$$\frac{\theta(x) - \theta_{\infty}}{\theta_b - \theta_{\infty}} = T \quad (19)$$

becomes

$$\frac{d^2 T}{dx^2} - ST^2 - nT = 0 \quad (20)$$

The constant, $S = \frac{2 \rho_c g k \beta}{R \nu c_p k_{eff}}$ and $n = \frac{hp}{k_{eff} A}$

input all the geometric and flow parameters that influence the solution of the problem into definite parameter. To solve this equation we need two boundary condition. One boundary condition here is that the temperature at the base of the fin is θ_b . Then

$$T(0) = 1 \quad (21)$$

The second boundary condition depends on the condition of the fin at the tip. The case that considered in this study is finite-length fin with insulated tip.

2. Results

The governing equation is solved numerically with curve fitting method. This method is a well-known method and has been widely used in literature.

In the finite-length fin with insulated tip, the second boundary condition at $x=L$ will be $\frac{dT}{dx} = 0$.

In this study to simplify the governing equation, assumed that $L=1$ (m). For solving the governing equation, It has been used “Maple 14” and this is the codes of solving this equation in MAPLE 14.

> with(linalg) : with(CurveFitting) :

>

```
BVPsol := proc(S, n, k) # k shows number of subintervals
  local bvp, sol, d, X, T, P;
  X := [seq( $\frac{i}{k}$ , i = 0..k)];
  bvp := {diff(T(x), x, x) - S*(T(x))^2 - n*T(x) = 0, D(T)(1)
    T(0) = 1};
  sol := dsolve(bvp, numeric, output = array(X));
  d := eval(sol[2, 1]);
  T := col(d, 2);
  T := convert(T, list);
  P := PolynomialInterpolation(X, T, x);
  return X, T, P
end proc;
```

Some result of this solving is:

```
a := BVPsol(1, 0.5, 5)
[0,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , 1], [1.00000000000000, 0.844829011352
  0.735552970947914, 0.662924310953779, 0.6213431362
  0.607799313129204], -0.0275497731897726x5
  + 0.150091023196619x4 - 0.345217117806639x3
  + 0.742097610001791x2 - 0.911622429072794x
  + 1.000000000000000
```

```
a := BVPsol(10, 0.5, 5)
```

```
[0,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , 1], [1.00000000000000, 0.625843381743979,
  0.433444784724519, 0.328888341361934, 0.275775922301351,
  0.259412586136504], -0.932670580109573x5
  + 3.36319892649033x4 - 5.05974870625561x3
  + 4.47804925940624x2 - 2.58941631339488x
  + 1.000000000000000
```

```
a := BVPsol(50, 0.5, 5)
```

```
[0,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , 1], [1.00000000000000, 0.399012751529879,
  0.213794957240962, 0.136724326781819, 0.102698050806002,
  0.0928305228070700], -5.11203849387947x5
  + 16.5396884722636x4 - 21.1443853884917x3
  + 13.8660812573918x2 - 5.05651532447720x
  + 1.000000000000000
```

```
a := BVPsol(100, 0.5, 5)
```

```
[0,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , 1], [1.00000000000000, 0.301273595675838,
  0.143179108974865, 0.0854082244018191,
  0.0614332936463886, 0.0546543261016980],
  -8.43367212191453x5 + 26.6012157851039x4
  - 32.6608767263614x3 + 19.9181252409074x2
  - 6.37013785163360x + 1.000000000000000
```

```
a := BVPsol(150, 0.5, 5)
```

```
[0,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$ , 1], [1.00000000000000, 0.248703251824705,
  0.110313731783634, 0.0633994874838542,
  0.0445807929007307, 0.0393314388690428],
  -10.6562163934608x5 + 33.2408761819294x4
  - 40.0960006997073x3 + 23.6902414077773x2
  - 7.13956905766954x + 1.000000000000000
```

The variation of the dimensionless temperature is shown in figures 3, 4, 5 and 6.

For drawing the result in figure, the “MATLAB FIGURE” has been used.

It is clear that, in the Equation (20) when the $s=0$, the Equation transfer to the conventional fin equation and the governing equation becomes as same as the equation (12). In this particular condition the constant $n = m^2$. In the figures 3,4,5,6 for every figure the “n” is constant and “S” is variable.

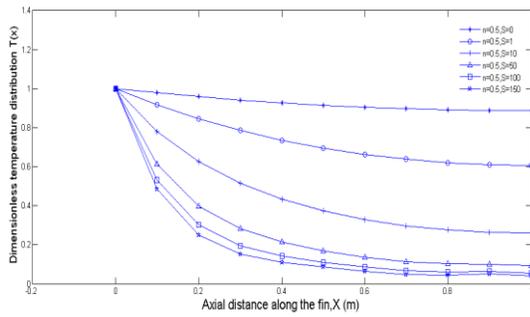


Figure 3. The distribution of the axial nondimensional temperature along the insulated fin with $n=0.5$ and for different value of S .

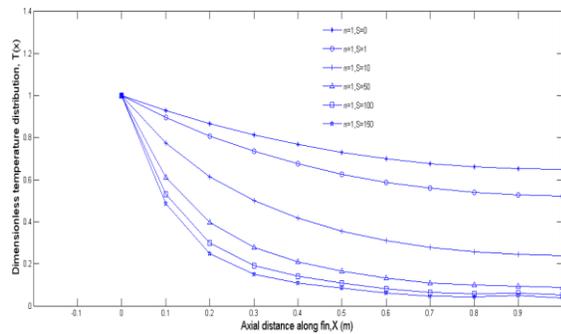


Figure 4. The distribution of the axial nondimensional temperature along the insulated fin with $n=1$ and for different value of S .

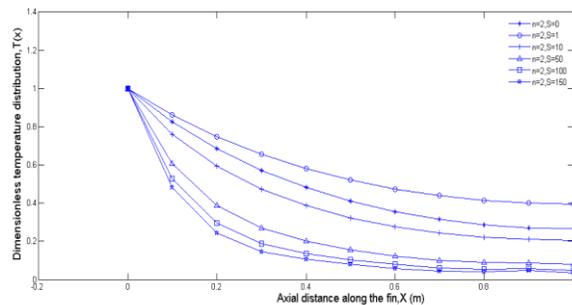


Figure 5. The distribution of the axial nondimensional temperature along the insulated fin with $n=2$ and for different value of S .

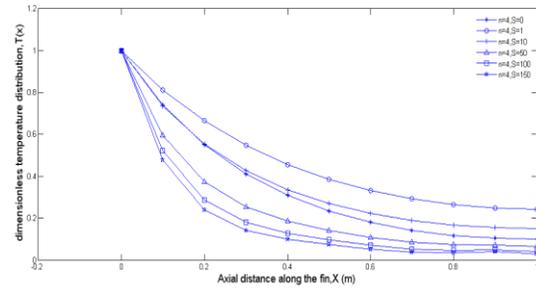


Figure 6. The distribution of the axial nondimensional temperature along the insulated fin with $n=4$ and for different value of S .

The figures 3, 4, 5 and 6 indicate that increasing the value of “S” will increase the heat transfer rate from the fin base. And it is clear from these figures that as the value of S increase the fin will attain the temperature of the surrounding fluid faster. Of course the figure 5 illustrate that the heat transferring in condition $n=2, S=0$ more than $n=2, S=1$. In fact in this condition, the conventional fin has more heat transfer than the porous media fin with $S=1$. Also the situation in figure 6 is same and the heat transferring in condition $n=4, S=0$ more than the both conditions $n=4, S=1$ and $n=4, S=10$.

3. Conclusion

Temperature distribution of porous fin for natural convection has been performed here. A second order non-linear ordinary differential equation has been derived as the governing equation for this problem. It has been solved using the curve fitting method. It is also found that all geometric and flow parameter influencing the temperature distribution has been grouped in three parameters called “m”, “S” and “n”. this temperature distribution analysis was performed for finite porous fin with insulated tip. It was found that increasing S, increase the heat transfer from fin. Of course in some condition the conventional fin has more heat transfer than porous fin.

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Surgical management of patellar ligament rupture in dogs using a prosthetic woven fabric: Experimental study.

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Abstract: A new synthetic fabric composed of a mixture of two biomaterials, polyamide 6.6 and polyester, was manufactured with specific tensile characters to serve in the reconstruction of the patellar ligament rupture in dogs. Twelve skeletally mature mongrel dogs with no evidence of clinical signs of lameness were used in the present study. Patellar ligament rupture was induced by severing the mid portion of the right ligament of each limb. Surgical intervention was performed by primary suturing of the severed patellar ligament ends and applying a synthetic fabric to act as a supportive internal splint. Satisfactory results were obtained concerning the tendon healing and the return to limb normal function without complications. It was found that the polyamide polyester fabric proved to be a suitable reconstructive biocompatible material that allowed primary ligament repair with adequate support by and give an excellent outcome in cases of patellar ligament ruptures in dogs.

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Keywords: Antioxidative enzymes, Drought stress, Photosynthesis, Proline, Pea

1. Introduction

Patellar tendon rupture is a rarely reported injury in both veterinary and human medicine. In dogs it generally occurs as a result of direct trauma, or fall and was also associated with some systemic diseases (Quintero *et al.*, 2003). There are predisposing factors similar to those in the human literatures and others have not been identified (Culvenor, 1988 and Gemmil, 2003).

Recently, surgical inoculation of the new synthetic fabrics for reconstruction of biological tissues had become one of the things that attract attention, since they give very satisfactory results regarding the strengthening of living tissues (Kasten *et al.*, 2001). Different pathomechanisms have been postulated, and multiple techniques for repair have been described in the literatures (Smith, *et al.*, 2000).

Diagnosis and treatment is time sensitive and should be achieved before more complications. Current recommendations for the repair of patellar ruptures included suturing of the severed ends and the protection of the repair with an interior splint (Vasseur, 2003 and Moretti *et al.*, 2008).

Nylon leader, orthopedic wire and fascia lata have been tried (Shipov, 2001). They should accommodate the reconstruction and give enough support. Such implanted materials are applied to give strength to the cut tendon ends and act as a scaffold for the growth of the repairable tissue (Bushnell *et al.*, 2008). Many techniques have been applied for the implantation

including the transpatellar fixation, the suture anchor techniques associated with protective stainless wire, or associated with quadriceps tendon flap. (Bushnell *et al.*, 2008).

Nowadays, biomaterials and tissue engineering play an important role in the biological tissue repair to develop new approaches for augmenting and replacing damaged body parts (Kammula and Morris, 2001). When the tissue damage is so extreme, the difficulty is in finding a scaffold of special characteristics that the cells can grow and organize on (Moretti *et al.*, 2008). The key requirement of any material used in the body is that, in addition to providing mechanical support or repair, it should be biocompatible. Such materials can generally be produced either in nature or synthesized in the laboratory using a variety of chemical approaches (Vasseur, 2003).

There are many applications for biomaterials such as joint replacements, bone plates, artificial ligaments and tendons (Stupp and Braun, 1997 and Wikipedia the free encyclopedia).

Of the most important industrial polymers that produce fabrics commonly used in the medical field are polyester and polyamide (Cozma, 2000). The basic raw materials for polyester fiber production are petroleum, coal, air & water. Due to good extension, strength and functional property of polyester, it is widely used as sewing thread in the garment industries, its fibers do not shrink or extend and have very low moisture content which ranges from 0 – 0.4%. Polyester fibers

are easily cleaned and resistant to mildew, moths and insects (The Textile blog., 2010).

Polyamide 6.6 has the property of tenacity-elongation at break ranges from 8.8g/d-18% to 4.3g/d - 45%, 100%, It is elastic under 8% of extension, of melting point 263⁰c, it is chemically stable. It has a bactericidal effect and 4 - 4.5% of moisture regain and abrasion resistant. (Raghavendra *et al.*, 2004). The applications of textile materials as reconstructive devices for compensating the defects in the living tissues in the veterinary practice were previously discussed (Gadallah, El-Husseiny, 2000 and Smith, *et al.*, 2000).

The aim of the present study was to develop a specification for producing a new synthetic fabric that should be available and cheap with special characters regarding the biocompatibility and the tensile strength that acts as an appropriate internal splint for the reconstruction of the patellar tendon ruptures in dogs.

2. Materials and Methods

This experimental work was carried out on 12 dogs apparently healthy and without any apparent signs of lameness. Animals were of different weights and ages. The mean body weight was 20.3± 2.38 kg and the mean age was 18.2± 4.6 months.

All dogs were operated under general anesthesia through intravenous injection of atropine sulphate (0.05 mg/kg); diazepam (1 mg/kg); xylazine (1mg/kg) and ketamine Hcl (10mg/kg). The anesthetic depth was maintained with intravenous injection of 2.5% thiopental sodium and general inhalation anaesthesia via the semi-closed technique (Vet Surg. model 2005) induction using oxygen and nitrous oxide and maintenance with Flothan gas 1.5: 0.5: 2%, respectively. The dogs were restraint in dorsal recumbence.

Characters of the used fabric :

This work was carried out in the Textile Division at the National Research Center in Cairo. In the present study, the textile sample was synthesized from polyester material for warp and polyamide 6.6 for weft with woven structures plain 1/1, using monofilament microfibers for each of the warp and weft yarn.

Physical and mechanical tests were carried out on the warp and weft directions after conditioning the fabric for 24 hours under the standard atmospheric conditions (20±2°C temperature, 65 ± 2% relative humidity).

All samples were used raw without treatment. The fabric was tested for the following parameters: tensile strength and elongation, weight and fabric thickness. Load to failure was examined before sterilization of the implantable sample.

The tensile strength and elongation measurements of the plain structure 1\1 fabric was done at the Instron 3345[®] England. The size of the sample was 5 cm width × 20 cm length for each warp and weft directions this is in accordance with ASTM (2006) ; and the weight tests were performed on Balance the capacity of 0.001 for sample size 5 cm width × 10cm length accordance with ASTM (1996). Frazier Thickness Gauge was used for the measurement of the fabric thickness without load with capacity of 0.01 according to ASTM (1996).

Table (1): indicates the specification of the implanted fabric:

Parameters	Value
Mixing Ratio of fabric	50:50
Density of polyester	1.38
Density of polyamide	1.14
Diameter of Warp yarn	55micron
Diameter of Waft yarn	58 micron
warp yarn Count	40 dtex.
weft yarn Count	40 dtex.
Warp density	36 ends / cm
Weft density	32 picks / cm

The surgical operation:

The right hind limb of each experimental animal was prepared for aseptic surgery. The left hind limb was considered as a control. Lateral parapatellar skin incision was performed and the patellar ligament was severed transversely. The prosthetic fabric, polyamide 6.6 – polyester was twisted and introduced through a 3 mm hole drilled in the tibial tuberosity (from lateral to medial), just behind the insertion of patellar ligament. The fabric encircled the patella and passed through the musculotendinius portion of the quadriceps muscle (from medial to lateral), just proximal to the patella (Fig.1). The stifle was flexed to a normal standing angle (~135°) and the two ends of the prosthetic fabric were pulled in an opposite direction until the 2 ends of the severed patellar ligament were approximated. The two ends of the prosthetic fabric are tied together and knotted at the lateral side of the patellar ligament (Fig.2). The approximated ends of the ligament were then sutured with 2-0 polydioxanon in an interrupted suture pattern (Fig.3). Extreme flexion and extension of the operated stifle was performed to ensure a physiological smooth range of motion without failure of the stiches. The subcutaneous tissue and skin were routinely closed after thorough irrigation of the joint with sterile normal saline. Dogs were exposed to restricted activity for 2 weeks postoperatively followed by a leash walk until they were euthanized. All dogs underwent a complete physical examination, including orthopedic, neurologic

examinations, and radiographic assessment. Dogs were euthanized 6 months postoperatively for histopathology and biomechanical testing. Radiology was performed

with the limbs at dorsopalmar and lateromedial views using 60 K.V.P. and 220 m.A.s at 80 cm- F.F.D.to detect any abnormal changes.

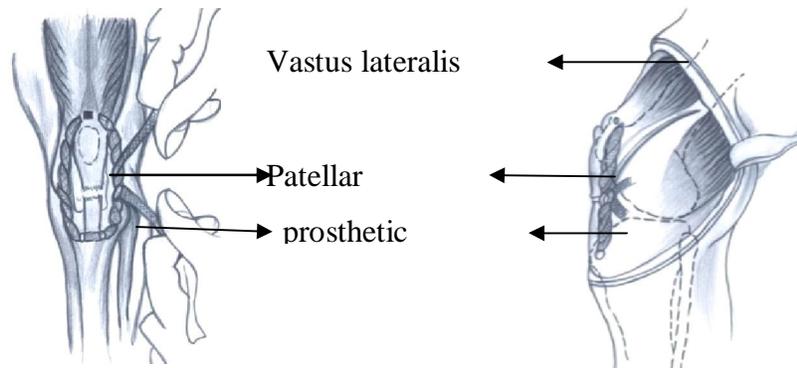


Fig.1: Diagram showing the cranial view of the stifle showing the application of the twisted synthetic fabric through the quadriceps tendon proximally and tibial tunnel distally "note the severed patellar ligament".

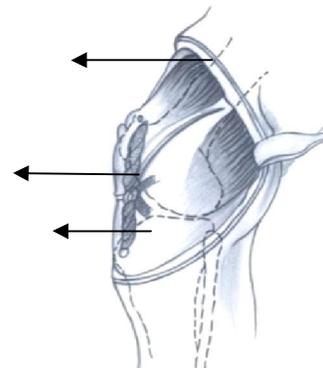


Fig. 2: Diagram showing the lateral view of the stifle showing the approximated and sutured patellar ligament after tensing and knotting the two ends of the prosthetic fabric.



Fig. 3: The prosthesis was twisted on both sides of the patellar ligament , the two ends of the fabric are tied at one side. (c) is the cut in the patellar ligament

Biomechanical evaluation:

This was carried out by collection of the specimen after euthanasia of the experimental animals, 180 days postoperatively. Samples were wrapped in saline soaked towels and immediately examined for biomechanical analyses. Biomechanical studies were carried out at The Textile Division– National Research Center, using a tensile testing machine (Instron 3345[®], England).

Biomechanical parameters were measured and were represented in table (1).The examined samples were evaluated in the operated and control groups.

Histopathological studies:

Autopsy samples were taken from the healed patellar ligaments after euthanasia, 180 days after implantation. Samples were examined macroscopically then fixed and stained with hematoxylin and eosin stains for microscopical examination (Banchroft *et al.*, 1996).

3. Results:

Clinical observations:

Experimental animals began to ambulate and bear weight with mild to moderate limping on the operated limbs within the first 2 weeks. Progressive improvement occurred after this period. No patient had rerupture of the patellar ligament after surgery.

30 days postoperatively, there was a complete return to limb function and the operated stifles showed a limited degree of stifle flexion. A marked thickening of the periarticular soft tissues was noticed.

180 days postoperatively, animals were fully weight bearing with a full range of motion. There was an obvious reduction in the periarticular thickening. During the evaluation period (6 months), the patella was palpated as discreet, firm structure which maintained its integrity throughout the range of stifle motion in all dogs. Radiographic findings revealed, that 30 days postoperatively the femoropatellar joint showed minimal periarticular soft tissue swelling with no evidence of intraarticular degenerative changes or effusion (Fig.4), 180 days showed no evidence of postoperative intraarticular changes (Fig.5).



Fig.4: An experimental case just after surgery, Notice, the normal articular joint.



Fig. 5: 180 day's postoperation. Notice, the stifle joint was free from intraarticular changes.

Evaluation for the mechanical properties of the used textile fabric before implantation (Table 2):

Table (2): Result of load testing (M±SD).

	Load at max. (N)				Load at break (N)			
	warp	Warp twist	weft	Weft twist	weft	Weft twist	weft	Weft twist
Mean	236.7	120.7	254.5	139.5	216.3	56.5	248.4	126.9
±S.D	0.80	0.028	0.88	0.80	0.69	0.90	0.42	0.37

warp, weft twist means the normal sample after 20 twist\10cm.

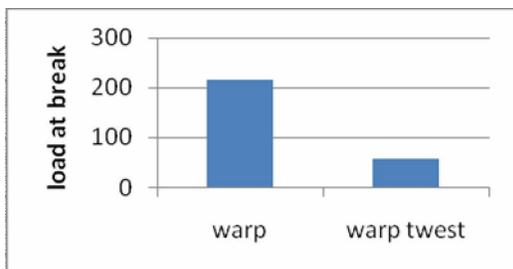


Fig.6 load at break for warp

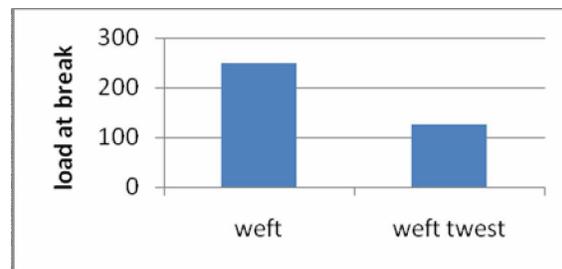


Fig.7 load at break for weft

Figs. (6,7) clear that the value of the tensile strength of directional warp and weft in the fabric product, without giving twist higher than the case of a twist, We also find that the value of tensile strength generally in the direction of weft is higher than the warp.

Table (3): Result of strain testing (M±SD).

	Stain at max. (N)				Strain at break (N)			
	Warp	Warp twist	Weft	Weft twist	Warp	Warp twist	Weft	Weft twist
Mean	21.35	43.58	35.10	56.14	21.8	36.16	36.20	56.50
±S.D	1.104	0.58	0.73	1.11	1.06	0.42	0.42	1.06

warp, weft twist means the normal sample after take 20 twist\10cm

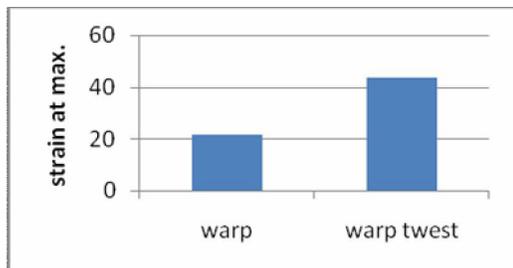


Fig.8 Strain at max. for warp

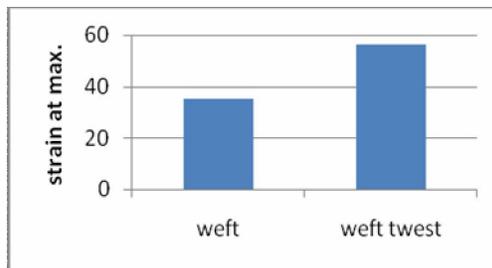


Fig.9 Strain at max. for weft

Figs. (8,9): show that the value of the strain of the fabric produced in the directional warp and weft are higher in the case of a twist of the non-existence. Also find that the strain in the case of weft is higher than the warp.

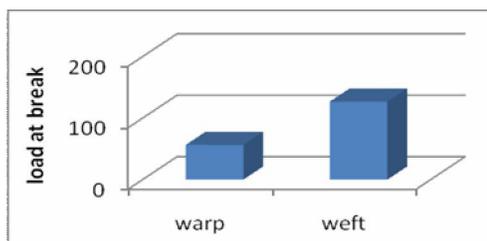


Fig. 10 Load at break for fabric after twist

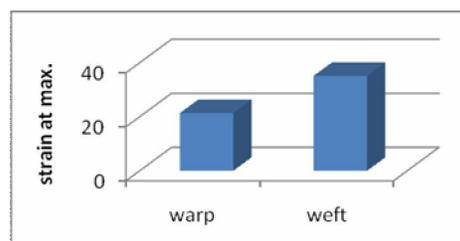


Fig. 11 Strain at max. For fabric after twist

Fig.(10): Shows that the value of tensile strength necessary to break the sample in the direction of weft is higher than warp after conducting the test on the fabric in the warp and weft and give the two directions 20 twist\10cm. As (Fig.11) shows that the maximum strain of the sample in the direction of the weft is higher than the warp with twisting.

From the table (4) we find that the thickness of producing a few, and interfaces with spaces accurate and reflected the value of weight.

Table (4): Result of weight and thickness for fabric sample.

Weight (gm\m ²)	Thickness (mm)	Opining size (Cm ²)
26.0	0.13	52.14

Table 5: The values of the biochemical tests applied on the samples of the normal control and healed tissues

Case No.	Strain at max. load (mm.mm)	Load at max. load (KN)	Load at break (KN)	Average Thickness of tissue
Normal(mean value)	1.400	624.26	331.85	7.45mm
1	0.408	1267.13	510.91	
2	1.367	1176.73	1072.02	
3	0.617	1171.39	520.27	
4	0.770	1205.09	701.07	
5	0.797	1176.26	1060.18	
6	0.610	1217.01	703.56	
7	0.380	1213.20	524.15	
8	1.210	1257.18	1070.01	
9	1.200	1202.16	522.01	
10	0.789	1253.70	515.01	
11	0.800	1170.30	701.12	
12	0.616	1151.013	515.02	
Mean	0.797	1205.09	701.27	
±S.D	0.504	5.49	32.76	
C.V	63.225	4.46	45.83	

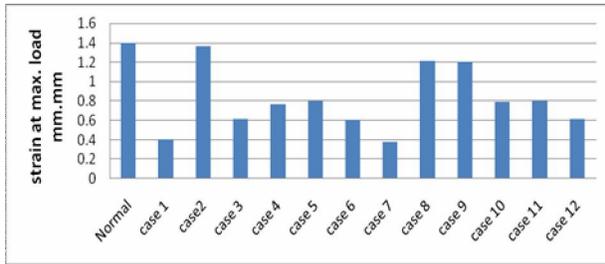


Fig.12: The diagram demonstrates the values of strain at max. load of normal and operated cases

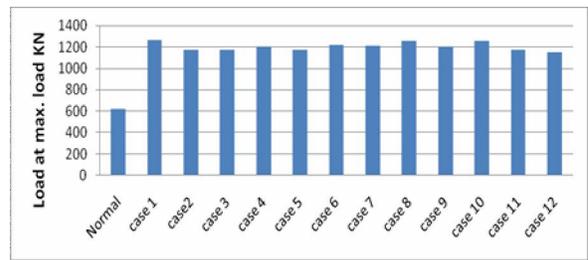


Fig.13: The diagram demonstrates the values of load at max. load of normal and operated cases

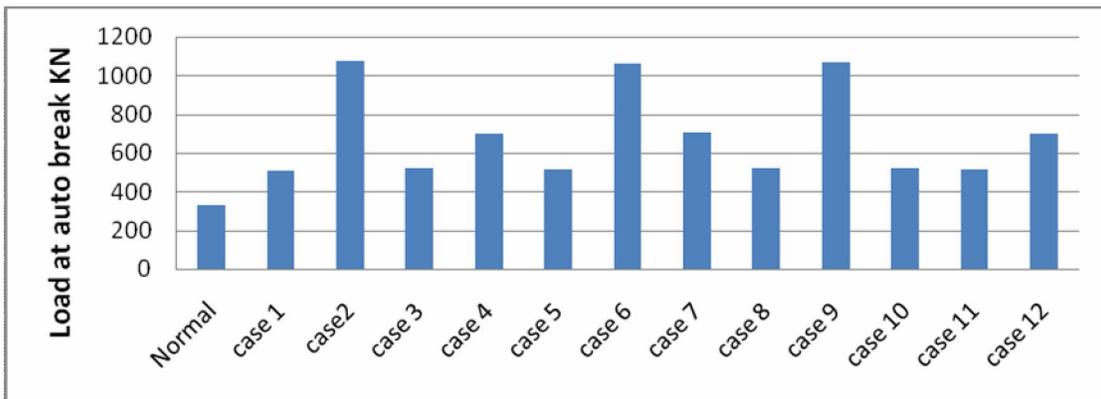


Fig.14: The diagram demonstrates the values of load at break of normal and operated cases.

Histopathological results:

Microscopically, complete fibrous healing appeared after 180 days post implantation which appeared in the form of dense bundles of collagen fibers. There was no evidence of infection or body rejection. Remnants of the implant were still present infiltrated and surrounded by mature fibrous connective tissue. The predominant cells were fibroblasts along with little numbers of macrophages and mast cells indicative of active matrix synthesis of collagen with the presence

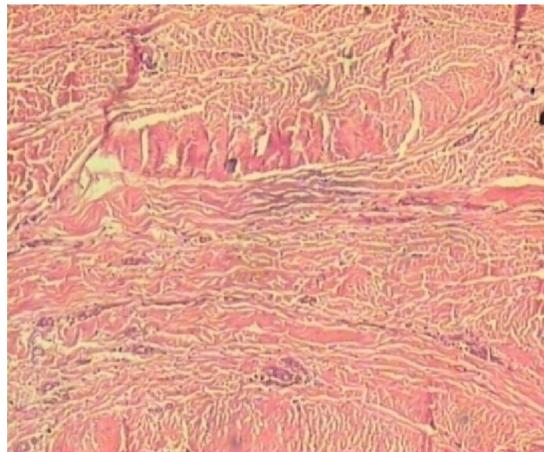


Fig.15: longitudinal section in a normal case, demonstrating, long bundles of dense collagen fibers closely packed together (H&E X50).

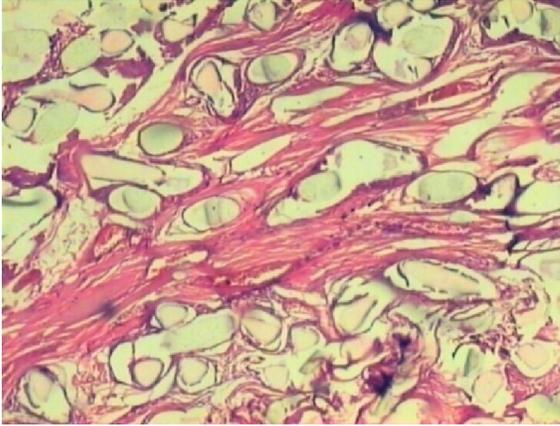


Fig.16: longitudinal section of the patellar ligament showed dense connective tissue with foreign material in multiple rounded spaces with small focus of calcification (H&E X50).

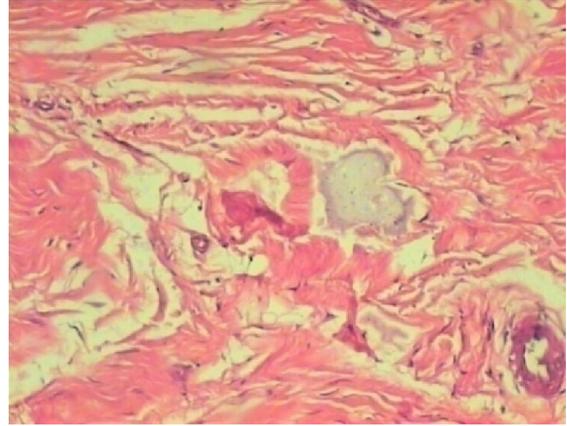


Fig.17: Section of tendon, formed of bundles of dense collagen fibers with intervening blood capillaries. There are remnants of foreign material (P) not surrounded with inflammation or foreign body reaction (H&E X50).

4. Discussion

The patellar ligament in dogs transmits the contraction of the quadriceps muscle to the tibia, and causes extension of the knee. It is present to prevent the patella from being dislocated upward Gibbons *et al.* (2006): Rupture of this ligament usually occurs as a result of severe trauma, chronic local stress and local or systemic administration of steroids (Culvenor, 1988):. Adequate support and stability are essential factors for better outcome. Best treatment was achieved by primary suturing and application of an internal splint (Gemmil & Carmichael, 2003)

Massoud (2010) reported the importance of the support use of reinforcement device in cases of ruptured patellar ligament for tension regulation at the suture line. Kasten *et al.* (2001) added that, many augmentation techniques have been tried after end-to-end sutures for reinforcement such as wire cerclage or PDS cord. Reliable results were obtained and experimental cases did not sustain reruptures.

As was mentioned by Alexa and Cozma (2009) treatment of ruptured patellar ligament necessitates immediate repair with a synthetic material that allowed immediate mobilization and decreased the recovery period which improved the outcome of rehabilitation.

In the present study, A textile fabric was used for the treatment of patellar ligament ruptures. The fabric was synthesized at the Textile Division at the National Research Center which composed of a combination of two synthetic materials polyamide 6.6, a material which possesses a high tensile strength and elongation and polyester which is a strong, inert material. The prosthetic fabric was made in a special

manner to fulfill the demanded strength and flexibility for the internal support of the ruptured patellar ligament in dogs. The implanted fabric would be biocompatible within the living tissues (Bushnell *et al.*, 2008)

The structure of the prosthetic textile was composed of monofilament microfibers which gave advantage for the properties of the textile fabric to be strong enough to withstand the loads and the tensile forces to compensate the cut ligamentous tissue. The material also was not water absorbent and was resistant to the ordinary chemical and biological agents (Raghavendra *et al.*, 2004).

Twisting of the prosthetic material during the surgery was applied as 10 twists / cm in order to give success in using the material in a flexible manner and be capable of being a solid internal splint. This helped in the normal biomechanical movement of the joints (Phelps & Dormer, 1986).

Clinical results demonstrated that the operated animals were moving normally on the operated limbs after 15 days postoperatively and at the end of the experiment they were running freely without obvious signs of complications. At 30 days, all animals recovered from surgery in which animals walked and ran normally on the repaired legs. At the end of the experiment, 180 days postoperatively, the dogs were fully weight-bearing. Same results were obtained by (Kasten *et al.*, 2001 and Archer *et al.*, 2010) who stated that full range of motion was achieved at 3 months.

Our clinical and histopathological results proved that the prosthetic material did not show any signs of rejection or septic inflammatory reaction.

Clinical examination revealed the presence of local periarticular soft tissue swelling at the seat of operation which decreased gradually till the end of the experiment seen as focal swelling, this was attributed to fibroplasias and healing around the synthetic fabric. Same results were seen by Bushnell *et al.*(2006) . Radiographic results, 180 days postoperatively revealed no intraarticular changes a result which advocates the use of this technique as other treatment techniques were usually accompanied by intraarticular degenerative changes (Alexa and Cozma, 2009).

Macroscopic examination after euthanasia and exploration of the seat of the operation indicated healing of the ruptured ligament ends was evident indicated by the formation of new tissue greatly resembling the original ligament. Microscopically, results proved-primary ligament repair characterized by formation of bundles of dense collagen fibers running parallel to each others . At 180 days,The fabric disintegrated to remnants which appeared as foreign vacules not surrounded by inflammation or body reaction indicating biocompatibility with the body tissue. Healing by tissues greatly resembling the structure of the normal ligamentous tissue proved the efficiency of the fabric as an internal splint for immobilisation and maintaining the normal physiological function of the joint without any adverse reactions.

Biomechanical results indicated that the newly formed ligamentous tissue at the end of healing 180 days postoperatio not only a good support against the loads applied on the joint but exceeded the values of the normal tissues needed to support strenuous loads applied on the joint during extension and flexion . This was proved by finding out that, the force values needed for complete cut of the newly formed tissue were exceeding those for the normal tissue of the control group , this was a considerable result regarding the tendon reconstruction using the implant material.

On the other hand biomechanical evaluations proved that the new healed tissue possessed nearly the same tensile strength of the normal ligamentous tissue but of less elasticity. This is attributed to the new replacing tissue which is fibrous in nature and don't identically resemble the pure collagen type 1 of the healthy ligamentous tissue. Same results were mentioned by Bushnell *et al.*(2006).

The biomechanical tests for the textile sample, found that the values of the tensile strength for the direction of the weft is higher than that of the warp , this is attributed to the material used which is the Polyamide 6.6 with its advantage of a tensile strength and strain higher than that of polyester. It was also noticed that, the tenacity-elongation at break ranges from 8.8g / d - 18% to 4.3 g/d-45%,100% elastic under 8% of extension for polyamide 6.6 While tenacity varies from 4.5 to 5.0 g / d for the polyester textile. It is

known that, high tenacity fiber reaches up to 8.0 g/ d and extension at break varies from 20% to 30 % (Raghavendra *et al.*,2004 and The textile plog. 2010).

A slight proximal displacement (patella alta) was radiographically observed in most cases which may later on predispose to patellar luxation , a point which need more further studies.

In conclusion, we recommend the polyamide 6.6 polyester fabric as an internal synthetic supportive splint for acute patellar tendon ruptures in dogs The product has the advantage of mechanical and biological properties in the medical field.The implant also allowed immediate rehabilitation without the need for prolonged immobilization .

Twisting of

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Effect of Methanol intoxication on the Function of Retina of Rabbit

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Abstract: Methanol is an ideal candidate to replace fossil fuels. However, alterations in the retinal function are primarily associated with methanol intoxication. In the present work, chronic methanol intoxication was carried out in New Zealand rabbits previously depleted of foliates with methotrexate. We analyze the effect of long-term alcohol consumption on oxidative stress parameters of the rabbit retinas and its correlation to retinal function. We show that methanol has a toxic effect on rabbit retina associated with oxidative stress. Decreases in retina glutathione concentration and increases in catalase activity in whole retina homogenate significantly correlate with ERG a- and b-wave decrease. We show also a marked change in the molecular structure and orientation of rhodopsin in cell membranes of the retina. Chronic methanol consumption induces oxidative stress in rabbit retina associated with an impairment of ERG and molecular changes of membrane proteins.

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Keywords: Methanol intoxication, Retina, Rabbit, fossil fuels.

1. Introduction

Integrating methanol into our energy system in the foreseeable future would have numerous economical and environmental benefits. However, considerable toxic effects due to acute or chronic methanol exposure could limit its use.

Exposure of methanol normally occurs through inhalation, skin or eye contact, and ingestion. The response and sensitivity of various species to methanol intoxication is varied (1,2); humans show considerable sensitivity to methanol (3). Further, the amount of methanol needed to cause acute toxicity varies widely from person to person (4).

In contrast to the acute intoxication, the debate about chronic neurotoxic effects of daily low to moderate methanol exposure is not yet settled. The mammalian metabolism of methanol mainly occurs in the liver. It breaks by alcohol dehydrogenase down into formaldehyde and then to formic acid (5). The metabolism of formic acid is mediated through a tetrahydrofolate-dependent pathway (6). Clinical findings correlate better with formic acid levels, which cause the profound metabolic acidosis that is a hallmark of methanol poisoning.

Formic acid accumulation gives rise to mitochondrial damage and suppression of oxidative metabolism by inhibiting cytochrome oxidase activity, which may also lead to an increase in H_2O_2 (7-9). Interestingly, the formation and stability of reactive oxygen species, for instance OH-like radicals, either by the iron-catalyzed Fenton and Haber-Weiss chemistry is favored in the presence of an acidic pH (10,11). Moreover, the metabolic acidosis can trigger iron release (12).

The electroretinogram (ERG) is the measure of action potential produced in the retina by sufficient

light. It is a chain of electrical response in the form of graded potential evoked in each layer of the retina, from the photoreceptors to the amacrine cells. The high existence of oxygen and light in the retina even though its essential to vision but it may lead to photo-oxidative damage by means of formation of reactive oxygen species (ROS). Therefore, it is not surprising that it would possess antioxidant system (e.g. GSH, Vitamin E, Lutein and Zeaxanthin) and enzymes (e.g. catalase, glutathione peroxidase, superoxide dismutase) capable of metabolizing such foreign species (13,14).

All together, we designed this investigation to explore the effect of chronic methanol poisoning on the molecular biophysical characteristics of proteins in the retinas of rabbits. It has been used FT-IR spectroscopy as a non-invasive tool to detect the molecular changes in protein content.

2. Materials and Methods

Methanol intoxication protocol

Twenty two-month-old New Zealand white rabbits (average body weight 1450 g) fed a standard laboratory chow were divided into two groups for treatment during 7 days. Animals were individually housed in stainless steel cages with free access to food and water. They were maintained on a 12-light/dark cycle. Control and experimental rabbits received water for drinking from the polypropylene bottles.

For treatment, Methyl alcohol (HPLC grade; sigma) was diluted in sterile saline and was administrated as a 20% v/v solution. At the onset of the experiment, rabbits were injected with methotrexate (0.2 mg/kg b.w./day). The treated

animals were given 24-hrs access to a 20 % v/v solution H₂O for one week.

Electroretinogram technique:

The intoxicated rabbits were anaesthetized by 0.1 ml/kg separine, 50 mg/kg ketamine hydrochloride administered intraperitoneally. ERG was recorded by using three Ag-AgCl electrodes. The active electrode was a disc electrode placed at the corneal periphery. The other two electrodes were placed in the skin of the lower eyelid and in the ear, as a reference and earthed electrodes respectively. A white flash was used in this work with fixed intensity (4 lux) and duration (0.2 sec). The obtained ERG signals were amplified and delivered to a computer system with a wide band (1-100 Hz). Sampling of the ERG records were performed using a custom-made computer system. Details of the technique are found in El-Awadi (15).

Sample preparation

At the ends of experimental periods (1, 3, 5, and 7 days) all the animals were sacrificed. For each experimental period, one animal was used for ERG experiments and the fellow one was dissected. Retinas were removed quickly and placed in iced PBS solution for 1 min, blotted on filter paper, weighed and homogenized (1:9, w/v) in a glass-teflon Potter homogenizer in 0.02 M phosphate buffer pH 7.4. The homogenates were centrifuged at 15,000 x g (4°C) for 30 min to settle the organelles and their membranes. The supernatant received from homogenate and used for subsequent experiments.

Antioxidative defence enzyme activities:

Catalase was measured at 240 nm for 3 min, using the linear decrease of H₂O₂ (10 mM) at pH7.4 in 50 mM potassium phosphate buffer. Activity was calculated using the molar extinction coefficient of 0.0394 mmol⁻¹ cm⁻¹, 1, and the results were expressed as nmol H₂O₂/min/mg of protein (16).

GSH concentration was measured in the supernatant. DTNB (5, 5'-dithiobis-2-nitrobenzoic acid) recycling method was used to produce a yellow compound, TMB (5-thio-2-nitrobenzoic acid), which was measured at 412 nm (17).

FTIR spectroscopy:

The absorption measurements were all performed with a Jasco-4100 Fourier-transform-spectrometer. Spectra were recorded in the range 4000 - 400 cm⁻¹ using Instrumentation and Services Laboratory, National Research Center. The absorption intensity of the peak was calculated using the base line method.

Protein assay:

Protein contents were quantified with Lowry method (18).

Statistical evaluation

The results were expressed as mean ± SEM. Statistical analysis was performed using Student's t test for unpaired data, and values from p < 0.05 were considered significant.

3. Results:

Figure (1) shows FT-IR spectra of rabbit retinas in the spectral region from 1900 to 400 cm⁻¹ for the periods indicated. The major IR bands of the retinal chromophores were assigned to either vibrations of the protein part or the membrane lipids. In Fig (1), the amide I (C=O stretch vibrations) band is centered around 1643 cm⁻¹ and amide II (N-H bending vibrations) at 1537 cm⁻¹. This vibration bands are characteristics for α -helical structure of rhodopsin (19). Figure (2) showed the dichoric ratio (amide II₁₅₃₇/amide I₁₆₄₃) decreases with time from 0.954 at 1-day to 0.363 at 7-day. These ratios were employed to calculate the orientation angle of rhodopsin with the membrane normal. Table (1) showed the estimated angles. The exposure of rabbit retinas to methanol for one day has no change in the orientation angle of rhodopsin. The exposure of retinas for longer time (3 and 5 days) showed a remarkable increase in the angle of orientation (31° and 57.5°, respectively). At the seventh day the angle of orientation has been markedly deteriorated.

Catalase, the enzyme that facilitates the breakdown of hydrogen peroxide to oxygen and water. Table (2) shows the activity of catalase in the retinas of methanol-intoxicated rabbits. Catalase activity was increased significantly in a time-dependent manner. The catalase activity in normal rabbit retinas was 4.39±0.93 U/mg protein. With one day of intoxication, the catalase activity increased to 5.12±0.74 U/mg protein. At 3 days post-insult, the catalase activity became 5.48±0.69 U/mg protein. By 5 and 7 days post-intoxication, the catalase activity increased to 6.87± 0.98 and 7.43±1.12 U/mg protein, respectively.

To determine the effect of chronic methyl alcohol administration on antioxidant activity, we measured GSH concentrations per wet weight of retinal cells at the corresponding periods (Table 2). In freshly isolated control retinal cells, the cytosolic GSH were 107.81±6.19 µg/g wet weight. After one day of chronic methanol ingestion, the cytosolic GSH pool was decreased by more than 11% (P < 0.05). The methanol ingestion of rabbits for 3, 5, and 7 days caused a significant decrease in the cellular GSH pool (P<0.05). By 7 days of methanol intoxication, the drop of GSH concentration reached more than 40% (Table 2).

The traces in figure (3) illustrate a set of control and methanol-intoxicated rabbits ERGs using the flash stimulation technique. In all control animals,

well-defined ERG responses were found. The mean amplitude of a-wave = 0.22 ± 0.009 mV, and b-wave = 2.29 ± 0.2 mV. It was observed that a- and b-wave amplitudes in the ERGs were significantly reduced with respect to control for all experimental periods (1, 3, 5, and 7 days). The rate of b-wave amplitude change showed a linear decrease (Fig. 4). It was 7.5% after one day whereas this drop was ~ 22% and 27% for 3 and 5 days respectively upon intoxication (Table 3). The rate of change reached 35% on the end of the time course of experiment. On the other hand side, a-wave amplitude showed a sharp increase in the ascending side (Fig. 5). The implicit time of both a-, and b-wave showed a marked changes upon intoxication.

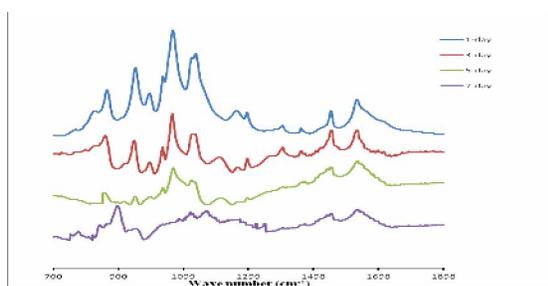


Fig (1): FTIR absorbance spectra of rhodopsin as a function of intoxication time

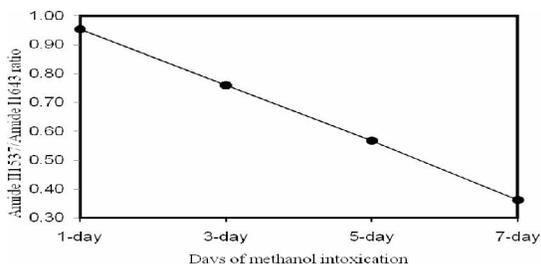


Figure (2):The relationship between dichoric ratio and methanol intoxication time (days)

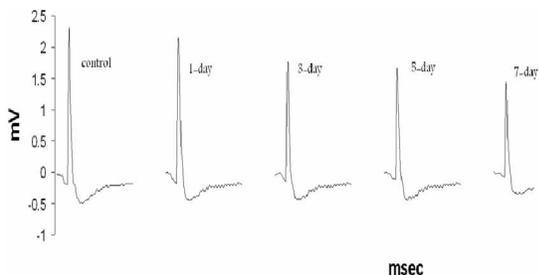


Figure (3): Typical record of ERG of control and methanol-intoxicated rabbits from different periods during dark adaptation

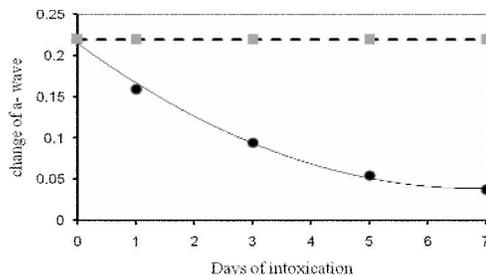


Figure (4):The relationship between of methanol concentration () and the corresponding a-wave (mV) of rabbits during dark adaptation.

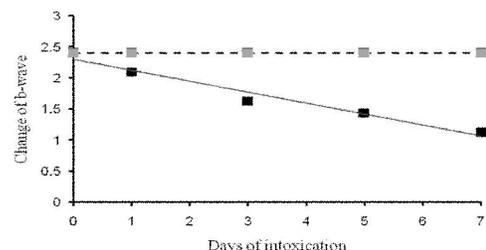


Figure (5):The relationship between of methanol concentration () and the corresponding b-wave (mV) of rabbits during dark adaptation.

Table (1): The angle of the alpha-helix with the membrane normal as a function of the ratio of amide II/amide I

Amide ratio	Orientation angle
0.954	0
0.76	31
0.568	57.5
0.363	ND

Table (2): The effect of methanol poisoning on the reduced glutathione (GSH) and catalase activity.

Item	Catalase activity ^a Mean±SEM	Reduced GSH ^b Mean±SEM	P-value
Control	4.39±0.93	107.81±6.19	
1-day	5.12±0.74	95.32±5.02	<0.05
3-days	5.48±0.69	82.45±3.21	<0.05
5-days	6.87±0.98	75.94±4.67	<0.05
7-days	7.43±1.12	63.49±2.24	<0.05

^a catalase activity (U/mg protein)
^b reduced GSH (µg/g wet weight)

Table (3): The rate of change for a-wave and b-waves with the intoxication time course.

Item	a-wave (mV)	b-wave (mV)
Control	0.22 ± 0.01	2.4 ± 0.05
1	0.16 ± 0.02	2.1 ± 0.04
3	0.095 ± 0.002	1.63 ± 0.02
5	0.055 ± 0.0016	1.44 ± 0.03
7	0.038 ± 0.002	1.12 ± 0.04

4. Discussion

Chronic methanol intoxication can severely damage many systems of the human body, especially severe visual dysfunction (20, 21). As in the case of many chronic degenerative diseases, increased productions of reactive oxygen species (ROS) and lipid peroxidation have even been considered to play an important role in the pathogenesis of methanol toxicity (22, 23). In the present study, chronic methanol-intoxicated rabbits have been pretreated with methotrexate, which selectively inhibits formate oxidation and binding dehydrofolate reductase, thereby depleting the animal's folate store (25). Interestingly, the formation and stability of reactive oxygen species either by the iron-catalyzed Fenton and Haber-Weiss chemistry is favored in the presence of an acidic pH (24). Moreover, the metabolic acidosis can trigger iron release (12). Therefore, we analyzed the effect of long-term methyl alcohol consumption on oxidative stress in the retina and its correlation to retinal function by ERG.

The results herein from eyes of methanol-treated rabbits show a significant decrease in the level of endogenous antioxidant (GSH), as well as an increase in catalase activity (Table 3). Methanol induced depletion of glutathione supports the hypothesis that reactive oxygen intermediates generated during the metabolism of methanol lead to glutathione oxidation and lipid peroxidation. These findings agree with previous studies that reported an alteration of oxidative stress metabolites after long term administration of methanol in liver and retina (22, 35). Hyperoxia-induced retinopathy of prematurity and ischemia-reperfusion show a depletion of retinal GSH that may become insufficient to buffer an increased release of free radicals (24).

Catalase enzyme serves as a second messenger of oxidative stress. The accumulation of reactive oxygen species giving rise to induction of the expression/activity of catalase enzyme (Table 3). Increase of the catalase activity will lead to a decrease in H₂O₂ concentration within the cell, depriving the Fenton reaction of substrate. Consequently, the formation of hydroxyl radicals through the Fenton reaction (and thus the formation of MDA) will occur at a lower rate. The induction of antioxidant enzymes to varying degrees by H₂O₂ has been reported in other systems, including rat lens (27), primary rat hepatocytes (28), or the developmentally regulated catalase of *E. nidulans* (29).

A result of free radicals action may be the modification of biologically active proteins, and damage to biological membranes. Our data suggest a quite interesting general inverse relationship between the ratio of Amide II₁₅₃₇/Amide I₁₆₄₃ and the time of

methanol poisoning (Fig. 5). The alteration of these dichroic ratios could be used as a monitor to get information about the configuration of main protein component, rhodopsin. The magnitude of changes in these spectral regions indicates significant changes in α -helix configuration of rhodopsin (30). In α -helix, the amide I dipole is close to the helix long axis whereas the amide II dipole is roughly perpendicular to it. Though localization of short chain methyl alcohol, in the headgroup region of lipid membrane (31, 32) is giving rise to disruption of lipid bilayer packing, i.e. increases membrane fluidity. The enhancement of fluidity seems to make the membrane has less steric constraints (33) and may cause changes in the orientation angle between rhodopsin and membrane normal.

ERG analysis in methanol-intoxicated rabbits revealed a significant reduction of the amplitudes of a- and b-waves (Figs. 3, 4). In fact, rhodopsin is a protein anchored in the membranes of discs-flat vesicles that fill the outer segment of rod cells. These membranes contain a high amount of long-chain polyunsaturated fatty acids (34), which make them particularly susceptible to oxidative stress. Therefore, hypothesis may directly pertain to the alterations in the ERG is that the function of the retina may be diminished by exposure to methanol and/or the byproducts of methanol metabolism (35, 36). It has also been hypothesized that persistent conditions of oxidative stress due to chronic alcohol exposure can alter the fatty acyl composition of membrane phospholipids (37, 38).

Moreover, oxidative stress in the outer rod segment is associated with double bond breaking of 11-*cis*-retinal during *cis*-*trans* isomerization. In the case of free retinal, this photochemical reaction has been reported to cause the formation of oxygen free radicals. Oxygen radicals can also cause formation of the protein peroxides (39). Changes of the primary structure of proteins cause modification in their secondary and tertiary structures.

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Intellectual capital and its effect on economic performance: A Case Study in Iranian Automotive IndustryDr, Mojtab Rafiei¹, Dr Tahereh Feyzi,², Hossein Azimi,³

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Abstract: Studies have shown that in the contrary of loss productivity of traditional sources (money, land and ...), knowledge is really a source of increasing economic performance. Basically, managers of companies are forced to correct and improve production methods, marketing, innovations and ultimately increase productivity and economic efficiency by considering prevailing economic conditions constantly. One of the main ways to improve economic conditions and increase competition for successful factories which can reach to the potency of competition, is the use of creative thinking that without the recognition and protection of intellectual capital will not be possible. In this study, elements and components of intellectual capital are independent variables as human, Structural, and relational capitals. Economic performance indicators (dependent variables): profit and cash earnings are considered. Methods of research in doing is descriptive - correlation of covariance analysis of structural equation model. The results were analyzed with the Lisrel & SPSS software, and finally the relationship between intellectual capital were confirmed and it has been found that relational and structural capital directly and human capital, indirectly, impress economic performance by structural effects.

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Key words: human capital, relational capital, structural capital, economics, Lisrel

1 – Introduction

Coincided with revolution of information technology and rapid development of superior technology, since decade 1990, pattern of economic growth has got fundamental change and consequently, knowledge as the most important factor, superseded of financial and physical capital in the global economy. In other words, industrial economy replaced to knowledge-based economy. In Knowledge-based economy give more Attention to knowledge and intellectual capital as the main factors of wealth production in comparison with other tangible and physical capitals. In the current competitive markets, the success of an organization depends on applying the elements of knowledge management and intellectual capital in all aspects of organizational (Chen, et al, 2006). In the knowledge-based economy, intellectual capitals, especially human capital are considered as a part of the most important component of corporate capitals and the main potential success factor of organizations, in comparison between tangible capitals, is their intellectual ability.

With the growth of knowledge-based economy significantly, we see that the corporate intangible capitals in comparison with other tangible capitals are more important to preserve and achieving sustainable competitive advantage (Tayles, 2007). Thus the business's environment of economic changes

wonderfully. In Businesses and the economy in twenty-first century, invest on information, information technology, electronic commerce, software patent of research trademark and Innovation and www and etc, that all are part of intangible capitals and intellectual capital and knowledge capitals and are beyond of evident context capitals. (Seetharaman, 2007). In summary, in knowledge-based economy, the most important capitals and company's economic factors are intangible that using of them doesn't less their value, and rather increase their value. These intangible capitals include knowledge, intellectual capital and etc, but in industrial economy the most important factors and capitals are economic and physical that using them diminishes their value. These capitals include land, machinery, monetary capitals and tangible and etc. Nowadays, the role of knowledge in business and maintain competitive advantage are discussed as a major problem in the management of all departments and organizations. All have come to believe that the knowledge is the base of competition in business and future Economy. (Yazdani, 2006).

1-2 - Statement of problem, importance and objective of research

According to the importance of the automotive industry and especially with the implementation of Article 44 of the Constitution and the tendency to the

privatization of the economy and thereafter that, dramatic increasing in the domestic economy also with willing to join the World Trade Organization and also applied prohibitions by the Western countries need to improve the economic status of the organizations approach to intellectual capital and intangible capitals to be felt as much as before. Managers of organization must get better understand the mentality and the concept of intellectual capital. They need to review products, processes and people and assessment of their knowledge and increase it. One of the main ways that plants have got succeeded to improve production methods, increasing compete with other competitors and improve the financial position, is the using of creative thinking and making innovation in system that this case without recognition and protection of intellectual and intangible capitals would not be possible. In the current situation with regard to the extent of competition and privatization and high complexity and instantaneous changes in environment, corporate managers, to deal with these changes, urgent need to identify intellectual capital levels of the organization and correct management. According to the importance of the automotive industry in the country and the importance of intellectual capital issues were considered, in this study has tried to relate investing in the main value of intellectual capital for automotive industry and the impact on economic performance of intellectual capital. Also determining of the Intellectual capitals value of these companies can affect on efficiency and increasing the economic performance of this group.

With further researcher's study at the statistical prototype, it seemed the subject of intellectual capital and intangible capitals in these companies has been ignored. Accordingly, it has prepared the researcher to do relevant research in this direction. And trying to find a model that firstly identifies the intellectual capital, introduces these basic organization's elements, determines the relationship between these elements. And secondly, determines the effect of each of these elements on the performance of employees.

The main objective of the research:

The components effect of intellectual capital on the auto motive's financial and economic performance.

Other sub-objectives:

1 - Evaluation of components of intangible capitals and intellectual capital components (human, structural and relational) among managers, experts and supervisors of active companies in Iran's automobile industry.

2 - Provide solutions and necessary recommendations to improve intellectual capital level of economic performance.

3 - Discussing the intellectual capital subjective and its relationship between organizational economic performance in order to attract the attention of senior managers of active companies in the Iran's automobile industry, to the importance of intellectual capital and intangible capitals of their organizations.

1-3 - Background and research framework

Emergence of intellectual capital statement has an interesting story. At the end of decade of sixty late AD, an Economist in the name Galbraith, during with a correspondence with his economist friend, Kalsky, speaks to Kalsky about his religion and other's religion caused by his intellectual capital that created in the sixties. For this reason that today, the appearance of intellectual capital statement can be attributed to Galbraith (Khavandkar and others, 1388, 3). The concept of intellectual capital initially, was presented by management science pioneer, Peter Drucker, in description of society after capitalism. At the end of 1990 referring to the intellectual capital and knowledge in the publications and management books and trading were very common (Bontis, 2004). By passing time, the fields of Intellectual capital management became more widespread and were also entered in fields of financial reporting and accounting organizations. Stewart (1991) in an article published in Fortune magazine, by presentation of the main motivation for the formation of another world under the title "world's intellectual capitalists" has gave more reliability to the researches in this field. Along with Stewart in Fortune magazine articles, this subject matter, has followed by his colleagues like Baruch lev from New York University, Davenport (1993) from Boston University, Bontis and his colleagues and also Lif Edvinson (1993) of the pioneers of Skandia Swedish company and other scientists. Therefore focus on intellectual capital and knowledge organizations was increased. Today, many private and governmental institutions have done extensive efforts to identify the intellectual capital of organizations and also to evaluate and comparison of them in different levels of micro and macro. For example, one of the efforts to identify and evaluation investment knowledge that has done in international level is the research that has been done in the United Nations Economic and Social businesses and their sub-units(government management and development unit),under name: measuring knowledge capitals of nations.(Rafiee, 2009). In Knowledge-based economy, the **success** of organizations depends on managing intangible capitals and intellectual capital of their organizations. To manage these capitals, we must

firstly identify and measure them and finally we able to manage those (Sanches, et al, 2008). Much emphasis and attention to intellectual capital represents the fundamental differences between companies that work in the new and old economy. In the old economy-based, market value was based on physical capitals, while the value of the new economy value is caused the application of intellectual capital of the company and knowledge. The appearance of knowledge-based economy is caused to end time of relative importance of tangible capitals and subsequently the new paradigm that much attention to the intellectual capital and knowledge is occurred. (zhou, 2007). Basic steps must be taken to our economy to become knowledge-based economy. We should learn that our organization take to deal with rivals ahead, introduce as a knowledge-based exporter, if we didn't increase our speed, fall farther and farther in this course every day. And soon, if not try we will join to the organizations that have moved toward fail. Economic activists of organizations must achieve to understand the mentality of concept intellectual capital as better as before. They must specify their hidden capitals and change them to intellectual capital and must have a specified plan to use them (Erteghaee, 2009). In this study, the meaning of intellectual capital components is: human capital, structural capital and relational capital are considered as the independent variables which of course, they have a relationship with each other. And personnel's economic performance is considered as dependent variable. it is intended to mention that the performance index in this quantitative study have been considered as profit institution and cash flow or economic indices generally. Indexes of human capital in this study include: innovation and creativity (I & C) - Education and Learning (L & E) - experience and expertise (E & E) indicators of capital structure include: systems and applications (S & P) - processes and structures (P & S) - intellectual property rights (IPRs) relational capital indicators include: agreements and strategic relationships (AA) - relationship with suppliers and customers (R. SC) - Knowledge about customers (KC). In this study, we will understand How with appropriate management intellectual capital components (human capital, structural capital, relational capital), can we improve profits and economic development of organizations and get value for organization according to a very competitive environment.

This model shows the relationship between independent & depended variables of this research. The model that human, structural and relational capitals are considered as independent variables which influence on each other, and the performance of organization with benefit index is considered as dependent variable.

Now, according to clarify the variables and model, research hypothesis are offered:

Main hypothesis: intellectual capital has significant effects on economic performance of organization.

Sub-hypothesis:

- 1 - Human capital has significant effects on economic performance of organization.
- 2 - Structural capital has significant effects on economic performance of organization.
- 3 - Relational capital has significant effects on economic performance of organization.
- 4 - Human capital and structural capital have a significant relation with each other.
- 5 - Relational capital and human capital have a significant relation with each other.
- 6 - Relational capital and structural capital have a significant relation with each other.

In fact in this study the relationship between intellectual capital components with each other, will be identified and the effect of the components of intellectual capital on economic and financial performance of organization will be measured directly or indirectly. It is important to know that in this research the meaning of relationship's effect is correlation and not casual.

2 – Methodology

This study according to its aim that it is determining of the empiric relations in the field of interaction relations between the components of intellectual capital and its effects on the financial performance of the organization, in terms of purpose is applicative and in terms of methodology (how data collection) is descriptive – correlative of covariance analysis methodology of structural equation model (path analysis).

2-1 - Gathering tools and data analysis techniques:

The most important methodology of data collection in this research is as follows:

In this study, library resources, articles, required books and also global information of Internet network are used for data collection in the field of theoretical and literature of research topic. Also, information & data collection to analyze has been done by fielded method by using questionnaires' tool. Questions (items) of questionnaire include four sections:

Part I: Human capital assessment questions: this section includes 16 questions.

Part II: Questions relating to structural capital: this section includes 18 questions.

Part III: Questions relation to relational capital: this section includes 16 questions.

Part IV: Questions relation to financial performance that includes 10 questions.

In this research, after collecting the questionnaires and extraction Replies for changing the Initial data from the questionnaires to the usable mode for using SPSS software and login the information, extracting descriptive statistics with classify the information ,and converting the classified information to frequency and statistical average and one & two-dimensional tables have been converted. And finally by using path analysis of Lisrel software the path models have been traced .and hypothesis have been tested.

2- 2 – Definition of variables and the introduction of statistical prototype.

Intellectual capital: intellectual capital is an information and applicative knowledge to create a value for company (Edvinsson & malone, 2005).

In other words, those capitals of per company that make additional value for company, but they are not touchable and seeable are named as intellectual capital. Stuart Thomas expresses that intellectual capital is a useful knowledge box for the organization. Respect to Boroking, difference between book value and market value of a company is named as intellectual capital (Shaemy Barzeky, 2005).

Practical definition of intellectual capital: intellectual capital consists of capitals and assets that companies have, but they can't easily identify and measure. These capitals have too effect on company's benefit & cost, but they are not visible. It causes to increase the importance of identification and assessment of them. These capitals and assets are called company's intellectual capital, which are converted to three parts: structural capital, human capital and relational capital (Lotfizadeh, 2006).

Human capital: human capital is very important because they are the strategic source of creativity & renewal of organization. Basis of human capital is organizational personnel's intelligence and talent. Range of human capital is limited to the knowledge that workers have in their mind. In other words, it is the most important capital for any organization because this capital is the source of creativity in the organization. This capital consists of staff proficiency, leadership abilities, experiences, ideas, risk-taking, problem solving ability, and... (Bontis, 2004).

Practical definition of human capital: human capital consists of total abilities, capabilities and personnel

competencies that can help in solving company's problem. (Shaemy Barzeky, 2005).

Relational capital: relational capital consists of factors that they organize and manage the between organization relations & surrounding environment. Relational capital is not only included relations with customer and marketing, even includes: external relations company with networks, business competitors, material suppliers, good reputation of exploitative unit, associations and trade guilds, government, governmental institutions, media and research centers (Marr, 2005).

Practical definition of relational capital: relational capital points to satisfied customers who loyal to the organization. In General, attitude of all external beneficiaries to the organization (Ghlichly and Moshbaky, 1385).

Structural capital: Structural capital consists of capitals that make possible and improve the organization ability for creativity. Organization mission, vision, basic values, solutions, work systems and internal processes can be considered among these capitals. (Hajikarim, and Bathaee, 2009). Practical definition of structural capital: is the class of the company's capitals that by support human capital causes relational capital. This means, company with having procedures, systems, programs and suitable strategies can help to its personnel to achieve the ultimate goal that is costumers and beneficiaries' satisfaction. (Lotfizadeh, 2006).

This research has been done in the active companies of country's automotive manufacturers and automotive spare parts supplier. The statistical prototype is managers, specialists and supervisors. According to the main purpose of this research that it is discovery of the principle that maintained in whole community, but study the whole of community to lead a general rule, if not impossible, will be very time consuming and difficult work, so the researchers to do research get sample from the community. Sampling in this research has been classified presumably.

Sample size has been calculated by Kokaran formula as follows:

$$n = \frac{Nt^2s^2}{Nd^2s^2 + t^2s^2}$$

In this formula

T: has been considered as confidence level

N: is number of community

P and q: Is ratio of success failure of variable in community

D: is the accepted error rate by researchers.

So by following the above formula we will have:

$$n = \frac{400 \cdot 1.96 \cdot 0.31}{400 \cdot 0.04 \cdot 0.04 \cdot 1.96 \cdot 1.96 \cdot 0.31} = 219$$

N, is number of community: 400
 "t", is: 1.96
 D, (accepted error by researcher) is: 0.04

3 – Findings of research:

To summarize the answers in the questionnaire, central and dispersion parameters of mean and standard deviation of each of the questionnaire have been calculated. And by using the path analysis, hypothesis of research have been tested to determine the measure and the effect's kind and also direction of the relation between independent & depended variables. In each Equation, tree kinds of information are presented for each parameter. This information consists of:

1. Estimation the non-standard value of parameter.
 2. Standard error.
 3. The value of "t".
- Estimation of non-standard parameters shows that changing of per unit in independent variable,

if the other independent variables be fixed, how much change will be caused in the dependent variable. The direction of changing is defined by the positive or negative sign of relevant parameters. Standard error shows that the parameter's value with the how much accuracy is estimated. If the value of a parameter is divided on its standard error, "t" value will be calculated. "t" value is used in order to define whether a specific parameter in the community, has a significant differentiation with zero value. "t" value between 2 and 3 shows direct relation of the hypothesis is confirmed and the dissident hypothesis is rejected with more than 95% confidence.

For t value larger than 3, with 99% confidence hypothesis is confirmed and the dissident hypothesis will be rejected. In fact the t statistic tests the hypothesis that shows a parameter is equal to zero. (Kalantary, 102, 2008).

According to the done estimates in the model and equation by software, the results of the direct effect of values is shown for better decision making in Figure 2 and Table 1.

Figure 2: Initial Path Model for checking the direct relationship between model variables:

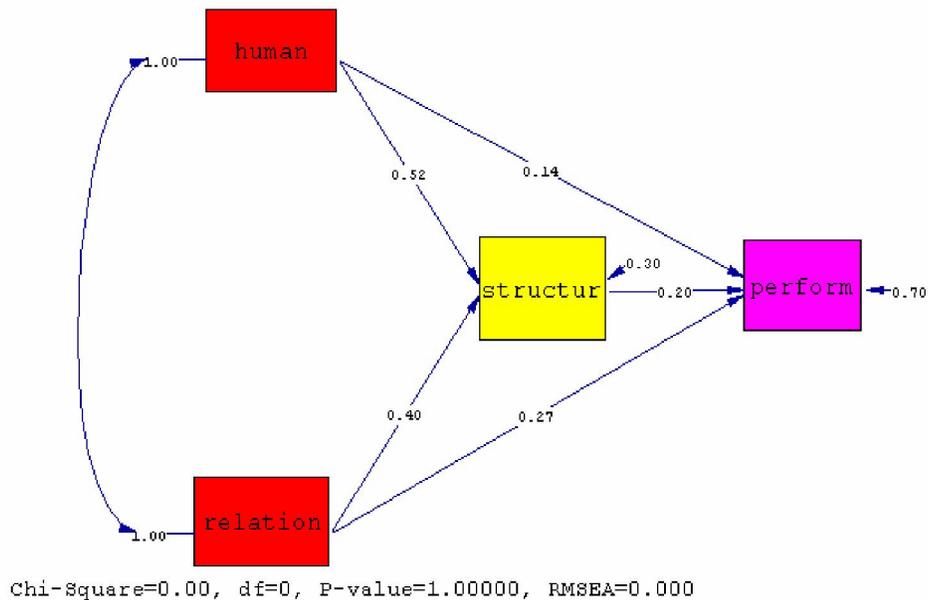


Figure 2, is showing the primary Path Model between variables, it means human capital (human), relational capital (relation), structural capital (structure) and economic performance (perform). The description is observed in Table 1.

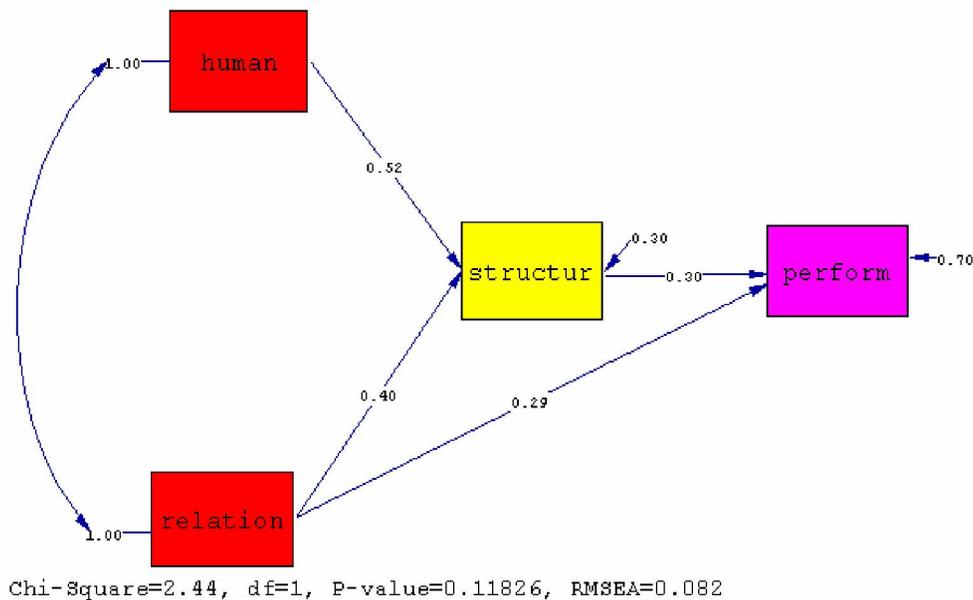
Table 1: direct values of the initial path model:

Variables relationship	Estimated	Standard	Standard's	t-value	Signification	Result
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	value	value	Error		level	
Relationship between human capital & economic performance	0.16	0.14	0.10	1.56	P > 0.5	Disconfirmation of direct relation
Relationship between structural capital & economic performance	0.22	0.20	0.11	1.98	P < 0.01	Confirmation of direct relation with more than 95% confidence
Relationship between relational capital & economic performance	0.31	0.27	0.096	3.23	P < 0.01	Confirmation of direct relation with more than 99% confidence
Relationship between human capital & structural capital	0.56	0.52	0.051	10.91	P < 0.01	Confirmation of direct relation with more than 99% confidence
Relationship between relational capital & structural capital	0.43	0.40	0.051	8.33	P < 0.01	Confirmation of direct relation with more than 99% confidence
Relationship between human capital & relational capital	0.14	0.62	0.054	7.78	P < 0.01	Confirmation of direct relation with more than 99% confidence

After analyzing the initial model of research, the results of estimated values for the above relationship shows that there is no direct relationship between human capital variable and economic performance ($P > 0.05$). Therefore, in order to calculate estimated values for the final model, non-significant relationships were excluded from the model and the new model is estimated again.

Figure 3: final path model after excluding the non significant values:



One of the advantages of Lisrel software is that shows the indirect effects of an independent variable effect on the dependent variable through one or more other intermediate variable. To understand this relationship, we should note to the presented diagram of the path in the final model according to the Figure 3. This diagram shows that the relational capital variable not only affects the economic performance directly, also affects the economic performance through structural capital indirectly. On the other hand the human capital variable only affects the economic performance indirectly through structural capital. Now according to the estimates done in the final model & equations by software, the results of the indirect effects of capital values of structural & relational capital on the economic performance for better decision making are shown in Table 2.

Table 2. Results of the indirect effects of capital values of structural & relational capital on the economic performance for better decision making

Variables relationship	Estimated value	Standard value	Standard's Error	t-value	Signification level	Result
Indirect relationship between relational capital & economic performance	0.14	0.12	0.04	3.28	P < 0.01	Confirmation of indirect relation with more than 99% confidence
Indirect relationship between human capital & economic performance	0.18	0.16	0.05	3.39	P < 0.01	Confirmation of indirect relation with more than 99% confidence

Considering the analysis done by Lisrel software which existed in Table 2, it can be defined that the relational capital more over than influences on the economic performance directly, has effect through structural capital on the economic performance indirectly. And indirect effect of relational capital on economic performance will be calculated through multiplying the approximate value of relationship between relational capital & structural capital (which is equal to 0.43 as Table 1), by approximate value of relationship between structural capital & economic per (0.32) as follow:

$0.32 \times 0.43 = 0.14$ Standard error of the two variables related to indirect effect, as seen in Table 2 is equal to 0.04. "t" value related to these two variables (relational capital and economic performance) in the indirect effect is equal to 3.28, which shows estimation at the level of 1 percent is significant. Considering the analysis done by the Lisrel software as observed in Table 2, is shown that more over than relational capital, the structural capital also has effect on the economic performance indirectly. However, the effect of human capital is only indirectly. Non-standard estimation value, related to indirect effect of these two variables as observed in Table 2 is equal to 0.18. Standard error of these two variables, related to the indirect effect is equal to 0.05. "t" value related to these two variables (human capital and economic performance) in the indirect effect equals 3.39, which shows estimation is significant with 99 percent confidence.

3-1 – Hypothesis examination

Hypothesis 1 - human capital has significant effects on economic performance.

H0: Human capital has no significant effect on economic performance.

H1: Human capital has significant effect on economic performance.

Path analysis results ($P > 0.05$, $t = 1.56$, $\beta = 0.16$) show that human capital has a significant effect on economic performance directly. So H0 hypothesis is confirmed and H1 hypothesis is rejected.

Therefore the research results and outputs of Lisrel software specifies that human capital does not influence on the performance directly, rather the human capital is related to capital structure and its effect on economic performance is through the intermediate structural capital variable. It seems that the result of research is absolutely normal & logical. If the dominant structure and culture of a company aren't supportive and openly, human capital won't be able to have any maneuvers. Capital structure makes it possible to transfer the existence of knowledge from the processes, procedures, contracts and etc to individuals or groups of employees throughout training or induction. Competencies and personal characteristics that make the human capital can be detected from the capital structure. To get a profitable usage made by employees, the existence of communicational systems and operational procedures in organization are necessary to support the activities of each employee. The human capital is a source to innovation and strategic rebuilt of a company, and the value of its benefit depends on its efficient usage.

In 2004, Chen got a result by his researches that human capital, in order to be able fully achieved to its optimal performance, requires a supportive structural capital, and if structural capital have not already been invested in, human capital won't handle its responsibilities well. Researches by Kolyung & Paolong showed that higher costs in research and structure improvement causes equally staff quality and high degree of organization and thus improvement of economic performance. In another study in 2007 by Carlos Maria & Marto and their colleagues from the Mizinss University in Argentina that it was done in the country's wood industry, During their study they found out that relational and structural capital directly, and human capital indirectly affect the economic performance. In this research, relationship between performance and relational capital is 0.565, relationship between structural capital and performance is 0.455 and indirect relationship between human capital and performance is 0.27. the results of the researches done by these and many others scientists are similar to the results of this research that states human capital affects the economic

performance indirectly. Of course, scientists like Bontiss (2000) and H. Su Feng (2009) also have proved the direct effect of human capital on economic performance. From the researcher's point of view the results of the researches done in each statistical prototype, considering its special conditions might be different. In this research according to the statistical prototype requirements, the indirect effect of human capital on economic performance has been proved.

Hypothesis 2 - Capital structure has significant effects on economic performance.

H0: capital structure has no significant effect on economic performance.

H1: capital structure has significant effect on economic performance.

Path analysis results show that with more than 99% confidence ($P < 0.01$, $t = 3.57$, $\beta = 0.32$) capital structure, has significant effects on economic performance. Thus, H0 is rejected and the research hypothesis is confirmed.

In 1998, Grilichs found a similar relationship between the investment in organizational structure and organizational performance, and professed we can control the organizational effectiveness in this way. Also Cohen and Lovintal expressed that the capability of palatability of a company is the result of investment in R & D (structure). A study done by Desspande and colleagues showed that culture as one of the components of capital structure, helps people to understand their organizational performance. The results of this research in relation to the mentioned hypothesis are consistent with the results of researches such as Bontiss & colleagues (2000), Chen & colleagues (2004) and H. Su, & Feng (2009). For example, the relationship between structural capital and performance in the research of Chen and colleagues (2004) is equal to 0.733, and the effect of capital structure on the improvement of economic performance in the research of H. Su & Feng is equal to 0.16.

Hypothesis 3 – relational capital has significant effects on economic performance.

H0: relational capital has no significant effect on economic performance.

H1: Relational capital has significant effects on economic performance.

The path analysis results show with more than 99% confidence ($P > 0.01$, $t = 6.28$, $\beta = 0.47$), relational capital has significant effects on economic performance. Thus, the H0 hypothesis is rejected, and the research hypothesis is confirmed.

The results of this research in relation to the mentioned hypothesis are consistent with the results such as

Bontiss & colleagues (2000), Chen & colleagues (2004) and H. Su, & Feng (2009). For example, the relationship between relational capital and economic performance in the study of Chen and colleagues (2004) is equal to 0.798, and the effect of relational capital on the improvement of economic performance in the study of H. Su & Feng (2009) is equal to 0.11. In addition, Stewart proved in 1999 that intellectual capital through customer capital change to financial capital also expressed that relational capital depends on support of structural capital. In research done in Turkish industry by Bozbora in 2000, was determined that relational capital has direct effect on book and market value of companies. In Research done in Malaysia by Bontiss and colleagues in 2000 was determined that relational capital affects on financial performance about 20 - 30 percent. Research in 2000 done by Gaph and colleagues showed that customer satisfaction causes the improvement of organization's financial performance and it's market value.

Hypothesis 4 - human capital and structural capital have significant relationship with each other.

H0: There is no significant relationship between human capital and structural capital.

H1: There is significant relationship between human capital and structural capital.

Path analysis results show that with more than 99% confidence ($P < 0.01$, $t = 10.91$, $\beta = 0.56$) there is significant relationship between human capital and structural capital. Thus, H0 is rejected and the research hypothesis is confirmed.

The results of this study in relation to mentioned hypothesis are consistent with the results of researches such as Bontiss & colleagues (2000), Chen & colleagues (2004) and H. Su, & Feng (2009). For example, the relationship between human capital and structural capital in the study of Chen & colleagues (2004) is equal to 0.748; in study of Bontiss & colleagues (2000) is equal to 0.483 and the effect of human capital on structural capital in the study of H. Su & Feng (2009) is equal to 0.41

In addition, Balekh.Lu & colleagues in 2005 pointed to the relationship between intellectual capital components such as human and structural capital. Ross & Ross in 1997 divided intellectual capital into human, organizational and relational capital and expressed that there is strong relationship between intellectual capital components. Grilichs proved in 1998 that immaterial ownership that is considered as a subset of structural capital, can be considered as the most probable output of inventive activities. That it shows the relationship between human capital and structural capital.

Hypothesis 5 - relational capital and human capital have significant relationship with each other.

H0: There is no significant relationship between relational capital and human capital.

H1: There is significant relationship between relational capital and human capital.

Path analysis results show that with more than 99% confidence ($P < 0.01$, $t = 7.78$, $\beta = 0.14$) there is significant relationship between relational capital and human capital. Thus, H0 is rejected and the research hypothesis is confirmed.

The results of this study in relation to mentioned hypothesis are consistent with the results of researches such as Bontiss & colleagues (2000), Chen & colleagues (2004) and H. Su, & Feng (2009). For example, the relationship between human capital and relational capital in the study of Chen & colleagues (2004) is equal to 0.833; in the study of Bontiss & colleagues (2000) is equal to 0.798 and the effect of human capital on relational capital in the study of H. Su & Feng (2009) is equal to 0.75

According to the provided theories and framework by Gotery & colleagues in 2003, relation with the outside of company without the personnel who can afford this work, is very difficult.

Hypothesis 6 - relational capital and structural capital have significant relation with each other.

H0: There is no significant relationship between relational capital and structural capital structure.

H1: There is significant relationship between relational capital and structural capital structure.

Path analysis results show that with more than 99% confidence ($P < 0.01$, $t = 7.78$, $\beta = 0.14$) there is significant and positive relationship between relational capital and structural capital. Thus, H0 is rejected and the research hypothesis is confirmed.

The results of this study in relation to mentioned hypothesis are consistent with the results of researches such as Bontiss & colleagues (2000), Chen & colleagues (2004) and H. Su, & Feng (2009). For example, the relationship between relational capital and structural capital in the study of Chen & colleagues (2004) is equal to 0.858; in the study of Bontiss & colleagues (2000) is equal to 0.496 and the effect of relational capital on structural capital in the study of H. Su & Feng (2009) is equal to 0.47

4 - Results and recommendations:

The subject of this study is evaluation of intellectual capital effect on the economic performance of companies which they are covered by Mega-engine construction-developer. The main problem that caused this researcher chose this subject and test it in motioned statistical prototype was the novelty of subject and it's importance in the automotive industry. Therefore, the identification and management of intangible capitals

can affect development and improvement of economic status of these companies importantly.

The main objective of this study was evaluation of intellectual capital effect on economic performance. Analysis of data from this study showed that the intellectual capital components to wit: structural capital affects economic performance, directly; relational capital affects economic performance through structural capital, directly and indirectly; and human capital affects economic performance just through structural capital, indirectly. However, the intellectual capital components relate to each other and the correlation between them is high. Providing support the structural capital, human resources play so vital and important role in the company and can be caused the improvement of economic status. The companies which have motivated forces and can maintain them, insure their financial success by high additional value created by each of these staffs, and can achieve to exclusive proficiencies and competencies in the future. To achieving this aim, organizations should employ the workers with special proficiencies and skills.

If the organization's staffs have a high level of intelligence but there is no strong systems and procedures to support the staffs activities, these people never reach the highest potential that they are able to achieve that. Capital structure is mentioned as a instrument for organization which shows how people do their works with keeping effectiveness.

Therefore, providing the lake of appropriate and high level structural capital, it is natural that human capital and also to some extent of relational capital has been removed from the scene, and company encounters with numerous problems such as disinclination of employee, low selling, low quality of products, lack of ability to compete with competitors, and in total loss of economic potency. But the organizations should know that the main problem is in the methods, procedures, processes, programs, organizational culture, infrastructures and etc which all of them are as structural capital of the organization. And by modify them, they can obviate many existed problems and almost improve them, and at the result cause the economic prosperity.

Now the main question is discussed thus: what is the way and method to improve the structural capital? The answer of this question point of the researcher view is attention to this point that structural capital is through the intellectual input of founders, Board of Directors and especially the Managing Director and executive superior managers of organizations. In other words, as human capital is related to structural capital, also structural capital dependences on human capital (although the relationship between intellectual capital

components are part of the research hypothesis which all of them were fixed) Therefore, to improve the capital structure, choosing and employing of superior managers of organization should be considered carefully by the owners, shareholders and the Board of Directors.

For managerial posts, people must be chosen who have higher university education in relevant fields, experience and sufficient expertise in management, humanities and behavioral, have necessary experience in relevant company's activities, be aware up to dated management problems. And above all caring, compassionate, undertaking and loyal to the organization and have no affiliation to the party and class. Selecting of them is based on qualification, not unofficial relations.

According to the results of data analysis, in order to enhance the intellectual capital and their relationships with each other and their effects on economic performance and growth and development in economic and improvement of financial situation of companies which active in the country's automotive industry, the following recommendations can be noted: Is proposed to achieve high levels of economic performance, managers must manage the knowledge resources, because knowledge resources expands within the collaboration network and can be a effective response to internal and external financial situations.

Solid belief and intellectual inanition "The way we work now is the best way to go" as the obstacle to development and continuous learning should change to this belief that "We always learn from others ". Because this belief causes more learning by affects thought and behavior of personnel. Perhaps the most important proposal, which could be proposed in this section, is company should be very careful in employment and utilization of force, especially in the manager posts. Company should proceed to discover and identify the managers who they have a learning mind, than these managers react about new idea and diversity in behavior and knowledge openly. And try to understand and improve of communication continuously and consider cooperation as a opportunity for development of ability and organizational resources. Other point is: training, continuing development and identify components of intellectual capital levels should not be forgotten, because the training and identification and management of intellectual capital components not only in technical aspects but also in the field of learning and participation and international knowledge and economic progress are important and essential. For making the desire learning environment, company must educate the value of learning process, to the personnel, rather than to assume, these training are unnecessary in the company. The last point,

considering that acting in the international cooperation is complex and with uncertainty, therefore it is suggested that open channels of communication which make clarification and fast data and cause more relationship between decision makers, be provided than knowledge and learning resources and intellectual capital levels will be increased and ultimately knowledge-based economy will be practical.

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Effect of Length of Delay after Slaughter (LODAS) on Quality of Raw Catfish (*Clarias gariepinus*)¹Ayeloja, A. A.; ¹George, F. O. A.; ¹Obasa, S. O.; ²Sanni, L. O and ^{3*}Ajayi, A. A.¹ Department of Aquaculture and Fisheries Management, University of Agriculture Abeokuta² Department of Food Science and Technology, University of Agriculture Abeokuta³ Department of Biological Sciences, Covenant University, Ota, Ogun State

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Abstract: The effect of delay after slaughter on microbial quality, proximate composition and sensory scores of raw catfish, *Clarias gariepinus* (Burchell, 1822) was evaluated. A total of 52 live catfish weighing 700.0 ± 7.0 g were used. Ten freshly slaughtered fish samples each were selected for organoleptic assessment at 0, 4, 8 and 12 hours post-slaughter, while three fish samples each were selected for chemical and microbial analyses. Microbial load on fish samples increased significantly ($P < 0.05$) with increase in length of delay after slaughter, LODAS. Bacteria isolated included *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Bacillus spp* and *Staphylococcus aureus*. Percent protein and ash contents of fish samples increased with increasing LODAS, while moisture content decreased and lipid was not affected. It was observed that raw *C. gariepinus* retained most of its physical attributes up to 4 hours post-slaughter. These quality attributes except colour and odour of gills, deteriorated significantly ($P < 0.05$) at every successive four-hour post-slaughter interval. Significant negative correlation existed between LODAS and sensory quality of raw fish (eyes, $r = -0.966$, $P < 0.05$; gills, $r = -0.980$, $P < 0.05$; skin, $r = -0.998$, $P < 0.01$; and odour, $r = -0.994$, $P < 0.01$). This study established that quality of raw *C. gariepinus* deteriorated with increasing LODAS and that raw *C. gariepinus* was not totally unacceptable when delayed for 12 hours after slaughter at ambient temperatures.

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Key words: *Clarias gariepinus*; microbiology; proximate composition; organoleptic assessment.

1. Introduction

Population growth is accompanied by increasing demand for food. Direct human consumption of fish reached an estimated 103 million tons in 2003 (World Fish Center, 2009). Fish and fish products constitute more than 60% of the total protein intake in adults especially in the rural areas where they are widely accepted and form a much-cherished delicacy that cut across-economic, age, religious and educational barriers (Adeleye, 2003). Fish is a rich source of essential nutrients required for supplementing both infant and adult diets (Abdullahi *et al.*, 2001), however, poor post-harvest technology (handling, preservation and processing) cause deterioration and spoilage (Kumolu-Johnson *et al.*, 2010). An estimated post-harvest loss of over 40% of total fish landings have been reported in Nigeria (Akande, 1996). Akande and Ola (1992) reported that traditionally in Nigeria, fish are left at tropical ambient temperatures (27 ± 2 °C), for several hours after harvesting and this leads to rapid quality deterioration before reaching the market, thereby calling for more attention to post-harvest handling of fresh water fish species being cultured. *C. gariepinus* was used in this study because it is an economically important freshwater fish, and enjoys wide acceptability. It is extensively cultivated in ponds but

it is sometimes under-priced (Kumolu-Johnson, 2010). The study thus aimed at assessing the effect of Length of delay after slaughter (LODAS) on microbial, chemical and organoleptic characteristics of raw *C. gariepinus* with the specific objective of determining the appropriate LODAS for premium quality raw *C. gariepinus*.

2. Materials and Methods

Collection of samples

52 live *Clarias gariepinus* were collected from the concrete tank of the Nigeria Institute for Oceanography and Marine Research (NIOMR). They were brought to the laboratory immediately for analysis.

Microbiological analysis

The fish were slaughtered using a sharp knife, gutted, washed with clean water and allowed to drip and later spread in the laboratory at ambient temperatures ($27^{\circ}\text{C} \pm 2$). Thereafter, twelve samples of *C. gariepinus* were filleted to determine their proximate composition and microbial load, Samples were collected at four time intervals including 0 hour (immediately after slaughter), 4, 8 and 12 hours after slaughter respectively. Three replicates each were

collected from each treatment for the determination of proximate composition and microbial load. The microbial count was determined using routine microbiological procedures described by Olutiola *et al.* (1991) and Fawole and Osho (1995). Identification of microbes was carried out using Bergey's Manual of Determinative Bacteriology.

Proximate Analysis

The determination of the crude protein, moisture, ash and fat contents of the raw and smoked fish were carried out in triplicates in accordance with AOAC (1995).

Organoleptic (sensory) Assessment

Forty samples (ten at each collection hour) were collected for organoleptic assessment and ten replicates each were collected from each treatment for organoleptic assessment. Sensory evaluation was carried out by a ten man-trained panel from NIOMR using a 5-point hedonic scale modified from Eyo (2001) and Tobor (1994). The following grades were allotted depending on the condition of the fish. $8 \leq 10$ = very good, $6 \leq 8$ = good, $4 \leq 6$ = fair, $2 \leq 4$ = bad and ≤ 2 = worst. Eyes, gills, skin, odour and flesh were examined for raw fish samples.

Table 1: Total Microbial Count of raw *Clarias gariepinus*

Hour	TVC (Cfu/g)	Log Cfu/g \pm SD
0	3.37×10^5	5.52 ± 0.03^a
4	3.49×10^5	5.54 ± 0.01^b
8	5.50×10^5	5.74 ± 0.02^c
12	7.31×10^5	5.87 ± 0.03^d

*Values with different superscript in the column indicates significant difference at $P < 0.05$

** Values represent pooled means vertically of triplicate determination

Statistical analysis

Analysis of variance (ANOVA) was carried out using F-test to determine the treatments level of significance. Treatments were separated using Duncan Multiple Range Test (DMRT) (Duncan, 1955) at 95% confidence value ($P < 0.05$). Correlation analysis was carried out to determine the relationship between LODAS and sensory qualities of the fish.

3. Results

Results of the microbiological study (Table 1) indicated that total viable count (TVC) of raw fish samples analyzed immediately fish was slaughtered recorded the lowest TVC of 3.37×10^5 (Cfu/g). TVC

value increased significantly ($P < 0.05$) up till 12 hours post slaughter. This is in accordance with the report of Hood *et al.* (1983) that microbial load increases with duration of storage and temperature. This study established that fish left at ambient temperatures up to 8 hours post slaughter still have a TVC that falls within the maximum recommended bacterial count for good quality fish product i.e. 5×10^5 ($5.7 \log_{10}$ Cfu/g) according to the *International Commission on Microbiology Safety for Foods*, ICMSF, (1986). However, this value was exceeded by raw fish samples left at ambient temperature for 12 hours post slaughter with the value of $7.31 \times 10^5 / 5.869 \log_{10}$ (Cfu/g) yet the fish was not totally unacceptable as it had not exceeded the maximum recommended bacterial counts for marginally acceptable products which is 10^7 ($7 \log_{10}$ Cfu/g) (ICMSF, 1986). This is in accordance with the recommendation of Abdul-Raouf *et al.* (1993) that food-borne illness resulting from the consumption of any food is dependent upon a number of factors including contamination with a pathogen and the survival of the pathogen until the time of consumption at levels sufficient to cause illness. *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Bacillus spp* where isolated from *C. gariepinus* (Table 2).

Table 3 presents the proximate composition of raw *C. gariepinus*. The highest moisture content (78.32 ± 0.50) was recorded in freshly slaughtered *Clarias gariepinus* (0 hour) and these values decreases significantly ($P < 0.05$) with increase in post slaughter intervals. The percentage protein contents of raw samples increased significantly ($P < 0.05$) with increase in post slaughter interval, this could be due to loss of moisture and an increase in dry matter content per unit of weight following sample dehydration (Omojowo, 2008). The result established that *C. gariepinus* had similar ash content between 0 and 4 hours post slaughter, followed by 8 and 12 hours post slaughter. However, hours of delay after slaughter had no significant ($P < 0.05$) effect on the lipid of raw *C. gariepinus*.

The effects of post-slaughter interval on the sensory quality of raw *C. gariepinus* are presented on Table 4. *C. gariepinus* retained most of its original freshness up to 4 hour post slaughter. The eyes were transparent, clear and protruding with a white cornea and dark pupil. The gills had bright red colour and fresh odour, while the skin was bright with shiny slime and a firm belly; and the flesh was still firm, flexible and elastic; while the odour was fresh and sea weedy. This result agrees with similar findings by Akande and Ola (1992), that African catfish, *Clarias gariepinus* retained most of its original freshness up to 3 hours. There was significant ($P < 0.05$) changes in

the condition of the eyes, gills, skin, flesh and odour of the raw fish delayed for 4 hours post slaughter interval. However, *C. gariepinus* started losing its physical attributes when delayed for 8 and 12 hours post slaughter. Similar findings were reported by Akande and Ola (1992) that deterioration was rapid in *Clarias gariepinus* delayed for 7 and 9 hours at ambient temperatures after slaughter.

Table 5 describes the relationship between LODAS and sensory quality of raw *C. gariepinus*. There was significant negative correlation between LODAS and sensory quality of raw fish i. e. eyes ($r = -0.966^*$, $P < 0.034$), gills ($r = -0.980^*$, $P < 0.020$), skin ($r = -0.998^{**}$, $P < 0.002$), and odour ($r = -0.994^{**}$, $P < 0.006$). Significant correlation existed between the sensory quality of eyes and some

physical attributes of raw such as gills ($r = 0.971^*$, $P < 0.029$), fish skin ($r = 0.948^*$, $P < 0.05$) and odour ($r = 0.975^*$, $P < 0.025$). There was also significant positive correlation between colour and odour of raw fish gills and skin ($r = 0.966^*$, $P < 0.034$), as well as odour ($r = 0.996^{**}$, $P < 0.004$). This result established a negative linear correlation between LODAS and the sensory quality of *C. gariepinus*. As sensory quality of the eye deteriorated all other sensory qualities of the fish deteriorated. Also as gills of the raw fish deteriorated by losing its brightness and freshness, the fish skin and odour also deteriorated. This agrees with the opinion of Akande and Ola (1992) that leaving fish at ambient tropical temperatures for several hours post-harvest leads to rapid quality deterioration.

Table 2: Bacterial Isolates From Raw Fish Samples

Samples	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Staphylococcus aureus</i>	<i>Pseudomonas aeruginosa</i>	<i>Bacillus spp</i>
0	+	+	+	+	+
4	+	+	+	+	+
8	+	+	+	+	+
12	+	+	+	+	+

+: Presence

Table 3: Mean proximate composition of raw *C. gariepinus* at different post slaughter intervals

Hours	Moisture (%) \pm SD	Protein (%) \pm SD	Lipid (%) \pm SD	Ash (%) \pm SD
0	78.32 \pm 0.50 ^a	18.01 \pm 0.34 ^d	1.11 \pm 0.35 ^a	1.13 \pm 0.04 ^b
4	78.30 \pm 0.12 ^a	19.00 \pm 0.21 ^c	1.10 \pm 0.30 ^a	1.04 \pm 0.02 ^b
8	74.91 \pm 0.12 ^b	19.70 \pm 0.03 ^b	1.44 \pm 0.21 ^a	2.88 \pm 0.12 ^a
12	72.16 \pm 0.16 ^c	21.99 \pm 0.35 ^a	1.68 \pm 0.39 ^a	2.97 \pm 0.12 ^a

* Values with different superscript in the column indicates significant difference at $P < 0.05$

** Values represent pooled means vertically of triplicate determination

Table 4: Mean sensory score of raw *C. gariepinus* at different post slaughter intervals.

Raw Fish Samples					
Hours	Eyes \pm SD	Gills \pm SD	Skin \pm SD	Odour \pm SD	Flesh \pm SD
0	8.20 \pm 0.43 ^a	9.00 \pm 0.45 ^a	8.40 \pm 0.67 ^a	8.80 \pm 0.91 ^a	8.60 \pm 1.03 ^a
4	7.00 \pm 0.32 ^b	7.20 \pm 1.11 ^b	7.40 \pm 0.37 ^b	7.00 \pm 0.23 ^b	7.00 \pm 0.88 ^b
8	6.80 \pm 0.33 ^c	6.40 \pm 0.74 ^b	6.00 \pm 0.44 ^c	5.80 \pm 0.43 ^c	5.60 \pm 0.32 ^c
12	6.00 \pm 0.65 ^d	3.80 \pm 1.27 ^c	5.00 \pm 0.32 ^d	3.60 \pm 0.85 ^d	5.80 \pm 0.25 ^d

* Values with different superscript in the column indicates significant difference at $P < 0.05$

** Values represent pooled means vertically of triplicate determination

Table 5: Correlation between LODAS and sensory qualities of raw *C. gariepinus*

	Time (hr)	Eyes-Raw fish	Gills-raw fish	Skin-Raw fish	Odour-Raw fish	Flesh-Raw fish
Time (hr)		-.966*	-.980*	-.998**	-.994**	-.917
Eyes-Raw fish		.034	.020	.002	.006	.083
Gills-raw fish			.971*	.948	.975*	.904
Skin-Raw fish			.029	.052	.025	.096
Odour-Raw fish				.966*	.996**	.837
Flesh-Raw fish				.034	.004	.163
					.985*	.924
					.015	.076
						.879
						.121
	Time (hr)	Eyes-Raw fish	Gills-raw fish	Skin-Raw fish	Odour-Raw fish	Flesh-Raw fish
Time (hr)		-.966*	-.980*	-.998**	-.994**	-.917
Eyes-Raw fish		.034	.020	.002	.006	.083
Gills-raw fish			.971*	.948	.975*	.904
Skin-Raw fish			.029	.052	.025	.096
Odour-Raw fish				.966*	.996**	.837
Flesh-Raw fish				.034	.004	.163
					.985*	.924
					.015	.076
						.879
						.121
	Time (hr)	Eyes-Raw fish	Gills-raw fish	Skin-Raw fish	Odour-Raw fish	Flesh-Raw fish
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					.015	.076
						.879
						.121
Odour-Raw fish						.879
Flesh-Raw fish						.121

4. Discussions

This study established that spoilage increased with increase in LODAS. It also established that raw *C. gariepinus* was not totally bad when delayed for 12 hours after slaughter at ambient temperatures because bacteria count have not exceeded the maximum acceptable quality. However, it should not be delayed beyond 12 hours after slaughter before processing because fish with LODAS of 12 hours have bacterial counts that had already gone beyond maximum recommended bacterial counts for good quality product. Akande and Ola (1992) recommended that raw *C. gariepinus* should not be delayed for 15 hours at ambient temperatures before processing.

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Coping Behavior of Junior Physicians in Managing Conflict between Work and Family Roles

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Abstract: This study examined the extent of work-family conflict experienced by married female junior physicians and the coping behavior of the physicians in managing the conflict. The sample of this study consisted of married female physicians (with at least one child) aged 40 and below working in fourteen public hospitals in Malaysia. Data were gathered from a sample of 231 female junior physicians using self-administered questionnaires through the drop and collect method. The two major strategies used by the physicians were personal role redefinition which involved changing their own attitudes and perceptions of role expectations, and reactive role behavior which involved careful planning, scheduling and organizing their role activities, and working harder to meet all their role demands. The least frequently used strategy was structural role redefinition which entails an active attempt to deal directly with role senders and lessen the conflict by mutual agreement on a new set of expectations. Implications of the findings and suggestions for future research were discussed.

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Keywords: coping behavior; work-family conflict; junior physicians

1. Introduction

The proportion of employed professional women in Malaysia increased from 6.7 per cent in 2004 to 8.3 per cent in 2009 and slightly more than half (59.4 per cent) of the total employed women in 2009 were married (Department of Statistics, Malaysia, 2010). With the increase in the number of female professionals and the need to balance the demands of their work and family lives, married female professionals are more likely to experience work-family conflict involving incompatible demands. Among professionals, men spent more time in professional work and women more time in childcare and women perceived themselves as responsible for childcare activities at home (Bergman *et al.*, 2008). This illustrates that apart from paid work, female professionals, including female physicians, are mainly responsible for work at home and thus carried a double workload. With the double workload, the female physicians are more likely to experience conflict between work and family roles. Work-family conflict is a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible, such that participation in one role makes it more difficult to participate in the other (Greenhaus *et al.*, 1985). The experience of work-family conflict among female physicians have been reported by Aminah (2010, 2008).

To ease the strain of work-family conflict, coping strategies have been used. Lazarus and Folkman (1984) defined coping as the cognitive and

behavioral efforts individuals use to manage taxing demands appraised as exceeding their personal resources. They suggest that coping has two main functions: the regulation of distressing emotions (emotion-focused coping) and doing something to positively change the problem causing the distress (problem-focused coping). Hall (1972) studied women's strategies for coping with role conflict and identified 16 strategies which were categorized into a three types of coping behavior for dealing with interrole conflict. Type I coping (structural role redefinition) involves an active attempt to deal directly with role senders and lessen the conflict by mutual agreement on a new set of expectations. One way of changing structural demands would be to relocate and share one's role tasks (house cleaning for example). Type II coping (personal role redefinition) involves changing one's personal concept of role demands received from others. It entails changing the expectations themselves. An example is setting priorities among and within roles, being sure that certain demands are always met (for example, the needs of sick children), while others have lower priority (such as lawn care). Type III coping (reactive role behavior) entails attempting to improve the quality of role performance with no attempt to change the structural or personal definition of one's roles. Implicit in coping through reactive role behavior is the assumption that one's role demands are unchangeable and that the person's main task is to find ways to meet them; this coping strategy involves a reactive orientation toward one's roles.

Other forms of coping strategies include segmentation, compensation and accommodation, where individuals limit their psychological and/or behavioral involvement in one sphere to satisfy the demands of the other (Edwards *et al.*, 2000). Boundary management work is another strategy that individuals engage in which involves principles and practices for creating, maintaining, and crossing borders between the two domains (Ashforth *et al.*, 2000; Clark, 2000).

Much of the research on coping with work-family conflict has used Hall's typology to conceptualize coping. A study of female married professionals with children in Hong Kong indicates that their major coping strategies are personal role redefinition and reactive role redefinition (Lo *et al.*, 2003). Others who have used Hall's typology include Kirchmeyer (1993) who investigated coping among Canadian managers and Matsui, Ohsawa and Onglatco (1995) among Japanese working women. Recently, Hsieh and Eggers (Hsieh *et al.*, 2010) explored the coping strategies used by North American lodging managers to resolve the conflict between their work and personal lives. They found that obtaining role support from inside role set, including support from family and employees, establishing priorities, and planning, scheduling, and organizing better were the most frequent coping strategies used by the lodging managers to resolve the conflict.

Rotondo and Kincaid (2008) studied four types of coping with work-family conflict using data collected as part of the National Survey of Midlife Development in the United States. The coping strategies studied include direct action and advice seeking (problem-focused) and positive thinking and cognitive reappraisal (emotion-focused). They found that the relationships between individual coping styles and conflict as well as facilitation were not uniform and varied depending on the source domain. Wentzel, Buys and Mostert (2009) investigated the strategies African secondary school educators use to deal with the interaction between their work and personal lives. Among the strategies reported were keeping work and personal life apart, acceptance of their teaching environment, planning ahead, and seeking for advice through communication. Niehm *et al.* (2009) examined strategies employed by American family business managers to cope with overlapping work and family demands. They found that managers of surviving businesses were more likely to make adjustments by hiring temporary help for the business or home as part of their coping strategies. Meanwhile, Somech and Drach-Zahavy (2007) identified eight coping styles that employed parents used to deal with work-family conflict, labeled as

super at home, good enough at home, delegation at home, priorities at home, super at work, good enough at work, delegation at work, and priorities at work.

Given the pertinence of work-family conflict experienced by working women and the modest attention paid to the coping strategies used to balance the demands of work and family roles among Asian women, particularly Malaysian professional women, the objectives of the present study are as follows: 1) to determine the extent of work-family conflict experienced by married female junior physicians, and 2) to examine the coping strategies used to handle the conflict using Hall's (1972) typology. Hall's typology continues to be widely used by researchers in studies of coping with work-family conflict. Therefore, the researcher adopted Hall's typology to investigate the coping strategies used by junior physicians to resolve conflicts between their work and family lives.

2. Method

2.1 Sample and Procedure

The sample of this present study consisted of married female physicians (with at least one child) aged 40 and below working in fourteen public hospitals (eleven state hospitals and three teaching hospitals) in Peninsular Malaysia. The age limit was established since physicians tend to have more work load at this stage of their career span and hence tend to experience greater work-family conflict. Data were collected from a sample of 231 female physicians using self-administered questionnaires through the drop and collect method. The questionnaire was first constructed in English language and then translated into Malay language and was validated by back-translation to ensure that both versions were equivalent. The questionnaire was administered in both the Malay and English languages and the physicians were given the alternative to choose either of the two languages.

2.2 Measurements

Work-family conflict was measured using an interrole conflict scale developed by Pleck *et al.* (1980). This scale consists of eight items based on the three most prevalent aspects of work interference with family, namely excessive work time, schedule conflict and fatigue or irritability. Responses were coded on a five-point scaled response options ranging from strongly disagree (1) to strongly agree (5). Examples of items are: "My work schedule often conflicts with my family life"; "My work takes up time that I would like to spend with my family". The reliability coefficient (alpha) of the work-family conflict scale was 0.83.

Coping was assessed using an adapted version of role-coping inventory by Hall and Hall

(1979). This inventory has 22 coping strategies or items for three types of coping -- structural role redefinition (Type I), personal role redefinition (Type II) and reactive role behavior (Type III). The response options for the items were five-point scales ranging from never (1) to nearly all the time (5). One of the items for Type II coping was deleted since it was inappropriate to the subjects based on content validation. Another item was deleted from the Type III coping scale because of lack of variance and low item-total correlation based on the reliability test via internal consistency. The inventory for this present study consisted of 20 items, 12 items for Type I, six for Type II and two items for Type III coping. The reliability coefficient (alpha) for Type I coping scale was 0.60, Type II, 0.69 and Type III, 0.74.

3. Results

Table 1 presents the characteristics of the respondents. The respondents' ranged from 25-40 years of age ($M = 32.18$, $SD = 3.56$) with 79.5% aged from 25-35. They had an average of 4.73 years of experience ($SD = 3.26$) and 69.4% had 5 years or less of experience in the present job. Majority (74.4%) of the physicians in this study had 1 to 2 children ($M = 2.08$, $SD = 1.12$). The mean score for work-family conflict on a five point scale was 3.34 ($SD = 0.81$), and Type I coping was 3.18 ($SD = 0.41$), Type II coping was 3.85 ($SD = 0.45$) and Type III coping was 3.75 ($SD = 0.66$).

Table 1: Characteristics of Respondents

Characteristic	Frequency	(%)	Mean	SD
Age (years)	25 - 30	87	39.7	32.18 3.56
	31 - 35	87	39.7	
	36 - 40	45	20.6	
Work experience (years)	≤ 5	152	69.4	4.73 3.26
	6 - 10	53	24.2	
	11 -15	13	5.9	
	≥ 16	1	0.5	
Number of children	1 - 2	172	74.4	2.08 1.12
	3 - 4	51	22.1	
	≥ 5	8	3.5	

In managing the work-family conflict, the Type II coping (personal role redefinition) with a mean of 3.85 ($SD = 0.45$) was most frequently used by the women whereas the least frequently used strategy was Type I coping (structural role redefinition) with a mean of 3.18 ($SD = 0.54$) (Table

2). Table 3 presents the t values for the difference in the use of coping type in managing the work-family conflict. There were significant differences in the use of Type I and Type II, as well as Type I and Type III coping. The means for Type II and Type III coping were also significantly different.

Table 2: Means And Standard Deviations Of Work-Family Conflict And Coping Types

Variable	M	SD
Work-Family Conflict	3.66	0.54
Type I Coping (Structural Role Redefinition)	3.18	0.41
Type II Coping (Personal Role Redefinition)	3.85	0.45
Type III Coping (Reactive Role Behavior)	3.75	0.66

Table 3: Differences In The Use Of Coping Types

Type of Coping	df	t	p
Type I and Type II	215	-18.53	0.00
Type I and Type III	224	-12.17	0.00
Type II and Type III	224	2.78	0.01

4. Discussions

Overall, the two major strategies used by the physicians are Type II coping (personal role redefinition) and Type III coping (reactive role behavior) to manage their conflict. Similar findings were reported by Lo *et al.* (2003) in their study among female married professionals in Hong Kong. In this present study, among the three types of coping, Type II coping (personal role redefinition) was the most frequently adopted strategy. Type II coping involves changing the person's perceptions of his or her role demands rather than attempting to change the environment. In other words, the women in this study tended to be involved less in redefining the expectations held by other people and negotiating a new set of expectations from their role senders as would be the case with Type I coping. Instead, the women tried to change the perceived role by seeing their own behavior or the external expectations in a different light. By doing so, they attempted to reduce the amount of conflict actually experienced. Compromising as a way of reducing strain and making an individual's lifestyle manageable is a common behavioral response (Skinner *et al.*, 1991). Domestic overload, for instance, may be managed through compromise by deliberately lowering standards.

The second most frequently adopted coping strategy was Type III coping (reactive role behavior). The reactive role behavior involves attempts to meet all the role demands experienced. These strategies probably present considerable strain on the women's

energies since they involve attempting to do everything demanded, rather than attempting to reduce demands. Since the assumption is that all role expectations must be met, the women engaged in careful planning, scheduling and organizing of their role activities, and working harder to meet all their role demands. The study conducted by Skinner and McCubbin (1991) found that one of the coping strategies that women in dual employed families commonly used was maximizing efficiency and organization to meet the demands of work and family roles. Although Type III coping is thought to be less effective (Hall, 1972), the attempt to be a “super mother” appears to be a common strategy among married women.

Type I coping (structural role redefinition) was the least frequently adopted coping strategy among the women. It involves redefining the expectations held by other people so that fewer conflicting demands are placed upon the person and a new set of role behaviors is expected from that person by members of the role set. Such coping requires communicating with one’s role senders and negotiating a new set of expectations which will be mutually agreed upon. This means changing the received role as opposed to changing the perceived role alone, as would be the case with Type II coping. The lack of help obtained from family members in reducing work load and resolving conflict suggests that the redistribution of roles within the family to match increased role responsibilities outside the home has not been widely practiced.

The less frequent use of Type I coping could, to a certain extent, be due to the notion that Type I coping seems more directly related to long-term conflict reduction and satisfaction than Type II or Type III coping. More convincingly, the literature on sex role socialization indicates that the universal culture, through what Bem and Bem (1971) call a non-conscious ideology, rewards more reactive, less confronting and less aggressive coping in women of all ages. A study by Long (1989) found that sex-role socialization relates to differences in coping and occupational strain among working women, while a study by Somech and Drach-Zahavy (2007) found that gender role ideology moderates the relationship between coping behaviors and work-family conflict.

Several limitations of this study should be noted. First, this is a descriptive survey research, which reports the extent of work-family conflict experienced and the coping strategies. The effectiveness of the different types of strategies used has not been addressed. Second, a significant limitation of the present investigation is the limited sample size utilized for this study. The results reported here may only be generalized to female

junior physicians meeting the selection criteria (married and aged 40 years and below) in the fourteen public hospitals in Malaysia, but any assumption of external validity beyond that is cautioned. Third, the inferences drawn from this study are limited by self-reported and cross-sectional characteristics of the data.

The experience of work-family conflict among employees suggests the need for organizations to facilitate the development of individual coping strategies through human resource development programs. Training programs could be initiated to help employees identify the effective coping strategy, and thereafter intensify the use of such strategy. The importance of family-supportive work culture which is sensitive to employees’ family needs has been emphasized by Aminah and Zoharah (2010). Facilities such as reliable dependent-care center, including childcare center, and family leave would help junior physicians at this life stage cope with the conflict more effectively, besides the individual coping strategies that they adopt. There is a need to review the ratio between physicians and patients that has a great implication on work-family conflict. The excessive work that junior physicians have to perform has been emphasized by Aminah (2010), Shaufelli *et al.* (2009) and Lingard *et al.* (2006). The working hours of physicians, the weekly frequency of on-calls and the total number of hours that physicians have to spend on on-call duties should be reassessed. Limiting on-call frequency and hours may be more likely to reduce the level of work-family conflict experienced.

Future research efforts should seek to expand this study and identify effective coping strategies for managing conflict between work and family roles. The use of qualitative research would help to further our understanding of how employees can effectively cope with work-family conflict.

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Is salinity tolerance of rice lines related to endogenous ABA level or to the cellular ability for ABA synthesis under stress?

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Abstract:As the plant hormone abscisic acid (ABA) is involved in responses to salinity stress. We tested its putative relationship with the degree of tolerance to this abiotic stress. For this purpose we examined the responses of sensitive (IR29) and tolerant (IR651) varieties of indica rice (*Oryza sativa* L.) to a range of salinity (0 (control) and 100 mM NaCl). Shoot and root dry weight was reduced and leaf Na concentration increased in response to salinity for both cultivars with a higher extent in sensitive. Tolerance of IR29 to saline stress was generally improved by ABA treatment and leaves Na content reduced to their respective control treatment. This ABA effect was evident in IR29 with low tolerance, as their ability to recover from stress increased up to seven fold. Independent of the saline treatment, the absolute endogenous leaf ABA content in sensitive variety was significantly more than tolerant one. However, upon stress, the increase in endogenous ABA synthesis was higher in tolerant than in sensitive varieties. These data together with those obtained by using Fluridone, an inhibitor of ABA synthesis, suggested first, there was differential sensitivity to ABA in the tolerant and sensitive leaves cultivars and enhanced concentrations at tolerant levels acted primarily to maintain root and shoot growth salt stress and second, the differences in the level of tolerance to saline stress is related to their different capacity of ABA synthesis under stress conditions.

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Keywords Abscisic acid; Fluridone; *Oryza sativa* L.; Salinity; Stress tolerance

1. Introduction

Salinization of arable land is increasing, and could possibly have devastating global effects. Over 6 % of the world's land and 20% of the world's irrigated land are currently affected by salinity (Rhoades et al. 1992; Munns 2005). In such soils, NaCl concentrations typically exceed 40 mM, and much higher values are frequently found (Munns 2005). Enhancing membrane permeability in salt stressed plants has been well documented (Hasegawa et al. 2000), resulting in Na⁺ accumulation and increasing Na⁺/K⁺, conversely reducing K⁺ in many plant species i.e. rice (Dionisio-Sese & Tobita, 1998) green bean (Yasar et al. 2006), winter wheat (Zheng et al. 2008), umbu plant (Da silva et al. 2008). From some previous studies, the results showed that rice growth and development are reduced when exposed to the salinity stress (Morsy et al. 2007; Cha-um et al. 2007; Dionisio-Sese and Tobita 1998; Shannon et al. 1998). However, the response of rice to salt stress depends on its salt tolerance abilities. During the last two decades, it has been well established that abscisic acid (ABA) is a vital cellular signal that mediates the expression of a number of salt and water deficit-responsive genes. The direct relation between stress tolerance and increased levels of ABA does not always exist. Thus, in barley and wheat changes in endogenous ABA levels have been reported to be unrelated to freezing tolerance or to cold hardening

(Kadlecová et al. 2000; Faltusová-Kadlecová et al. 2002). Among the comparisons between stress-tolerant and stress sensitive cultivars within the same species, some reports have shown higher ABA levels in tolerant cultivars, although the differences appeared in either unstressed, non-acclimated cultivars (Bravo et al. 1998) or following the stress (Chen et al. 2002; Moons et al. 1995; Zheng and Li 2000). In rice, ABA contents increased in a semi salt-tolerant variety but only marginal changes were measured in salt-tolerant and salt sensitive ones (Bohra et al. 1995). Exogenous ABA treatments prior to subjecting the plants or tissues to adverse conditions have been reported to improve tolerance to cold temperatures (Bornman and Jansson 1980; Duncan and Widholm 1987), osmotic stress (Nayyar and Kaushal 2002; Nayyar and Walia 2003), or to salt stress via soluble sugar accumulation in common bean (Khadri et al. 2007) and rice (Asch et al. 1995). In the current study we tested the hypothesis that responses to root-sourced salt stress, are coordinated by elevated ABA concentrations and probably there is tolerance a differential response of tolerant and sensitive cultivars to ABA applications .

2. Materials and methods

Plant material and growth conditions

Two rice cultivars different in tolerance of salt stress during the vegetative stages (Moradi et al.

2003) were selected for this investigation. IR65192-4B-10-3 (abbreviated as IR651) is breeding line tolerant of salt stress at both the seedling and reproductive stages, and IR29 is a cultivar sensitive to salt stress during both stages and is commonly used as a sensitive check in breeding nurseries.

This experiment was conducted in a growth cabinet with light intensity of about $700 \mu\text{mol m}^{-2} \text{s}^{-1}$ and 12 h duration, 70 % relative humidity and 29/22 8C day/night temperature. Pre-germinated seeds of each cultivar were sown in holes made on Styrofoam sheets with a nylon net bottom (Gregorio et al. 1997). Two seeds were sown per hole, with 50 holes per entry. The sheets were first floated on distilled water in 11 L plastic trays for 3 d, after which a nutrient solution (Yoshida et al. 1976) was used until the plants were 21 d old. A control treatment (nutrient solution) and the level of salt stress, 12 dS m^{-1} (100 mM) using NaCl was introduced thereafter. Four hours after imposing the salt treatment, half of the plants of both cultivars were exposed to spraying of Fluridone (50 μM) or ABA (20 μM). The youngest fully expanded leaf (leaves that had completed petioles), harvested at 0 (immediately before starting the salinity), 4, 12, 24, 48, 96 and 168 h after the start of the salt treatments for ABA measurements. Shoot and root dry matter, K^+ and Na^+ concentration of youngest fully expanded leaf measured at the end of this experiment.

The experiment was designed as 2×2 (Cultivars \times Salinity) factorials in Completely Randomized Design (CRD) with three replicates. The mean in each treatment was compared by Duncan's New Multiple Range Test (DMRT) at $p < 0.01$ and analyzed by SPSS software (SPSS for Windows, SPSS Inc., Chicago, Illinois, USA). The culture solution was renewed once with the pH adjusted daily to 5.5 by adding either NaOH or HCl.

Sodium and potassium measurements

Dried samples were ground to a fine powder. About 0.1 g was transferred to a test tube containing 10 ml 0.2 N acetic acid. Then test tubes heated in a water bath at 80 °C for 2 h. The extracted tissue was cooled at room temperature and left overnight and then filtered by using Whitman filter paper number 42. Sodium and potassium concentrations were determined by using an atomic absorption spectrometer (Perkins Elmer, Norwalk, CT, USA).

Leaf gas exchange measurement

Stomatal conductance (g_s) was made on fully expanded youngest leaf of each plant using an open system LCA-4ADS portable infrared gas analyzer (Analytical Development Company, Hoddesdon, England). Measurements were

performed with the following specifications/adjustment: molar flow of air per unit leaf area $403.3 \text{ mmol m}^{-2} \text{ s}^{-1}$, atmospheric pressure 99.9 kPa, water vapor pressure into chamber ranged from 600 Pa to 890 Pa, Par at leaf surface was maximum up to $1711 \mu\text{mol m}^{-2} \text{ s}^{-1}$, temperature of leaf ranged from 28.4 0C to 32.4 0C, ambient temperature ranged from 22.4 to 27.9 0C, and ambient CO₂ concentration $352 \mu\text{mol mol}^{-1}$.

Measurement of endogenous ABA levels

Endogenous ABA analyses were performed as described in Gómez-Cadenas et al. (2002), Frozen rice leaves of 1.5 g were finely ground in liquid nitrogen and 10 mL of 80% methanol was added together with 0.01 g of ascorbic acid and 0.01 g polyvinylpyrrolidone (PVP) to prevent oxidation reactions during extraction. The homogenate was stirred overnight at 4 °C. After centrifugation (4000 \times g, 15 min), the supernatant was recovered and adjusted to pH 8.0. The aqueous methanol was evaporated under reduced pressure at 35 °C. The residue was dissolved in 5 mL of water. Then it was frozen and thawed for three cycles. After centrifugation (4000 \times g, 15 min), the supernatant was recovered and adjusted to pH 2.5 and partitioned against ethyl acetate. Then the solution with the free ABA in ethyl acetate was collected. This process was repeated thrice. After that, the collection was adjusted to pH 8.0 and dried. The resulting dried precipitate was dissolved in 1 mL of 3% methanol containing 0.1 M acetic acid, and was filtered through a 0.45 mm membrane filter. The extract (100 μL) was automatically injected and processed by HPLC (Agilent 1100 Series, USA) equipped with a reverse phase column (4.6 \times 250 mm Diamonsic C18, 5 μm). It was eluted with a linear gradient of methanol (3–97%), containing 0.01% acetic acid, at a flow rate of 4 mL/min. The detection was run at 260 nm with a diode array detector. The retention time of ABA was 36.4 min and shifted 0.1 to 0.5 min. Quantification was obtained by comparing the peak areas with those of known amounts of ABA.

3. Results

Effect of stress on K & Na concentration with impaired ability for ABA synthesis

A different approach was used to study the implication of ABA in the mechanism of stress-tolerance. This experiment was performed with Fluridone treated, an inhibitor of ABA biosynthesis. Irrespective of Fluridone application no statistically significant differences were measured between tolerance and sensitive cultivars in Na concentration in control treatment of both cultivars investigated (Figure.2a&b). Salinity treatment increased 2 fold the

Na level in IR29 but became unchanged in IR651 with their respective control (Figure.2b). The Na accumulation in young leaves of both cultivars became more pronounced upon applied Fluridone in salinity treatment (Figure.2a&b) and cause to rapid raise of Na, 7.3 and 2.8 fold in sensitive and tolerant cultivars respectively, contrast to controls treatments). Fluridone had a dramatic effect on their response to stress in both cultivars.

Thus, when plants of both cultivars were sprayed with Fluridone, they showed higher sensitivity to a subsequent salinity stress than stressed plants that had not been sprayed with the inhibitor (Figure.2). Salt stress induced an approximate 30% increase in endogenous leaf ABA content of tolerant cultivar, while spraying with 50 μM Fluridone during the salinity treatment not only suppressed this increase but declined it more than 30% (Figure. 3).

In a further experiment, plants from tolerant and sensitive cultivars were treated with exogenous ABA and subjected to salinity (Figure.2). When plants were treated with ABA (20 μM), leaf tolerant cultivar did not change significantly their Na level response to the subsequent stress. By comparison, in IR29 plants application of exogenous ABA, lead to dramatically reduction the Na level and dropped the value to normal treatment (Figure.2b).

It has to be pointed out that the effect of ABA was totally counteracted with the inhibitor.

Regardless of the salinity, ABA or Fluridone treatments, a very similar changing pattern was observed for K concentration in leaves of both cultivars and no significant differences was observed (Figure.2c&d).

Effect of stress on endogenous ABA levels

Endogenous ABA levels of tolerant and sensitive of both cultivars were determined in order to check whether the different degree of tolerance to stress was correlated with hormone contents. Irrespective of salinity treatment, leaves ABA concentration in IR29 was higher than IR651. Endogenous ABA levels of leaves under non stress conditions varied in the range of 13.4 to 14.10 $\mu\text{g g}^{-1}\text{Fwt}$ in IR29. Compare to sensitive cultivar, the tolerant cultivar had a lower ABA concentration, and the values varied in the range of 6 to 9.5 $\mu\text{g g}^{-1}\text{Fwt}$ in control treatment. Leaves ABA content of stressed IR651 plants was significantly bigger than that of control plant throughout sampling time and the differences became more pronounced and achieved a maximum value by end of experiment (Figure. 3). Opposite to tolerant cultivar, leaves ABA levels in sensitive cultivar increased slightly but did not reach the level of statistical significance at the end of

experiment compare to their respective control treatment (Figure. 3).

Stomatal conductance and biomass accumulation

Stomatal conductance under no stress conditions was two fold in IR651 than IR29, and the differences keep constant throughout of experiment (Table 1). Salinity was significantly lowered the stomatal conductance, the rate of stomatal conductance of IR29 and IR651 plants was reduced by 50% (Table.1). Result regarding plant biomass showed inverse relationship with salinity. A general trend of decrease in dry weight of plant with salinity was noted in both cultivars. However, shoot and root weight reduction was largest in the susceptible variety compare to tolerant variety (Figure.1b&d). Fluridone application lead to drastically decline in root and shoot dry weight of both cultivars (Figure.1a&c). Regardless of salinity, shoot and root dry weight in IR651 was two fold than IR29.

4. Discussion

The plant hormone abscisic acid has been implicated in plant responses to abiotic factors causing water stress. In most studies, elevated ABA levels prior to stress, or as a first step in the response to adverse conditions, are involved in tolerance mechanisms. Under this rationale, it is to be expected that ABA increased in leaves of tolerant variety have a positive role in alleviating stress effects. In the present work differences in ABA contents were observed between sensitive and tolerant of the two varieties studied, and maybe we can ascribe their different response to stress to a different endogenous hormone level under control, non-stress conditions (Figure. 2) when plants were subjected to stress we could detect differences in ABA synthesis in varieties with respect to non-stressed controls (Figure.3). Tolerant variety seems to have a higher ability for ABA synthesis than sensitive. This agrees with reported results comparing sensitive/tolerant cultivars of different species (Chen et al. 2002; Lee et al. 1993; Zheng and Li 2000). Moons et al. (1995) reported that although salt-tolerant rice cultivars showed higher increases of ABA than the sensitive cultivars, there was not a direct correlation between absolute ABA content and degree of tolerance. Therefore, they pointed out the importance of both the rate of ABA increase as well as the absolute ABA levels. The fact that IR29 produce less ABA under stress, could explain their sensitivity response to stress (Figure.3).

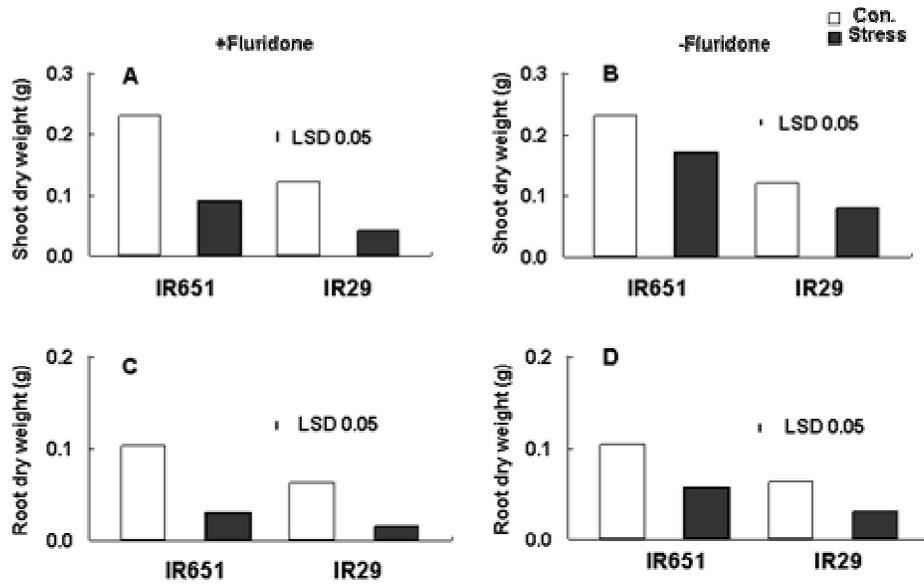


Figure 1. Shoot and root dry weight of two rice cultivars during the seedling stage under control and salt stress of 12 dsm^{-1} , with (A and C) or without (B and D) spraying Fluridone ($50 \mu\text{M}$). The data are mean values of three replications with three subsamples per replication, and vertical bars are $\text{LSD}_{0.01}$.

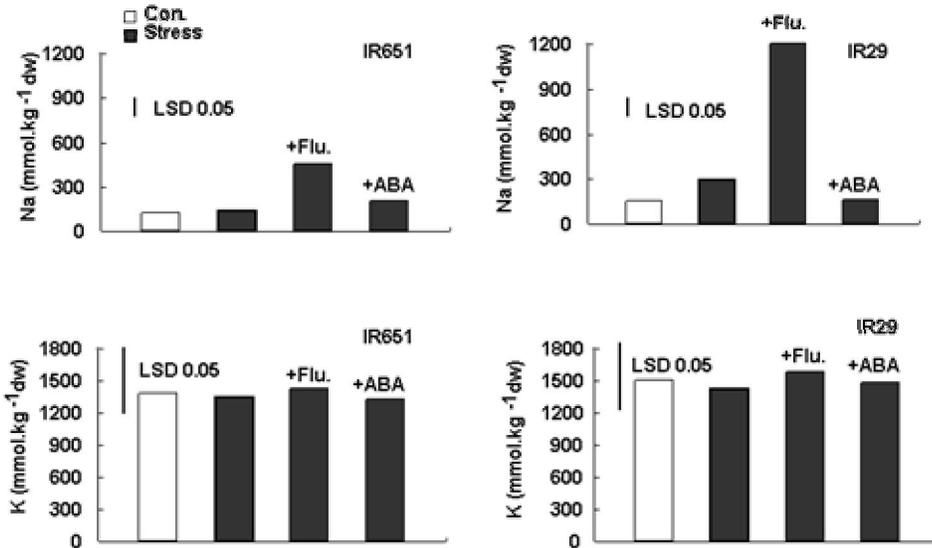


Figure 2. Na and K concentration of youngest full expanded leaf of two rice cultivars during the seedling stage under control and salt stress of 12 dsm^{-1} , with spraying Fluridone ($50 \mu\text{M}$) or ABA ($20 \mu\text{M}$). The data are mean values of three replications with three subsamples per replication, and vertical bars are $\text{LSD}_{0.01}$.

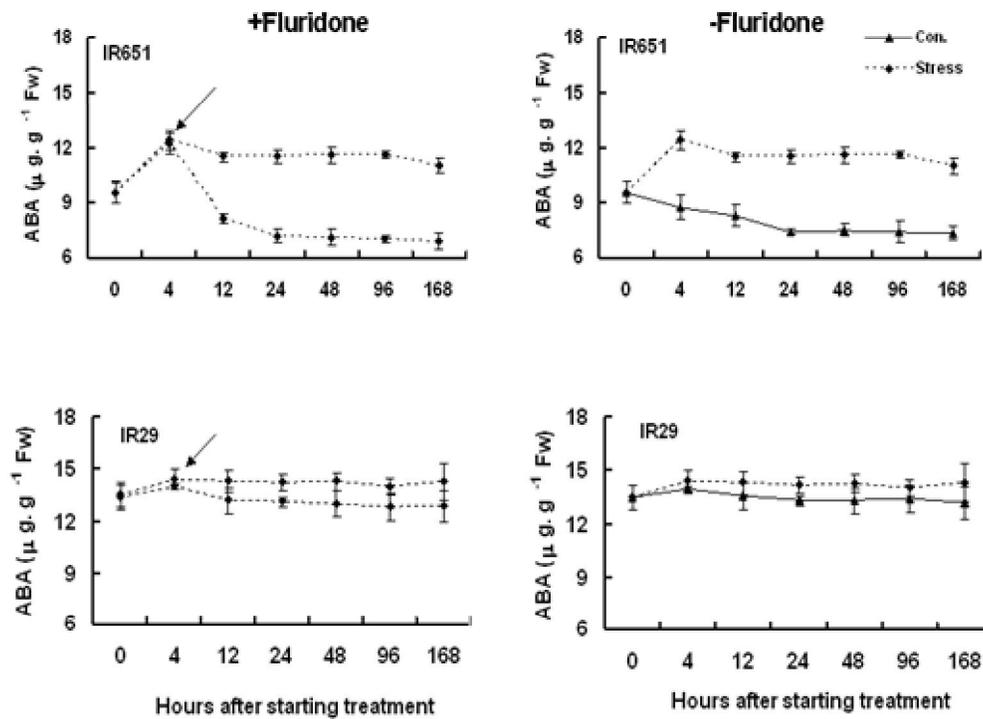


Figure 3. ABA measured on the youngest fully expanded leaf of two rice cultivars during the seedling stage under control and salt stress of 12 ds.m^{-1} . The data are mean values of three replications with three measurements per replication, and vertical bars represent \pm SE of the mean ($n=3$) where these exceed the size of the symbol. The values on the x-axis represent of hours after the start of salt stress treatment of 21-day-old seedlings. The *arrows* indicate the spraying of Fluridone.

Table1. Stomatal conductance ($\mu\text{mol m}^{-2} \text{s}^{-1}$) of rice varieties under control (0 Mm NaCl = 1.56 ds.m^{-1}) and salinity (100 Mm NaCl = 12 ds.m^{-1}) conditions.

Variety	Salinity (ds.m^{-1})	Sampling time						
		12	24	48	72	96	120	
IR29	0	0.5 \pm 0.01	0.5 \pm 0.01	0.5 \pm 0.02	0.5 \pm 0.05	0.5 \pm 0.03	0.6 \pm 0.03	
	12	0.1 \pm 0.02	0.2 \pm 0.02	0.2 \pm 0.04	0.2 \pm 0.02	0.2 \pm 0.01	0.2 \pm 0.03	
IR651	0		1.2 \pm 0.03	1.1 \pm 0.1	1.4 \pm 0.3	1.4 \pm 0.2	1.3 \pm 0.1	1.4 \pm 0.3
	12		0.3 \pm 0.03	0.8 \pm 0.04	0.7 \pm 0.1	0.7 \pm 0.1	0.8 \pm 0.1	0.7 \pm 0.04

Each value is a mean of three replicates \pm se.

Further experiments, using Fluridone, confirm the involvement of ABA synthesis in the mechanism of response to stress. Independent of the cultivar used, spraying 50 μM Fluridone, drastically

increased leaf Na concentration the tolerance and sensitive varieties when exposed to saline stress (Figure.2). However, the extent of this increment varied as a function of the tolerance level of the

varieties used. Thus, in tolerance variety the increment was of 3 fold, while in sensitive variety it reached 8 fold in their respective to control treatments (Figure.2). Thus, when plants of both cultivars were sprayed with Fluridone, they showed higher sensitivity to a subsequent saline stress than stressed plants that had not been sprayed with the inhibitor. This protective role of ABA is confirmed in the present work. While stress induced dramatically increased endogenous ABA, spraying with 50 μ M Fluridone during the salinity treatment suppressed this increase (Figure.3). We observed that an ABA treatment during saline stress nearly to 7 times reduced the leaf Na content of sensitive cultivar to recover from stress in comparison to untreated plants subjected to the same stress conditions (Figure.2). In contrast, tolerance cultivar was not affected by the hormonal treatment. In agreement with this result, Bohra et al. (1995) have also shown that exogenous ABA treatments improved tolerance to salinity in sensitive but not in tolerant rice cultivars. It is interesting to note that non-stressed barley varieties with lower ABA contents were more sensitive to freezing and responded better to exogenous ABA treatments than other varieties with higher hormone levels (Bravo et al. 1998). In fact, growth rate and leaf Na concentration of plants were significantly affected by this inhibitor (Figure.1&2), which interfere with ABA action. Similar results have been obtained by Bianco-Trinchant and Le Page-Degivry (1998) in protoplasts from different plant origin.

Our results demonstrate the importance of ABA synthesis in their tolerance to stress, tolerance variety with a higher capacity of ABA synthesis (Figure.3).

In summary, our study lead to the following conclusions: 1- The degree of stress tolerance of a given variety does not appear to be related to endogenous ABA levels under control conditions, but to the different rate of ABA synthesis under stress. 2- The fact that cells from IR651 produce more ABA when subjected to stress, could explain their better response to salinity condition. 3- The beneficial effect of exogenous ABA on the tolerance to saline stress is mainly restricted to IR29 with low tolerance (sensitive cultivar). 4- There was a different threshold irritability for ABA content, because opposite to the bigger leave ABA level in sensitive variety, more deleterious effect observed in this cultivar. 5- Regardless to present or absent of salinity treatment, IR651 shows a higher growth rate, and low accumulation of Na with a Fluridone application in contrast to IR29, suggesting that improved growth probably alleviating Na^+ toxicity by diluting, this finding consistent with Nooden (1988).

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First report on the Karyomorphology Of a threatened Snow barbel, *Schizothorax labiatus* (Teleostei: Cyprinidae), From the River Jhelum Kashmir.

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Abstract: The karyotype and chromosomal characteristics of (Chush Snow barbel) *Schizothorax labiatus* from River Jhelum Kashmir were investigated. The analysis of 80 metaphase plates revealed the chromosome number of this fish $2n=98$ and a fundamental arm number (FN) =142. The diploid complement comprised 12 metacentric pairs, 10 submetacentric pairs, 1 subtelocentric pairs and 26 telocentric pairs ($24m+20Sm+2St+52t$). Total length of the haploid complement equalled $157.5\mu m$ with a range in the length of shortest and longest chromosome between 2-8 μm . The arm ratio and the centromeric index ranged between $1-\infty$ and 0-50 respectively. No heteromorphic sex chromosomes were found. The present study is the first to describe the chromosomal characteristics of *Schizothorax labiatus* from The Kashmir Valley.

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Key Words: Karyotype, *Schizothorax labiatus*, River Jhelum, Kashmir, Chromosome.

Introduction

Fishes belonging to the subfamily Schizothoracinae are widely distributed in mountain streams and lakes around Himalayan Karakorum and Hindukush Ranges, The Tibet Plateau and Central Asia (Terashima, 1984). The genus *Schizothorax* Heckel comprises many species that inhabit the reservoirs of Central Asia from Turkmenistan and Eastern Persia in the West to the far reaches of Mekong and YangtzeKiang in the East. *Schizothorax labiatus* inhabiting cold streams and rivers is distributed in the inland waters of Kashmir (Kullander *et al.*, 1999) besides Afghanistan and Pakistan. Hill-stream fish species constitute about 3.5% of the fish fauna available in India and all of them can be easily put into the threatened category on account of the adverse effect of increasing human activity (Rishi *et al.*, 1998). This fish is edible and an important species for commercial and sport fishing and has not been cytologically investigated till date.

Cyprinid karyotypes have not been without systematic implications (Joswiak *et al.*, 1980) because comparative karyology has become a useful tool in fish systematic studies (Arai, 1982; Buth *et al.*, 1991) as chromosome number and morphology shows high promise for interpreting the evolution of fishes (Uyeno and Miller, 1973) and permits the detection of changes that modified an ancestral karyotype as it evolved into new lines (Winkler *et al.*, 2004) and are useful for addressing a variety of evolutionary,

genetic and cytotaxonomic questions about animals (Kirpichnikov, 1981; McGregor, 1993). The present study was undertaken with the aim to investigate chromosomes and karyotype of *S.labiatus* to compare it to other members of the genus and generate information that can be utilized for its management and conservation.

Materials and Methods.

Live fish were obtained (6 males & 4 females) from local fishermen in the River Jhelum and transported live to the Limnology and Fisheries Laboratory of Centre of Research for Development University of Kashmir and placed into 50 l fully aerated aquarium a for several days. For karyological preparation the protocol of Thorgaard and Disney (1990) was followed. Fish received two doses of phytohemagglutinin (PHA) injections ($4\mu g g^{-1}$ bw), in a 20-h interval at $20^{\circ}c$. Fishes were pre-treated by intraperitoneal injection of colchicine (0.05% @ 1ml/100g bw) eight hours the second dose of PHA to arrest cell division at the metaphase stage and kept alive for 2-3 hours before sacrificing. For the preparation of smears, their cephalic kidney was removed, homogenized and hypotonised simultaneously by potassium chloride 0.56% for 35 minutes at room temperature. Because of their tiny tissues, they were well mixed. Suspensions were spun at 1000 rpm for 10 minutes. Supernatant was discarded and the cells were fixed by cold fresh

Carnoy (3:1 methanol and glacial acetic acid) and refrigerated for 30 minutes. This process was repeated three times and smears were prepared on cold lamellae using splash method from 1m height and air dried for 24 h, then stained with 2% Giemsa.

Chromosomal analysis

Leica DM LS2 trinocular microscope fitted with a camera and 100x×10x oil immersion lens combination was used to scan the cells and take the photographs. Eighty well spread metaphase complements were obtained for chromosomal analysis. The chromosomes of 5 well spread metaphase complements were individually measured from photomicrographs with precision dial callipers and their centromeric indices and arm ratios were determined in order to ascribe the morphology as suggested by Levan *et al.* (1964). Using chromosomal indicators (Table II) an ideogram (Fig.2) was prepared in MS Excel 2007 software.

Results

Relatively small and high number of chromosomes was observed in *Schizothorax labiatus*. Eighty cells from the anterior kidney tissue were analysed in total. The overwhelming majority (80%) of the metaphase complements contained 98 chromosomes, though the count varied between 94-100 in a few cells (Table I). Cells not showing modal counts were probably caused by loss during preparation or by chromosomes being obscured by surrounding cell nuclei. The diploid complement (Fig.1a) comprised 12 metacentric pairs, 10 submetacentric pairs, 1 subtelocentric pairs and 26 telocentric pairs (Fig.1b). Total length of the haploid complement equalled 157.5µm with a range in the length of shortest and longest chromosome between 2-8µm (Table II). The arm ratio and the centromeric index ranged between 1-∞ and 0-50 respectively. Using chromosomal indicators, an ideogram (Fig.2) was drawn in MS Excel 2007. The chromosomal formula can be represented as: K (2n) =98= 24m+20Sm+2St+52t. Both male and female karyotypes were similar.

Discussion

Schizothorax labiatus analysed cytologically in the present study revealed a high number of chromosomes 2n=98. Species with high numbers are considered to have resulted through polyploidy from ancestral 2n= 48 or 50 (Rishi *et al.*, 1998). Large-scale genomic expansions or whole-genome duplication events have been documented in early vertebrate evolution (Friedman and Hughes, 2001; Ohno, 1970; Wang and Gu, 2000), near the base of

the phylogenetic tree of teleost fishes (Christoffels *et al.*, 2004; Meyer and Schartl, 1999; Robinson-Rechavi *et al.*, 2001; Wittbrodt *et al.*, 1998), and near the basal roots of several major teleostean clades [such as salmonids (Allendorf and Thorgaard, 1984), catostomids (Ferris, 1984; Uyeno and Smith, 1972), acipenserids (Vasil'ev, 1999) and some cyprinids (Larhammer and Risinger, 1994)]. Such genomic enlargements have been hypothesised as key factors that enable or even drive diversification in various vertebrate groups (Holland *et al.*, 1994; Meyer and Malaga-trillo, 1999; Navarro and Barton, 2003a, b; Ohno, 1970; Stephens, 1951). Chromosome counts in nearly all cyprinid polyploids occur in multiples or combinations of the most common karyotype (48-50) and tetraploids (96, 98 or 100) and hexaploids (148-150) have arisen through hybridisation (Dowling and Secor, 1997). This is well illustrated by a number of species of fish belonging to diverse orders. Buth *et al.*, (1991) noted 52 such taxa most of which belong to cyprinidae identified through karyological analysis (Dowling and Secor, 1997) and such forms are ancestral polyploids (Ohno *et al.*, 1969). Polyploidy in fishes has been associated with traits including large body size, fast growth rate, long life and ecological adaptability (Uyeno and Smith, 1972; Schultz, 1980). Since *Schizothorax* fishes are hill stream fishes, it may be that polyploidy may have resulted on account of cold temperature of their habitat. The use of thermal shocks to eggs for induction of polyploidy (Chourrout, 1988) provides support to the above assertion. The role of polyploidy in evolution and survival of fish is very important because it prevents from natural selection pressure (Oellerman and Skelton, 1990).

It is interesting that the Kashmir Valley *Schizothorax labiatus* showed diploid number similar to that recorded for other species inhabiting different geographical locations (Table III) e.g., *Schizothorax richardsonii*, 2n=98 (Sharma *et al.*, 1992; Lakara *et al.*, 1997), *Schizothoracichthys prograstus*, 2n= 98 (Rishi *et al.*, 1983), *S. kumaonensis*, 2n=98 (Rishi *et al.*, 1998; Lakara *et al.*, 1997) but different fundamental arm number which may be attributed to the intra-chromosomal changes involving pericentric and paracentric inversion, suggesting origin from the same primitive ancestor. The overall similarity in the chromosome number and morphology implies that *Schizothorax* species are very closely related in that they have not been isolated as evolving entities long enough for random chromosome changes to have taken place and become fixed, and that a particular karyotype would be selected implies an adaptive advantage for that particular configuration. This hypothesis has been suggested for chromosome

differences found in *Fundulus* (Chen, 1971) and

Rivulines (Scheel, 1972).

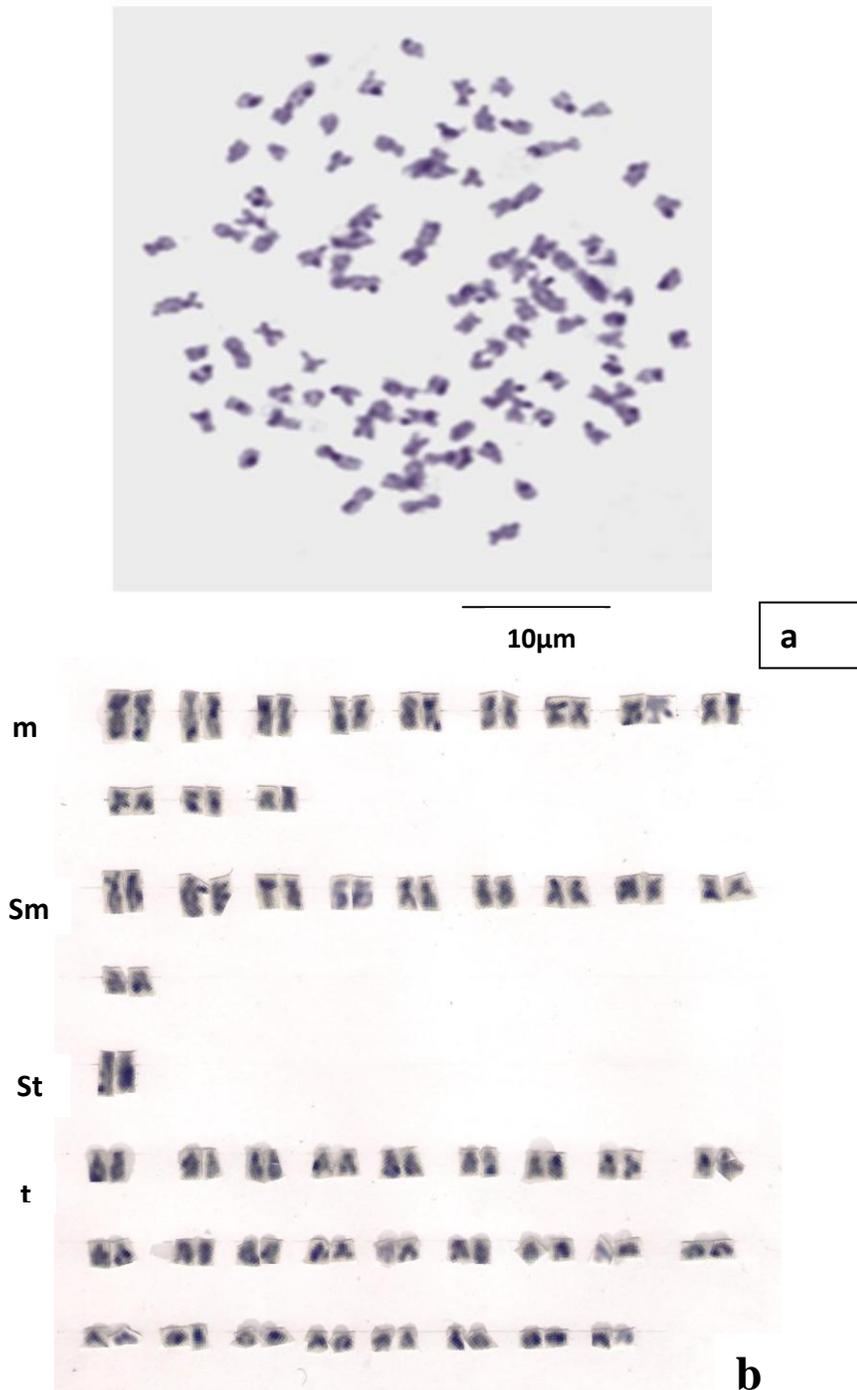


Fig.1a: Chromosome preparation of *Schizothorax labiatus*.

b: Karyotype of *S.labiatus* (m=metacentric; sm=sub- metacentric; st=sub-telocentric; t=telocentric).

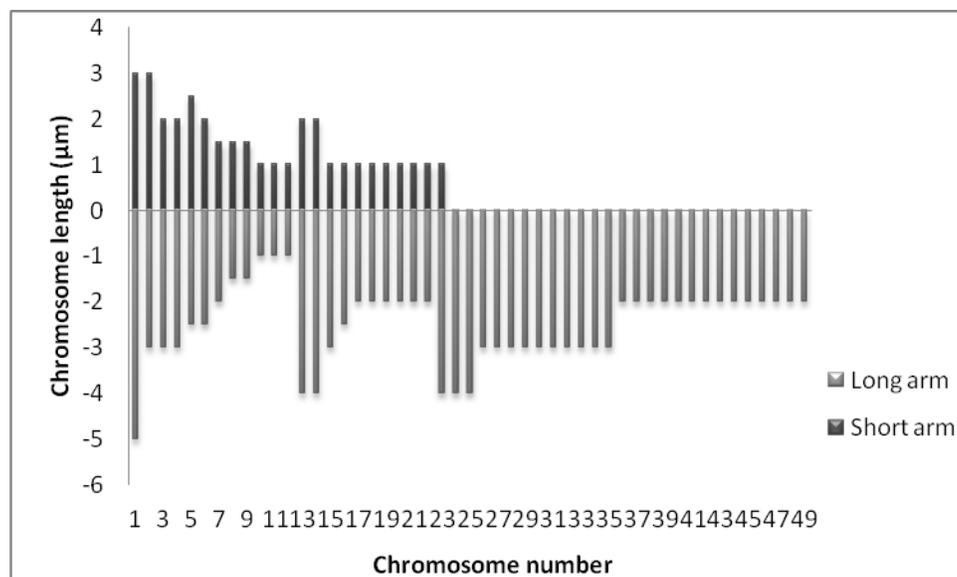


Fig. 2: Haploid ideogram of *Schizothorax labiatus*.

Table I: Showing percentage frequency of the metaphases.

Species	No. Of chromosomes	No. Of cells	Frequency % of chromosomes	Modal diploid No.
<i>Schizothorax labiatus</i>	94	8	10	98
	96	6	7.5	
	98	64	80	
	100	2	2.5	

Table II: Chromosome morphometry of *Schizothorax labiatus* (m= metacentric; Sm=sub-metacentric; St=sub-telocentric; t=telocentric)

Pair No.	Length of short arm (µm) 'S'	Length of long arm (µm) 'L'	Total length(µm) L+S	Arm ratio (L/S)	Centromeric index	Category
1	3	5	8	1.6	37.5	m
2	3	3	6	1	50	m
3	2	3	5	1.5	40	m
4	2	3	5	1.5	40	m
5	2.5	2.5	5	1	50	m
6	2	2.5	4.5	1.2	44.4	m
7	1.5	2	3.5	1.3	42.8	m
8	1.5	1.5	3	1	50	m
9	1.5	1.5	3	1	50	m
10	1	1	2	1	50	m
11	1	1	2	1	50	m
12	1	1	2	1	50	m
13	2	4	6	2	33.3	Sm
14	2	4	6	2	33.3	Sm
15	1	3	4	3	25	Sm
16	1	2.5	3.5	2.5	28.5	Sm

17	1	2	3	2	33.3	Sm
18	1	2	3	2	33.3	Sm
19	1	2	3	2	33.3	Sm
20	1	2	3	2	33.3	Sm
21	1	2	3	2	33.3	Sm
22	1	2	3	2	33.3	Sm
23	1	4	5	4	20	St
24	0	4	4	∞	0	t
25	0	4	4	∞	0	t
26	0	3	3	∞	0	t
27	0	3	3	∞	0	t
28	0	3	3	∞	0	t
29	0	3	3	∞	0	t
30	0	3	3	∞	0	t
31	0	3	3	∞	0	t
32	0	3	3	∞	0	t
33	0	3	3	∞	0	t
34	0	3	3	∞	0	t
35	0	3	3	∞	0	t
36	0	2	2	∞	0	t
37	0	2	2	∞	0	t
38	0	2	2	∞	0	t
39	0	2	2	∞	0	t
40	0	2	2	∞	0	t
41	0	2	2	∞	0	t
42	0	2	2	∞	0	t
43	0	2	2	∞	0	t
44	0	2	2	∞	0	t
45	0	2	2	∞	0	t
46	0	2	2	∞	0	t
47	0	2	2	∞	0	t
48	0	2	2	∞	0	t
49	0	2	2	∞	0	t

Table III: Showing different *Schizothorax* species worked out so far.

S.No.	Name of the species	2n	Chromosome morphology				NF value	Author and Year
			m	Sm	St	t		
1	<i>Schizothorax kumaonensis</i>	98	24	6	68		128	Rishi <i>et al.</i> , 1998
2	<i>Schizothorax kumaonensis</i>	98	18		70	10	126	Lakara <i>et al.</i> , 1997
3	<i>Schizothorax progastus</i>	98	16	20	12	50	134	Rishi <i>et al.</i> , 1983
4	<i>Schizothorax richardsoni</i>	98	16		42	40	154	Lakara <i>et al.</i> , 1997
5	<i>Schizothorax labiatus</i>	98	24	20	2	52	142	Present work

The latter study followed the suggestion of Stebbins (1958) in that co-adapted gene sequences in plants have become closer linked via chromosome structural rearrangements and thus is less likely to be disrupted by normal exchange events. Similar arguments for chromosome changes paralleling species evolution in frogs and mammals can be found

in Wilson *et al.*, (1974) and for other animals in White (1978). No heteromorphic sex chromosomes were found.

Cells lacking normal value (2n=94-100) were also encountered in the preparations and these probably resulted from losses during the preparation

or addition from the neighbouring cells or hypotonic overtreatment (Nanda *et al.*, 1995).

The present study is the first to describe the chromosomal characteristics of *Schizothorax labiatus* from The Kashmir Valley. The results of the study can be used for the genetic manipulation and management and conservation of the species.

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Building Social Capital for Poverty Reduction in Rural Areas of Marvdasht, Iran

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Abstract: Does social capital generate positive influences on poverty reduction? This question has important theoretical and policy implications for the contemporary world, especially for the developing countries. This study assesses social capital in poverty reduction in rural areas of Marvdasht, Iran. Data were collected using survey questionnaire. Results indicate that although there is strong communication and social cohesion for poverty reduction, but communities still face challenges and constraints which hinder their contributions in poverty reduction.

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1. Introduction

Social capital" is a concept that tries to capture the essence of community life. The concept is based on the idea that communities work well or poorly based on the ways in which people interact. It emphasizes the social dimension of life and how it is lived in specific places (Mignone, 2003). The concept of social capital is generally associated with social participation and with networks of co-operation and solidarity (Aref, Ma'rof, & Sarjit, 2010). But other, more abstract, concepts are also associated with social capital, such as social cohesion, trust, reciprocity, and institutional effectiveness. Regardless of the context, this concept has been used productively in many areas of research. Woolcock (2001) had counted at least seven fields that had employed the concept of social capital: families and youth, schools and education, community life, work and organizations, democracy and governance, problems related to collective action, and economic development. Today, physical and mental health, immigration, and public protection could be added to that list (Franke, 2005). Hence, this paper attempted to outline the concept and level, of social capital and its limitation towards poverty reduction.

2. Literature Review

Poverty being a rural phenomenon where the majority of the people live in most

developing countries, the mechanisms to be used should target the recipients (Aref A, 2011). Poverty has been defined as the "denial of opportunities and choices most basic to human development to lead a long, healthy, creative life and to enjoy a decent standard of living, freedom, dignity, self-esteem and respect from others" (Hirschowitz et al.,2000, p. 54). Poverty can be reduced through building social capital. However, there is scant literature on social capital for poverty reduction. Empirical works on social capital, most of which are based on the experiences of Western societies, indicate that communities endowed with a diverse of social capital will achieve superior outcomes in multiple spheres such as, tourism development and community development while, communities with a low level of social capital tend to have a poor performance in these spheres. Overall, poverty can be reducing by investing in social capital. This research is guided mainly by the theoretical framework of social capital theory, and also, by empirical studies from previous work. This research contributes to providing a basis for measuring the social capital influences community's participation in poverty reduction.

To date many researchers agree that the forces of social capital influence important political and economic phenomena (Aref, 2011; Aref, 2010; Putnam, 1993; Putnam, 2000; Strzelecka & Wicks, 2010). Perceiving social

capital holistically as a resource for individuals, communities and regions, exposes complex community processes. This is because networks of relationships often have the potential to accelerate democratizing processes and local democratic cultures within their members (Strzelecka & Wicks, 2010).

How communities can offer a viable solution for poverty reduction. The researcher's answer to this question is building social capital. This answer is supported by the literature and research evidence from some filed such as families and youth, education, community life, work and organizations, democracy and governance, problems related to collective action, economic development, physical and mental health, immigration, and public protection (Aref, 2009; Franke, 2005).

2.1. Domains of Social Capital

Some experts have identified the dimensions of social capital. The common dimension of it usually is seen from the point of view of sources, scope of activity and degree of implementation. Dimension from sources of social capital including (1) civic social capital and (2) governmental (institutional social capital). From scope or area of activity, social capital can be divided into (1) bonding social capital, (2) bridging social capital and (3) linking social capital. While using the degree of implementation in society, it encompasses (1) structural social capital and (2) cognitive social capital. Social capital can be divided into levels: individual level and group level. At the level of individual social capital, we can explore interpersonal relationships, that is, ties between individuals, or social participation, the ties between individuals and groups or organizations. At the level of collective social capital, we can explore the associative dynamic by focusing on the intra organizational ties as well as ties that exist among groups and organizations, within a community and beyond a community (Franke, 2005). Based on previous study the below domains of have been chosen and measured for this case study.

Networks

Understanding the groups and networks that enable people to access resources and collaborate to achieve shared goals is an important part of the concept of social capital. Informal networks are manifested in spontaneous, informal, and unregulated

exchanges of information and resources within communities, as well as efforts at cooperation, coordination, and mutual assistance that help maximize the utilization of available resources. Informal networks can be connected through horizontal and vertical relationships and are shaped by a variety of environmental factors, including the market, kinship, and friendship (Dudwick, Kuehnast, Jones, & Woolcock, 2006).

Trust:

This dimension of social capital refers to the extent to which rural people feel they can rely on relatives, neighbors, colleagues, acquaintances, key service providers, and even strangers, either to assist them or do them no harm. Adequately defining "trust" in a given social context is a prerequisite for understanding the complexities of human relationships. Sometimes trust is a choice; in other cases, it reflects a necessary dependency based on established contacts or familiar networks for solve the community problems (Dudwick et al., 2006).

Cooperation

Cooperation is closely related to the dimension of trust and solidarity, however, the former dimension explores in greater depth whether and how people work with others in their community on joint projects and/or in response to a problem or crisis. It also considers the consequences of violating community expectations regarding participation norms (Dudwick et al., 2006).

Communication

Increasing access to information is increasingly recognized as a central mechanism for helping poor communities strengthen their voice in matters that affect their well-being and increase the quality of life (Dudwick et al., 2006).

Social Cohesion

Social cohesion are closely related to the previous four dimensions of social capital, but focus more specifically on the tenacity of social bonds and their dual potential to include or exclude members of community. Cohesion can be demonstrated through community events or through activities that increase solidarity, strengthen social cohesion, improve communication, for coordinated activities,

promote civic-mindedness and altruistic behavior, and develop a sense of collective consciousness (Dudwick et al., 2006).

Empowerment

Individuals are empowered to the extent that they have a measure of control over the institutions and processes that directly affect their well-being (World Bank 2002a). The social capital dimension of empowerment explores the sense of satisfaction, personal efficacy, and capacity of network and group members to influence both local events and broader political outcomes. Empowerment can occur within a small association or at broader local, regional, or national levels. Each level has its own importance and should be considered separately, as well as in conjunction with the others (Dudwick et al., 2006).

3. Research Methods

This study was carried out in rural areas of Marvdasht, during the period March and April 2010. Marvdasht is one of the northern cities and also counties of Fars province. The city is located 45 kilometers north of Shiraz and has an altitude of 1620 meters above the sea level. The county has an area of 3687 square kilometers. Marvdasht as a county is divided into four districts: Central, Kamfirouz, Doroudzan and Seydan. Marvdasht has a cold weather in the hilly areas and moderate climate in other regions (Wikipedia, 2011). Agriculture is the major development sector in Marvdasht (Allahdadi, 2011). This study is based on quantitative method to investigate the level of social capital in poverty reduction. The study used survey design, where a questionnaire was used to collect the data. The questionnaire was structured around a Likert scale. The respondents answered each statement based on five scales. The value of each response for these items on the questionnaire is as follows: 0 = Never, 1 = Seldom, 2 = Sometimes, 3 = Often and 4 = Always.. The respondents were 250 rural residences, where each citizen was chosen based on cluster sampling. The population of this research was rural men, above 22 years of age, who live in Marvdasht. The respondents were asked to answer these questions which were constructed to gauge their level of social capital for poverty reduction. The questionnaire was piloted tested to have its contents validated. Statements for level of social capital were tested for their validity using Cronbach's alpha. Descriptive analysis was employed to determine

the level of social capital for poverty reduction in rural areas of Marvdasht, Iran

4. Results

This study to determine the level of social capital in poverty reduction in rural areas used descriptive statistics. Table 1 reveals the mean score of six domains of the social capital including: cooperation, network, trust, communication, social cohesion and empowerment). Table 1 reveals the findings of the analysis, which show the differences between dimensions of social capital in poverty reduction (max=4, min =0). Using the mean of the total score as a standard indicator, it was found that generally social capital domains in communication and social cohesion was high whereas the level of cooperation, network, trust, and empowerment were low.

Table 1: Total scores of social capital in poverty reduction

Domains	Mean
Cooperation	1.09
Network	0.90
Trust	1.01
Communication	3.01
Social Cohesion	2.89
Empowerment	0.70

Table 1 showed the differences in the domains of social capital for poverty reduction. Using the mean it was found that the level communication and social cohesion for poverty reduction is higher than cooperation, network, trust and empowerment (3.01, and 2.98 respectively). Levels of social capital in cooperation, network, trust and empowerment, have low scores as compared to communication and social cohesion. It shows rural residence cannot cooperate with the local government and have not been empowered to influence policies and expand their opportunities in poverty reduction. Generally, the findings reveal that the level of social capital in rural areas of Marvdasht for poverty reduction is low. This means that most people are not involved in the decision-making process for poverty reduction. For rural residence to be effective in poverty reduction they should come together and interact with government organizations. Local residence should be more involved in community actions and influence decision-making processes that

affect their lives, and their communities. They need to interact with the cooperatives and foster active relationship with local organizations.

5. Conclusion

This study promises to make a significant contribution to the study of social capital in poverty reduction in rural areas of Marvdasht, Iran. The findings of this study showed that the level of social capital for poverty reduction in low, except for domains of communication and social cohesion. The findings from this study are especially valuable for establishing some conceptual and empirical baselines for subsequent studies of social capital in poverty reduction and rural development in Iran. This finding will assist social workers in understanding the barriers of building social capital in poverty reduction in Iran. Since social capital has impacts upon the way how rural development policies are implemented in each community, the central government could design relevant policies to cultivate the social capital that has positive effects on poverty policies.

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Investigation on relation between organizational structure and entrepreneurship in physical education of Eastern Azerbaijan's Islamic Azad University

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Abstract: This study aims to investigate the relation between organizational structure and entrepreneurship which is of discretionary – correlational type, done by the field method among all the physical education (PE) teachers and employees of Eastern Azerbaijan's Islamic Azad Universities (n=63). Two questionnaires about organizational structure and entrepreneurship, whose reliability was achieved by the experts, and Pearson and T correlational coefficients, were used to test and analyze the data. The results showed no relation between organizational entrepreneurship and complexity but showed a negative and significant relation among entrepreneurship and formality and concentration. Eventually, no difference was observed between organizational entrepreneurship of the (male or female) teachers and employees.

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1- Introduction

Organizations have different structures that affect on their employees' attitudes and behaviors. Organization is the process of creating organizational structure and organizational structure is a frame, referring to complexity, concentration and formality. Using organizational structure divides, classifies and conform the affairs, formally (James, 1998). Organizational structure determines communication, decision making and reporting ways and authorities' hierarchy and its recognition, reflects the whole organizational image. Considering the items that the structure determines, a good structure proportionate to the goals and needs of PE department seems necessary. Since, all decisions on planning, organizing, conforming and control get done on the structure; it should be strong enough to put into practice all those decisions.

Management art refers to provoking motivation and creating a proper environment for the employees to show their talents and capabilities (Sashkin, 1997). Nowadays, the world observes social and economical blooming and improvement in order to pave the way for improving human welfare, job conditions and lifestyle in their life and organizations (Zhou and Etzowicz, 2002).

Entrepreneurship is an important factor in improving the social and economical growth of the world, creating new job opportunities with creative and

innovative specifications. PE as a broad domain has many job potentials in itself (Green, 2007).

In today world, innovation and entrepreneurship in sportive organizations are inevitable. As the birth and death of sportive organizations depends on perspectives, intuitions and abilities of their officials, their existence and consistency is also dependent on their human sources, abilities, innovation and creativity. Entrepreneurship is a process which the organization undergoes to enable the employees to play their roles as entrepreneurs and do all their personal and collective entrepreneurial duties, fast and easily (Crawell and Perhman, 2002).

Organizational knowledge and management have undergone fundamental changes during the last century. Since early 1990s, organizations have resorted to innovation to accelerate those changes and survive. So, the best way is encouraging the innovative people to turn into entrepreneurs (Nayagar and Vuuren, 2005).

Today organizations' traits are consistency, complexity and tradition breaking and they always get affected by their environment and accept changeability as a necessity.

Understanding the changes as the inevitable parts of third millennium's organizations, has increased compatibility and adaptability of them in economical – social areas (Neil et al., 2001).

One of the most important domains to be studied is entrepreneurship because entrepreneurs can provide the conditions to improve production, services and human sources, for their own specific traits. Since the previous methods are not responding to the organization needs, the organization should resort to new methods, including organizational entrepreneurship in which human resources feel themselves commitment to granting organizational goals (Thompson, 1999). One of the cases causing the entrepreneurship to improve the organization is the environment in which human sources participate committed to reach organizational goals. Here, organizational structure plays the most important role and is considered as the skeleton of the collection (Wim, 2003).

So, this subject and the way organizational structure dimensions affect on a proper environment for improving entrepreneurship should be investigated. Organizations are the fundamental parts of every society; So, proper managements should be selected for achieving every organization's aims, because it is the major factor of the organizations' progress and regression (Robbins, 1991). PE organizations have important roles in developing sportive activities, training human resources and reinforcing healthy spirit among people of the society. Managing sports and their organizations is of great importance because it can create necessary backgrounds for the growth of the country's sports. To sum up, it can be said that using suggested systems in every organization can improve its employees' participation in organizational decisions and organizational and personal performance, as well (Burton, 1998).

In a study on investigating the relation between organizational structure and entrepreneurship, Rezazadeh (2004) showed a reverse relation among complexity, formality and concentration in organizational decision making and entrepreneurship (Omid, 2008). Investigating the relation between structure, culture and technology with knowledge management strategies in work and social affair ministry, Asgari (2006) concluded the following results: In structure part, decreasing formality, concentration and accelerating communications has a relation with creating and transmitting knowledge. In other cases, the organization should have ICI substructures and the employees should get technological training (Nelson and Campbell quick, 2008).

- Omid (2008) investigated the relation between organizational structure and staff management innovation of PE department and concluded the following results:

- There is a significant relation between organizational structure and staff management innovation in PE department.
- There is no significant relation between complexity and innovation of PE departments' staff managers.
- There is a significant and negative relation among formality, concentration, and education level and staff managers' innovation in PE departments. There is also no significant relation between staff managers' job records and innovation (Nelson and Campbell quick, 2008).

In a research on the relation between cooperative management and entrepreneurship among PE faculty employees of Tehran University, Rasekh (2009) concluded a significant relation between the variables.

In a study on the relation between organizational structure and PE managers' entrepreneurship, KhalifehSoltani (2009) concluded the following results:

- There is a significant and negative relation between the structure and organizational entrepreneurship of PE organizations' managers.
- There is a significant and negative relation between complexity and entrepreneurship of the PE departments' managers.
- There is a significant and negative relation between formality and organizational entrepreneurship of PE departments' managers.
- There is a significant and negative relation between concentration and entrepreneurship in PE departments.
- There is a significant relation among age, job records and organizational entrepreneurship of PE managers (Green et al., 2008).

Abdolmaleki et al (2010) investigated the relation between entrepreneurship skills and organizational entrepreneurship and observed a significant relation between them.

Entrepreneurship' amount changed with differing gender, age, education level and job records (Nayagar and Vuuren, 2005). Khanifar et al (2010) investigated the relation between organizational structure and organizational and economical entrepreneurship in small and average companies and concluded a significant relation between them (Daft, 2006).

Investigating the organizational structure of PE organizations, Saboonchi et al., (2010) understood that PE organizational structures tend to mechanical structures. Age and organizational positions were the best predictors of organizational structures. Sex, field, age and organizational positions caused meaningful differences in organizational structures.

In a study, Bonez, Rockert and Walker (2003) showed a negative significant relation between

formal control amount and organizational employees, creativity. According to that study, lower degrees of formal control is necessary for an efficient management and improper formal control can decrease team creativity.

In a research on developing organizational performance by using effective parts and traits of organizational structure, Hunters (2002) concluded that:

- Less complicated organizational units whose managers' use cooperative management system increase organizational entrepreneurship.
- Less organizational hierarchy and more horizontal and vertical communications among the employees provides more space for creating entrepreneurship.
- Boner, Rockert and Walker (2003) showed a significant negative relation between formal control amount and organizational staff s creativity. Lower degrees of formal control are necessary for efficient managementand improper formal control or over control can reduce team creativity (Hunter, 2002). Boozbora (2007) in a part of his work has recognized non-concentrated structure' s role in creating an environment which encourages its employees to produce knowledge as useful.

This study's author follows these goals in her investigation:

1. Measuring the relation between organizational structure (complexity, formality, and concentration) and entrepreneurship in PE departments of Eastern Azerbaijan.
2. Investigating the relation between demographic qualities (age, sex, degree, and job records) and organizational entrepreneurship in PE education.

2- Methodology

This study is of descriptive – correlational type done by the field method.

The statistical society was the PE employees and teachers of Eastern Azerbaijan' s universities, including 69 people. 59 questionnaires were distributed among the testees . After losing 6 questionnaires, 63 questionnaires were returned. So, sample size equaled statistical society (n=63).

3-Information gathering methods

Stephan. P.Rpbins' standard organizational structure questionnaires were used to determine the structures of PE organizations of Eastern Azerbaijan. These questionnaires included 24 questions and 3 sub-scales that the questions 1-7 are about complexity, 8-14 about complexity and 15-24 about sub – scale. Organizational entrepreneurship questionnaires of Rahimi (2007) included 11 questions. Both questionnaires were scored in a 5-point Likert spectrum and the answers consisted of very little, a

little, average, much and very much. (1=very little, 5 = very much)

It must be mentioned that the scores of the question 18 to 24 were reverse in a way that very little item, and very much item got the scores 5 and 1, respectively.

The reliability of Robins' questionnaire was confirmed in MS thesis of Khalifeh. Soltani in 2008 and its consistency for the subscales of complexity, formality, and concentration were 0.88,0.85 , 0.79, = 0.86 . Organizational α respectively by Kronbakh entrepreneurshipquestionnaire' s reliability was also confirmed by Rahimi in 2005, and its consistency by . $\alpha = 0.82$ Kronbakh

The author got the confirmation of 5 PE professors on the reliability of both questionnairesand calculated their consistency over 30 PE employees and teachers of Eastern Azerbaijan' s Azad universities by coefficient for organizational structure α Kronbakh and entrepreneurship;The results were 0.81 and 0.84, respectively .

Personal information questionnaire (about age, sex, education and job records) was used to gather employees and teachers' demographic qualities.

Statistical methods

To describe the study variables, descriptive statistics including mean, percentage, variance and standard deviation were used.

4- Results

According to being linear, normality variance, homogeneity and score independence that was calculated by KolmogrofSmirnoftests , deductive statistics like Pearson correlation coefficient, Spearman correlation coefficient , Umanwhitney and Kroskal and Elis were used to test research' s statistical hypotheses and following conclusions were resulted:

1. There is no significant relation between organizational entrepreneurship and complexity of organizational structure.
2. There is a negative and significant relation between organizational entrepreneurship and formality of organizational structure.
3. There is a negative and significant relation between organizational entrepreneurship and concentration of organizational structure.
4. There is no relation between organizational entrepreneurship and job records.
5. There is no relation between organizational entrepreneurship and age.
6. There is no relation betweenorganizational entrepreneurshipand sex.

7. There is no relation between organizational entrepreneurship and education level. The results showed no relation between organizational entrepreneurship and complexity; But, there is a significant relation among organizational

entrepreneurship, formality and concentration. At the end, no difference was observed between organizational entrepreneurship of man or woman staff.

Table (1): Correlation coefficient between organizational structure's sub- scales and entrepreneurship in the statistical society.

Significant level	Pearson coefficient	Number	Criteria	Row	
0.099	0.157	63	Entrepreneurship	Complexity	1
0.035	-0.711			Formality	2
0.006	-0.253**				Concentration

** Correlation is significant at $\alpha = 0.05$ (bilateral)

Table (2) :Correlation coefficient among age , job records and entrepreneurship in statistical society .

Significant level	Spearman coefficient	Criteria	Row	
0.091	0.115	Entrepreneurship	Age	1
0.202	0.121*		Job records	2

Table (3): Investigating the differences in entrepreneurship according to sex and education level in the statistical society.

Significant level	coefficient	Test	criteria	row	
0.924	U=752.500	Man whitney U	Entrepreneurship	Sex	1
0.066	482.46	Kroskalvalis			

5- Conclusion

Nowadays, innovation and entrepreneurship exertions are inevitable in sportive organizations and their growth is also dependent on innovations and abilities of their human sources.

Organizations are the foundations of present society and they need creativity and innovation proportionate to their structures. So, good management and entrepreneurship are the important factors in the growth or regression of the organizations and their economical or social improvement. During entrepreneurship, new job opportunities are created which their specifications are innovations in production or services. PE, as a broad domain, has many potential job opportunities.

No significant relation was observed by investigating the relation between entrepreneurship and complexity, using organizational structure ' sub- scales on PE staff of Eastern Azerbaijan's Azad Universities , which this is consistent with Omidi (2001)'s results but not Rezazadeh (2004) and KhalifehSoltani (2009) 's conclusions. It shows that organizational departments with less complexity whose managers use cooperative management have increased their organizational entrepreneurship .So, less organizational complexity is suggested to increase

cooperation of human sources in entrepreneurial activities of PE departments and organizations. The perceived result from testing the second question shows a significant and

negative relation between formality and entrepreneurship which is consistent with the studies of Omidi (2009) ,Khalifeh . Soltani (2009) , Bones , Rockert and Walter (2003) . There is a significant negative relation between formal control amount and PE staff's creativity and entrepreneurship in Azad Universities which this suggests less formal control for efficient management. Improper formal control or over control can decrease team creativity, self-confidence and cooperation in organizations, especially in PE organizations which need more cooperation and team work.

Increasing formality causes extra and time – consuming bureaucracies which decrease organizational utility. Decreasing formality in PE departments will be to the benefit of the organizations and managers and enables the staff to show creativity and their talents and reach organizational goals.

Testing the third question shows a significant negative relation between concentration and entrepreneurship which is consistent with Khalifeh

Soltani (2009), Linders, Anglen and Kratzer (2003)'s studies. In organizational positions with lower concentration levels, people communicate more ideas and information and represent creative attitudes. Moreover, facilitating information communication among people produces more meaningful information which is efficient in active environments. Instead, higher concentration levels lead to disruptive attitudes and prevent from creating new ideas and entrepreneurship.

To confirm these points, Boozbora (2007), in a part of his study declared that non-concentrated structure creates an environment that enables the staff to participate in spontaneous production of knowledge and entrepreneurship grounds.

Concentration in organizational decision – making increases hierarchy, vertical communication, severe control, supervision and inflexible rules that lead to a decrease in human resources cooperation especially in PE departments.

Less concentration on decision – making increases staff's discretion and cooperation in entrepreneurial activities.

No significant relation was observed between demographic qualities (age, sex, education and job records) and organizational entrepreneurship. This is consistent with Omidi (2007) and Khalifeh Soltani's studies (in the field of education level).

The results of this study and previous researches show that proper structure, complexity, formality and concentration provide the necessary grounds for PE staff's more cooperation and talent growth and improving entrepreneurship.

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Ceramic Tile Border Defect Detection Algorithms in Automated Visual Inspection System

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Abstract: Automated Visual Inspection Systems (AVIS) are becoming increasingly popular due to low cost maintenance and high accuracy. Ceramic tile factories, for example, are very much interested in these sorts of systems. This paper introduces a different strategy in ceramic tile inspection system to reveal four major problems, namely, edge curvature, thickness, size measuring and edge crack defects. It is believed that this method will cover edge curvature defects and thickness measuring of ceramic tiles in AVIS with recommending an individual algorithm for each defect based on line feature extraction techniques. In addition, it is assumed that our model makes size measuring and edge defects detection easier and more accurate rather than previous approaches. This proposed model will allow ceramic tile companies to perform quality control inspection without costly measuring tools or error-prone inspection by humans. Moreover, factories have to install and apply Flatness Control Machine (FCM) to measure the flatness curvature of ceramic tiles. This machine keeps the ceramic tiles in fixed position to investigate the upper surface only. But our strategy is independent of a specific position through inspection in various angles from top and side views. We hope that our model, which is prominent in low cost implementation, will enable companies to apply this method in different situations in their manufacturing production line systems. Hence, it will assist them to produce not only more accurate reports on defects but also permit improved manufacturing of quality products.

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Keywords: Edge curvature; thickness measuring; edge defect; visual inspection; machine vision; ceramic tile

1. Introduction

Automated visual inspection in ceramic tile manufacturing and production systems have been pursued and studied during the last two decades. For example, automated system for surface inspection of tiles by Costas & Ferancesco; colour grading of textured ceramic using colour histogram by Contantinos & Josef Kittler; dynamic photometric stereo of tiles by Farooq & Smith; and automated defect detection and classification of tiles by Rahman & Mobarak (Atiqur Rahaman & Mobarak Hossain, 2009; C Boukouvalas et al., 1998; C. Boukouvalas, Kittler, Marik, & Petrou, 1999; Farooq, Smith, Smith, & Midha, 2005). Elbehiery *et al.* also stated that all parts of a producing line except those of quality control are automated (Elbehiery, Hefnawy, & Elewa, 2005).

The quality control stage which is monitored by human resources (i.e. sorting) is located in the final step. Therefore, the automated system is vital to collect the feedback of their products. With the result obtained from the quality control part, companies can understand which producing part works correctly and

which previous part does not work expectedly. Finding accurate inspection in tile manufacturing within acceptable time and cost is of significant concern to businesses, and developers and researches that have to design such systems (Yamaguchi, Nakamura, & Hashimoto, 2008).

Common defects can be divided in four groups; they are those that are related to dimension of products, surface faults, incorrect assembling and operational defects (Malamas, Petrakis, Zervakis, Petit, & Legat, 2003). The main concerns in this paper are about surface defect detection and dimensional techniques in ceramic tiles. This detection can be checked in three stages; steps prior to kilning, colouring and packing. Defected tiles that are being recognized before kilning and colouring will be rejected or will be preceded to the production chain but the continuous production cycle can be marked as a low level sorting function. Pinholes, cracks, scratches, blobs, edge defects, texture faults, spots and glaze are most common surface defects in ceramic tiles (Atiqur Rahaman & Mobarak Hossain, 2009). However, in dimension inspection, part of the

goal is finding size defect, parallel edge defect, edge curvature deviation and thickness faults.

Fundamental requirement of Automated Vision Inspection Systems in Ceramic tile (AVISC) which is shown in Fig 1 consists of illumination part, camera vision, and classification part. The camera on top of the conveyer captures the image of the tiles: while the controlling and classifying part is done by a sorting machine.

The important function in AVISC which directly influences decision making is image acquisition. Light resources, camera position, resolution of acquired image and environment properties are considered in this part (Smith & Stamp, 2000). Light resources would be fluorescent, halogen or LEDs (Z. Hocenski, Dizdar, & Hocenski, 2008; Ž. Hocenski, Sobol, & Mijakovi 2010; Mathiassen, Misimi, & Skavhaug, 2007) while recent researches have shown that compared to fluorescent and halogen lamps, noise of image captured by LED's lights is reduced to give better images (Ž. Hocenski, et al., 2010). Capturing the images with minimum noise and correct position is the aim of this part.

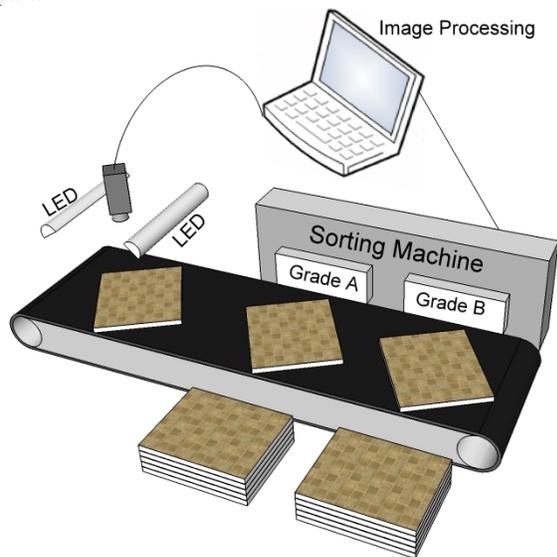


Fig 1. Automated Vision Inspection Systems in Ceramic tile (AVISC)

As shown in Fig1, captured images are sent to the computer for processing. Before analysing captured images, certain techniques such as noise removal, image subtraction, histogram equalization and morphological operands will be applied to reduce noise of images. Each of these techniques is applied to enhance a special problem in image analysis to detect defects more accurately. For example, *opening* and *closing* of morphological operands are equivalent or similar to reducing *salt* and *pepper* noises in black and white images while *mean* filter in convolution

category applies on colour picture to reduce salt noises.

In the production/processing stage, some methods such as edge detection, binarization, line detection and edge linking are applied to focus on obvious properties of images. Edge detection shows the borders of images and with invariant features, image understanding will be more accurate.

The final stage is post processing. Artificial Intelligent (AI) approaches are applied to simulate manner of system. Neural network, fuzzy logic, and genetic algorithm are common methods that are used in this stage. Decision which is taken is sent to the Sorting machine, where it will sort the ceramic tiles.

He Junji in 2010 introduced a length measuring method of firebricks based on machine vision technology. It is said that edge defect problems such as flatness and thickness defects are relayed by CCD sensors that need a fixed position for detection (He, Shi, Xiao, Cheng, & Zhu, 2010). We go beyond this type of approach by proposing a smarter AVISC strategy and method for ceramic tiles that detects edge defect tiles without the tile to be in a fixed position and with much low cost implementation tools and computer software.

This paper is organized as follows: in section 2, previous related works in ceramic tiles are described. In section 3, our proposed strategy that is related to edge defects detection for ceramic tiles is presented. In section 4, expected results, advantages and disadvantages of this method are mentioned. Concluding remarks are shown in section 5.

2. Related Works

The common approaches in image processing are discussed in this section. The combination of basic image processing techniques leads to creating new algorithms. Some defects are more sensitive than others. Therefore developing new approaches is challenging. We present and discuss smarter methods in two types of defects that are related.

A. Surface defects

As mentioned before, many forms of surface weaknesses exist in ceramic tiles. Some of the methods that are defined for these defects are suitable for specified faults and others are suggested for all defects (Atiqur Rahaman & Mobarak Hossain, 2009). Real time processing and correct classification percentage are proposed for AVISC criterions.

Recently, due to desirable properties of noise reduction, morphological techniques have become popular. Based on morphological operands some image processing algorithms are presented by Elbehery *et al.* (Elbehery, et al., 2005). The

practical issues that are described in this paper are based on combination of morphological operands and edge detection methods which are specified for only one defect (i.e. crack, spot or pinhole). On the other hand, they introduce an individual algorithm for most of ceramic tile defects but this method's efficiency is less than of individual algorithm.

Another approach is counting number of white pixel after segmentation part (Atiqur Rahaman & obarak Hossain, 2009). If defected tile is detected, morphological operand will be applied when the number of the defected pixel is more than the reference image.

In another work, compound of *morphological* and *Gaussian* detector is attained to take sharp point - focus on the essential features that are pertinent and ignore unnecessary features - of edges of an image in decay of stone surface point (Kapsalas, Maravelaki-Kalaitzaki, Zervakis, Delegou, & Moropoulou, 2007). In addition, in another work via *morphology* operands, small defects of fabric were found better in spatial filtered captured images (Mallik-Goswami & Datta, 2000). In most of above cases, *morphological* operands have been applied to enhance images, to remove noise and also sharpen the edges. This process is repeated in many surface defect detection applications. Some algorithms are suggested for special problems. Hocenski and Keser suggested a simple algorithm which only detects spot defect (Z. Hocenski, Keser, & Baumgartner, 2007). They mentioned that spot defects are not only one pixel but also have its geometry. Based on this property and Local Directional Derivatives (LDD), the new method of moving average with local difference (MALD) is proposed (Z. Hocenski, Keser, et al., 2007). In this method the average of surrounding pixels intensity is compared with a group of pixels to recognize the features which do not follow a similar pattern.

Compared to LDD, which is based on Sobel's edge detection method (Sobel, 1978), MALD is approximately twice faster and has better success detection in false detected. Although this method is fast, the successful rate of detected and undetected defect show weak results.

It is fairly well established that edge detection techniques are one of the fundamental processes in AVISC. Edge detection usually is done after smoothing techniques to minimize noise of the image. But due to similarity between spot and blob defects with *salt* and *pepper* noises in captured image, detecting these defects are generally difficult to recognize precisely. Convolution filters and Gaussian filters such as *median*, *mode* and *low pass* filtering are common methods for removing noise but

the *smoothing* task makes the image blurred, thus the problem is not hundred percent resolved.

Hocenski invented the *canny* image processing algorithm to detect ceramic tile defects on their surface and edge detector (Z. Hocenski, Vasilic, & Hocenski, 2007). It is an improvement by firstly using the *mean* filter to smooth the edges of the captured ceramic tile image, then the image is separated from its background by using the *histogram subtraction* technique. Finally, further refinement takes place where a low-level threshold is derived by subtracting minimum and maximum bound of histogram value.

It is said that between 3 and 3.5 times of low level is high level threshold in *canny* edge detection. The successful rate of this method is about 98%. However, the disability to detect the small amounts of texture variations of ceramic tiles is explained as depletion rather than a *defect*, since the amount is so small that it makes little difference to the overall texture of the tile (Z. Hocenski, Vasilic, et al., 2007).

Hocenski proposed a way to detect defect of edges in ceramic tiles (Z. Hocenski & Keser, 2008). The first stage is edge extraction and histogram subtraction. For better edge detection, *canny* method is chosen. Then in five angles (0, 45, -45, 90 and -90 degree), the next dot line is traced to cover the entire border of image. Finally, compared to contour descriptor of pattern tile, defected tile is detected. The result of this method is acceptable but it is time consuming to find defected tiles.

Mansoori provides a solution to this problem by presenting a *threshold* technique to detect defected edges of ceramic tiles (Mansoori, Tajik, Mohamadi, & Pashna, 2009). It is based on fuzzy logic. Thresholding is defined as a noisy task and enhancement is required to eliminate it. To reduce the noise, *radon transform* and *morphology* operands technique is applied. No faulty defect ceramic tiles curvature scan has 0, 90, -90 angles. Therefore, if any tile violates these angle conditions, it means that edge defected tile exists. In an experiment run of 300 ceramic tiles, this method achieved 98% accuracy of detection, which is acceptable for most industrial production application or systems.

B. Dimensional faults

As mentioned before, tile manufacturing companies investigate surface defects in ceramic tiles manually. Thus, human errors occur through tediousness, tiredness and carelessness. Totally, the visual inspection is not accurate, thus, it requires more work.

It is time consuming and impossible for humans to measure the length, width, thickness and edge curvature of each ceramic tile all at once. Some

ways are suggested such as using sensors or laser beam (Mattone, Campagiorni, & Galati, 2000). Based on the machine vision system for measuring firebreak, He Junji introduced a method in 2010 (He, et al., 2010). In summary, the procedure is carried out in six parts:

- Edge extracting via canny edge detection,
- Edge linking to eliminate noisy edges,
- Edge segmentation to separate lines with different curvature,
- Line fitting
- Finding *homography* matrix to convert perspective edges to direct view,
- Calculate the length of firebrick.

The stable result of this algorithm is the strong point with approximately maximum 2 millimeter error.

3. Material and Methods

In the last two decades, the focus was on visual inspection systems to look at the ceramic tiles from the top side. During this process, the Flatness Control machine (FCM) works on the thickness and edge curvature of tiles. FCM is composed of some sensors to check the flatness of surfaces. In our proposed method we suggest visual inspection model which contains two or four cameras to see the edge of tiles (Fig 2).

Assumptions

Investigation of each border of the tile is needed to have complete tile border inspection. Therefore, one camera is required for each border. It is assumed that this is sufficient, but four cameras together have undesirable effects. When two cameras are in front of each other, they can see each other as well. It is believed that finding a way with minimum noise have better performance. We recommend using two cameras for two sides of the tile (Fig2). To cover the other tile borders one solution is rotate the tile, thereby; the two cameras then inspect the two other borders. This idea seems to solve the problem, but the tile has to stop during visualising.

We suggest dividing this task in two steps (Fig 3):

- Inspect two tile borders with first and second camera
- Investigate other borders with third and fourth camera but in the next stage

Another assumption is the distance between two tiles on the conveyer. The captured image must contain only one border, otherwise size measuring and crack detection on border of tile will be influenced. Processing the border of a tile is not complex. We can use the conveyer with high speed

but the distance between the two tiles should be at a relative distance to ensure correct imaging for optimum analysis to take place. The speed of the conveyer belt can be calibrated to derive the optimum pacing. Placing of tiles and tile edges detection rates from control trial runs before the actual production consignment is inspected in normal production operation.

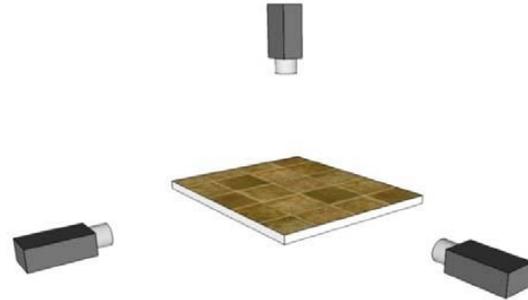


Fig 2. Using two cameras to inspect edges of ceramic tiles and one camera to inspect surface defects

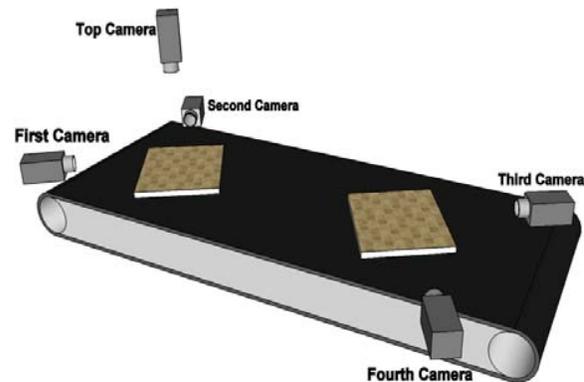


Fig 3. While top camera investigates the surface of tile; first and second cameras inspect two borders of tile. Then, third and fourth cameras investigate other borders.

Two cameras on the sides of the tiles inspect the edge of the tiles while a camera on top investigates the surface. This strategy would control surface and edge inspection in ceramic tiles on a conveyer belt simultaneously.

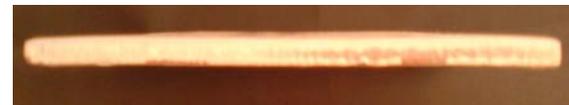


Fig 4. A sample of edge tile image

As it will be shown, LED light resources and black background for image capturing are recommended. The position of camera should cover the border length of tiles. In addition, it is stated also

that 30 cm distance between tile and camera is suitable (Ž. Hocenski, et al., 2010).

An instance of a ceramic tile border is shown in Fig 4. It is believed that other defects such as spots or blobs are not accepted in ceramic tile borders. Therefore, we could use smoothing, filtering and morphological operands to cover all the edges in the defected tile.

In the next stage, we recommend using *histogram subtraction* to separate the tile from background. We suggest applying *canny* edge detector because we want to focus on line gradient and this method is the one suitable for this purpose (Atiqur Rahaman & Mobarak Hossain, 2009). Finding a suitable threshold in canny technique will have a great effect on our work to succeed. In addition, using *morphological* operand (*opening, closing*) would help to remove unwanted noises (Ze-Feng, Zhou-Ping, & You-Lun, 2006).



Fig 5. An image of the tile edge after segmentation and enhancement

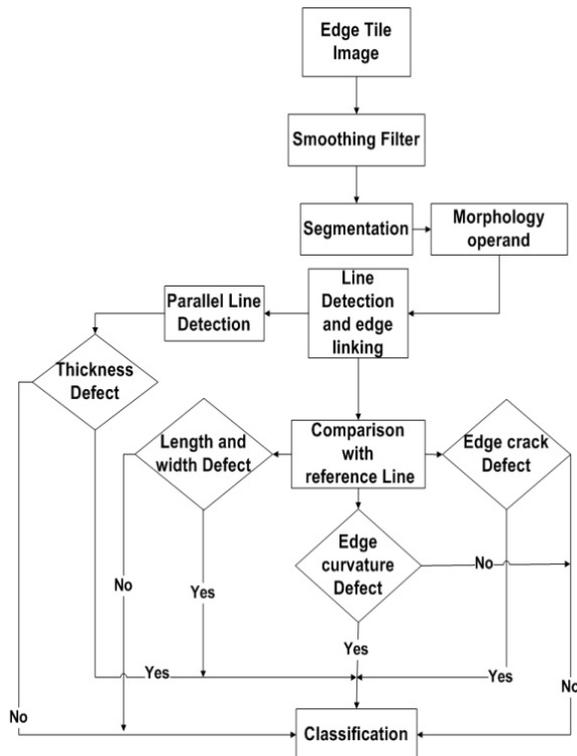


Fig 6. Proposed approach diagram for edges of ceramic tiles

The surface of the *front side* of a ceramic tile is shown in Fig 5 is a good example of how to investigate for *edge* curvature defects. The edge of the tile is derived from the segmentation part and straight edges are needed for assessing no fault tiles. *Hough transform, deep-first* algorithm and straight line detection are suitable to extract the edges of tile (Lee, Koo, & Jeong, 2006). Recognizing main correctors related to edges of tile will be interpreted as a line. We recommend using a straight line as a reference line to find defected edges (Pithadiya, Modi, & Chauhan, 2010).

Four major defects are considered in our method. In feature extraction part after line detection, edge linking is needed to join edges. Fig 6 presents a flowchart of edge defect detection in ceramic tile. As mentioned before, after line detection and edge linking part, three faults (edge crack defect detection, thickness measuring and curvature defect detection) still exist. It is assumed that comparing with reference line; this will help to find these defects, while for thickness measuring parallel line detection is chosen. The final stage depends on each ratio of each edge classification part done. Four solutions are proposed for each fault based on line detection.

A. Edge curvature defect detection

According to International Organization for Standardization (ISO) rules, less than five percent deviation is acceptable for edge curvature in ceramic tiles. The area between the edge line and reference line deviation of a tile is shown in Fig 7. By attaching the lowest point of edge line to reference line, the surrounded area is actually calculated by the function in equation (1). $F(x)$ is tile border's equation line which is located between 'a' and 'b' points. In practice, equation (1) attains with summation of pixels between reference line and tile border line that is presented in equation (2). In equations (1) and (2) x presents reference line location and x_i shows the edge tile location. The summation of destination between these lines is the curvature of the tile. In addition, the maximum deviation from reference line is interesting because it shows the curvature defect.

$$D = \int_a^b F(x)dx \tag{1}$$

$$D = \sum_{i=a}^b (x_i - x) \tag{2}$$

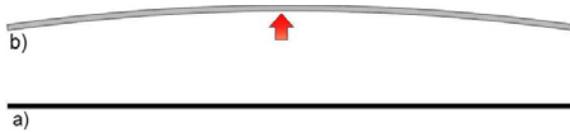


Fig 7. a) Reference line, b) Deviation compared to Reference line

When the maximum deviation is happening edge curvature defect will be seen or while average deviation is more than usual. Fig 8 shows this distance between reference line and edge of tile in practical view. As the line detection and edge linking number of pixels that do not match with reference line is counted in order to verify threshold values. If it is above the threshold value, a fluctuated edge is recognized and the tile is declared faulty. This is specified in algorithm 1.



Fig 8. After segmentation and feature extraction, reference line is matched with the lowest point of tile in same direction to achieve deviation from reference line.

Algorithm 1:

- line extraction method
- Edge linking ($L[i,j]$)
- Match reference($R[i,j]$) line and side of tile in same direction and lowest point.

For each i and j
 if distance ($R[i,j]$ AND $L[i,j]$) > Max (deviation)
 defect_counter = defect_counter + 1

if distance ($R[i,j]$ and $L[i,j]$) > 0
 Total_dis = distance ($R[i,j]$ AND $L[i,j]$) + Total_dis
 End For each

If Total_dis > Threshold OR defect_counter > Threshold
 Mark tile as a fluctuated surface tile

B. Length and width defect detection

Size measuring has been done in visual inspection systems (Elbehiery, et al., 2005). We predict that focusing on edges of tile will increase the accuracy. In our model other defects such as pinholes, cracks, scratches, blobs and texture of ceramic tiles are not seen. This property will help us to find the edges of tile without having to worry about the other defects.

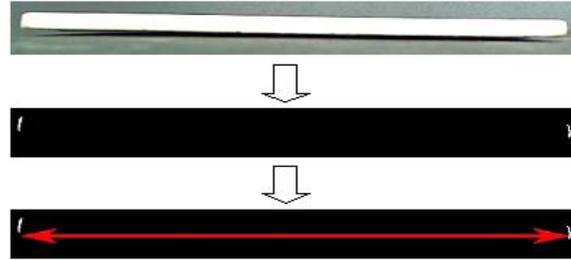


Fig 9. Steps of length measuring: after vertical line extraction method, the summation of pixels from left side to right side is distance between two sides.

Algorithm 2:

- Vertical line extraction method ($L[i,j]$)
- Binarization method

For each i And j From 0 To Width/2
 If Color($L[i,j]$) = White
 Left_Position = $L[i]$
 End If
 End For each

For each i And j From Width To Width/2
 If Color(i,j) = White
 Right_Position = $L[i]$
 End If
 End For each

Tile_Length = Right_Position – Left_Position
 Reference_Line_Length = Total pixel of Reference line

- Find the ratio between this Tile_Length and Reference_Line_Length

Algorithm 2 expresses the procedure of size measuring. At first, a longest virtual line between two sides of the tile is calculated. Afterward, through comparing the length size against the reference line, the acceptance of length size can be easily determined. Fig 9 shows the way that this process would be performed. Firstly, two vertical lines are fetched from the both borders of captured image so that it would be possible to count the number of pixels between them. Secondly, *binarization* task is performed to make the borders more clear. Thirdly, the total pixels spanning from the left side to right side determine the length of the ceramic tile edge. The same process is necessary for determining the *reference* line. The exact length is obtained by calculating the ratio between this line and *reference* line.

C. Edge crack defect detection

It is assumed that localizing the edges makes edge defect detection more accurate. In addition, we can combine the result of top side camera images – which is suspicious to edge crack - with that of our model to be more reassured about edge crack since defect is a group of pixels that shows unusual manner against the background (Joo, Huh, Hong, & Park, 2010). Therefore, an edge crack on surface of tile appears after straight line detection because crack edge unlike background does not have straight line.

Algorithm 3:

```

➤ Use straight line detection with PCA
For each i and j
  If R[i,j] not Match with any L[i,j]
    defect_counter = defect_counter +1
End for

If defect_counter > Threshold _ error
  Mark tile as a defected tile

```

In above code, each pixel of reference line(R) must have one pixel in edge tile (L) otherwise threshold error value will increase. Threshold error describes amounts of pixel that we want to distinct as a crack. Fig 10 shows an instance of crack edge that is achieved after straight line detection.

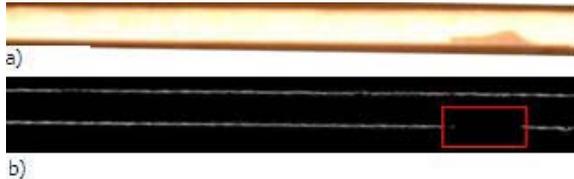


Fig 10a) Edge of tile that has crack, Fig 10b) edge crack is detected after applying algorithm

D. Thickness defect detection

Like edge curvature measuring that is not possible to see from top side, thickness measuring should be inspected from sides of ceramic tiles. Thickness is the distance between two sides of ceramic tiles. It should be parallel and it should not be thick or thin. As specified in algorithm 4, after line detecting we need to find two longest parallel lines in our image. Edge linking will help to find thickness measuring process. Then we count all of pixels that are out of thickness distance. If numbers of defected pixels are more than threshold value then thickness defect is observed.

Algorithm 4:

```

➤ line extraction method
➤ Edge linking ( L1[i,j] ) and ( L2[i,j] )

For each i and j
  If distance ( L1[i,j] , L2[i,j] ) NOT in Thickness_distance
    defect_counter = defect_counter +1
End for

If defect_counter > Threshold _ error
  Mark tile as a defected tile

```

Fig 11 presents theory of above algorithm. As we observed, the right side thickness is greater than that of left side which indicate the edges of two sides are not parallel.



Fig 11. Finding two lines that are not parallel and the distance between them is more than normal

3. Discussions and Result

The experiments for the four algorithms are currently undergoing rigorous laboratory tests which will be completely analyzed in a follow up paper. However, our preliminary evaluation of results using algorithm 2 for vertical line extraction method based on Prewitt and Sobel techniques, shows the fluctuation of Prewitt's method is closer to real size changes ascertained from our laboratory measurement using digital caliber. The maximum relative-error of both techniques shows an approximate deviation of 1.44%.

Since humans make mistakes, visual quality control systems in real time have become favorable recently. Because Ceramic tile companies should qualify their products, analyzing their outcome for efficiency is significant. We believe that this proposed method is suitable before and after kilning and coloring phases. These quality control surveys help to improve the process of production. They are important for preventing faulty tile production through automated feedback adjusting control system. It is also possible to recycle ceramic tiles before kilning to reduce disposal cost or profit margins. Therefore, if we predict defected tile correctly before kilning, the biscuit of each tile will return to the production line again. Even after kilning, it is more economical to reject some tiles that will not classify for "A", "B" or "C" grade sorting at

the end of production. Thus, understanding defected tile during the production is important for factories.

Human eye can detect some defects but the rest that are not recognizable by human eyes or need more accuracy should be investigated in AVIS such as size defects. Border defects of ceramic tiles are also categorized in the second group for example: shadows of ceramic tiles are seen after installation. Because workers are looking at the surface of ceramic tile from the top, so edge curvature is hidden in this kind of inspection.

It is assumed that flatness curvature in ceramic tile manufacturing spreads all over the tile surface. Therefore using two cameras is also acceptable, but for more accuracy, it is possible to expand this model to four cameras or rotate the tile for investigating other sides.

It is expected that many defected tiles that have edge faults will be found in the proposed model. Focusing on the edge of the tiles, size measuring also would be more accurate, particularly within the tolerance or threshold values set. The algorithm 2 can be made more advanced to be self-adjusting to determine more fine-grain values for "A" grade tiles. The opposite can also be true, that is, adjust the values to be more coarse-grain or larger for lower classes of tiles rejected from "A" class batches.

Advantages of this model

Most often it is expensive to use human resources while other times they are not accurate enough for visual controlling. In addition, in many cases, it is impossible to request humans to check all details such as size measuring in ceramic tile companies, because the speed of production line is more than human measuring. All of these limitations encourage companies to use other methods. Accurate method with low cost implementing and less limitation during production is becoming more popular recently.

Factories are using visual inspect systems to inspect surface defects of ceramic tiles and our model is a supplementary method that will be combined with the previous model to detect the border defects of ceramic tiles. In this paper, a method is suggested that is accurate and fast enough with lower cost implementing rather than previous methods while the quality assurance of this model has been considered. In this model we use a maximum of five cheap cameras that are using CMOS (Complimentary Metal-Oxide Semiconductor) technology as opposed to flatness control machines which use laser or CCD sensor. CMOS camera is far more economical. Besides, this model does not need another visual inspection system. Thus, the same AVISC which is used for surface defects can be applied for

determining other border tiles. Therefore, with a central computer the visual inspection will be done in different places of the production line. In previous methods, factories needed to buy FCM (Flatness Control Machine) to check other defects of ceramic tiles and usually this checking is done only at the end of production line, because it is expensive and unable to expand in networking.

Another advantage of this strategy in contrast with previous methods which need to fix position during controlling the flatness of tiles is that the ceramic tiles is located on conveyer belt and cameras investigate the tile rapidly without stalling the ceramic tile.

In a follow-up paper we will present our results from many different experiments using different sets of placement and measuring criteria.

4. Conclusion

Installing ceramic tiles with thickness and curvature defects are unpleasant. In this paper, we proposed a supplementary method to cover border defects in ceramic tile by using automated visual inspection system (AVIS). This model is able to cover border defects such as edge curvature, thickness, size measuring and edge cracks. For each defect an algorithm based on line feature extraction methods is suggested. This proposed system would cover edge defect problems more efficiently. In addition, this strategy solves the limitation of last step inspection existing in production lines which involve keeping ceramic tiles in a fixed position. Therefore, boosting the speed of quality control process will inherently increase the speed of production of tiles. Another advantage is that it is economically applicable so as to encourage factories to use this model in various parts of production lines such as before kilning, after kilning, after colouring and final sorting. This model is also flexible enough to be combined with other AVISs methods to investigate surface of ceramic tiles that reduce cost of implementation for factories due to the fact that they have to check ceramic tiles surface as a minimum requirement for quality control purposes. Thus, with the same computer and adding different cameras it will be implemented.

It is assumed, this model has the capability of covering curvature defect problems of tiles in AVIS without any dependency on CCD, flatness measuring laser sensor and fixed position limitation during quality control. By taking each border of tile, size and thickness measuring accuracy, in to account we hope that sorting and packing tiles will be improved. AVIS is a rational solution (Malamas, et al., 2003), therefore, regardless of CCD and laser sensor, this system can be implemented

economically. It guarantees factories to apply this method in different stages of production line such as before kilning, or coloring or after kilning.

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An Exploratory Study of Critical Success Factors of Brand Extension Strategies using Fuzzy Analytical Hierarchy Process

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Abstract: Nowadays, the issue of brand extension strategy has emerged as one of the most crucial topics for marketing management. Previous studies report extraordinarily high failure in brand extension strategies. Hence, this study presents a practical framework for evaluation of critical factors of brand extension strategy of product based on appropriate criteria and Fuzzy Analytical Hierarchy Process technique. For obtaining critical factors, the key published papers are employed to derive those initially important factors firstly, 15 factors are identified. These factors have been discussed and publicized in academic and management fields and can be summarized as three aspects and fifteen initially factors. Consequently, the proposed Fuzzy AHP approach is used to measure relative weights for evaluating these factors. The proposed methodology implemented as an actual case in the biggest automobile manufacture in Iran. Finally, the results of this study show that “Quality”, “Services after sale”, “Determining the suitable strategies in Brand field”, “Top management commitment and support” and “Advertisement” is the top five critical factors.

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Keywords: Brand extension strategy, Critical success factor, AHP, Fuzzy sets

1. Introduction

In today's new competitive environment, marketers endeavor to reduce marketing expenses and increase sales. Strong brands enjoying high brand strategy can help managers and policy makers to relish higher margins, less vulnerability to competitive attacks, greater customer loyalty, better customer response to communications, and more cooperation from trade and other intermediaries. In order to keep track of the strength of their brands, managers need to be able to quantify brand strategy. However, creating and holding brand extension strategy is a challenge for top managers in the organizations.

A direct branding strategy is defined as a new extension that is strongly linked to the parent brand's name, colors, and/or symbols, which appears in a prominent position in the brand name (Milberg et al., 1997). A beneficial brand extension strategy can reduce marketing expenditures (Randall, 1993) and, thus increase new product introductions' profitability (Collins-Dodd and Louviere, 1999). Furthermore, the parent brand's image can also benefit from brand extensions (Balachander and Ghose, 2003).

From a detailed examination of the literature, the concept of brand strategy cannot be uniform, owing to the difference of the perspective of the research. The authority of the United States Marketing Philip

Kotler says that (Philip Kotler, 1997; Philip Kotler, 1999). The brand is a name, a noun, a symbol or a design, or the sum of the above, whose purpose is to make their own product or service is different from other competitors. Therefore, the so-called brand strategy is just a corporate strategy, which takes the corporate brand as core competitiveness in order to obtain the difference profit and the value. Its essence is the inevitable outcome with the development of market economy to the current stage. Developing brand strategies are therefore essential in building brands. A branding strategy reflects the number and nature of common and distinctive brand identities applied to the different products sold by an organization. Devising a brand strategy involves deciding the nature of new and existing brand identities to be applied to new and existing products (Kotler & Keller, 2006; Keller, 2003). In other words, branding strategies are concerned with how brand identities are employed across the products of an organization (Keller, 2002). It is therefore not surprising that 'capitalizing on the equity in established brand names has become the guiding strategy of product planners' (Tauber, 1988). This notion is supported by Simms (2005), who identifies 82 percent of new product introductions as brand extensions.

Given the importance and popularity of brand extension strategy on the one hand, and a brand extension failure rate of about 80 per cent on the other, it is pivotal to know which factors influence brand extension success (Völckner and Sattler, 2006). Researchers have sought to identify factors related to the success of a brand extension, and the negative effect that the brand extension strategy may have on the original brand (Loken and John, 1993; Gu`rhan-Canli and Maheswaran, 1998; John et al., 1998; Martı́nez and Pina, 2003; etc). The choice of branding strategy is likely to be a key factor in the development of any line extension, but specific effects of the branding strategy have received limited attention in the brand/line extension literature (Milberg et al., 1997). The decision as to how to brand new products is thus critical. When an organization introduces a new product, it has three main choices, namely (1) it can develop new brand identities for the new product; (2) it can apply some of its existing brand identities; and (3) it can use a combination of new and existing brand identities (Kotler & Keller, 2006).

Brand extensions are among the most important and often used branding strategies (Keller 2003). They refer to the use of well-known brand names when launching new products—for example, the transfer of the Virgin brand (i.e., the parent) to a new product (i.e., the extension) such as limousine services.

Unfortunately, there are only a few studies that address for critical factors of brand extension strategies. Therefore, the motivation of this study is that although several critical success factor analyses in the field of brand strategies appear in the literature, most of them do not have any technical background. In addition, lack of theoretically empirical research in the classification factors, that are affected the successful brand strategies is existed. Many researchers have proposed using fuzzy analytical hierarchy process (FAHP) technique and this technique has become a popular and common tool in literature at least in this problem. Iranmanesh et al., (2008) applied a risk evaluation methodology to prioritize and organize risk factors in IT projects based on fuzzy analytical hierarchy process (FAHP). Azadeh et al. (2010) presented a robust decision-making methodology based on Fuzzy Analytical Hierarchy Process (FAHP) for evaluating and selecting the appropriate simulation software package. Azadeh et al. (2011) presented a decision making approach based on Fuzzy Analytical Hierarchy Process (Fuzzy AHP), Technique for Order Performance by Similarity to Ideal Solution (TOPSIS), and computer simulation to determine the most efficient number of operators and the efficient

measurement of operator assignment in CMS. Miri-Nargesi et al. (2011) proposed a fuzzy group decision making process to evaluate and select the appropriate Information System Project (ISP) based on fuzzy Analytical Hierarchy Process (FAHP).

Therefore, in this study Fuzzy Analytical Hierarchy Process is used to classify CSFs for helping decision-makers focus on those factors that provide great influence. As an advantage, the AHP enables decision-maker to handle problems in which the subjective judgment of an individual decision-maker constitutes an important role of the decision-making process. Also using fuzzy theory in this problem can reduce ambiguities and uncertainties that are inherent in the judgments of experts in the field of selection. The proposed methodology implemented in an actual case in one of the biggest Car Company (SAIPA) in Iran.

The reminder of the paper is structured as follows: Section 2 describes the proposed methodology to Brand Strategy problem based on Fuzzy AHP and presenting of all criteria that we considered; in section 3, the proposed methodology applied as an empirical illustration is provided and the results of proposed methodology are discussed. Finally, the conclusions of this work are presented in section 4.

2. Fuzzy Analytic Hierarchy Process (FAHP)

Analytic hierarchy process (AHP) is a useful method for solving complex decision-making problems involving expert judgment (Saaty, 1980). In AHP method, the multi-attribute weight measurement is calculated by pair-wise comparison of the relative importance of two factors. Traditional methods of AHP still cannot process imprecise or vague knowledge, to address such vagueness; Zadeh (1965) introduced fuzzy sets theory, to rationalize uncertainty associated with impression or vagueness. Fuzzy set theory resembles human reasoning in its use of approximate information and uncertainty in decision making; many researchers have used fuzzy theory in conjunction with AHP. The steps of the proposed methodology are as follows:

Step1: Find Criteria and Alternatives and Establish hierarchal structure

Firstly, the organization should specify the strategies and selection criteria for evaluating these criteria by interviewing the SAIPA staff and managers (through different approaches i.e. Delphi, brainstorming and so on) and reviewing the literature.

Step 2: Gather expert' judgments based on fuzzy number and establish fuzzy pair wise comparison matrix

The sample questionnaire is used to determine the priorities of the criteria using experts' opinions based on fuzzy numbers. This questionnaire along with similar questionnaire about the evaluation of the alternatives should be filled by the experts for the evaluation of the relative importance of the criteria as well as the relative performance of the alternatives. In this paper, triangular fuzzy numbers is used which is illustrated in Figure (1). Equation (1) shows the membership function of a triangular fuzzy number. Triangular fuzzy number (TFN) is usually shown with (l, m, u).

$$U(x) = \begin{cases} \frac{x-l}{m-l} & 1 \leq x \leq m \\ \frac{u-x}{u-m} & m \leq x \leq u \\ 0 & \text{Otherwise} \end{cases} \quad (1)$$

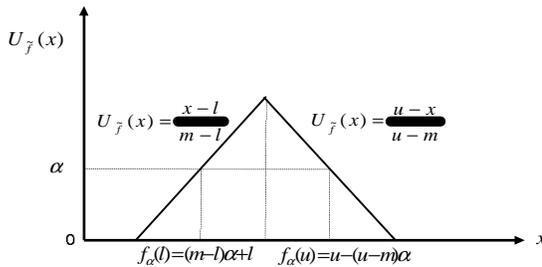


Figure 1. Triangular Fuzzy Number

The conventional AHP method, which is proposed by Saaty (1980), uses pair-wise comparisons shown in equation (2). The fuzzy judgment matrix can be defined as follows:

$$\tilde{A}^k = [\tilde{a}_{ij}^k] \quad (2) \quad \text{where}$$

$$\tilde{a}_{ij}^k = (1, 1, 1) : \forall i = j; \tilde{a}_{ij}^k = \frac{1}{\tilde{a}_{ji}^k} : \forall i \neq j .$$

\tilde{A}^k is the fuzzy judgment matrix of evaluator k, \tilde{a}_{ij}^k the fuzzy assessments between criterion i and j of evaluator k, $\tilde{a}_{ij}^k = (l_{ij}^k, m_{ij}^k, u_{ij}^k)$ n is the number of the related criteria at this level. FAHP replaces crisp a_{ij} in AHP by triangular fuzzy numbers. Because each number in the matrix shows the opinions of the experts, fuzzy number is the best solution to show expert judgments. Eigenvector method proposed by Buckley (1985) is used here to analyze the data and achieve the consensus of the experts. As is shown in equations (3-6), l, m, and n show the minimum possible, most likely and the maximum possible value of a fuzzy number,

respectively. These numbers have following characteristic:

$$\tilde{a}_{ij}^k = (l_{ij}, m_{ij}, u_{ij}) : l_{ij} \leq m_{ij} \leq u_{ij}, l_{ij}, m_{ij}, u_{ij} \in [1/9, 9] \quad (3)$$

Based on Saaty's scale (1980), the linguistic scale and corresponding triangular fuzzy numbers are illustrated in Table (1).

Table 1. The linguistic scale and corresponding triangular fuzzy numbers

Fuzzy	Linguistic scales	Scale of fuzzy
$\tilde{1}^k$	Equally important	(1, 1, 1)
$\tilde{2}^k$	Weakly important	(2, 3, 4)
$\tilde{3}^k$	Essentially important	(4, 5, 6)
$\tilde{4}^k$	Very strongly	(6, 7, 8)
$\tilde{5}^k$	Absolutely important	(7, 8, 9)
$\tilde{2}^k, \tilde{3}^k, \tilde{4}^k, \tilde{5}^k$	Intermediate values	(x- 1, x, x+ 1)
$1/\tilde{x}^k$	between two adjacent judgments	(1/(x+ 1), 1/x, 1/(x- 1))

Step 3: Calculate Consistency Rate (C.R.)

According to the analysis of Csutora and Buckley (2001), let $\tilde{A}^k = [\tilde{a}_{ij}^k]$ be a fuzzy judgment matrix with triangular fuzzy number $\tilde{a}_{ij}^k = (l_{ij}, m_{ij}, u_{ij})$ and form $A = [m_{ij}]$. If A is consistent, then \tilde{A}^k is consistent. Saaty (1980) suggested consistency index (C.I.) and consistency rate (C.R) to verify the consistency of the judgment matrix. Random index R.I. represents the average consistency index over numerous random entries of the same order reciprocal matrices. The value of R.I. depends on the value of n (the number of related criteria or alternative in decision matrices) which is shown in Table 2.

Table 2. Random Index used to compute consistency rate (C.R.)

n	1	2	3	4	5
R.I.	0	0	0.52	0.89	1.11
n	6	7	8	9	10
R.I.	1.25	1.35	1.4	1.45	1.49

Saaty (1990) provided a consistency index to measure any inconsistency within the judgments in each pair-wise comparison matrix as well as for the entire hierarchy. The consistency index (C.I.) is formulated as follows:

$$C.I. = \frac{\lambda_{max} - n}{n - 1} \quad (4)$$

where λ_{\max} is the maximum eigenvalue, and n is the dimension of matrix. Accordingly, the consistency rate (C.R.) can be computed with the use of following equation:

$$C.R. = \frac{C.I.}{R.I.} \quad (5)$$

Step 4: Test Consistency Rate (C.R.)

If $C.R. < 0.1$, the estimate is acceptable; if the consistency is not passed, a new comparison matrix must be established.

Step 5: Defuzzify each expert's Judgment using CFCS Method

The method for defuzzification used in this paper is the converting fuzzy data into crisp scores (CFCS) method introduced by Opricovic and Tzeng (2003). The CFCS method can clearly express fuzzy perception, which is based on the procedure of determining the lower and upper scores by fuzzy min and fuzzy max, and the total score is determined as a weighted average according to the membership functions (Lin, 2010). The steps of CFCS method are as follow:

1: Normalized matrix

$$xl_{ij}^k = (l_{ij}^k - \min l_{ij}^k) / \Delta_{\min}^{\max} \quad (6)$$

$$xm_{ij}^k = (m_{ij}^k - \min l_{ij}^k) / \Delta_{\min}^{\max} \quad (7)$$

$$xu_{ij}^k = (u_{ij}^k - \min l_{ij}^k) / \Delta_{\min}^{\max} \quad (8) \quad \text{where}$$

$$\Delta_{\min}^{\max} = \max u_{ij}^k - \min l_{ij}^k \quad (9)$$

2: Computing lower (ls) and upper (us) normalized value:

$$xls_{ij}^k = xm_{ij}^k / (1 + xm_{ij}^k - xl_{ij}^k) \quad (10)$$

$$xus_{ij}^k = xu_{ij}^k / (1 + xu_{ij}^k - xm_{ij}^k) \quad (11)$$

3: Computing total normalized crisp value:

$$x_{ij}^k = [xls_{ij}^k (1 - xls_{ij}^k) + xus_{ij}^k] / [1 - xls_{ij}^k + xus_{ij}^k] \quad (12)$$

4: Computing crisp value:

$$a_{ij}^{*k} = \min l_{ij}^k + x_{ij}^k \Delta_{\min}^{\max} \quad (13)$$

For all experts' judgments, Equations (6-13) should be implemented separately. After calculating the crisp value for each expert, the consistency Rate of each expert can be also calculated.

Step 6: Calculate integrated crisp values, weights and final ranking

After defuzzifying by using CFCS Method and collecting all consistent crisp judgments for all levels of the hierarchical structure, geometric average

is applied to integrate crisp values of k evaluators using Equation (14).

$$a_{ij}^* = \sqrt[k]{(a_{ij}^{*1} \times a_{ij}^{*2} \times \dots \times a_{ij}^{*k})} \quad (14)$$

$$A_{ij}^* = [a_{ij}^*] \quad (15)$$

A_{ij}^* is a aggregated crisp judgment matrix of

k evaluators, a_{ij}^* is the aggregated crisp assessments of criterion i and criterion j of k experts, $i, j = 1, 2, \dots, n$, and k is the number of experts. In the next Step, we can achieve the final weight of the alternatives using Equation (16) and then the decision can be made based on the weight of alternatives. The weights are sorted decreasingly and the first ranked alternative is selected finally.

$$w_i = \frac{(\prod_{j=1}^n a_{ij}^*)^{1/n}}{\sum_{i=1}^n (\prod_{j=1}^n a_{ij}^*)^{1/n}} \quad i, j = 1, 2, \dots, n \quad (16)$$

3. Applying the Proposed Methodology

As mentioned before, according to the decision problem presented in Section 1, in this section, the proposed methodology on an actual case in one of the biggest Car Company (SAIPA) in Iran is implemented. SAIPA is one of the few largest automobile manufacturers in the Middle East. Since 1966, SAIPA has produced different passenger cars such as SABA, SAIPA111, SAIPA 132, SAIPA 141, Rio and Xantia as well as the New Local Brand, TIBA, which is on the way for mass production. The production volume reached 520,000 vehicles in 2008 capturing more than 53% of the local market share in the passenger car segment and resulting in a turnover of more than 4.2 billion US\$.

According to the strategic plan of SAIPA, the production volume of the year 2011 will amount to 720,000 vehicles. The main factory is located on the suburb of Tehran, Iran. The company's strategy is to improve infrastructure of information system technology to continue progress pace in its competitive advantage and achieve higher market share. The brand strategy is one the important plan for this company. The company's managers have decided to implement the successful planning for their brand strategy. Therefore, when we construct the AHP model, the first element is to look for the criteria. After reviewing, the literature shows that different organizations may want to consider different criteria and strategies, but in our actual case, the management convenes a meeting to study the criteria, experts finally considered seventeen criteria.

For this problem, after some debate, the task force depicts a hierarchy structure as illustrated in Figure (2). The fuzzy decision matrices for intangible criteria and brand strategies to select the most important criteria are attained from a verbal questionnaire filled by thirty different experts who had work in IT field at the SAIPA Company and then converted to fuzzy numbers based on scales mentioned in Table (1) for Fuzzy AHP. Information about tangible criteria and brand strategies is collected documents, which were existent in the organization.

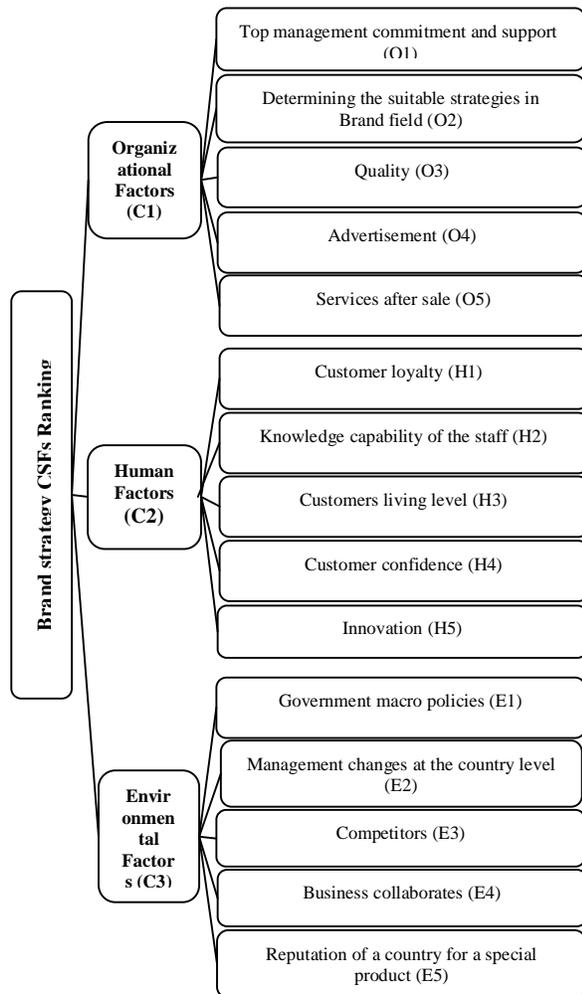


Figure 2. Hierarchy structure for Critical success factors of the brand strategies

Step1: Find Criteria and Alternatives and Establish hierarchical structure

The first step of analytical hierarchy process is to find criteria and alternatives using expert judgment and literature reviews. In this section, fifteen criteria have been identified for the problem.

These criteria are categorized into the three aspects such as Organizational, Human and Environmental. After that, decision makers will establish hierarchical structure. The hierarchical model should be able to break the existing complex decision problem into manageable components of different layers/levels. Different layers of the hierarchy structure are sketched in Figure .2.

Step 2: Gather experts' judgments based on fuzzy number and establish fuzzy pair wise comparison matrix

In this step the pair-wise comparison matrices for main and sub criteria are gathered from a verbal questionnaire filled by thirty experts in the SAIPA Company. Then these verbal pair-wise comparison matrices are replaced with correspondent triangular fuzzy numbers. For example, the integrated fuzzy comparison matrix for all evaluators of three main criteria with respect to the goal node is shown in Table 3.

Table 3. The integrated fuzzy comparison matrix for all evaluators of three main criteria with respect to the goal node

	C1			C2			C3		
	<i>l</i>	<i>m</i>	<i>u</i>	<i>l</i>	<i>m</i>	<i>u</i>	<i>L</i>	<i>m</i>	<i>u</i>
C1	1	1	1	2.97	3.71	4.37	2.21	2.72	3.21
C2	0.22	0.26	0.336	1	1	1	1.09	1.37	1.73
C3	0.31	0.36	0.45	0.57	0.72	0.91	1	1	1

Step 3: Calculate Consistency rate (C.R.)

As mentioned above in step 3 of the proposed methodology, if $\tilde{A} = [a_{ij}]$ be a fuzzy judgment matrix with triangular fuzzy number (e.g. data in Table (3)), to calculate consistency rate, firstly we form $A = [m_{ij}]$. Then the consistencies of fuzzy judgment matrix (Table (3)) are evaluated using Equations (4-5) and (17) is used to determine maximum eigenvalue (λ_{max}). For the data in Table (3) we have:

$$\lambda_{max} = 3.0444 \quad C.I. = \frac{\lambda_{max} - n}{n - 1} = \frac{3.0444 - 3}{3 - 1} = 0.0222$$

and CR ; 0.0383 < 0.1

Step 4: Test Consistency Rate

If judgments of the evaluators were inconsistent, we asked them to repeat the pair-wise comparison processes until the consistency index was less than 0.1. The result shows that the decision

matrix for the second level of the proposed hierarchical structure for all evaluators is consistent.

Step 5: Defuzzify each expert's Judgment using CFCS Method

After the fuzzy matrix is made and consistency test is satisfied, CFCS method is applied to carry out defuzzification (Opricovic and Tzeng, 2003). After ensuring the consistency of the data in Table (3), data in this table should be defuzzified to calculate the final weights of criteria.

Step 6: Calculate integrated matrix values, weights and final ranking

When all thirty evaluators' judgments are defuzzified and passed the consistency test, firstly Equations (14-15) are applied to calculate integrated crisp matrix. Then, in the final step, Equation (16) is applied for computing the final weights of criteria in level 1, 2 of Hierarchy. Table (4), (5) shows the aggregate crisp judgment matrix and weights of main and sub criteria in Level 1, 2, respectively.

Table 4. Aggregate crisp judgment matrix with respect to Level 1 for thirty experts

	C1	C2	C3	Weights (Ranking)
C1	1	3.654199	2.711263	0.768 (1)
C2	0.270271	1	1.39932	0.135 (2)
C3	0.369396	0.735721	1	0.097 (3)

Table 5. Aggregate crisp judgment matrix with respect to Level 2 for thirty experts (Organizational Factors)

	O1	O2	O3	O4	O5	Geometric Mean	Weights (Ranking)
O1	1	0.981412	0.612884	1.118005	0.866358	0.165	0.127 (4)
O2	1.035285	1	0.585769	2.114881	0.62912	0.176	0.135 (3)
O3	1.659517	1.742758	1	3.823217	2.007752	0.341	0.262 (1)
O4	0.913721	0.480371	0.258689	1	0.406764	0.099	0.076 (5)
O5	1.177449	1.621319	0.500993	2.501764	1	0.219	0.168 (2)

For another criterion in the level 2 the same calculations have been carried out. As a result of the calculations based on table (4), the weights of five criteria of level 2 i.e. Top management commitment and support, determining the suitable strategies in Brand field, quality, advertisement, services after sale are 0.127, 0.135, 0.262, 0.076 and 0.168, respectively. For sub-criteria in level 2 step 2 to 6 are performed. By multiplying weights of level 1 in level 2 (Sub-criteria), global weights are determined. The final rank in per environment is shown in Table (6).

Table 6. Final ranking of criteria

ID	Weights	Final ranking in each environment	Final ranking
O1	0.127	4	4
O2	0.135	3	3
O3	0.262	1	1
O4	0.076	5	5
O5	0.168	2	2
H1	0.023	4	10
H2	0.028	3	8
H3	0.014	5	14
H4	0.031	2	7
H5	0.045	1	6
E1	0.025	1	9
E2	0.02	3	12
E3	0.022	2	11
E4	0.017	4	13
E5	0.014	5	15

According to the obtained results, the third criterion (O3) has the highest weight and is the most proper brand strategies factor according to the experts' judgment. Therefore, the priorities for all criteria are in the following order: O3, O5, O2, O1, O4, H5, H4, H2, E1, H1, E3, E2, E4, H3 and E5. In order to better understanding the results of this ranking, results are sketched in Figure (3).

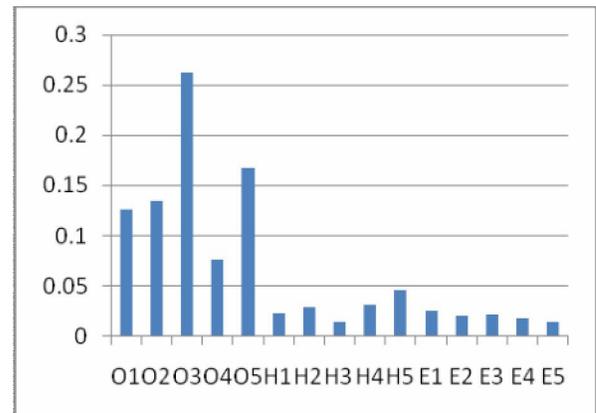


Figure 3. Graphical priorities of criteria

The results have clearly demonstrated that Quality is critical to succeed. Besides, the results show that another important criterion for successful brand strategy is Services after sale. In addition, determining the suitable strategies in Brand field is a vital criterion in this regard. On the other hand, Top management commitment and support is a crucial criterion. Furthermore, advertisement should be considered for succession of the brand strategies. Finally, it should be mentioned that all organization should be noted that these criteria which has important role to success the brand strategies.

4. Conclusions

A brand extension strategy in an organization has some benefits. Yet in many cases, failure rates of brand extension strategies have reported. In order to reduce the failure rate of brand extension strategies and also better understanding of the mentioned strategies, several studies have conducted. However, most of those studies as mentioned simply list factors and are lacking in the systematic efforts and technical background to classify and evaluating factors. To evaluate the priority of CSFs, MCDM method could be useful. Hence, AHP method as a MCDM technique in this problem could be applied. In this paper, a practical framework for evaluation and selecting CSFs of brand extension strategies based on fuzzy analytical hierarchy process has been applied. Applying AHP method under fuzzy environment by giving the experts opinions could lead us to realistic decision-making process. The results of this study shows that "Quality", "Services after sale", "Determining the suitable strategies in Brand field", "Top management commitment and support" and "Advertisement" is the top five CSFs. These results could be very useful in other similar cases. For the extension of this study, other fuzzy AHP methods can be used. In addition, various methods of multi-criteria evaluation such as TOPSIS and Data Envelopment Analysis (DEA), in the fuzzy environment can be applied.

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Fourier Transformer Infrared Spectroscopy for Quality Assurance of Tomato Products

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Abstract: FT-IR spectroscopic technique was used to evaluate the chemical composition, lycopene, β -carotene and some adulterants (starch, allura red pigment and paprika) of tomato products as a fast technique in comparison with standard methods. The results indicated that, sensory evaluation and color parameters of Hunter measurements (L^* , a^* & b^*) represent color value but the quality of tomato natural pigment (lycopene) not identified. FT-IR spectra of adulterated tomato paste with starch showed spectral peaks at (1137 cm^{-1} and 1040 cm^{-1}) while, in adulterated paste with paprika revealed some peaks at 641 cm^{-1} for stretching (CH_2 , CH) and at 1520 cm^{-1} for vibrational stretching of ($\text{C}=\text{C}$). Ketchup was characterized with stretching ($\text{C}-\text{O}-\text{C}$) at 1279 cm^{-1} . Adulterated tomato paste with paprika characterized with total phenolic compounds (42.7 ± 2.3) and high antioxidant activity ($78.3.8\%\pm 2.9$). The effect of processing on the volatile components present in tomato paste, ketchup and adulterated tomato paste with starch or paprika has been studied by gas chromatography (GC) and gas chromatography-mass spectrometry (GC/MS). The most predominant volatiles were saturated and unsaturated 6-carbon aldehydes and alcohols. Hexanal and (Z)-3-hexen-1-ol, (Z)-3-hexenol, 5-methyl-5-hexen-2-ol and 1-hexanol were present in significant concentrations in all samples. Methyl-(2-hydroxy-3-methyl)-valerate and methyl-(2-OH)-iso-methyl valerate were generated in tomato paste with high concentration (1.0 and 4.25%), respectively.

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Keywords: Fourier Transformer; Infrared Spectroscopy; Quality Assurance; Tomato

1. Introduction:

Tomato (*Lycopersicon esculentum*) is one of the most consumed fruits in the world, either as a raw fruit or as a processed product. In fact, in the entire world, tomatoes are second only to potatoes in economic importance and consumption and are used in the foodstuff industry as raw material for the production of several products such as juices, sauces, purees, pastes, and canned tomatoes. In recent decades, the consumption of tomatoes has been associated with the prevention of several diseases (Sharoni & Levi, 2006 and Wilcox et al., 2003) mainly due to the content of antioxidants, including carotenes (lycopene as well as β -carotene), ascorbic acid, tocopherol, and phenolic compounds (Periago et al., 2009). Lycopene is a hydrocarbon carotenoid, $\text{C}_{40}\text{H}_{56}$, with molecular weight 537.

Lycopene has been shown to have strong antioxidant activity; it exhibits the highest physical quenching rate constant with singlet oxygen; it induces cell-to-cell communication; and it modulates hormones, immune systems, and other metabolic pathways (Rao & Agarwal, 1999). Phenolic compounds exhibit a wide range of physiological properties, such as anti-allergenic, antiatherogenic, anti-inflammatory, anti-microbial, antioxidant, antithrombotic, cardioprotective, and vasodilator effects (Balasundram et al., 2006). Whereas

tocopherol and ascorbic acid are recognized as antioxidant vitamins and heat-labile compounds, lycopene and phenolic compounds are more resistant to thermal processing, being the main antioxidants in processed products. Related to the distribution of both compounds in tomatoes, it is recognized that the peel of tomato is richer in lycopene and phenolic compounds than the pulp (George et al., 2004).

Carotenoids are a group of pigments, varying from yellow to red in color, widely distributed in the vegetable and animal kingdoms. It is estimated that more than 100 million tonnes of these pigments are produced annually in nature, in which they serve as ancillary pigments in photosynthesis, antioxidants, membrane stabilizers, and phytohormone precursors (Fraser et al., 2007).

Monitoring quality of tomatoes is very important at all levels of the industry, including the breeding programs, the agricultural productions, and the postharvest managements as well as processing. Several different parameters such as soluble solids, dry matter, acidity, contents of sugars and organic acids are often used to assess the quality of tomatoes. Sugars and organic acids, which are responsible for the sweetness and tartness and influence on tomato flavour, are the major factors affecting consumer acceptability (Baldwin et al., 2008).

Soluble solids and dry matter are very important for the food industry, affecting processing yield of many tomato products such as pulp, paste and concentrate, which are evaporated to a definite percentage of solids (Gould, 1992). In consideration of the role played by sugars and acids contents in the definition of tomato quality, several analytical techniques have been developed to evaluate these parameters. However, traditional methods are not well adapted to on-line and require an expensive and time consuming sample preparation. Thus, the tomato production sector is interested in development of analytical method allowing simultaneous measurement of a large number of samples for routine quality control program.

The volatile compounds present in fresh and processed tomato are included in various chemical classes such as ketones, aldehydes, alcohols, esters, ethers, hydro- carbons, sulfur, nitrogen and oxygen compounds, phenols, oxygen-containing heterocyclic compounds, free acids and lactones (Linforth et al., 1994). Different methods, such as distillation, solvent extraction, head-space analysis and the solid phase micro-extraction (SPME) have been proposed to analyse volatile compounds in foods (Zhang and Pawliszyn, 1993). The SPME is a relatively new method that can be used to evaluate the volatile compounds present in the vapour and/or in the liquid phase of solid and liquid foods (Servili et al., 1998).

During processing the endogenous enzymes catalyze the formation of important compounds of tomato flavour. In fact saturated and unsaturated C6 and C9 alcohols and aldehydes, that are impact compounds of fresh tomato, are originated by lipoxygenase activity, while terpene and carotenoid derivatives can be released from odourless glycosidic compounds by glycosidase activities (Charron et al., 1995). The tomato processing includes thermal treatments applied to inactivate enzymes (blanching) or to stabilize the product (sterilization) that cause changes in sensory and nutritional characteristics of tomato derivatives due to co-oxidation reactions of carotenoids and Maillard reaction (Baldwin, 1996).

Separation and quantification of tomatoes components has been widely studied, and currently relies heavily on analysis by HPLC (Barba et al., 2006). Although reliable and accurate, this method is time consuming, requires extensive sample preparation, and uses and disposes of hazardous organic solvents. New techniques such as matrix-assisted laser desorption ionisation time-of-flight mass spectrometry, and one- and two-dimensional NMR have been successfully evaluated for profiling carotenoids in tomatoes (Fraser et al., 2007).

While relatively rapid and specific, these techniques are complex and rely on costly equipment

that limits their application to laboratory environments.

Vibrational spectroscopy, on the other hand, represents a cost effective simple alternative for the rapid profiling of carotenoids that could easily migrate to in-field applications thanks to the development of FT-IR and Raman portable devices. Rapid spectroscopy techniques for the evaluation of carotenoids have been developed, including the application of resonance Raman spectroscopy, mid-infrared (Halim et al., 2006) and near-infrared spectroscopy (Baranska et al., 2006). These novel quantification techniques could be improved with the development of a rapid and simple profiling method that can identify both components in tomatoes and their concentrations.

In the present study, the authors investigate the changes of chemical compositions and volatile components in tomato products by using GC and GC-MS. Spectroscopic techniques as FT-IR and FT-Raman used as fast methods to evaluate the chemical composition of tomato products and investigate the adulterants in tomato products.

2. Materials and Methods

Dichloromethane, sodium sulphate anhydrous, starch, gallic acid, 1,1-diphenyl-2-picrylhydrazyl (DPPH), tert-butyl hydroquinone (TBHQ), acetone, hexane, ethanol, β -carotene, allurared pigment, Folin-Ciocalteu reagent, *n*-alkanes and methanol, were purchased from (Aldrich and sigma company, Germany), standard lycopene was obtained from (Commercial Quimica Masso, S.A. Barcelona, Spain); Starch and paprika purchased from local market.

Fully matured tomatoes were procured from local market. Natural tomato juice, paste, ketchup and adulterated tomato paste with paprika, synthetic color (allura red) and starch were prepared in food technology Lab., National Research Centre as follows:

Tomato Juice and Paste

Fresh tomatoes were washed, crushed, scalded at 90°C for 5 min, and juice was obtain in the usual way after sieving and then sterilized at 100°C for 30 min, filled in bottle then cooled. The obtained tomato juice transferred to an open kettle which was heated until the concentration of the paste reached to > 25 brix, then filled in bottle and cooled (Apaiah and Barringer, 2007).

Ketchup:

The basic formulation of tomato ketchup was prepared as described by Srivastava (1982). Tomato pulp (4.7% TSS) was mixed with spices (sodium chloride, red chilies), onion and garlic pulp; heated on a low flame with constant stirring till 23%

TSS, then vinegar was added to the mixture and the ketchup was heated until the final TSS was reached. The thickening agents (starch) were pre-blended with the sugar and salt and added to the ketchup during the final stages of cooking, then hot ketchup filled in glass bottles and stored at ambient temperature (30°C) up till use.

Physico-chemical Analysis:

Tomatoes and their products were analyzed for Total Soluble Solids (TSS) using Digital Hand-held "Pocket" Refractometer; and pH was measured by digital pH meter, (Hanna, Italy). Also, Moisture, crude protein content, lipid content, and ash were estimated using AOAC (1990).

Extraction of lycopene

For extracting lycopene, 1 g of homogenized fresh or semi-dried tomato sample was weighed into a screw-top, which was covered with aluminum foil to exclude light and the lycopene from the samples was extracted using the method of Sadler et al (1990). In brief, a 25 ml mixture of hexane-acetone-ethanol (2:1:1, v: v: v) was added to the samples, which were then placed on the rotary mixer for 30 min. Agitation was continued for another 2 min after adding 10 ml of distilled water. The solution was then left to separate into distinct polar and non-polar layers and then the hexane layer was collected in a 50 ml flask.

The residual solids were re-extracted to ensure complete extraction of lycopene. The absorbance of the combined hexane layers was measured at 472 nm on UV-Vis recording spectrophotometer (UV-2100, Shimadzu) using hexane as a blank. The purity of the extracted standard lycopene was checked using its extinction coefficient ($E_{cm}^{1\%}$) of 3450 (Davis, 1976) and a standard curve was prepared. The amount of lycopene in the tomato samples was determined from this standard curve, and the results were expressed as mg/100 g.

Total carotenoid content

Total carotenoids were determined using the modified method described by Koca et al (2007). Extractions were carried out using 25ml of hexane: acetone (7:3) and 0.5 g of freeze dried sample using conditions described for antioxidant extractions. The residue was re-extracted until it became colorless. The filtrates were combined in a separating funnel and washed with 50 ml distilled water. The water phase was discarded and Na₂SO₄ (10 g) was added as desiccant. The hexane phase was transferred to a 50ml volumetric flask and brought to volume with hexane. The absorbance of this solution was then determined at 450 nm using a UV-Vis spectrophotometer. External calibration with authenticated β -carotene standards solutions (0.5 μ g/ml–10 μ g/ml) in hexane: acetone (7:3) was used to

quantify carotenoids in the solutions. Carotenoid content was expressed as β -carotene equivalents (β CE) in mg/100 g dry weight of sample.

Total phenolics content (TPC)

Total phenolics in tomato paste, ketchup and adulterated tomato paste with paprika or starch were measured by the method adapted from Spanos and Wrolstad (1990). In brief, the extracts were appropriately diluted and then oxidized with 2.5 ml of freshly diluted 0.2 M Folin-Ciocalteu reagent. This reaction was neutralized by adding 2.0 ml of 7.5% w/v sodium carbonate, and the samples were vortexed for 20 sec. The samples were then incubated at 45 °C for 15 min and the absorbance of the resulting blue color was measured at 765 nm on an UV-Vis recording spectrophotometer (UV-2100, Shimadzu). Gallic acid was used as a standard, and results were expressed as gallic acid equivalents (GAE) per 100 g fresh weight (FW). The results were corrected for the contribution of ascorbic acid to the total phenolics as described by Toor (2004).

Antioxidant activity by DPPH method

The hydrogen atom or electron-donation ability of the corresponding extracts/ fractions was measured from the bleaching of a purple-colored methanol solution of DPPH. The antioxidant activity of the extracts/fractions, on the basis of the scavenging activity of the stable 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical, was determined by the method described by Gordon et al (2001). A methanolic solution (100 μ L) of the extracts/ fractions was placed in a cuvette and 0.5 ml of a methanolic solution of DPPH (50 mg DPPH/100 ml MeOH) was added. After 30 min absorbance at 515 nm was determined using a spectrophotometer (Shimadzu Co. Ltd., Kyoto, Japan), all determinations were performed in triplicate.

Instrumental Color Analysis

Color measurement (L^* , a^* , b^*) were measured using Hunter Lab. This color assessment system is based on the Hunter L^* , a^* and b^* coordinates. L^* was representing lightness and darkness, $+a^*$ redness, $-a^*$ greenness, $+b^*$ yellowness and $-b^*$ blueness (Hunter, LabScan XE - Reston VA, USA). The instrument was standardization against a White Tile of Hunter Lab Color Standard (LX No.16379): $X=77.26$, $Y=81.94$ and $Z=88.14$ before each measurement.

Infrared and Raman spectroscopy

The spectra or fingerprints of the selected samples were obtained using FT-Raman and/or FT-IR spectroscopy. The samples of FT-IR (FT-IR-6100

Jasco, Japan) were prepared by using potassium bromide disks. FT-Raman spectra were obtained using a Nicolet Raman module 32B (Madison WI, USA) and ND-YAG laser source operated at 1064 nm with a maximum power at 0.7w.

Preparation of volatile concentrate by simultaneous steam distillation-extraction (SDE)

The author used the simultaneous steam distillation-extraction (SDE) described by Shultz et al. (1977) which used the modified apparatus of Nickerson and Likens, in order to collect the volatile components from tomato products. 200 gm of tomato products was placed in 1 L round flask. The volatiles were extracted by using (DCM) and the extracts were concentrated by using rotary evaporator. The obtained concentrates were analyzed using gas chromatography and gas chromatography-mass spectroscopy.

Analysis of the volatiles

Gas chromatography

The obtained volatiles samples were thermally desorbed, using a modified injector port, directly on the front of a (DB5) (60 m x 0.32 mm i.d) fused silica capillary column, in the oven of a Hewlett-packed HP 5890 gas chromatography, and temperature increase from 45 -240°C by the rate 2°C/min. Kovat's indices were determined by co-injection of the sample with a solution containing homologous series of n-hydrocarbons (C₆-C₂₄) under the same conditions as described above. The separated components were identified by matching with NIST mass -spectral library data, and by comparison of Kovat's indices with those of authentic components and with published data (Adams, 1995). RI of each compound was calculated from the standard n-alkane retention time and the peak retention time using the following equation.

$$R. I = [Rt_x - Rt_n / Rt_{n+1} - Rt_n] \times 100.$$

Where, RI = retention indices.

Rt_x = retention time of sample.

Rt_n = retention time of n-alkane before peak.

Rt_{n+1} = retention time of n-alkane after peak.

n= carbon number of n-alkane before peak.

3.4.2. Gas chromatography- mass spectrometry (GC-MS)

Analyses were performed on An HP model 6890 GC interfaced to an HP 5791A mass selective detector (GC/ MS) was used for mass spectral identification of the GC components at (MS) ionization voltage of (70 eV. A 30 m x 0.25 mm i.d). (DF = 0.25 lm) DB wax bonded-phase fused-silica capillary column was used for (GC). The linear velocity of the helium carrier gas was 30 cm/s. The injector and the detector temperatures were 250 °C. The oven temperature was programmed from 40 to 240 °C at 4 °C/ min and held for 50 min.

Statistics

All data is reported as mean ± standard error of the mean for three replicates. One-way analysis of variance (ANOVA) was used and the least significant difference (LSD) at *p* < 0.05 was calculated (Genstat, 2000) to determine significant differences between the different fractions of tomatoes. Two-way analysis of variance was also performed to study the interactions between tomato paste and adulterated tomato samples.

3. Results and discussion

Table (1) showed the proximate gross chemical composition of tomato and their products. Fresh tomato and its juice had higher moisture content accompanied with lower other contents. Thermal concentration of tomato products caused a reduction in moisture contents (71.43 and 72.33% in ketchup and tomato paste), while adulterant tomato paste with starch led to a higher decline in moisture content (60.33%) and increment in total carbohydrate (30.5%). These results indicated that gross chemical composition unable to detect adulterant paste with paprika; on contrary adulterant paste with starch showed higher carbohydrate content.

Table (1): Chemical composition of tomato and their products.

Sample	Moisture	Protein	Fat	Ash	Carbohydrate
Tomato	92.57±1.32	1.2±0.09	0.22±0.01	1.28±0.03	4.5±0.2
Juice	93.6±1.05	0.8±0.1	0.23±0.10	1.1±0.1	4.3±0.2
Ketchup	71.43±0.6	3.0±0.25	0.5±0.02	1.4±0.01	22.7±0.3
Paste	72.33±0.55	4.4±0.30	2.4±0.2	2.73±0.25	18.5±0.15
Adulterated Paste					
Paste+paprika	71.3±0.55	4.4±0.30	2.4±0.2	2.73±0.25	18.5±0.15
Paste+starch	60.33±0.5	3.2.4±0.2	2.4±0.2	2.73±0.20	30.5±0.17

Table (2) indicated that, TSS and pH were in accepted range; and tomato ketchup records a high

value of TSS (30.3) followed by tomato paste. Also, TSS was unable to detect adulterant tomato paste.

Table (2): Total soluble solids (TSS) and pH of tomato paste, ketchup and adulterated tomato paste with starch and paprika products.

Parameter	Fresh Juice	ketchup	Tomato Paste (Control)	Adulterated Tomato paste	
				(+) Starch	(+) Red pepper
TSS	4.07	30.3	25.79	25.53	23.56
pH	3.56	3.08	3.86	3.89	3.84

Lycopene is the major carotenoid pigment found in ripe tomato fruits and responsible for their characteristic red color. Sensory and instrumental techniques are used to determine the color of food products. Data in Table (3) showed the color variation of tomato and tomato products as affected by heat treatments or by adulteration the color with

synthetic, allura red or thickener agent (starch). The highest redness value (a^*) was found in tomato paste that treated with synthetic pigments (allura red). This result indicated that, the color parameter of Hunter measurements (L^* , a^* & b^*) represent color value but the quality of tomato natural pigment (lycopene) not identified.

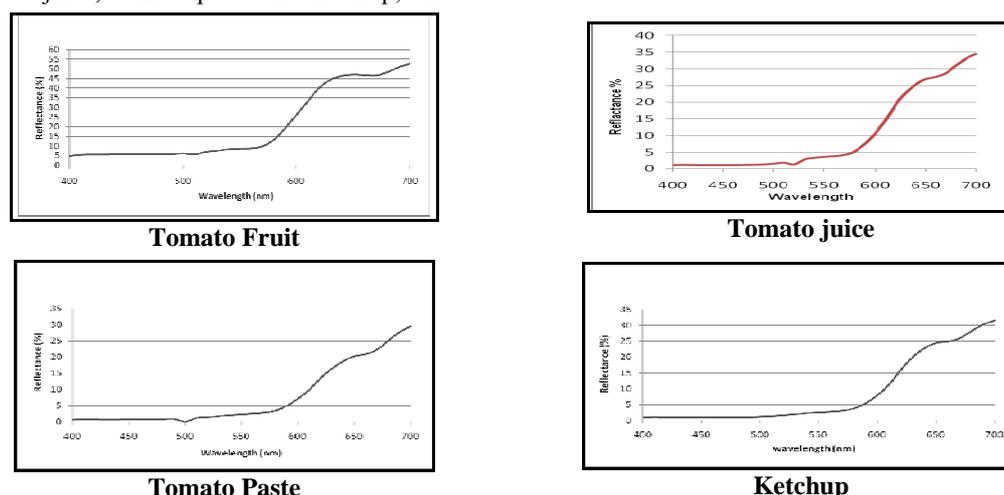
Table (3): Hunter color parameter of tomato fruits, Tomato juice, tomato paste, ketchup and adulterated tomato best with thickener agent (starch) or color agent (red pepper)

Sample	L^*	a^*	b^*
Tomato fruit	30.75 ^c ±0.116	30.9 ^d ±2.15	25.57 ^f ±1.11
Tomato pulp	46.62 ^a ±0.215	27.48 ^f ±1.09	30.03 ^b ±2.48
Tamato juice	43.63 ^b ±0.419	33.57 ^c ±0.89	26.28 ^{ef} ±0.4
Tomato Paste	27.88 ^d ±0.049	36.11 ^b ±0.23	26.98 ^{def} ±0.129
Ketchup	25.26 ^e ±0.0552	31.5 ^d ±0.12	26.98 ^{def} ±0.194
Adulterated Tomato Paste:			
Tomato Paste + starch	30.51 ^c ±0.056	34.64 ^c ±0.2	27.18 ^{de} ±0.1
Tomato Paste + Paprika	25.54 ^e ±0.045	28.3 ^{ef} ±0.024	27.98 ^{cd} ±0.067
Tomato Paste + anthocyanine	24.65 ^f ±0.065	40.71 ^a ±0.117	38.07 ^a ±0.33
Tomato Paste + Allura red	25.63 ^e ±0.344	36.27 ^b ±0.09	29.31 ^{bc} ±0.1
LSD at 0.05	0.586	1.43	1.45

L^* = lightness a^* = Redness b^* = Yellowness

Since lycopene is a phytonutrient, so the quality control requires the ability to measure lycopene in tomato product. Hunter color instrument was used to evaluate reflectance spectra of tomato fruits, tomato juice, tomato paste and ketchup; and

illustrated in Figure (1). The obtained reflectance spectra of tomato and their products were characterized by a sharp enhancement in 600 and 700 nm till reached 35% reflectance.

**Figure (1): Reflectance of tomato fruit, tomato juice, tomato paste and ketchup.**

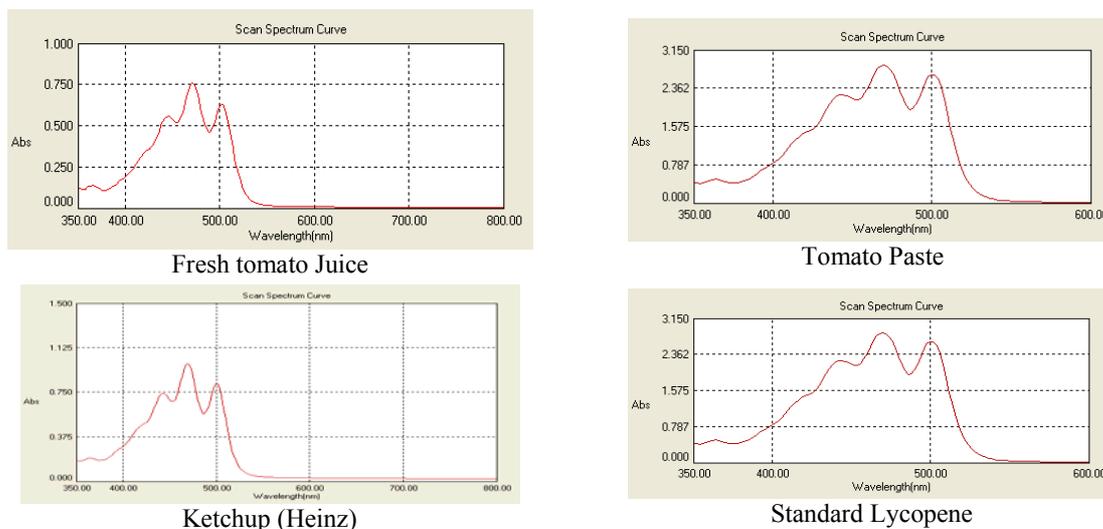


Figure (2): UV-visible spectrophotometer scanning of fresh tomato juice, tomato paste and ketchup.

Table (4): Total carotenoids of tomato products.

Tomato products	Total carotenoids (mg/100g)
Tomato Juice	6.74
Tomato Paste	34.31
Ketchup	8.71

The previous results concluded that, traditional methods were not quite enough to identify adulterated products with pigments in tomato products. But, there are chromatographic methods to detect nature and synthetic pigments as Gas Chromatography (GC), Gas Chromatography-Mass spectroscopy (GC-MS) and High performance liquid chromatography (HPLC). These methods are expensive and time consuming due to their extraction technique, purification (clean up) and different types of detector. Mid-infrared spectroscopy have been frequently proposed (Rubio-Diaz et al., 2010) as alternatives to HPLC for the simple, high-throughput and cost effective analysis of tomato carotenoids. This study aimed to evaluate and detect main finger prints of tomato and their products referred to lycopene pigment, so they were measured directly as shown in Table (5) or extracted as shown in Table (3).

FT-IR spectral peaks (Table 5 & Fig 3) of all samples showed stretching OH, stretching C=C of lycopene, aliphatic CH at (3437-3426 cm^{-1}), (1635-1637 cm^{-1}) and (1410 - 1414 cm^{-1}), respectively. While the band at 1150 cm^{-1} found in fresh tomato and tomato juice; and also stretching CH₃ of polyene system (1033-1037 cm^{-1}) was detected in them. The other bands of carbohydrates were identified in ketchup only.

Moreover, UV-visible spectrophotometer (Choudhary et al., 2009) was used to evaluate natural pigment (lycopene) in tomato and their products. Tomato and their products showed three strong peaks at 450, 470 and 500 nm as shown in Figure (2). Table (4) showed the total carotenoids of some tomato products, where tomato paste was the highest carotenoids value (34.31 mg/100g) among other products. On the other hand, synthetic pigment (anthocyanine and allura red) that used to adulterate tomato products not detected by spectrophotometer method because they found as pigment salts.

Table (6) and Figure (4) showed FT-IR spectra of standard lycopene and extracted fresh tomato, tomato juice, tomato paste and ketchup. Standard lycopene was characterized with specific spectral functional bands as stretching CH symmetric and asymmetric (2921 and 2854 cm^{-1}), stretching vibration of cis-vinylene (1630 cm^{-1}), deformation CH₃, trans-R-HC=CH-R (970 cm^{-1}). Fresh tomato, tomato juice, tomato paste and ketchup extracts showed different spectral function groups in the region (2920-2924 cm^{-1}) to (1381-1390 cm^{-1}) which attributed to stretching CH symmetric and asymmetric, stretching vibration of cis-vinylene, deformation CH₃. While, ketchup extract was characterized with multiple trans-double bond at (920 cm^{-1}).

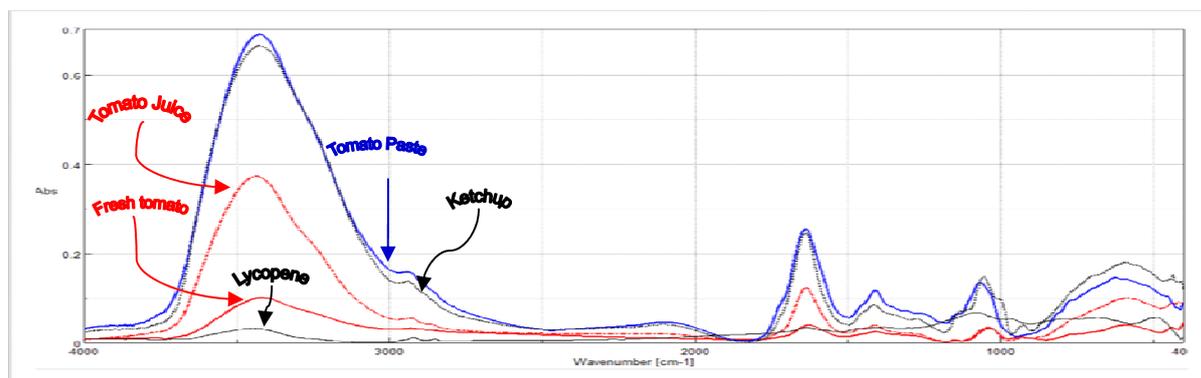


Figure (3): FTIR spectra of standard lycopene pigment, fresh tomato and its products.

Table (5): FT-IR assignments of fresh tomato and their products.

Assignment	Fresh Tomato	Tomato Juice	Tomato Paste	Ketchup
OH stretching	3430	3437	3425	3426
CH ₂ asymmetrical	-----	2929	-----	2929
V C=C of olefin	1635	1635	1637	1637
CH stretching of pectin	1410	1410	1410	1410
CH ₃ stretching of polyene system	1033	1037	-----	-----
V CO, V CC of glucose	-----	-----	1067	1053
Stretching C-C	1150	1150	-----	-----
Stretching CH+OH of carbohydrates	-----	-----	-----	1271
Stretching CCH, C-OH of carbohydrates	-----	-----	-----	926

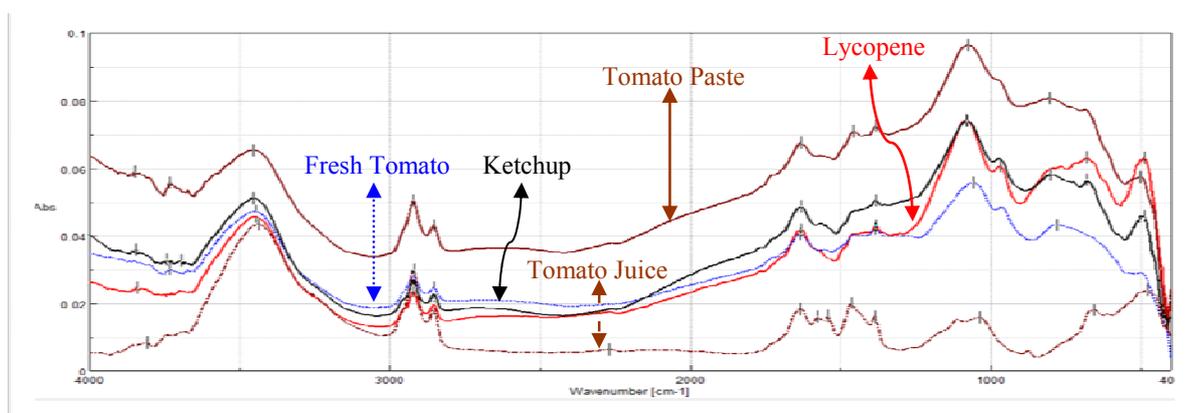


Figure (4): FT-IR spectra (fingerprints) of standard lycopene, extracted fresh tomato, tomato juice, tomato paste and ketchup.

Table (6): FT-IR spectra of extracted tomato and tomato products.

Functional groups	Lycopene	Fresh tomato	Tomato juice	Tomato paste	Ketchup
Stretching (CH) symmetric	2921	2923	2920	2922	2924
Stretching (CH) symmetric	2854	2855	2853	2854	2857
Stretching vibration of cis-vinylene	1630	1639	1636	1635	1640
Deformation (CH ₃)	1381	1390	1385	1387	1385
Stretching (CH-CH)	1082	-----	-----	-----	-----
Trans-R-HC=CH-R	970	957	-----	-----	-----
Multiple trans-double bond	-----	-----	-----	-----	920

FT-IR spectroscopy was applied to identify lycopene content in adulterated tomato paste with paprika. Table (7) and Figure (5) represents the FT-IR spectra of tomato products. The strong absorption of lycopene pigment was matched with fresh tomato juice and their products as tomato paste with paprika and ketchup. Fresh tomato juice, ketchup and paste contain the following functional groups as OH stretching ($3442-3446\text{ cm}^{-1}$), $-\text{CH}_2$ vibrational symmetric, vibrational stretching $\text{C}=\text{C}$ ($1634-1640\text{ cm}^{-1}$). However, amide II, CH_2 of trans-lycopene, CH_3 attached with polyene system appeared at ($1541-1550\text{ cm}^{-1}$), ($1458-1465\text{ cm}^{-1}$), ($1385-1390\text{ cm}^{-1}$),

respectively. The CH stretching of adulterated paste with paprika showed CH_2 , C-C-H and C-OH stretching of carbohydrates (Inbaraj and Chen, 2008). The lycopene pigment was assigned with specific spectral bands with the region ($3450-960\text{ cm}^{-1}$). The 960 , 1082 , 1156 and 1444 cm^{-1} were belonged to R-CH=CH-R, CH_3 attached with polyene system, stretching C-C, vibrational CH_3 of lycopene molecule and vibrational symmetric of lycopene. Vibrational $\text{C}=\text{C}$, CH_2 stretching symmetrical and asymmetric were found at specific wave number at 1643 , 2856 , 2924 cm^{-1} , respectively (Irudayaraj and Tewari, 2003).

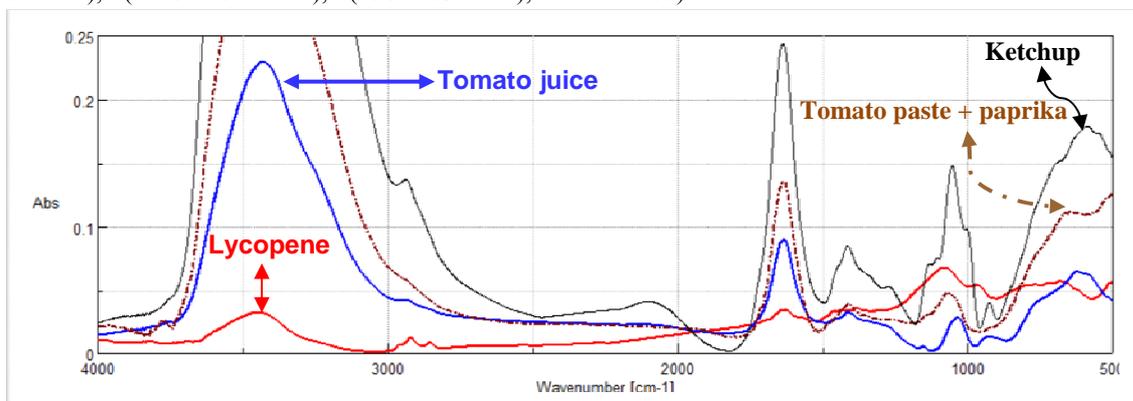


Figure (5): FT-IR spectral (cm^{-1}) assignment of lycopene, fresh tomato juice, paste + paprika and ketchup.

Table (7): FT-IR spectral (cm^{-1}) assignment of standard lycopene, and extracted fresh tomato juice, paste with paprika and ketchup

Assignment	Lycopene	Tomato Juice	Paste+Paprika	Ketchup
Stretching OH	3450	3442	3430	3446
CH_2 asymmetrical	2924	2923	---	2924
CH_2 asymmetrical	2856	2855	---	2857
V $\text{C}=\text{C}$ of olefin	1643	1639	1634	1640
Amide II	---	1550	---	1540
V $\text{C}=\text{C}$	1510	1515	1520	---
V symmetrical of CH_2 of lycopene	1444	1465	---	1458
CH stretching	---	---	1410	---
CH_3 stretching of polyene system	---	1036	---	1022
R-CH=CH-R of lycopene	960	---	---	---
Stretching CCH, C-OH	---	920	---	---

Confirmation of the authenticity of a food or food ingredient is an increasing challenger for food processors and regulatory authorities. Table (8) shows the IR spectra of allura red, and adulterated tomato paste with allura red pigment. The obtained FT-IR spectra attributed to spectra of specific function groups as well as vibrational $\text{C}=\text{C}$ stretching 1631 , 1633 cm^{-1} and vibration C-C stretching at 1048 , 1063 cm^{-1} in pigment and adulterated tomato

paste with allura red pigment, respectively (Bureau et al., 2009).

Confirmation of the authenticity of a food or food ingredient is an increasing challenger for food processors and regulatory authorities. So, FT-IR spectroscopy was used to detect starch or paprika that could be added to tomato paste. Tomatoes and various product derived from processed tomatoes are the major source of lycopene, a polyenic

chromophore with trans RH-C=CHR groups, other micronutrients and carotenoids such as β -carotene are present in tomato fruit. In addition, Table (9) and Figure (6) show some difference in FT-IR spectra of tomato paste that mixed with starch or paprika.

Starch carbohydrate peaks at 1137 cm^{-1} and 1040 cm^{-1} detected in paste that mixed with starch only. While, mixed tomato paste with paprika showed specific spectral peaks located at 641 for stretching (CH_2 , CH) and 1520 cm^{-1} for vibrational stretching of (C=C).

Table (8): FT-IR assignments of adulterated tomato paste with allura red.

Assignment	Allura red	Tomato Paste with allura red
NH stretching in allura red	3444	-----
Stretching C=C aromatic	1631	1633
Vibrational C=C aromatic system	1490	-----
=CH stretching	-----	1410
CH ₂ bending	1225	-----
C-N=N-C	1192	-----
Vibrational C-C	1048	1063
V CCC of carbohydrate	-----	903

Table (9): FT-IR assignment (cm^{-1}) of tomatoes paste mixed with paprika and starch.

Functional groups	Tomatoes Paste with	
	Red paper	Starch
Str. (OH) of water	3430	3428
Str. (CH) _{sym.}	-----	2982
(OH) bend. of water	1636	1636
□ (C=C)	1520	-----
(OCH ₃ , COH) _{deform.} of carbohydrate	1410	1411
□ (C-C), (C-C) _{bend.} and v (C-O)	-----	1137
Str. (C-C)	-----	1040
□ (CO + □ CCH), □ _{asym.} of pyranose ring	-----	920
CH ₂ +CH of carbohydrate	641	-----

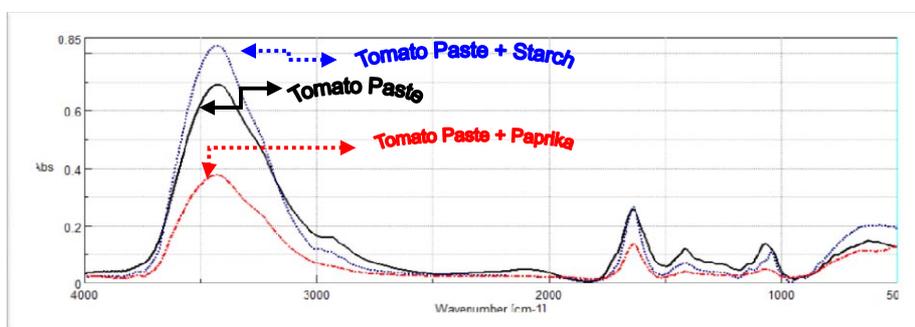


Figure (6): FT-IR spectra (cm^{-1}) of tomato paste and tomato paste that mixed with starch or paprika

Total phenolic content

Polyphenolic compounds, carotenoids and lycopene are very important tomato and its products constituents, by virtue of their antioxidant activity by chelating redox-active metal ions, inactivating lipid free radical chains and preventing hydroperoxide conversion into reactive oxyradicals. Table (10) summarizes the contents of total phenolics, expressed as gallic acid equivalents (GAE), either as mg GAE g^{-1} or mg GAE/100 g^{-1} , found in the extracts. These values were obtained from the absorbance of the extracts treated with Folin-Ciocalteu reagent.

These data indicate the TPCs of the tested tomato extracts, which could strongly account for the antioxidant activities of the samples. phenolic compounds react with Folin-Ciocalteu reagent only under basic conditions ($\text{pH} \sim 10$) due to a much higher reactivity of the phenolate anion with the molybdenum-based compounds present in the reagent (Huang and Prior, 2005). TPCs of tomato paste with paprika showed highly TPCs followed with tomato paste, tomato paste, tomato paste and ketchup, respectively with (42.7 ± 2.3 , 33.1 ± 2.7 , 32.3 ± 1.8 and 29.1 ± 1.8 GAE/100 g). George et al. (2004) reported that the phenolic content in the tomato genotypes

ranged from 9–27 mg catechin equivalents/100 g; and in pulp and tomato products the phenolic content ranged from 12-32 mg catechin equivalents/100 g.

the high TPCs in tomato paste with paprika may due to lycopene, carotenoids and capsenoids contents.

Table (10): Total phenolic contents in tomato products

Samples	mg GAE/100 g ⁻¹
ketchup	29.1±1.8
Tomato paste	33.1±2.7
Tomato +paprika	42.7±2.3
Tomato paste +starch	32.3±1.8

Antioxidant activity by DPPH method

Table (11) shows the antioxidant activity of tomato products (tomato paste, ketchup and adulterated samples with starch or paprika pepper) as measured by the DPPH assay. The addition of tomato extracts and TBHQ at various concentrations (50, 100, 200, 400 µg/ ml) respectively, prevented the decolourization of DPPH reagent to different degrees. The antioxidant activity was found to increase with the increase in concentration of tomato extracts. For the all tomato extracts, the increase of antioxidant activities were significant between 50µg/ ml and

100µg/ ml ($P < 0.05$), and 200 µg/ml and 400 µg/ ml ($P < 0.01$). The free radical-scavenging of tomato paste with paprika pepper was superior to all other extracts in dose dependent manner (78.3.8%±2.9, 70.8±2.3, 69.4%±2.3 and 67%±2.4) at 400µg/ml compared to TBHQ (99.5± 0.64 % at 400µg/ ml), a synthetic antioxidant widely used in food chemistry George et al. (2004). The highly antioxidant activity of tomato paste with paprika is due to the presence of lycopene, carotenoids and capsenoids and other phenolic compounds respectively.

Table (11): Antioxidant activity of tomato paste, adulterated tomato paste with paprika or starch and ketchup by DPPH scavenging assay

Samples	50 µg/ml	100 µg/ml	150 µg/ml	200 µg/ml
Tomato paste	18.9%±2.4	27.5%±2.7	42%±2.6	70.8±2.3
Tomato +paprika	22%±3.1	39%±3.0	57.5%±2.8	78.3.8%±2.9
Tomato paste +starch	19.7%±2.2	31.2%±2.5	52%±2.3	69.4%±2.3
Ketchup	15%±1.8	28%±2.8	40%±3.1	67%±2.4
TBHQ	85%±1.9	95.2%±2.3	99.5%±2.4	99.5%±1.8

Volatile components of tomato paste, ketchup and adulterated tomato paste with starch and paprika

Table (12) shows the relative amounts of most major volatile components obtained by SDE of tomato paste and other products. Tomato volatile compounds have been widely studied and until now, more than 400 volatile components were identified (Beltran et al., 2006). Their formation is the result of different biosynthetic pathways. For instant, saturated and unsaturated C₆-C₉ aldehydes and alcohols are a secondary metabolites originating from the lipoxygenase (LOX) pathways (Russo et al., 2010), while carotenoids and terpene derivatives are originated by glycosides activities (Servilli et al., 2000). These volatiles were identified by matching their recorded mass spectra with those present in the NIST library and comparison of their retention indices (RI) relative to (C₆-C₂₄) n-alkanes with those in the literature at the same chromatographic conditions.

The most predominant volatiles were saturated and unsaturated 6-carbon aldehydes and alcohols. hexenal and (Z)-3-hexen-1-ol, (Z)-3-hexenol, 5-methyl-5-hexen-2-ol and 1-hexanol were

present in significant concentrations in all samples, and contribute a green, leafy herbaceous aroma. These compounds have been previously associated with the characteristic green, tomato fruit-like aroma released by tomato leaves and present in processed tomato products (Buttery et al., 1993).

The reduction products, (Z)-3-hexen-1-ol and (Z)-3-hexenol, were observed at lower concentrations in adulterated tomato paste with paprika and starch and absent in tomato paste and ketchup; (Z)-3-hexen-1-ol was previously reported by Buttery and Ling (1993) to form in tomato via a reductase conversion pathway. Hexanal, one of the major aldehydes in tomato flavor and identified in tomato paste with high concentration rather than other tomato products with (4.1%), also is considered to be important for fresh tomato flavor (Buttery et al., 1989).

Hexanal is a contributor to the green, fatty component of tomato aroma. Similar to the unsaturated aldehydes, it is derived from a linoleic acid breakdown pathway. 1-Hexanol provides a winey, cider-like character and is produced via bio-reduction of hexanal. Other significant aldehydes include 8- to 10-carbon enals including 2-octenal, (E)-2-nonenal, and (E, E)-2, 4-decadienal, which

contribute fatty green aromatics. After the aldehydes, the largest volatile classes of compounds identified in tomato paste, ketchup and adulterated samples with paprika and starch were esters.

Among these were butyl, iso-butylacetate, butyl acetate, methyl-(2-OH)-valerate, methylhexanoate, methyl-(2-OH)-3-methyl iso-valerate, methylbenzoate, ethyldecanoate, linallyl valerate, ethyl-(*E*)-cinnmate and iso-propyl benzoate. Aromatic esters include methyl and propyl benzoate, and ethyl-(*E*)-cinnmate. Two unique hydroxy esters were identified by matches with the mass spectral library: methyl-(2-hydroxy-3-methyl)-valerate, and methyl-(2-OH)-3-methyl valerate the latter which was only found in cooked tomato paste.

Carotenoid-derived terpene compounds comprise a third class of volatiles identified in tomatillo flavor. The oxidative decomposition of carotenoids, particularly lycopene and p-carotene, has

previously been shown to lead to the formation of terpene and terpene-like compounds in tomato flavor (Buttery et al., 1989).

Unique terpenes identified in tomatillo include a-terpinolene, terpinen-4-ol, iso-eugenol and linalool oxide (in adulterated tomato paste with paprika), syringol geraniol (in adulterated tomato samples), linalool (in ketchup and adulterated tomato with starch), cadinene, β -isoabolol, β -terpinene. Identifications of other terpene-derived tomato volatiles previously reported in processed tomato products include 6-methyl-5-hepten-2-one, while eudesmol was found in adulterated starch samples with (8.76%). The amino acid-derived volatiles including 2-phenylethanol, pyridine. These compounds play a considerable role in cooked tomato flavor and are also present in the mature green stage of tomato development (Gabriella et al., 2011).

Table (12): Volatile components of tomato paste, ketchup and adulterated samples with paprika or starch

Peak No.	Compounds	RI	tomato ketchup	Tomato paste	Adulterated Paste	
					Paprika	Starch
1	2-Ethylfuran	715	0.79	nd	nd	0.04
2	Dimethyl disulphide	732	nd	1.17	0.77	0.81
3	Pyridine	745	0.20	0.10	1.3	0.15
4	Acetic acid	758	1.00	6.25	4.81	1.16
5	Iso-butyl acetate	772	1.00	8.08	6.01	1.69
6	Butyric acid	781	0.50	3.96	2.73	0.80
7	Hexanal	789	1.48	4.10	2.57	0.83
8	Butyl acetate	810	24.68	0.80	0.16	0.05
9	3-Furaldehyde	822	nd	1.04	1.06	2.34
10	(<i>E</i>)-2-hexanal	831	nd	nd	0.18	0.39
11	(<i>Z</i>)-3-hexen-1-ol	854	0.96	6.27	6.53	1.97
12	(<i>Z</i>)-3-hexanol	858	nd	nd	0.84	0.32
13	5-Methyl-5-hexen-2-ol	865	0.60	0.84	1.07	0.34
14	(<i>Z</i>)-3-Hexen-1-ol	875	nd	nd	0.41	0.22
15	1-Hexanol	882	2.19	18.81	14.24	4.57
16	Methyl-(2-OH)-iso-valerate	886	3.30	4.25	4.17	1.33
17	2,4-Hexadienal	918	0.20	1.36	0.55	0.09
18	Methylhexanoate	931	3.84	0.56	0.55	0.16
19	benzaldehyde	940	nd	0.93	1.3	0.43
20	(<i>E</i>)-2-heptanal	955	nd	nd	0.34	0.09
21	Dimethyltrisulphide	962	nd	nd	0.33	0.12
22	6-Methyl-5-hepten-2-one	987	nd	nd	0.23	0.31
23	Methyl-(2-OH)-3-methyl)-valerate	994	0.61	1.00	0.34	0.3
24	(<i>Z</i>)-3-hexen-1-yl acetate	1006	nd	nd	0.29	0.16
25	2-Octenal	1062	nd	0.80	0.64	0.33

Peak No.	Compounds	RI	tomato ketchup	Tomato paste	Adulterated Paste	
					Paprika	Starch
26	Methyl benzoate	1089	1.20	nd	nd	0.16
27	2-phenyl ethanol	1115	0.15	0.10	0.42	0.22
28	(E)-2-nonenal	1154	7.80	nd	0.19	0.15
29	Terpienen-4-ol	1168	1.18	nd	nd	nd
30	Ethyl octanoate	1190	36.01	nd	nd	0.11
31	Decenal	1195	nd	nd	nd	1.08
32	Linalool oxide	1210	nd	nd	0.40	1.90
33	(E)-2-decenal	1247	nd	nd	0.25	0.21
34	Geraniol	1282	nd	nd	0.10	1.12
35	(E, E)-2,4-decadienal	1310	0.42	0.30	5.76	1.36
36	Syringol	1364	nd	nd	1.15	0.10
37	Iso-eugenol	1370	nd	nd	4.49	nd
38	Dodecanal	1404	nd	0.68	0.68	nd
39	(E)-octenal	1424	0.30	4.16	0.61	2.70
40	Tridecane	1446	nd	0.54	nd	nd
41	γ -Muurolene	1472	nd	0.99	0.32	0.19
42	(E,E)-2,4-heptadienal	1482	0.42	nd	0.41	0.22
43	Valecene	1491	5.24	nd	0.14	0.16
44	Ethyl laurate	1495	3.83	nd	0.14	0.11
45	Methoxy saffrole	1512	0.11	nd	0.23	0.18
46	Linallyl valerate	1522	1.14	2.86	9.86	4.94
47	Linalool	1445	0.36	nd	nd	22.56
48	Iso-propyl benzoate	1573	0.14	1.45	0.62	0.03
49	(E)-ISO-elemicin	1590	nd	0.57	0.49	0.28
50	Cadinene	1614	0.66	2.55	5.12	0.50
51	Iso-eugenol	1628	0.33	1.14	0.80	24.64
52	β -Isoabolol	1676	0.14	15.66	11.40	5.46
53	β -Terpineol	1682	0.25	0.66	0.29	0.24
54	Heptadecane	1722	0.23	1.23	0.54	0.09
56	(E)-Farnesol	1737	0.25	1.67	0.62	0.17
57	Ethyl-(E)-cinnamate	1740	nd	0.96	0.46	0.25
58	(-)-Nootkatone	812	nd	1.34	0.53	0.45
59	Eudesmol	1884	nd	nd	nd	8.76

nd: not detected, RI: retention index

4. Conclusion:

The study suggested using FT-IR spectroscopy as a simple and fast technique for quality assurance of tomato products. The author used FT-IR technique to investigate the presence of adulterants in tomato paste such as synthetic colorants (allura red) and thickening agent (starch). Also, tomatoes paste, ketchup and tomato paste with paprika characterized with high phenolic and antioxidant compounds. Volatile components of tomato paste, ketchup and adulterated tomato paste

with paprika and starch were affected by thermal processing.

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Detecting Adulteration of Durum Wheat Pasta by FT-IR Spectroscopy

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Abstract: Hard wheat flour and durum of different extraction level (whole meal, 82% and 72%) and their pasta products were evaluated by the ordinary methods in parallel with FT-IR spectroscopy. Chemically, there was considerable difference between hard wheat flour and durum in protein and crude fiber contents. Durum whole meal, hard wheat flour (72%) and durum adulterated with hard wheat flour 72% (1:1) were used to prepare high quality pasta and adulterated pasta, respectively. Color analysis showed that, addition of hard wheat to durum increased the lightness values but decreased the redness and yellowness values. Also, pasta processed from these raw materials had the same character except lightness. Cooked pasta had no significant differences in lightness and redness values while there were significant differences in yellowness values of the cooked pasta. Sensory evaluation of pasta made from durum and hard wheat and their mixture showed that, there were significant differences between them in all sensory properties. Cooking quality of pasta revealed that, the weight of hard wheat pasta increased more than durum pasta, while, the volume of durum pasta was higher than hard wheat pasta. Cooking loss was very lower in durum pasta than hard wheat pasta. Since, wheat and their products contain different polar functional groups such as lipids, carbohydrates and proteins, FT-IR spectroscopy was used as a beneficial tool for detecting adulteration of pasta. The FT-IR results showed that hard wheat (72%) was recognized from durum (72%) by presence of two specific bands at 1420 and 1375 cm^{-1} which are nearly disappeared in durum, while durum was characterized by two absorption bands at 2857 and 1745 cm^{-1} . FT-IR spectral analysis of durum pasta and adulterated ones showed the same results of durum and wheat flour raw materials.

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1. Introduction

Pasta is one of popular wheat products worldwide, manufactured from special type of wheat known as durum wheat that gives the required quality of the pasta (Sisson, 2008). Most countries legislation stipulates that pasta must be made from (*Triticum durum*) semolina. Addition of common wheat is the most common adulteration in industrially made pasta. Food authenticity is a subject of serious concern to the consumers and food authorities, where correct and adequate labeling of food composition has become crucial. Besides the composition of specific foods is always a key factor in the quality of the final product (Aktas *et al.*, 2009; Gupta and Panchal, 2009; Terzi *et al.*, 2003). Different techniques have been used to determine the level of common wheat adulteration in pasta, but methods concerning sitosterol palmitate (Matveff, 1952) or water soluble proteins specific to common wheat (Resmini, 1968; Garcia *et al.*, 1969; Feillet and Kobrehel, 1972) were not specific enough or not sensitive enough. Recently, several methods had been invented to investigate adulteration of durum wheat pasta, these included near infrared spectroscopy (Cocchi *et al.*, 2006); immunoassay (Stevenson *et al.*, 1994) and polymerase chain reaction (PCR) method (Alary *et al.*

2002). Near Infrared spectroscopy is a widespread technique used in many fields of analytical chemistry including the quality control of foodstuffs (Bertrand *et al.*, 1985; Sirieix and Downey 1993; Shenk *et al.*, 2001 and Barton *et al.*, 2000). In the field of cereal analysis, NIR spectroscopy being successful in modeling many quality variables such as protein, moisture, dietary fiber contents and wheat hardness (Manley *et al.*, 2002; Osborne, 2000).

In present work, FT-IR spectroscopic technique was applied to differentiate between two Egyptian wheat varieties and to detect the adulteration of durum pasta in parallel with the common evaluation methods of chemical composition, color parameters, cooking quality and sensory evaluation.

2. Materials and Methods

Hard wheat (Sakha 93) and durum wheat (Sohage 3.) were obtained from Field Crops Department, Agricultural Research Centre, Ministry of Agriculture, Giza, Egypt. The properties of the selected samples were identified using chemo-physical methods in parallel with FT-IR Spectroscopy.

The moisture, proteins, carbohydrates, fats, fiber and ash content in wheat flour and durum were

determined by A.O.A.C (1990). Color measurement (L^* , a^* , b^*) were measured using Hunter Lab. This color assessment system is based on the Hunter L^* , a^* and b^* coordinates. L^* was representing lightness and darkness, $+a^*$ redness, $-a^*$ greenness, $+b^*$ yellowness and $-b^*$ blueness (Hunter, LabScan XE - Reston VA, USA). The instrument was standardization against a White Tile of Hunter Lab Color Standard (LX No.16379): $X= 77.26$, $Y= 81.94$ and $Z= 88.1$ before each measurement.

Cooking quality of pasta were carried out by measuring the increases in weight, volume and cooking loss after cooking according the methods of AACC (2000). Sensory evaluation of cooked un-adulterated and adulterated pasta was evaluated as described by Hallabo *et al.* (1985).

All spectra of the selected samples were measured using FT-IR spectrophotometer 6100 Jasco, Japan. All spectra were recorded in the absorbance

mode (three replicates) from 400 to 4000 cm^{-1} using the KBr technique

All results were evaluated statistically using analysis of variance and regression analysis as reported by McClave and Benson (1991).

3. Results and Discussion

Hard wheat and durum flour of different extraction levels (whole meal, 82% and 72%) were evaluated chemically as shown in Table (1). The obtained results indicated that, there was slight difference between hard wheat flour and durum in total carbohydrate, fat and ash contents. A considerable difference between them was observed in their protein and crude fiber contents. In other word, gross chemical composition represented the nutrient contents of wheat varieties but was not suitable to differentiate between them.

Table (1): Gross chemical composition of durum and hard wheat (dry weight basis %).

Varieties	Moisture	Total Car.	protein	Crude fiber	fat	Ash
Durum wheat (Sohage 3)						
Whole meal	11.92± 0.18	80.97± 0.29	13.3± 0.29	1.69± 0.05	2.52± 0.09	1.51± 0.03
82%	11.65± 0.25	83.53± 0.05	12.05± 0.13	1.12± 0.03	1.81± 0.08	1.47± 0.03
72%	10.13± 0.17	86.33± 0.29	10.57± 0.28	0.66± 0.01	1.62± 0.04	0.8± 0.04
Hard wheat (Sakha 93)						
Whole meal	13.61± 0.51	80.38± 0.57	11.81± 0.33	3.46± 0.22	2.52± 0.09	1.81± 0.06
82%	13.14± 0.13	84.16± 0.25	11.04± 0.04	1.47± 0.07	0.81± 0.08	1.51± 0.06
72%	12.83± 0.36	86.39± 0.16	10.42± 0.13	0.91± 0.11	1.62± 0.04	0.64± 0.06

Data represent mean of three replicate sample ± standard deviation.
Total Car. = Total carbohydrate.

Pasta made from durum wheat of superior quality results in a bright yellow color and it retains, after cooking, firmness and absence of stickiness. Bright yellow color of pasta is an important prerequisite for customers. Table (2) shows the color attributes of raw material (durum or durum replaced with hard wheat), uncooked and cooked pasta. Data in the table indicated that addition of hard wheat to durum increased the lightness values but decreased the redness and yellowness values. This may be due to the higher content of carotenoids in durum than hard wheat. Also, pasta processed from these raw materials had the same observation except lightness, as the lightness of pasta made from wheat flour decreased than pasta made from durum. Cooked pasta had no significant differences in lightness and redness values while there were significant

differences in yellowness values of the cooked pasta. These results could be attributed to the different solubility behavior of pigments. This leads to the leaching of white and red pigments in cooking water.

Table (3) shows the sensory evaluation of pasta made from durum and hard wheat and their mixture. There were significant differences between the tested samples in all tested properties i.e. appearance, color, flavor, tenderness and stickiness. Pasta made from durum had the highest score for appearance and color. This is due to the higher content of carotenoids compared with pasta made from hard wheat. Also, pasta made from durum had the highest score for tenderness and the lowest score for stickiness. This could be attributed to the strong gluten network in durum wheat compared with hard wheat.

Table (2): Effect of replacing durum with hard wheat on color quality of pasta.

Samples	L*	a*	b*
Raw materials			
100% Durum	87.88 ^c ±0.129	1.42 ^a ±0.072	17.79 ^a ±0.37
75% durum	84.72 ^d ±0.133	1.15 ^b ±0.025	14.17 ^b ±0.28
50% durum	90.92 ^b ±0.096	0.93 ^c ±0.057	12.57 ^c ±0.13
100% hard wheat	92.11 ^a ±0.129	0.59 ^d ±0.113	11.17 ^d ±0.128
LSD	0.212	0.073	0.467
Uncooked pasta			
100% Durum	76.89 ^a ±0.38	2.8 ^a ±0.035	18.83 ^a ±0.067
75% durum	76.72 ^a ±0.133	2.45 ^b ±0.065	17.39 ^b ±0.31
50% durum	76.59 ^a ±0.35	2.21 ^c ±0.09	17.22 ^b ±0.068
100% hard wheat	75.52 ^b ±0.89	1.94 ^d ±0.21	16.25 ^c ±0.86
LSD	1.05	0.223	0.862
Cooked pasta			
100% Durum	61.31 ^a ±0.53	1.16 ^a ±0.041	18.66 ^a ±0.18
75% durum	60.16 ^a ±0.31	1.11 ^a ±0.021	18.93 ^a ±0.15
50% durum	57.85 ^a ±0.25	1.17 ^a ±0.032	17.24 ^b ±0.21
100% hard wheat	59.72 ^a ±0.31	1.16 ^a ±0.04	15.72 ^c ±0.31
LSD	3.66	0.197	0.977

Table (3): Effect of replacing durum with hard wheat on sensory quality of pasta

Sample	Appearance (10)	Color (10)	Flavor (10)	Tenderness (10)	Stickiness (10)
100% Durum	8.4 ^a	8.2 ^a	8.8 ^a	8.3 ^a	6.5 ^c
75% Durum	7.8 ^a	7.9 ^a	8.2 ^{ab}	8.0 ^{ab}	7.3 ^b
50% Durum	7.9 ^a	7.4 ^a	7.8 ^{bc}	7.2 ^{bc}	7.7 ^{ab}
100% Hard wheat	7.0 ^b	6.3 ^b	7.4 ^c	6.4 ^c	8.3 ^a
LSD at 0.05	0.78	0.87	0.79	0.88	0.76

Cooking quality of pasta i.e. weight increase, volume increase and cooking loss are shown in Table (4). Data revealed that, the weight of pasta made from hard wheat increased more than pasta made from durum while, the volume of pasta made from durum was higher compared with those containing hard wheat. Cooking loss, the most

important parameter, was very lower in pasta made from durum than that containing hard wheat. These results could be related to the strong gluten network and the milling procedure that was used for durum production compared with production of hard wheat which allowed more starch to be leached out during cooking.

Table (4): Effect of replacing durum with hard wheat on cooking quality of pasta.

Sample	Weight increase	Volume increase	Cooking loss
100% Durum	122	300	2.5
75% Durum	160	255	7.5
50% Durum	191	235	7.5
100% Hard wheat	235	215	10

Differentiation between durum and hard wheat varieties can be adopted on molecular basis by using FT-IR spectroscopy. Since wheat and its products contain different polar functional groups as lipids, carbohydrates and protein, so FT-IR spectroscopy was used as a helpful tool to identify the molecular composition. Assignments of the FT-IR absorption of wheat flour varieties (Figure 1) are tabulated in Tables (5 - 6). The obtained results showed different bands arising from NH stretching of

protein, CH stretching asymmetric, amide I (C=O stretching) and amide II (C-N stretching and NH bending) at 3427 - 3393 cm⁻¹, 2929 - 2926 cm⁻¹, 1651 - 1654 cm⁻¹ and 1540-1544cm⁻¹, respectively. Furthermore, whole meal and flours (72% and 82%) of durum, and hard wheat characterized with some bands, i.e. CH bending, C-O-C stretching, C-C stretching, C-O stretching, (C6-C5-O5-C1-O1) bond of starch and ring breathing associated with absorbance at 1458 - 1454 cm⁻¹, 1157 cm⁻¹, 1080 cm⁻¹,

1019-1022 cm^{-1} , 860-857 cm^{-1} and 760-764 cm^{-1} . Differentiation between wheat varieties were detected via the presence of certain peaks at about 1420 cm^{-1} (COO^- symmetric stretching vibration) and 1373 cm^{-1} (stretching C-OH) in hard wheat and its extracts only. Assignments of FT-IR were agreed with Williams et al., 1993, Brown et al., 1993 and HRUŠKOV and ŠVEC (2009).

FT-IR spectroscopy technique was also used to evaluate the quality of pasta, where high grade pasta was manufactured from high grade wheat type (durum). High grade durum has a high price, where it is grown in cold climate and imported from abroad

so, durum could be adulterated with cheaper wheat flour. In our study, pasta was produced from 100% durum flour and adulterated durum that was replaced with 50% or 100% hard wheat flour. Careful analysis of the obtained spectra (Figure 2 and Table 7) revealed that durum pasta was characterized by presence of specific bands at 2857 cm^{-1} and 1745 cm^{-1} , which are due to CH and C=O stretching vibration, respectively. On the other hand, these absorption peaks were absent in the hard wheat pasta and appeared with very weak intensity in the adulterated pasta.

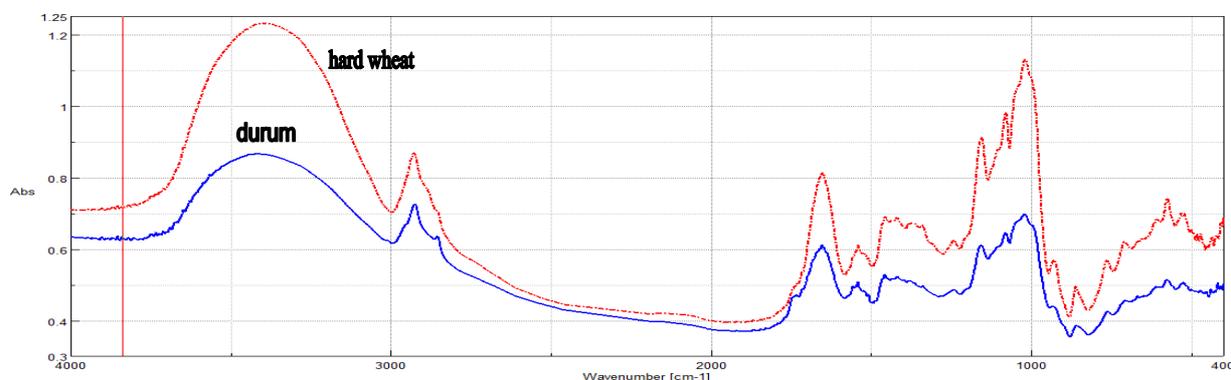


Figure (1): FT-IR spectra of durum and wheat flour 72%.

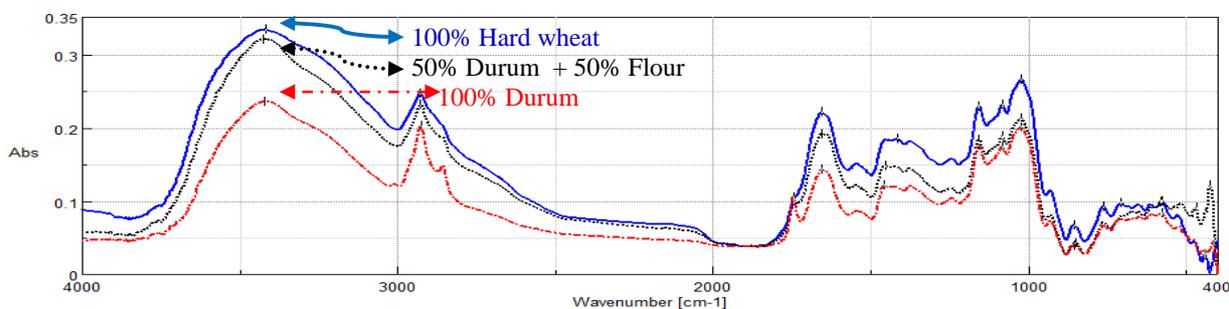


Figure (2): FT-IR peaks of adulterated pasta with hard wheat

Table (5): Assignments of FT-IR absorption bands of durum wheat and its extracts

Assignments	Whole meal	Wheat flour	
		82%	72%
NH stretching of protein	3427	3425	3419
CH stretching asymmetric	2926	2926	2926
Amide I (C=O stretching of ester)	1651	1652	1654
Amide II (C-N stretching with NH bending)	1543	1543	1543
CH bending	1457	1458	1456
C-O-C stretching of starch	1157	1158	1157
C-C stretching	1080	1081	1080
C-C stretching of starch	1021	1021	1022
Stretching C-O ring	930	930	---
(C6-C5-O5-C1-O1) ring	860	859	857
Ring breathing	763	763	760

Table (6): Assignments of FT-IR absorption bands of hard wheat and its extracts.

Assignments	Whole meal	Wheat flour	
		82%	72%
NH stretching of protein	3399	3407	3393
CH stretching asymmetric	2929	2926	2928
Amide I (C=O stretching of ester)	1651	1652	1652
Amide II (C-N stretching with NH bending)	1542	1540	1541
CH bending	1455	1455	1455
Stretching (COO-)	1420	1421	1420
Stretching C-OH	1373	1377	1374
C-O-C stretching of starch	1157	1157	1157
C-C stretching	1080	1080	1080
C-C stretching	1019	1020	1019
Stretching C-O ring	930	930	930
(C6-C5-O5-C1-O1) ring	860	860	860
Ring breathing	764	763	764

Table (7): Assignments of FT-IR absorption bands of adulterated pasta.

Identification	Hard wheat 100%	Durum/Hard wheat (1:1)	Durum 100%
NH stretching vibration band	3420.14	3427	3422.06
C-H, CH ₂ groups of lipids	2927.41	2927.41	2926.45
C-H stretching vibration	-----	2856.20	2857.02
C=O ester of lipids	-----	1741	1745
Amide I	1656.55	1656.55	1654.62
Amide II	1547.59	1547.59	1547.59
CH ₂ , CH ₃ bending vibration bands	1454.06	1454.06	1456.96
Stretching (COO-)	1420	1421	-----
CH ₂ group of amino acids	1375	1377.89	-----
Amide III	1243.86	1245.79	1242.9
C-O-C RING OF STARCH	1157.08	1157.08	1157.08
-----	1082.83	1082.83	1083.8
C-C, C-C-C bands of starch	1022.09	1023.05	1023.05
C-O, C-C, C-C-O bands of starch	931.45	931.45	930.485
TryptoPhan stretching bands	8556.239	855.454	855.275
Tryptophan stretching bands	763.673	762.709	761.744
C-S vibration band	705.819	705.819	712.569
C-H bending band	655.679	651.822	651.822
Phenyl ring	614.217	610.12	608.431
S-S Stretching band	576.612	580.469	578.54

Conclusion

Chemical and color analysis separately were not sufficient to identify and differentiate between wheat varieties (hard and durum wheat) and adulterated pasta, but sensory evaluation and cooking quality were able to detect the quality variation between them. FT-IR spectroscopy was used successfully for identifying and differentiating between two Egyptian wheat varieties (durum and hard) and was able to detect the adulteration of pasta on molecular basis.

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Optimizing Browning Capacity of Eggplant Rings during Storage before Frying

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Abstract: Deterioration of fresh eggplant rings was demonstrated as a rapid increase of enzymatic browning and with an obvious browning. The effect of thermal and chemical pretreatments on enzymatic browning and frying quality of eggplant rings were investigated. Thermal pretreatment using water or steam blanching; and chemical pretreatment by dipping in different concentrations of SO₂, chitosan, carboxy methylcellulose (CMC) or sodium chloride. Changes in enzymatic browning in fresh eggplant rings during storage at 25°C for 24 hrs were investigated by determining rings colour as a capacity of browning and colour parameters. Best colour values of eggplant rings were found in SO₂ and steam blanching pretreatments; hence the quality of fresh eggplant rings was able to maintain for up to 24 hours at 25°C. The inhibitory effect of various thermal and chemical pretreatments on eggplant rings was found to decrease in the following order SO₂ > steam blanching > water blanching > coated chitosan > coated CMC > sodium chloride. Frying eggplant rings at 180°C/4 min for SO₂, chitosan or steam blanching was able to optimize the quality of eggplant rings regarding to L*, a*, C*, BI, ΔE-values and non-enzymatic browning (A_{420 nm}). The fried pre-treated eggplant rings with SO₂ or water blanching gave higher mean panel scores (7.8–8.6) in all sensory characteristics compared to other pre-treated samples.

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Keywords: Eggplant; rings; fruit; steam; storage; chitosan; CMC; sodium metabisulphite, colour, % inhibition, browning, frying

1. Introduction:

Eggplant (*Solanum melongena* L.) is a plant of the family Solanaceae (also known as the nightshades) and genus Solanum. It bears a fruit of the same name, commonly used in cooking and frying. The fruit is capable of absorbing large amounts of frying oils. Production of eggplant is highly concentrated, with 85% of output coming from five countries. China is the top producer (56% of world output) and India is second (26%); Egypt, Turkey and Indonesia produce the remains amount. Its world production is around 32 million tons (FAOSTAT, 2009).

The quality of Eggplant attributes to violet surface without defects, and absence of seed (Cantwell and Suslow, 2009). Fruit deterioration during long term storage is associated with pulp browning caused by the oxidation of phenolic compounds. The level of phenolics has been shown to correlate with browning in different eggplant varieties (Prohens *et al.*, 2007). In addition, loss of cellular compartmentalization has been shown to accelerate browning by increasing peroxide levels and oxygen partial pressure within the tissues, and by releasing phenolics stored in the vacuoles, which can then be readily available for oxidation by polyphenol oxidases and peroxidases (Beaulieu *et al.*, 1999; Concellín *et al.*, 2004). Low temperature storage is effective for reducing browning reactions and for

delaying eggplant fruit deterioration. However, refrigeration cannot be fully exploited because eggplants are chilling sensitive and should not be stored for long periods below 7–10°C (Concellín *et al.*, 2007). Most fruits and plants originating in tropical and subtropical regions are prone to physiological injury when exposed to temperatures below 12.5°C and above their freezing point. Eggplant, as a tropical fruit has sensitivity to chilling injury (CI), is generally associated with problems in storage and processing. One of these symptoms is the darkening of seeds and pulp tissue. More severe symptoms include pitting and browning of skin or surface scald (Cantwell & Suslow, 1999). Biochemical and nutritional characteristics of fruits are changed due to the presence of brown pigments. Moreover, browning, after mechanical or physiological injury during harvest, processing or cold storage affects consumer acceptability and palatability because of unpleasant appearance and concomitant off-flavour development (Das *et al.*, 1997; García-Carmona *et al.*, 1988). In general, browning is caused by enzymatic oxidation of natural phenolic compounds, and polyphenol oxidase (PPO; EC 1.14.18.1) is a key enzyme in this degradation.

The main problem facing eggplant rings production is the quality assurance of colour, enzymatic browning and maintains palatability.

Therefore, the present study aimed to investigate the effectiveness of thermal and chemical pretreatments in maintaining the quality of fresh eggplant rings in terms of colour as a brown capacity and % inhibition during storage at room temperature (25°C) for 24 hours. The effect of frying at 180°C for 4 min on colour characteristics and sensory evaluation of pretreated eggplant rings was also studied.

2. Materials and methods

Preparation of eggplant rings:

Eggplant (*Solanum melongena* L. family *Solanaceae*) samples were obtained from local market during the fall and winter of 2011 and stored for using at 4°C. One hr prior to use, fruits were removed from the refrigerator and equilibrated to room temperature. Each eggplant was rinsed with water, peeled, sectioned to rings at least 1cm from the skin end (to exclude the effects of bruising) and exposing fresh surface.; then treated separately with chemical solutions (chitosan, CMC, SO₂ or sodium chloride) or with water or steam blanching.

Evaluation of browning capacity or brown inhibitors:

Colorimetry was performed with spectro-colorimeter (Tristimulus Colour Machine) using the CIE lab colour scale. This colour assessment system is based on the Hunter L*, a* and b* coordinates. To determine the suitability of the tristimulus reflectance procedure for evaluating browning inhibitors applied to cut surface of eggplant rings. Treatments were applied to 3 rings and 3 rings as a control, using only one eggplant fruit. Samples were dipped for 20 min in freshly prepared carboxy methylcellulose (CMC) and chitosan (0.5, 1 and 2%), NaCl (0.5, 1 and 2%), and sodium meta bisulfate (0.01, 0.05 and 0.1%). Peeled eggplant rings were thermal treated (water blanching and steam blanching for 1, 3 and 5 minutes), then the rings were drained, blotted dry with absorbent tissue and held in covered glass dishes to minimize dehydration at the cut surface for 24 hours at room temperature (25°C) during which time tristimulus reflectance measurements were carried out at intervals. Values of the tristimulus coordinates in the L*, a* and b* values were recorded at 1, 5, 10, 15, 30, 45, 60, 90, 120 and 240 min; and after 24 hours. The tristimulus coordinates were plotted against time, and the slopes of linear portions of these curves were obtained by linear regression as described by the method of Sapers and Douglas (1987).

Frying experiment process:

Fresh eggplant rings samples were dipped separately in fresh prepared CMC (2%), chitosan

(2%), NaCl (4%), or sodium meta bisulfate (0.1%) for 20 min; or blanched separately in water or steam for 3 minutes), then the rings were drained. Untreated or pretreated eggplant rings were fried at 180°C for 4 min in a controlled temperature deep-fat fryer (Philips comfort, Germany) filled with 1.5 L of purified sunflower oil (Arma Crystal Company, Egypt) enriched with vitamins A and D, and contained 1.8g saturated fat, 3.8g mono-unsaturated fat and 8.4g poly-unsaturated fatty. Oil was replaced by fresh oil after four frying batches; three eggplant rings were fried in each batch. Colour characteristics and sensory evaluation (García *et al.*, 2002 and Bertolini *et al.*, 2008) were determined in fried eggplant rings samples.

Non-enzymatic browning determination:

Non-enzymatic browning was measured spectrophotometrically by 4054 - UV/Visible spectrophotometer, (LKB-Biochrom Comp., London, England), as absorbance at 420nm using ethanol as blank according to the method of Stamp & Labuza (1983) and Birk *et al.*, (1998).

Colour determination of eggplant rings:

Fresh and fried eggplant rings colour was determined according to Hunter (1975). Colour of Egyptian fresh and fried eggplant rings was measured using spectro-colorimeter (Tristimulus Colour Machine) with the CIE lab colour scale (International Commission on Illumination) as mentioned by Hunter (1975) and Sapers & Douglas (1987).

Sensory evaluation:

Twelve trained panelists were selected for sensory evaluation of the studied pretreated and fried eggplant ring samples. Colour, flavour, taste, texture, and appearance of the fried eggplant ring samples were determined using a ten point scale (10 = excellent and 1 = bad) as described by Bertolini *et al.*, (2008). The limit of the acceptability was 5.

Statistical analysis:

The obtained results were analyzed statistically using the analysis of variance (ANOVA with two ways) and the Least Significant Difference (LSD) as described by Richard and Gouri, (1987).

3. Results and discussion

Effect of chemical and thermal pretreatments on browning of fresh eggplant rings stored at room temperature:

Browning of eggplant rings was measured by a* (green-red) and L* (lightness-darkness). A decrease in L*-value and an increase in a*-value are

indicative of browning (Monsalve, *et al*, 1993). The effect of using anti-browning agents (chemical and thermal pretreatments) on inhibiting the browning reactions during storage of eggplant rings for 24 hours at room temperature (25°C) was measured and graphically represented in Figs (1a, b). These figures illustrate the changes in the colour of eggplant rings in terms of a^* -values over 24 hours as affected by the following treatments: thermal (steam and water), SO_2 at 0.01, 0.05 and 0.1%, chitosan and CMC at 0.5, 1 and 2% and sodium hydroxide (NaCl) at 1, 2 and 4%. Figures (1a, b) showed that, chemical treatment (SO_2 and chitosan) and thermal treatment (steam and water) were able to prevent eggplant rings from browning, where lowest a^* -value (< -0.55) was obtained after storage for 24 hrs at room temperature (25°C). At the same time, browning of untreated eggplant rings (a^* -value) increased sharply to >12.38 . On the other hand, Figures (1a, b) showed that, the most effective anti-browning was found in case of using SO_2 as a chemical pretreatment, and also by using steam as a thermal pretreatments. These results explained the higher anti-browning agent of chemical and thermal pretreatments than untreated eggplant rings during storage at room temperature for 24 hrs.

From the obtained results, it could be concluded that, SO_2 (0.1%) and chitosan (2%) were the most effective chemical treatments for inhibiting enzymes, obtaining good colour and lowering non-enzymatic browning in eggplant rings during storage at room temperature.

Effect of thermal and chemical pretreatments on changes of colour characteristics of fresh eggplant rings:

Hunter colour parameters showed that, fresh eggplant rings appeared at the light green region, while pretreated samples showed clear signs of degreening during storage at room temperature (25°C). Visually, fresh eggplant rings showed a darker colour than treated rings. Degreening appeared with a rapid increase of a^* -value in eggplant rings (Figures. 1a, b). However, thermal treatment of eggplant rings inhibited the occurrence of degreening in eggplant rings during storage. Thermal, coated chitosan and SO_2 addition have a preventive effect against any changes that might occur in colour indicating a lowest - a^* value especially during the late period of storage at room temperature 25°C. Browning was observed in the control sample representing a rapid increment in a^* value within the first 4 hrs. Afterward, the colour of eggplant rings became lighter with decrement in - a^* values during storage at room temperature (Figures 1a, b). This result indicated that thermal and chemical pretreatments inhibited browning. The decrease of -

a^* values during the late period of storage could be related with sedimentation or breakdown of brown compounds.

Effect of various thermal and chemical treatments on colour characteristics of Fresh eggplant rings:

The surface colour of eggplant rings was measured with a colour difference meter (Hunter Lab colour scale). Under all tested conditions, SO_2 treatment had higher efficient values based on a^* -values than A420 measurements, where the other anti-browning behaved an opposite trend. For all tested samples the increase in the concentration of the anti-browning agents revealed increase in the inhibition efficient. Such trend is in agreement with previous studies of Janovitz-Klapp (1990), and Ozoglu and Bayindirh, (2002). The inhibitory effect of the studied anti-browning agents on eggplant rings was based on measurements at their maximum concentrations as shown in tables 1 and 2. Both tables showed a decrease at the following order $SO_2 > steam blanching > water blanching > coated chitosan > coated CMC > sodium hydroxide$. It is obvious that thermal pre-treatments of eggplant rings increased the development of red colour a^* value as non-enzymatic browning. The Hunter colour values of steam blanching samples in eggplant rings were lower than those of water blanching samples. Also, the Hunter colour value of SO_2 pre-treatment in eggplant rings was lower than that of coated chitosan, coated CMC and sodium hydroxide pre-treatments. These results indicated that the browning (redness) increased in water blanched samples than in steam blanched samples for eggplant rings. According to our results, the main colour change in untreated and pre-treated eggplant rings of thermal and chemical treatments was due to increase in browning index (BI) and a^* -value, which were in high correlation to browning measurement. Also, other colour parameters such as Hue angle and chroma indicated that heat pre-treatment caused a slight colour change. Heat treatment (blanching) showed that, water blanching had a BI lower than that of steam blanching on eggplant rings. But, BI values in SO_2 samples were lower than those of coated chitosan and coated CMC samples as shown in Figure (7b). These results are in good agreement with those of Janovitz-Klapp *et al* 1990; and Ozoglu and Bayindirh (2002). Generally, pre-treatments of coated chitosan, coated CMC and sulfiting improved the colour of eggplant rings (Figures 2b-7b). Sulfur dioxide has been shown to be effective for preventing browning by combining with carbonyl groups. From the above mentioned results, it could be concluded that, the pretreated eggplant rings with sulfites (SO_2) had the best colour values (a^* and BI) and lower enzymatic browning

compared to the other pre-treatments, as shown in Tables (1 and 2). The optimum conditions of thermal and chemical pre-treatment for improving the quality of eggplant rings (inhibition enzymatic browning - good colour) were found in case of using steam and water blanching for 5 min, SO₂ (0.1 ppm), chitosan (2%), CMC (2%) and sodium hydroxide (4%), as seen in Figures (1a, b - 7a, b).

Effect of thermal and chemical pretreatments on % Inhibition of browning in fresh eggplant rings

As shown in Table (1 and 2), thermal (steam and water), SO₂ addition and coating with chitosan reduced enzymatic browning of fresh eggplant rings, and chemical pretreatments at high concentration were more effective than thermal pre-treatment. Enzymatic browning of untreated fresh eggplant rings was about hundred fold higher than that of chemical and thermal treated rings. On the other hand, addition of 0.1% SO₂ and 2% coated chitosan increased inhibition percentage to 100 and 78%, respectively.

Table (1): Effect of thermal pretreatments on the percentage inhibition of enzymatic browning in eggplant rings

Samples	% Inhibition	Standard Deviation (n=3)
Untreated sample	0.00	1.05
Water 1min.	90.77	15.87
Water 3 min.	90.77	23.05
Water 5 min.	97.09	8.87
Steam 1 min.	77.79	7.75
Steam 3 min.	95.67	11.46
Steam 5 min.	100	15.09

Table (2): Effect of Chemical pretreatments on the percentage inhibition of enzymatic browning in eggplant rings

Samples	% Inhibition	Standard Deviation (n=3)
Untreated sample	0.000	1.18
0.5% chitosan	50.00	6.52
1% chitosan	62.50	8.12
2% chitosan	78.03	9.44
0.5% CMC	53.03	8.17
1% CMC	66.67	7.28
2% CMC	68.56	9.57
0.01% SO ₂	48.48	6.78
0.05% SO ₂	98.48	3.68
0.1% SO ₂	100.0	4.97
1% NaCl	9.47	10.19
2% NaCl	32.95	9.35
4% NaCl	49.62	13.46

High temperature of thermal pretreatments inactivated enzymatic browning, which confirmed the observation of Va'mos-Vigya'zo (1981), who reported that PPO enzymes are destroyed at 80°C although they are relatively heat labile. These inhibitory effects of thermal (steam and water) and chemical (SO₂ and coated chitosan) pretreatments on enzymatic browning were related with the prevention of PPO enzyme activity. Browning is mostly the result of the activity of PPO enzyme acting on phenolic compounds to produce dark coloured

polymers when sugarcane is crushed to release the juice (Vickers *et al.*, 2005).

Effects of thermal and chemical pretreatments on colour characteristics and non-enzymatic browning (A_{420nm}) of fried eggplant rings.

The surface colour of fried eggplant rings was measured with a colour difference meter, using the Hunter Lab colour scale. The Hunter colour values of fried eggplant rings were determined immediately after frying. Changes in L* values were inversely proportional to the changes in a* values of

the Hunter colours. Absorption at 420 nm, the CIE L*, a*, b* colour parameters, hue angle, chroma and BI were found to be suitable indicators for the brown pigment formation because of non-enzymatic browning after processing, as seen in Table (3). The a* values and BI for SO₂, NaCl and steam-treated fried eggplant rings were low in contrast to high values for untreated and other treated fried eggplant. The CIE a* and colour parameters like hue angle (H*), chroma (C*), browning index (BI) and non-enzymatic browning (A_{420nm}) of fried eggplant samples had the lowest values in SO₂ treated samples compared with the untreated and other treated samples in fried eggplant, as seen in Table (3). Also, it was generally found that steam blanching, NaCl and SO₂ treatments improved the colour of fried

eggplant rings. However, SO₂, NaCl and steam blanching samples had the high increase in colour as optical density (A_{420nm}) compared with the untreated and other treated samples in fried eggplant. The increase in colour (browning as A_{420nm}) could be attributed to the reaction occurred between amino groups and active carbonyl groups (Maillard reaction) after thermal treatments (blanching). From the above mentioned results, it could be concluded that the pretreated eggplant rings with sulphites (SO₂), NaCl and steam blanching have the best colour values and higher nonenzymatic browning as compared with the other treatments of fried eggplant, as seen in Table 3. The results are in accordance with those of Janovitz-Klapp *et al.* (1990) and Ozoglu and Bayindirh (2002).

Table (3): Effect of chemical and thermal pretreatments on colour characteristics of fried eggplant rings.

Samples	L*	a*	b*	ΔE	C*	H*	BI	NEB (A _{420nm})
Untreated	45.70 ±3.0	9.0 ±0.8	19.69 ±1.0	54.23 ±2.4	21.66	65.36	127.06	5.64 ±1.1
SO ₂ 0.1%	46.48 ±2.6	8.49 ±0.7	18.19 ±1.3	50.90 ±2.0	20.07	64.98	113.34	7.05 ±1.0
Chitosan 2%	49.63 ±5.0	9.25 ±1.6	20.99 ±2.2	52.30 ±3.6	22.94	66.22	123.15	6.75 ±1.6
CMC 2%	49.50 ±1.1	9.10 ±0.6	21.14 ±1.1	52.42 ±1.7	23.02	66.71	124.05	6.51 ±0.8
NaCl 4%	56.04 ±6.3	7.21 ±1.6	22.88 ±2.5	48.64 ±3.4	23.99	72.51	110.89	9.21 ±2.1
Water 3min	46.44 ±5.2	8.61 ±1.0	19.45 ±3.2	53.21 ±1.6	21.27	66.12	121.78	5.99 ±0.8
Steam 3min	43.95 ±5.4	6.87 ±0.7	16.68 ±2.3	51.40 ±2.9	18.04	67.61	106.38	6.51 ±1.4

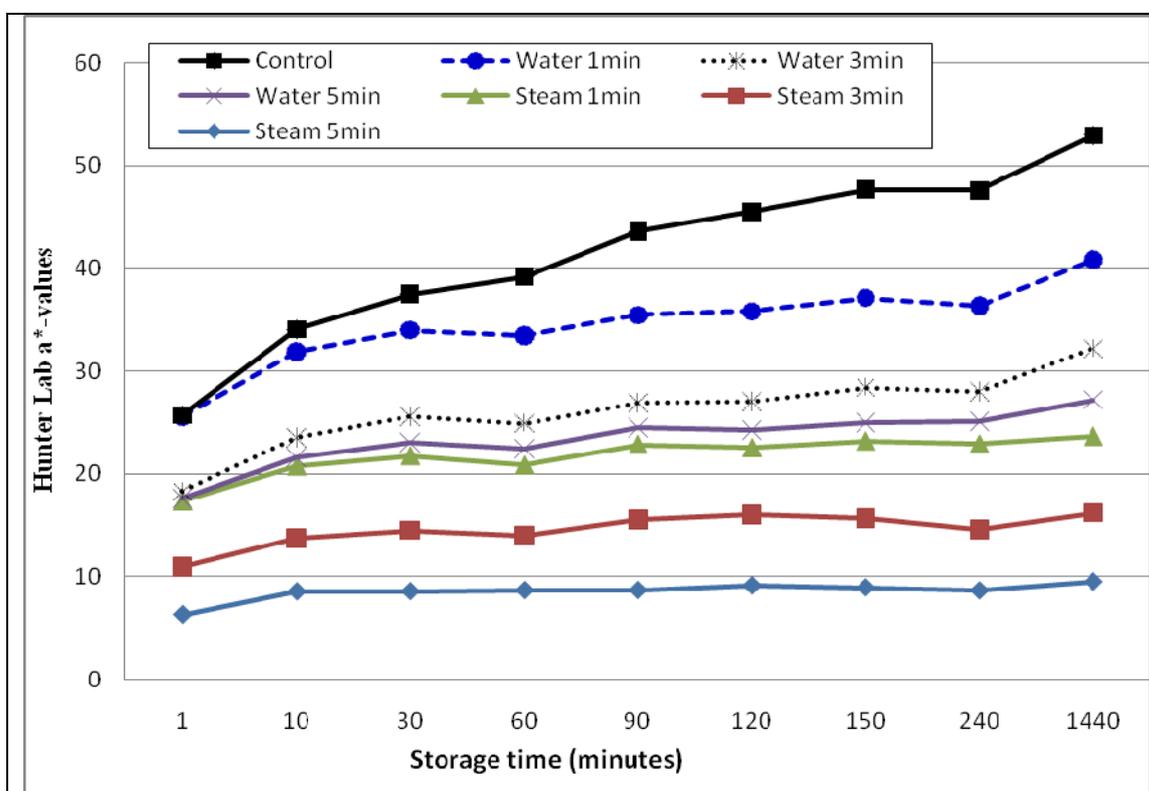
Effects of thermal and chemical pretreatments on sensory evaluation of fried eggplant rings:

Sensory attributes are of great importance to measure consumer attitudes and their influence on food choice and acceptability. The colour of fried food is the first quality attribute used to judge acceptability of fried products. A two-way ANOVA after frying process of the variables influenced by the pre-treatments, panelists and frying process is shown in Table (4). Flavour scores differ significantly after frying process, where a positive correlation was noticed between the flavour score of pretreated samples. The obtained result represents the statistical analysis of colour, odour, taste, texture and appearance of fried eggplant rings with thermal and chemical pre-treatments. Fried eggplant rings of different pre-treated samples were differed

significantly ($P < 0.05$). The fried pre-treated eggplant rings with SO₂ and water blanching gave higher mean panel scores (7.8–8.6) in all the sensory characteristics than other pre-treated samples. Texture and appearance of Fried eggplant rings characterized with their higher scores in pretreated steam blanching for 3 min. On the contrary, the untreated fried eggplant sample and that pre-treated with CMC and NaCl had lower scores in all sensory characteristics. This may be due to protein breakdown and dehydration on eggplant surface. In generally, frying had a positive influence on acceptability of colour, flavour and texture acceptability of eggplant rings. Moreover, all sensory scores of samples were in acceptable range (greater than 5). These results agreed with those of Perez & Albisu (2002) and Gonulalan *et al.* (2003).

Table (4): Effect of chemical and thermal treatments on sensory evaluation of fried eggplant rings.

Fried eggplants rings	Colour	Taste	Flavour	Texture	Appearance
Fried eggplant (control)	8 ^{AB} ±1.2	7.1 ^B ±1.05	7.8 ^B ±0.97	8 ^{AB} ±0.1	6.7 ^C ±1.3
Treated with Chitosan 2%	6.3 ^C ±2.1	7 ^B ± 1.2	6.2 ^C ±0.97	7 ^B ±1.2	7.6 ^B ±1.1
Treated with CMC 2%	5.6 ^D ±3.2	5.7 ^D ±3	5.7 ^D ±3.1	5.8 ^D ±2.7	5.6 ^D ±2.8
Treated with SO ₂ 0.1%	8.1 ^A ±1.1	8 ^A ±1	8.6 ^A ±0.5	8.4 ^A ±0.7	8.2 ^A ±1.1
Treated with NaCl 4%	5.4 ^D ±2.3	5.9 ^D ±2.8	7.1 ^B ±1.7	6.8 ^C ±2.2	6.1 ^D ±3.2
Treated with Water 3min	7.8 ^B ±1.4	7.8 ^B ±1.4	7.8 ^B ±1.4	7.6 ^B ±1.7	7.8 ^B ±1.4
Treated with Steam 3min	6.2 ^C ±0.8	7 ^B ±0.7	6.8 ^C ±0.7	7 ^B ±0.5	7 ^B ±0.5

**Figure (1a): Effect of thermal pretreatments on a*-values during storage at room temperature in fresh eggplant rings.**

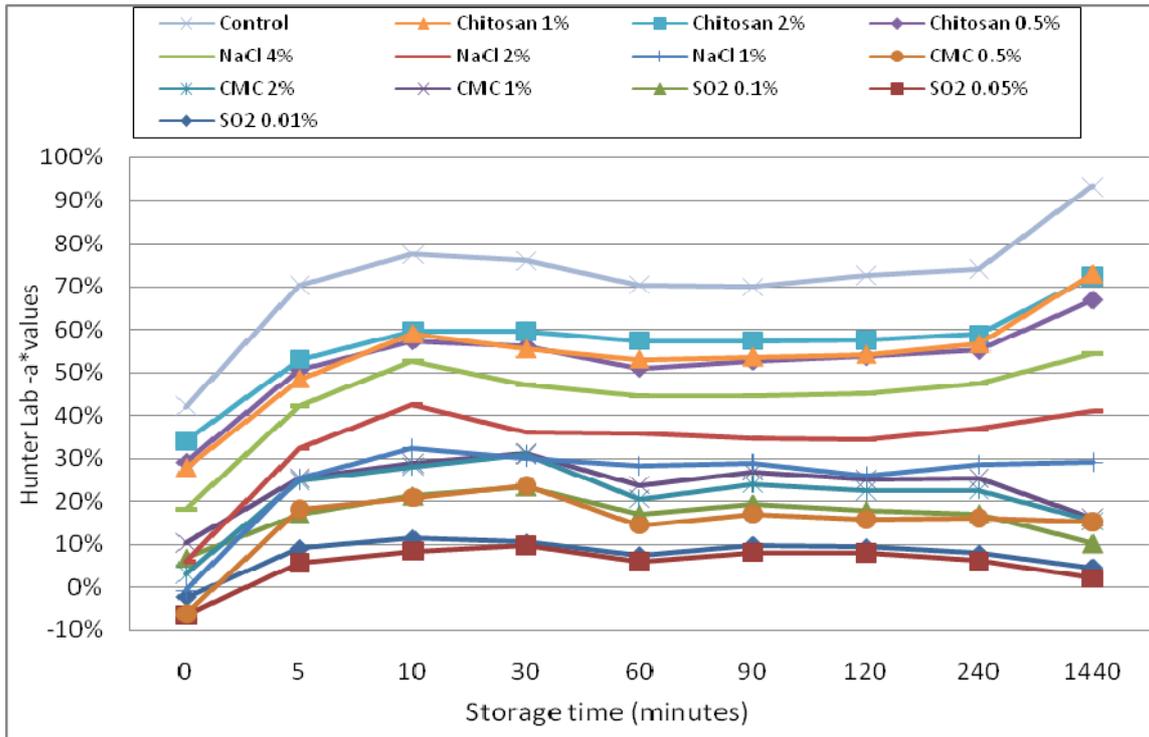


Figure (1 b): Effect of chemical treatments on a*-values during storage at room temperature.

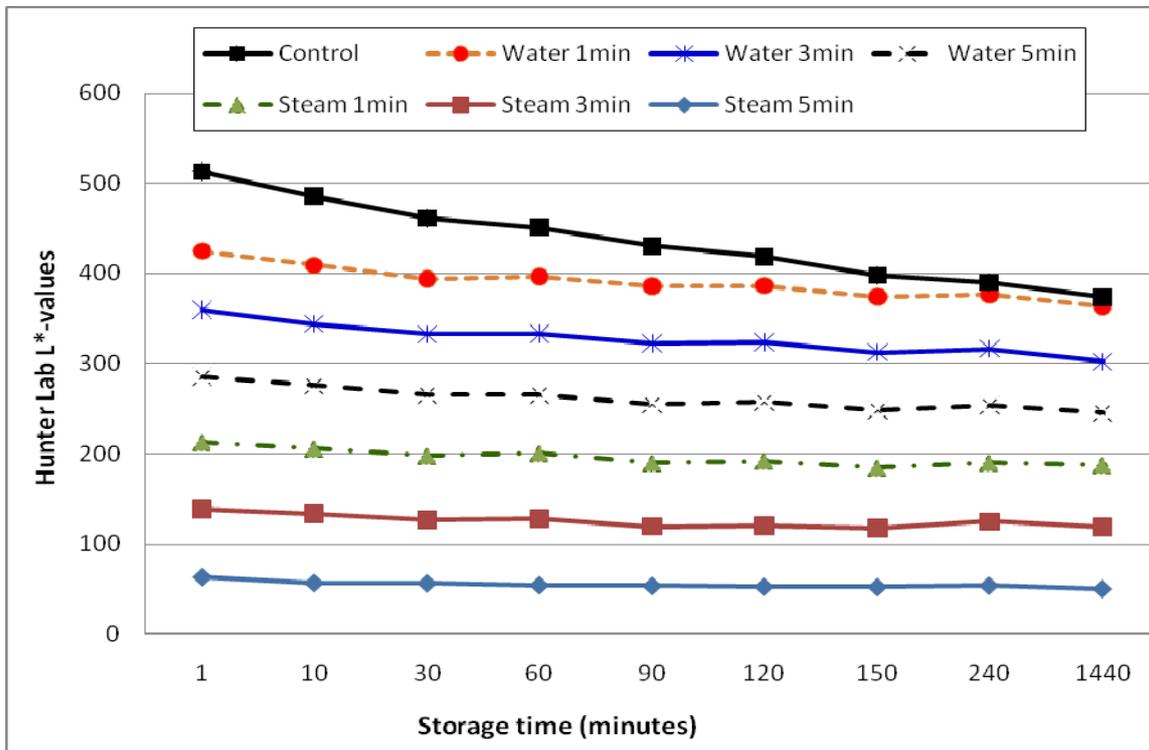


Figure (2 a): Effect of thermal pretreatments on L*-values during storage at room temperature in fresh eggplant rings.

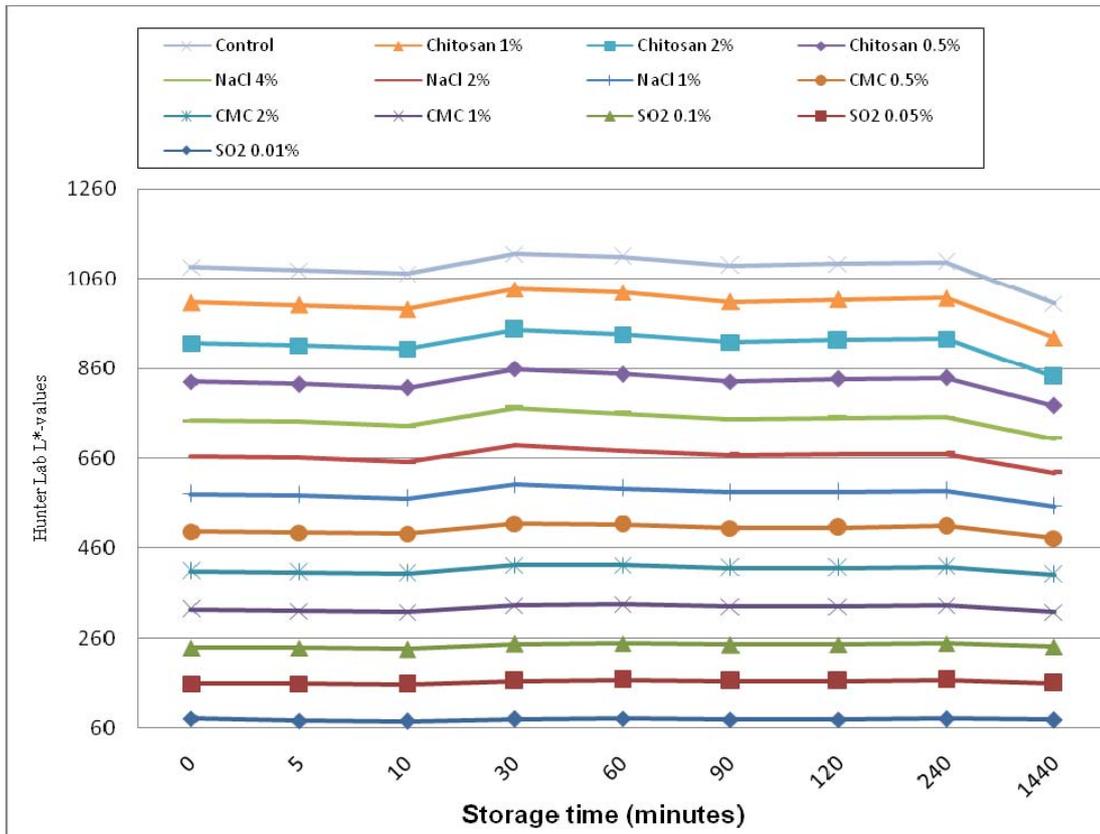


Figure (2b): Effect of chemical treatments on L*-values during storage at room temperature 2.

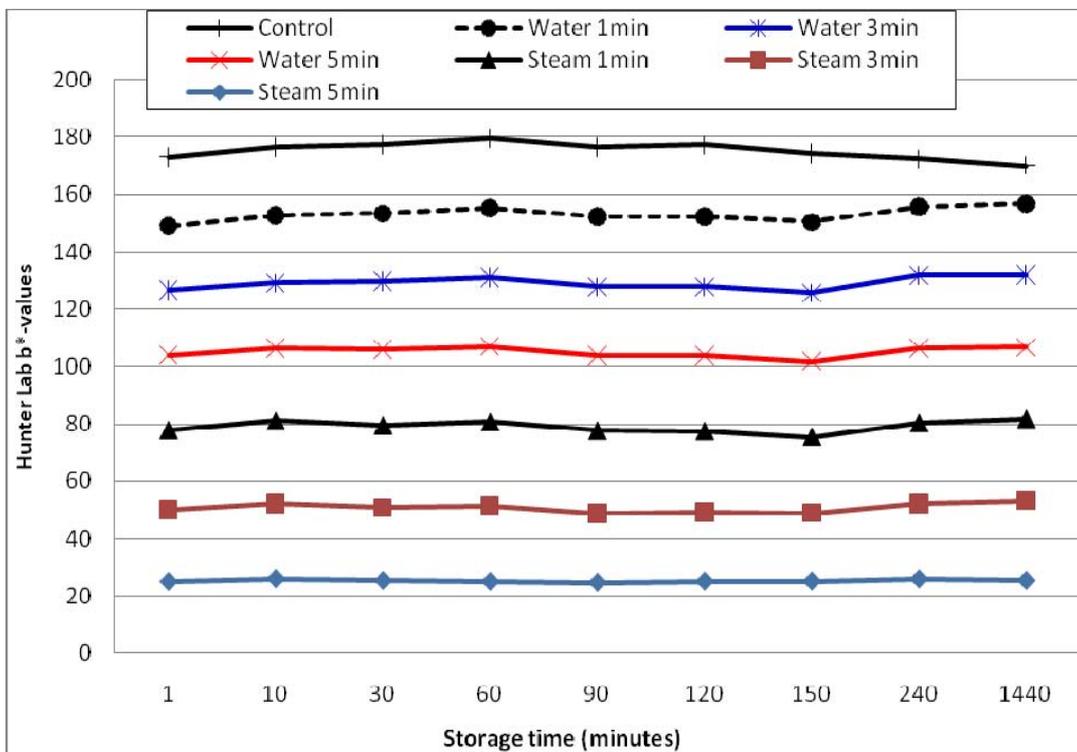


Figure (3 a): Effect of thermal pretreatments on b*-values during storage at room temperature in fresh eggplant rings.

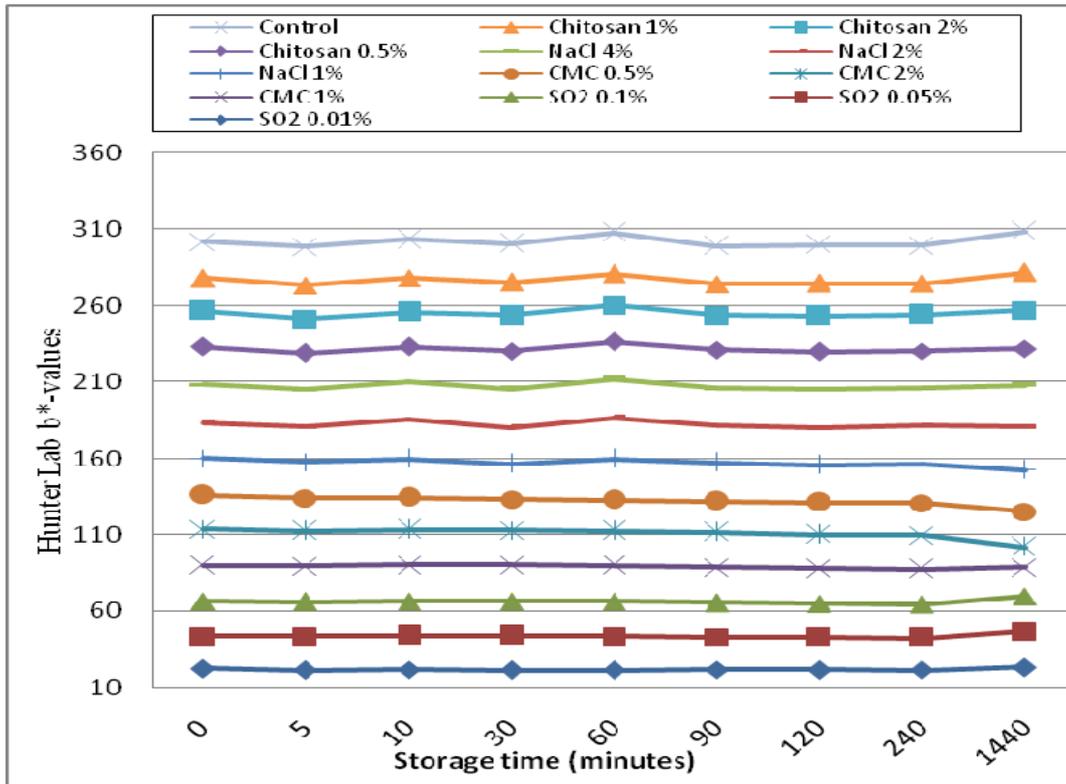


Figure (3b): Effect of chemical treatments on b*-values during storage at room temperature.

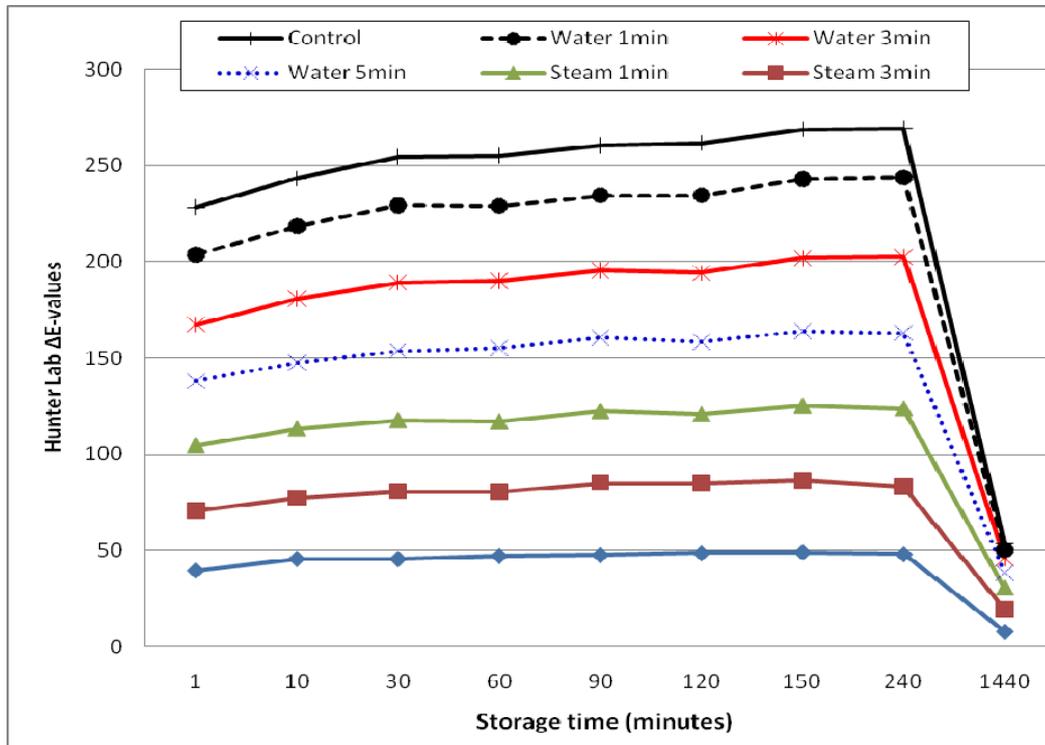


Figure (4 a): Effect of thermal pretreatments on ΔE*-values during storage at room temperature in fresh eggplant rings.

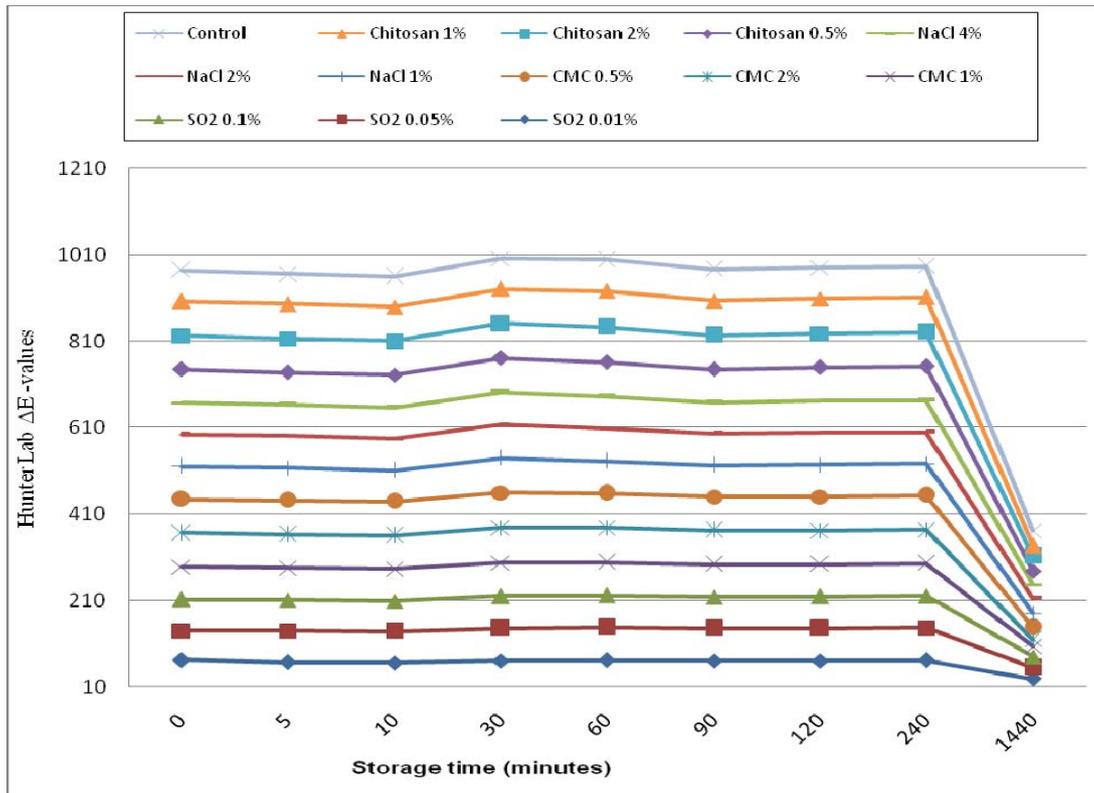


Figure (4b): Effect of chemical treatments on ΔE^* -values during storage at room temperature.

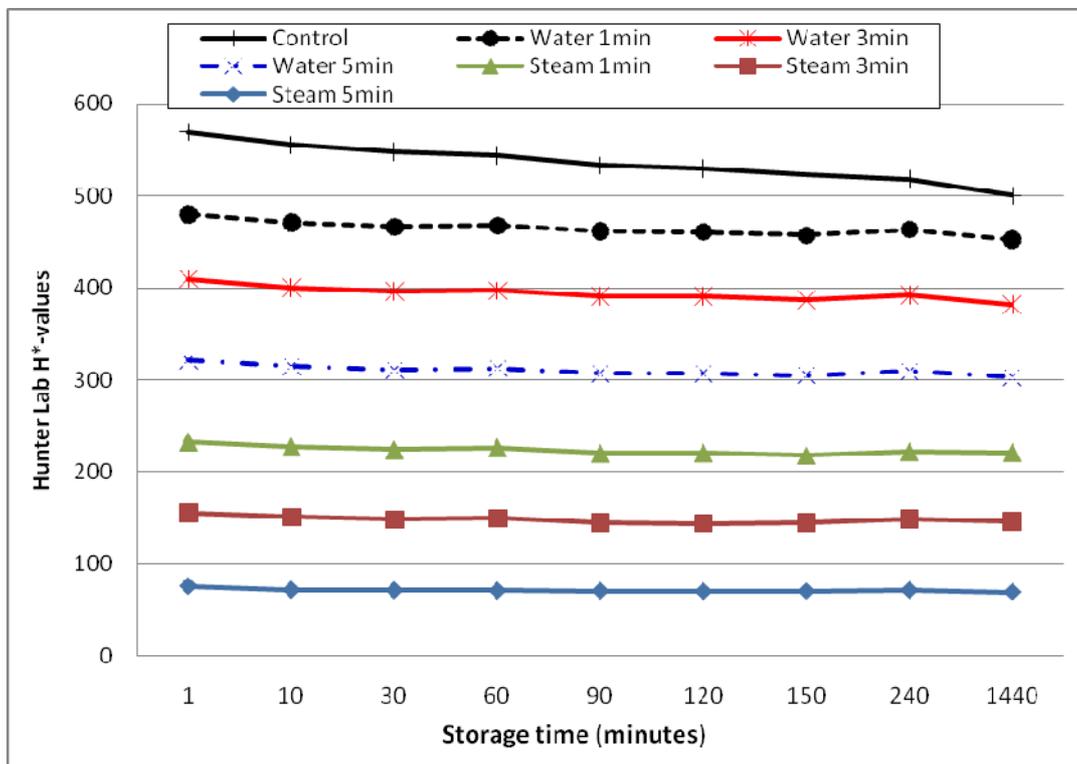


Figure (5 a): Effect of thermal pretreatments on H^* -values during storage at room temperature in fresh eggplant rings.

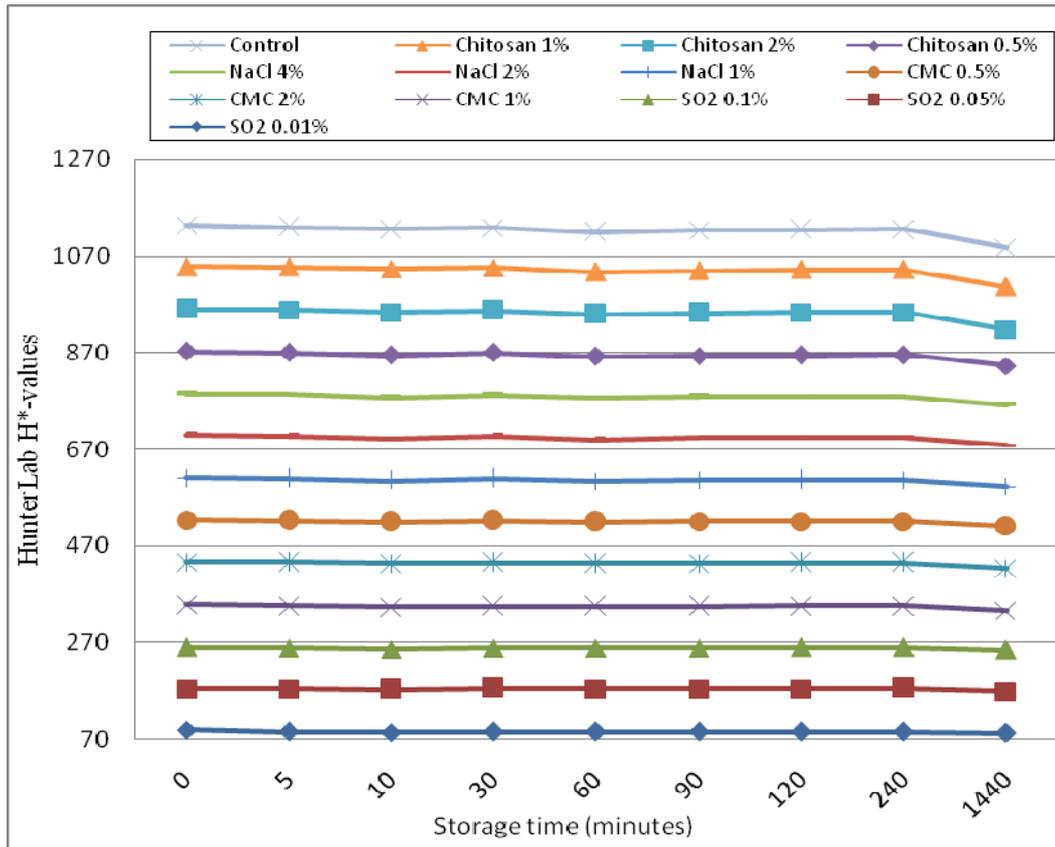


Figure (5b): Effect of chemical treatments on H* -values during storage at room temperature.

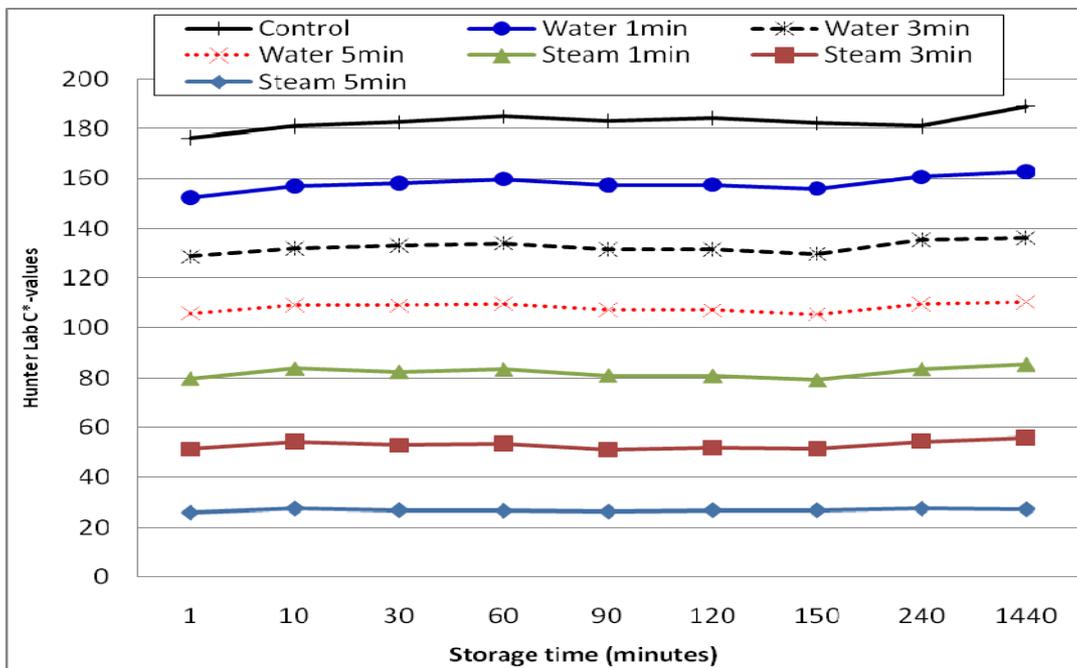


Figure (6 a): Effect of thermal pretreatments on C* -values during storage at room temperature in fresh eggplant rings.

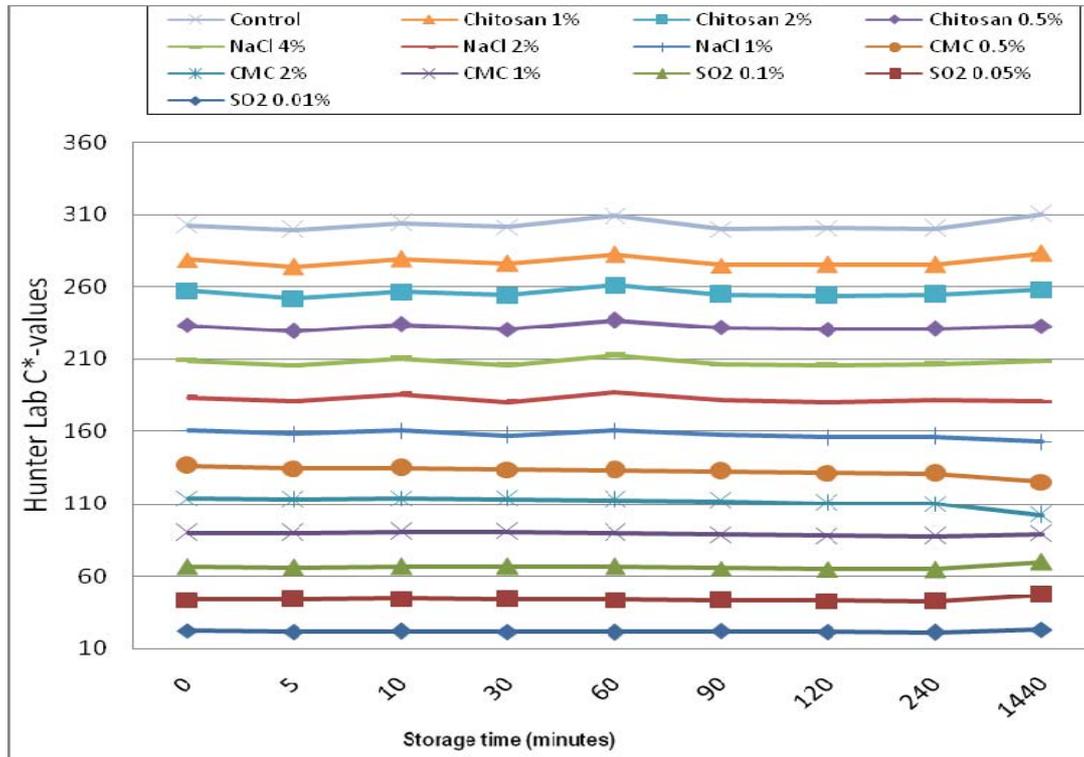


Figure (6b): Effect of chemical treatments on C*-values during storage at room temperature.

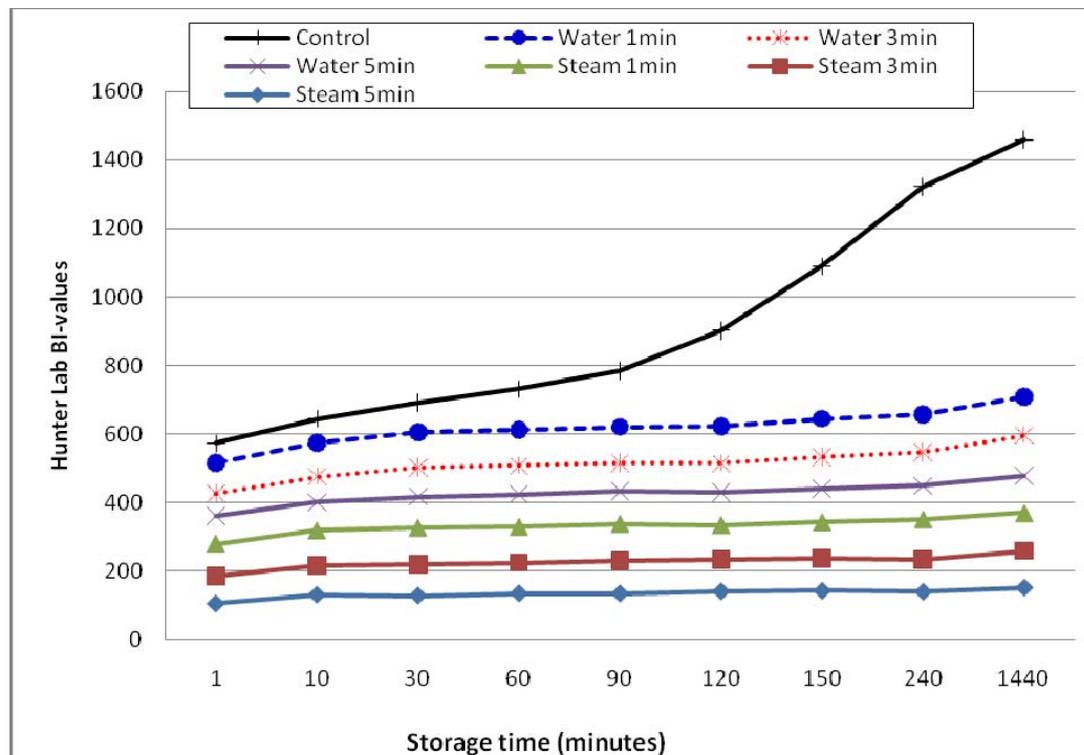


Figure (7 a): Effect of thermal pretreatments on BI-values during storage at room temperature in fresh eggplant rings.

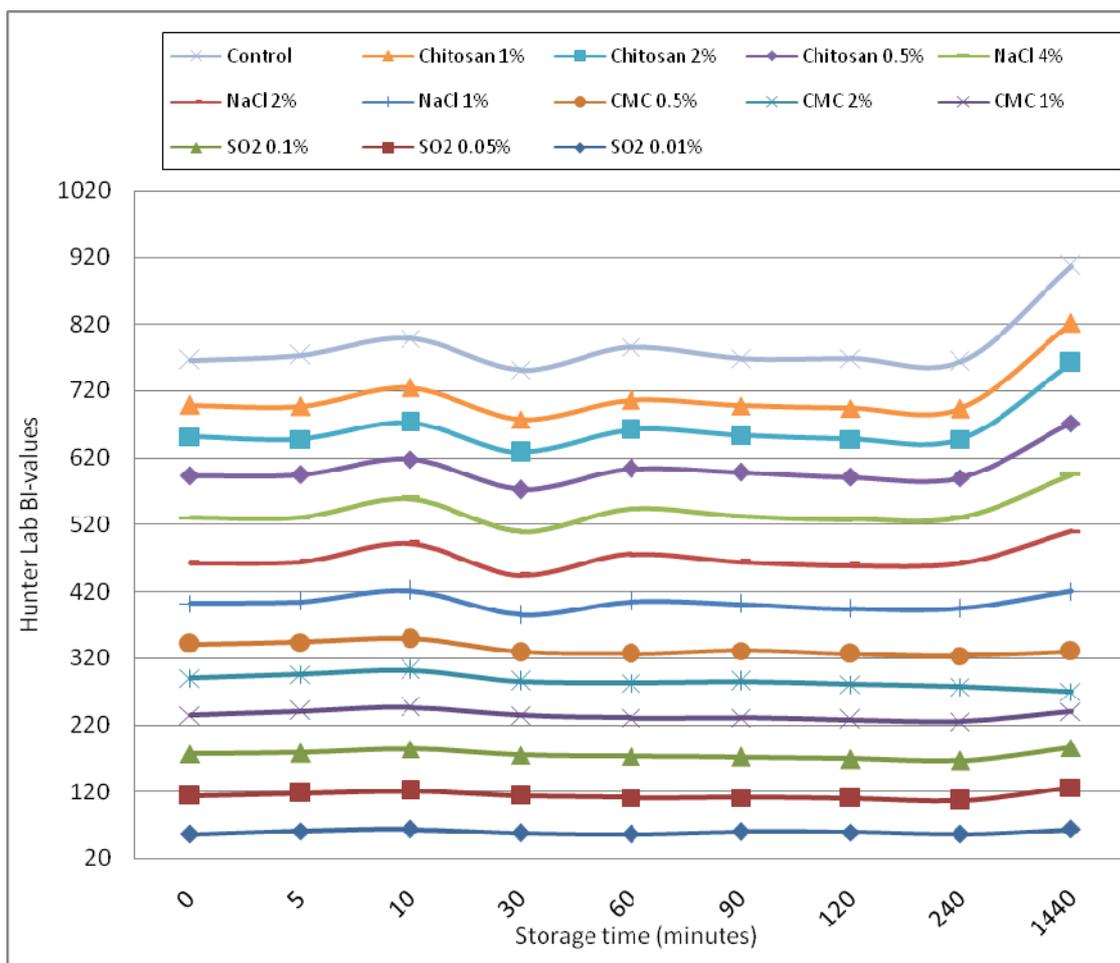


Figure (7b): Effect of chemical treatments on BI*-values during storage at room temperature.

4. Conclusion:

Using SO₂ or steam blanching pretreatments as a pretreatment for eggplant rings were able to optimize the quality of eggplant rings during storage at room temperature for 24 hrs. Frying eggplant rings at 180°C/4 min for the previous pretreatments of SO₂, chitosan and steam blanching were able to optimize the quality of eggplant rings regarding to L*, a*, C*, BI, ΔE-values, non-enzymatic browning (A₄₂₀ nm) and sensory evaluation.

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Chlamydia Pneumonia Infection and Possible Relationship to Childhood Bronchial Asthma

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Abstract: Background: Asthma is a leading cause of chronic illness in childhood. Respiratory tract infections with viruses and mycoplasma pneumonia are considered the most common triggers of asthma in all age groups. Recently Chlamydia pneumonia infection has been suggested to play a role in pathogenesis of asthma. **Objective:** The aim of this work was to evaluate the possible role of Chlamydia pneumonia in the development or aggravation of childhood bronchial asthma. **Patients and Methods:** This study included 50 asthmatic patients divided into 2 groups; group (1) composed of 20 new wheezier who denied previous wheezing and were evaluated during initial wheezing episode, group (2) composed of 30 chronic asthmatic children who had recurrent episodes of/or persistent wheezing. Also 20 healthy children were included as a control group. Qualitative estimation of Chlamydia pneumonia infection in nasopharyngeal swabs using polymerase chain reaction (P.C.R) technique was done to all cases and controls. **Results:** In the new wheezier group 8 cases (40%) were Chlamydia pneumonia PCR (+ve), in the chronic asthmatic group 9 cases (30%) were PCR (+ve), while in the control group only 2 cases (10%) were PCR+ve. The infection rate of Chlamydia pneumonia among patients were 17 (89.5%) and among controls 2 (10.5%) with a statistically significant difference ($P = 0.041$) between patients and controls. There was an increase in asthma severity and severity of exacerbation in PCR+ve than in PCR-ve patients for C. pneumonia but it didn't reach statistical significance. Also there was a significant increase in PCR+ve males (58.8%) than PCR+ve females (41.2%), while there were no significant statistical difference between PCR+ve and PCR-ve patients as regards age, residence, seasonal variation, atopic manifestation and family history of atopy. **Conclusion:** The incidence of C. pneumonia infection among new wheezier and chronic asthmatics is high pointing to its possible role as a triggering factor for asthma in new wheezier and continuation of symptoms in spite of proper treatment plan in chronic asthmatic children.

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Key words: Chlamydia pneumonia, Childhood asthma, polymerase chain reaction.

1. Introduction:

Chlamydia are intracellular bacteria that cause infections of the respiratory tract, which is a major clinical problem (Asquith et al., 2011). It is an obligate intracellular parasite with discrete cell wall that is similar to those of gram negative bacteria, it contains both RNA and DNA. It spreads through person to person by droplet and outbreaks of infection have been reported in families, schools, military barracks and nursing homes (Niedzwiadek et al., 2000).

Asthma is a chronic inflammatory airway disease characterized by variable airway obstruction and bronchial hyper responsiveness. There are many factors affecting the development and severity of childhood asthma such as genetic predisposition, atopy, environmental factors, obesity, diet, socioeconomic status, and infectious triggers (Annaqur et al.,2007). It is a leading cause of chronic illness in childhood, responsible

for a significant proportion of school days lost. It is the most frequent admitting diagnosis in children's hospital and result nationally in 5 to 7 lost school days/year/child (Martin et al., 2001).

Chlamydia pneumonia has been associated with asthma. It has also been suggested that Chlamydia pneumonia infection may lead to lung remodeling in a subset of asthmatic patients. Although there is no specific symptoms in Chlamydia pneumonia infection, this infection should be suspected in any child with prolonged wheezing for proper diagnosis and treatment (Hahn and Peeling, 2008).

The development of polymerase chain reaction (PCR) test for diagnosis of respiratory tract infection has highlighted the importance of this infection in acute exacerbation of asthma (Johnston et al., 1995).

Aim of the work: Was to investigate the relationship between C. pneumonia in school age children and bronchial asthma. We tried to determine whether previously asymptomatic children presenting

with first ever broncho-spasm would have PCR+ve criteria compatible with Chlamydia pneumonia infection. Another aim was to determine whether patients with established chronic asthma would have C. pneumonia infection.

2. Patients and Methods:

This study was carried on 50 children with reactive airway disease. Their ages ranged from 6-14 years, they were (19) males and (31) females. All cases were selected from Asthma and Allergy Clinic, Children's Hospital, Cairo University. Patients were divided into two groups; group I: new wheezier; a group of 20 children each of whom denied previous wheezing and were evaluated during the initial wheezing episode. All patients in this group reported that wheezing began after an acute respiratory tract illness (described as rhinitis, pharyngitis, bronchitis or pneumonia). Group II: chronic asthmatics; a group of 30 children (who had recurrent episodes of/or persistent wheezing) and who met the American Thoracic Society (ATS) criteria for reversible airway obstruction. All patients in this group were examined during an exacerbation (had prolonged respiratory symptoms and wheezes in spite of proper treatment plan). Also 20 healthy children (age and sex matched) were included as a control group. Cases with chronic illness as chronic liver or kidney disease or diabetes were excluded from the study. All cases and controls were subjected to: thorough medical history and clinical examination, peak expiratory flow rate (PEFR), skin allergy testing, routine laboratory investigations including; CBC, urine and stool analysis, total serum IgE using the IMx micro particle enzyme immunoassay (MEIA) the quantitative measurement of IgE in human serum, chest x-ray and qualitative estimation of Chlamydia pneumonia infection in nasopharyngeal swabs using polymerase chain reaction (P.C.R) technique: the DNA was extracted then PCR was performed using specific primer set which amplifies a 437 bp fragment and consists of the following primers: forward primer HL-1 (5'-GTTGTTTCATGAAGGCCTACT-3') and reverse primer HR-1 (5'-TGCATAACCTACGGTGTGTT-3'). The PCR products (20µl) were analyzed by electrophoresis

on a 2 % agarose gel stained with ethidium bromide.

Data was analyzed on an IBM compatible computer using SPSS win version 11 statistical package. Numerical data were described in terms of means, standard deviation, median, minimum and maximum. Nominal data were expressed by frequency distribution and percentage. Chi square test was used to compare groups for categorical data. Mann whitney test was used to compare two groups for numerical data. If P-value is less than 0.05, it is considered to be significant and if it is less than 0.001, it is considered highly significant.

3. Results:

The study patients consisted of 50 children with reactive airway disease. Their ages ranged from 5-14 with mean age of (9) years, and were 19 males (38%) and 31 females (62%).

The characteristics of the studied children as regards age, sex, serum IgE, absolute eosinophilic count (AEC) and atopy are shown in table (1). Table (2) shows comparison of selected data (age, severity of exacerbation, atopy, used inhaled corticosteroids, AEC and IgE) between C. pneumonia PCR-ve (12 case) and PCR+ve (8 cases) in new wheezier. No significant statistical difference could be found between the two groups.

Table (3) shows comparison of selected data between C. pneumonia PCR-ve (21 cases) and PCR+ve (9 cases) in chronic asthmatic patients. No significant statistical difference could be detected between the two groups.

Our results show that there is a significant statistical difference between patients and control group as regards percentage of patients with Chlamydia pneumonia infection using PCR technique for diagnosis, where we have 17 (89.5%) PCR+ve cases in patient group and only 2 (10.5%) PCR+ve cases in control group (P = 0.041) (table 4).

Our results also show that infected boys represent 58.8%, while infected girls 41.2%, with significant difference between both sex, being more in males (P = 0.029) (table 5).

As regards PEFR, there is a significant statistical decrease in PCR+ve than in PCR-ve patients (P= 0.035) (table 5).

Figure 1 shows results of polymerase chain reaction (PCR) of Chlamydia infection.

Table (1): Characteristics of study groups

Characteristic	New wheezier	Chronic Asthmatics	Control
	n=20	n=30	n=20
Age (yr.) mean \pm SD	9.00 \pm 2.90	9.33 \pm 2.34	8.45 \pm 1.57
Range	6-14	6-14	7-12
Sex	4 (20%)	15 (50%)	9 (45%)
Female	16 (80%)	15 (50%)	11 (55%)
Mean serum IgE (IU/L)	364.70 \pm (239.88)*	421.97 \pm (315.02)*	68 \pm 11.2
Mean absolute eosinophilic Count (cells/mm ³)	302.18 \pm 224.91	492.70 \pm 493.45	137 \pm 58.1
Atopy@ atopic	15 (75%)*	22 (73.3%)*	0 (0.0%)
Non atopic	5 (25%)	8 (26.7%)*	20 (100%)

* Significant difference compared to control (P<0.001).

@ Atopy defined as +ve skin prick test reaction to at least one of tested allergens (Dreborg, 1987).

Table (2): Comparison of selected data between Chlamydia pneumonia PCR(-) and PCR(+) patients in new wheezier group.

Data	PCR(-)	PCR(+)	P-value
	(12)	(8)	
Age (yr.) 6-14	9 (3.015)	9 (2.927)	0.741
Severity of exacerbation			
Mild	5 (41.7%)	4 (50%)	0.535
Moderate	7 (58.3%)	4 (50%)	
Atopy			
atopic	9 (75%)	6 (75%)	0.693
Non atopic	3 (25%)	2 (25%)	
Inhaled corticosteroids			
Not used	6 (50%)	3 (37.5%)	0.535
Low dose	1 (8.3%)	0 (0.0%)	
Medium dose	5 (41.7%)	5 (62.5%)	
Mean serum IgE (IU/L)	363.58 (253.38)	366.58 (253.38)	0.938
Mean absolute eosinophilic Count (cells/mm ³) \pm SD	632.17 \pm (273.76)	213.75 \pm (66.415)	0.216

P<0.05 is considered significant.

Table (3): Comparison of selected data between Chlamydia pneumonia PCR(+) and PCR(-) patients in chronic asthma group.

Data	PCR(-)	PCR(+)	P-value
	(21)	(9)	
Age (yr.) 6-14	9.5 (2.3)	8.7 (2.4)	0.334
Age of onset			
< 5 yr.	16 (76.2%)	5 (55.5%)	0.275
> 5 yr.	5 (23.8%)	4 (44.5%)	
Severity of asthma			
Mild	11 (52.4%)	3 (33.3%)	0.40
Moderate	10 (47.6%)	6 (66.7%)	
Severity of exacerbation			
Mild	12 (57.1%)	3 (33.3%)	0.427
Moderate	9 (42.9%)	6 (66.7%)	
Atopy			
atopic	14 (66.7%)	8 (88.9%)	0.3
Non atopic	7 (33.3%)	1 (11.1%)	
Inhaled corticosteroids			
Not used	6 (28.6%)	2 (22.2%)	0.50
Low dose	3 (14.3%)	0 (0.0%)	
Medium dose	12 (57.1%)	7 (77.8%)	
Mean serum IgE (IU/L)	356.85 \pm (314.03)	573.88 \pm (275.84)	0.090
Mean absolute eosinophilic Count (cells/mm ³)	535.04 \pm (366.37)	393.88 \pm (254.98)	0.928

P<0.05 is considered significant.

Table (4): Infection rate of Chlamydia pneumonia among patients and controls.

	PCR-ve	PCR+ve	Total	P-value
	n=51	n=19	n=70	
Patients group	33 (64.7%)	17 (89.5%)	50 (71.4%)	0.041
Control group	18 (35.3%)	2 (10.5%)	20 (25.6%)	
Total	51 (100%)	19 (100%)	70 (100%)	

P<0.05 is considered significant.

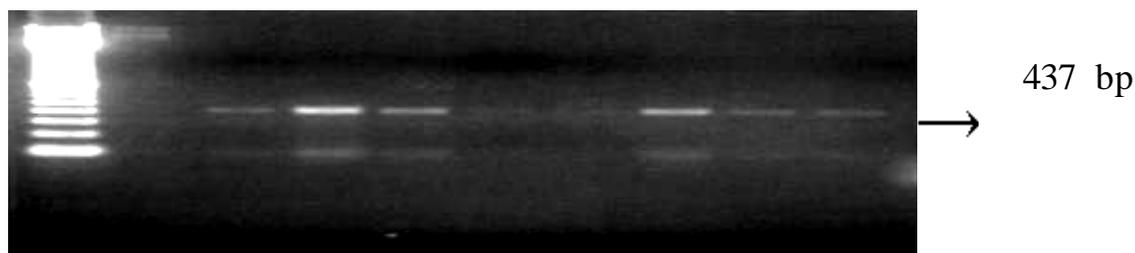
Table (5): Statistical comparison between PCR-ve and PCR+ve patients as regards sex distribution and median value of PEFR.

	PCR-ve	PCR+ve	P-value
	n=33	n=17	
Male (n=19)	9 (27.3%)	10 (58.8%)	0.029 (s)*
Female (n=31)	24 (72.7%)	7 (41.2%)	
PEFR (M±SD)	76.97 (9.38)	71.06 (9.22)	0.035 (s)

P<0.05 is considered significant.

Results of polymerase chain reaction (PCR) of Chlamydia infection

M -ve C 1 3 4 5 6 7 8

**Figure (1):** An agarose gel electrophoresis 2% stained with ethidium bromide.

M: DNA marker (100 bp each). **-ve C:** Negative control. **Lanes 1-3,6-8:** Positive samples. **Lanes 4,5:** Negative samples.

4. Discussion:

Asthma is a major health problem, it is the most common chronic childhood disease, it affects an estimated 5 to 10% of population and as such it is a major health care issue in most countries (Timothy, 2000).

Respiratory tract infection is considered one of the common risk factor. Infections with viruses such as respiratory syncytial virus, para influenza virus, influenza A and B virus, corona virus, adenovirus and rhino virus have been identified in 10% to 60% of children and adults with asthma. Another atypical respiratory pathogen, Chlamydia pneumonia, has been established as an important cause of acute

respiratory infection in 1% to 11% of children as well as adults (Specjalski, 2010).

In our study we investigated the relationship between C. pneumoniae in school age children and bronchial asthma. First we tried to determine whether previously asymptomatic children presenting with first ever broncho-spasm would have PCR+ve criteria compatible with Chlamydia pneumoniae infection. We found (40%) of those children (new wheezier) to have evidence of C. pneumoniae infection diagnosed by PCR technique.

Our findings are in agreement with the results of Zaitso, (2007) who found that C. pneumoniae infection triggers asthma in wheezy infants. Also Mostafa and Arnout, (2000) found that (27.3%) of

children with first ever wheezing and with objective measure of obstructive airway disease, had evidence of acute *C. pneumonia* infection diagnosed by serological criteria.

On regular follow up of the new wheezier at allergy clinic (87.5%) of children with first ever-wheezing episode and PCR+ve for *C. pneumonia* subsequently developed chronic persistent asthma based on clinical data and PEFr regular measurements, this provide evidence that acute wheezing illness due to *C. pneumonia* infection can develop into chronic asthma in previously asymptomatic individuals. In accordance with our observation Sato et al.,(2007) found *C. pneumonia* IgM- positive results in 48.4% of patients with asthma. Also Hahn and Mc Donald, (1998) found persistent *C. pneumonia* infection diagnosed by cultures of nasopharyngeal secretions after clinical resolution of acute respiratory illness and during development of chronic asthma symptoms.

Another aim of our study was to determine whether patients with established chronic asthma would have *C. pneumonia* infection. Nine of thirty (30%) children with established asthma were PCR+ve for *C. pneumoniae*. This result are in agreement with a study done by Agarwal and Chander, (2008) found IgG anti Chlamydia antibody-positively rate in the patients with bronchial asthma(80%) was significantly higher in all age groups than that in the healthy age and sex matched controls(59%).Also Thrumerelle et al., (2003) confirmed that persistent features of childhood asthma was more frequently associated with atypical bacterial infection (*C. pneumonia* and mycoplasma pneumonia). Bestou et al., (2003) showed the presence of anti Chsp 10 (children heat shock protein 10) antibodies in adult onset asthma (73%). In contrast to our results Dejsomritrutai et al., (2009) could not support the speculative theory that *C. pneumonia* is a cause of bronchial asthma, they found no difference between asthmatic and control as regards *C. pneumonia* specific IgA, IgG and IgM in the sera.

Investigators suggested that the immune response to organism might play a pathological role in asthma. *C. pneumonia* infects the human bronchial tree causing ciliary's dysfunction and epithelial damage. It also generates inflammatory cytokines, production of *C. pneumonia* IgE, and capacity during re infection to produce T cell mediated immune pathogenic disease considering this association between immune response to *C. pneumonia* and asthma symptom frequency, it seems logical to suggest that *C. pneumonia* infection may act as a cofactor, possibly rendering asthmatic children more

susceptible to other stimuli such as allergens or viruses or both (Hironos et al., 2003).

In our study there was no significant difference between PCR-ve and PCR+ve patients as regards age distribution, residence, seasonal variation, atopic manifestation and family history of atopy. This is in concordance with that of Kercksmiar ,(1998).

Sex distribution of our asthmatic patients was 38% males and 62% females, we found a significant statistical difference between males and females as regards PCR+ve for *C. pneumonia* (more in males). This difference may be secondary to other factors such as the increased ability to produce IgE, airway caliber that has a clear gender difference, or the possibility of inherited vulnerability of boys than girls to the injurious effect of aeroallergens. In quite similarity to this result Kaledy et al., (2001) showed that prevalence of antibodies to *C. pneumonia* was more common in males than in females, a difference that increased with age.

As regards asthma severity and type of medication, we followed the National Heart, lung and blood institute classification. There was an increase in asthma severity and severity of exacerbation in PCR+ve than in PCR-ve patients for *C. pneumonia* but it didn't reach statistical significance. Liberman et al., (2003) reported that Chlamydia pneumonia is not responsible for acute exacerbation of bronchial asthma. On the contrary Thrumerelle et al., (2003) and Niedzwiadek et al., (2000) reported that persistent Chlamydia pneumonia infection has occurred more frequently in-patient with moderate and severe asthma than in ones with mild asthma, also persistent clinical features were more frequently associated with atypical bacterial infection. This conflict in the results between studies can be attributed to the fact that serological test is not accurate way to diagnose Chlamydia. The only accurate way is by identification of organism by polymerase chain reaction which is known to be almost 100% sensitive and specific. Using PCR technique, one is able to detect the presence of *C. pneumonia* organism either due to acute infection, re infection or chronic infection (Shi et al., 2003).

In our study we didn't find significant statistical difference between PCR+ve and PCR-ve patients for *C. pneumonia* as regards total eosinophilic count. This can be attributed to the fact that eosinophilic count in sputum and markers of eosinophil degranulation (such as eosinophil cationic protein) can reflect the disease severity rather than blood eosinophilic count (Pifferi et al., 2001).

In the current study there was significant statistical difference between PCR+ve and PCR-ve for *C. pneumonia* as regards the median values of PEFr, this reflected increase severity of airway

obstruction in PCR+ve patients. Ten Brink et al., (2001) suggested that *C. pneumonia* infection might promote the development of persistent airflow limitation in patients with non atopic adult onset asthma. In contrast Strachan and Carrington (2000) showed a lack of significant association between COPD and level of *C. pneumonia* antibody titer of IgE and IgA.

Inhaled steroids have now become the main stone of chronic asthma treatment (Barnes, 1997). In our results, there was no significant statistical difference between PCR+ve and PCR-ve patients for *C. pneumonia* as regards use of inhaled corticosteroids. In contrast Black et al., (2000) reported high titer of antibodies to *C. pneumonia* in asthmatic being treated with high dose inhaled steroids. This difference may be attributed to steroid dose and duration of therapy.

It is worth to mention that the present study failed to find any peculiar clinical or laboratory characteristics distinguishing PCR+ve asthmatic patients from PCR-ve ones. In quite similarly to our results, Patel et al., (2010) diagnosed *C. pneumonia* in 33% of their studied asthmatics, with no significant difference in clinical signs, symptoms or laboratory data between patients with and without *C. pneumonia* infection.

5. Conclusion:

We can conclude that incidence of *C. pneumonia* infection among new wheezier and chronic asthmatics is high pointing to its possible role as triggering factor for asthma in new wheezier or continuation of symptoms in spite of proper treatment plan in chronic asthmatic children. We recommend that children with chronic asthma, not well controlled with conventional anti-asthma therapies, must be evaluated for *C. pneumonia* infection especially by PCR technique. Also it seems appropriate to do the test during the earlier stages of asthma onset especially if it begins during or after acute respiratory illness and once infection is verified proper antibiotic must be given.

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5/22/2011

Corrosion inhibition of lysine as basic amino acid on 316L stainless steel in 0.5 M H₂SO₄ solution**Azza El-Sayed El-Shenawy**Department of Chemistry, Faculty of Science (Girls), Al-Azhar University, Cairo, Egypt
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Abstract: The corrosion inhibition of 316 L stainless steel in 0.5 M H₂SO₄ by lysine was investigated using open-circuit potential measurements, potentiodynamic polarization measurements and scanning electron microscopy (SEM) techniques. The open circuit potentials were measured in the absence and presence of different concentrations of lysine. It was found that the open circuit potential becomes more positive with increasing the concentration of lysine. Potentiodynamic polarization measurements showed that the presence of lysine in acidic solution affects mainly the cathodic process and decreases the corrosion current to a great extent and shifts the corrosion potential towards more negative values. Results revealed clearly that lysine is a good cathodic type inhibitor for 316L stainless steel in 0.5 M H₂SO₄. The maximum inhibition efficiency of lysine was achieved at (7 x 10⁻² M). Analyses of the surface by SEM confirm these results.

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<http://www.americanscience.org>.

Keywords: Corrosion; inhibition; lysine; amino acid; steel; M H₂SO₄

1. Introduction:

Stainless steel have found very wide applications both in modern chemical industries and other places [1]. Since aggressive acid solutions are widely used for industrial purposes. The use of organic inhibitors in acidic solutions is very common, particularly in view of the high corrosion rate [2-9]. Amino acids are attractive as corrosion inhibitors because they are nontoxic, relatively easy to produce with high purity at low cost, and are soluble in aqueous media. A number of studies involving amino acids and their derivatives on the corrosion inhibition of iron and its alloys has been carried out [10, 11]. Most of the natural amino acids are the alpha amino acids which contain carboxyl and amino groups bonded to the same carbon atom. It was shown that the inhibition action of some organic compounds is based on adsorption phenomenon [12].

The object of this study is to investigate the inhibition effect of lysine on 316L stainless steel in acidic media.

2- Experimental

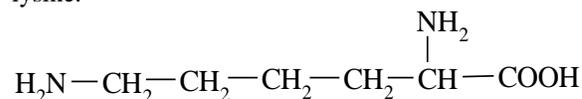
The analysis of the 316L stainless steel electrode is given in Table (1).

Table (1): The chemical composition of 316L stainless steel electrode (Wt %)

Element	Si	Cr	Ni	Mo	Mn	Fe
Weight %	0.56	17.28	10.57	2.62	1.14	67.83

Circular electrode with working surface area of 1.76 Cm² were used. Experiments were carried out

in 0.5 M H₂SO₄ solutions in absence and presence of different concentrations (5 x 10⁻³ – 7 x 10⁻² M) of lysine.



Diamino monocarboxylic acid (Basic amino acid)
α, ε-diamino caproic acid (lysine).

All aerated test solutions were prepared from distilled water at room temperature (25 ± 1°C) and analar reagent chemicals. Freshly polished electrodes were used for each run. Platinum electrode and standard calomel electrode (SCE) were used as counter and reference electrodes. The solution volume was fixed at 100 ml in all experiments. The open circuit potentials of the metal immersed in the test solutions were measured using the electronic multimeter (type ES cord-EDM – 2116). The polarization measurements were run on a computerized potentiostat (Radiometer model volta Lab 40) and Volta Master 4 software. Potential scan rate in all experiments was 2 mV/s. The morphology of stainless steel surface before and after immersion in the test solutions was examined by scanning electron microscope (JEOL-JSM- 5500 LV).

3- Results and Discussion**3.1. Open-circuit potentials measurements**

Open circuit potentials (OCP) were measured in the absence and presence of different concentrations (5 x 10⁻³- 7 x 10⁻² M) of lysine in 0.5 M H₂SO₄.

Fig. 1 represents typical curves of OCP variation with time for blank acid and inhibited solutions. Steady state potential is shifted either in the positive direction in the presence of lysine. The OCP shift in the noble direction, suggests the formation of a passive film that acts as a barrier for metal dissolution and reduces the corrosion rate by reducing the driving force of the cathodic reaction

and increasing the thickness of more stable complex compound (Fe-lysine).

On introduction of lysine into the acid solution, the potential shift and attainment of a stable OCP become more noble values than those observed in the blank acid. This can be attributed to the formation of a protective layer of lysine on the stainless steel surface.

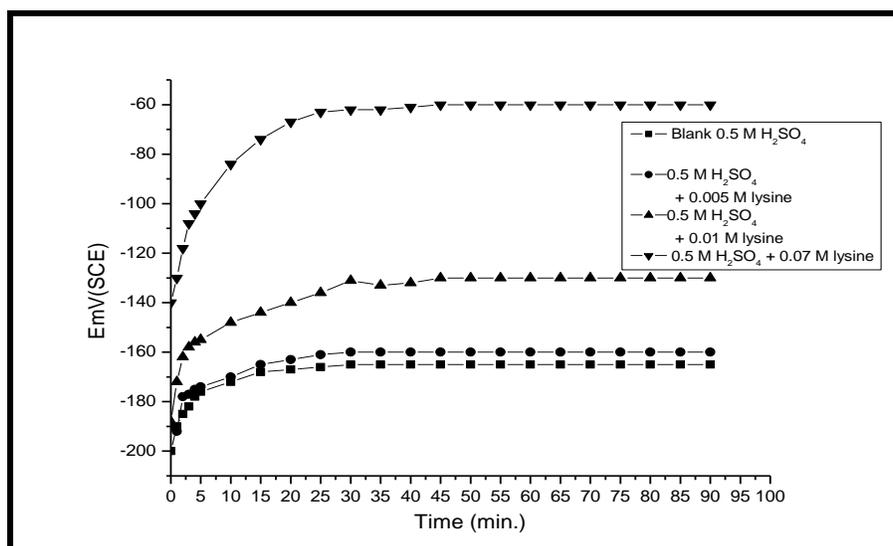
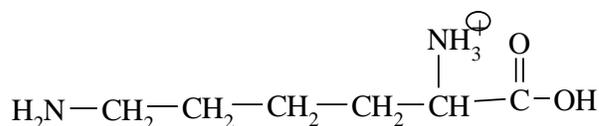


Fig. 1. Variation of the open circuit potential of 316 L stainless steel with time in 0.5 M H₂SO₄ containing different concentrations of lysine.

3.2- Liner Polarization

Fig. 2 shows the effect of lysine concentration on the polarization curves of 316 L stainless steel electrode. Corrosion parameters in the absence and presence of inhibitor obtained from curves are given in Table 2. Generally with increasing inhibitor concentration, the corrosion current density and corrosion rate decrease and polarization resistance increases (Table 2). From the results, it is found that, with increasing inhibitor concentration, E_{corr} shifts to more negative values are observed and it indicates that these inhibitors have been adsorbed to cathodic areas and act as cathodic inhibitor. Thus, the amino acid presents in its protonated form in acidic solution. Such protonated form is expected to be highly attracted to the cathodic sites on the metal surface [13].



Protonated form

The following equation was used to the calculated inhibition efficiency (IE) from polarization measurements[14]:

$$IE = \left(1 - \frac{i}{i_o} \right) \times 100$$

Where i and i_o are the corrosion current densities obtained by extrapolation of the cathodic and anodic Tafel lines in inhibited and uninhibited solutions, respectively.

Table (2): Corrosion parameters, and inhibition efficiency IE for 316L stainless steel in 0.5 M H₂SO₄ solution in the presence of different concentrations of lysine.

Conc. M	$E_{\text{corr.}}$ (mV)	$I_{\text{Corr.}}$ mA/cm ²	Tafel slope		R_p Ωcm ²	Corrosion rate(mm/y)	IE%
			B_a	B_c			
Blank	-336.4	0.1300	160.8	-163.9	-208.38	1.520	-
5×10^{-3}	-341.8	0.1158	138.9	-135.6	-108.59	1.354	10.9
1×10^{-2}	-342.2	0.0904	114.5	-126.0	30.86	1.057	30.46
7×10^{-2}	-356.3	0.0558	102.8	-119.1	100.83	0.6521	57.07

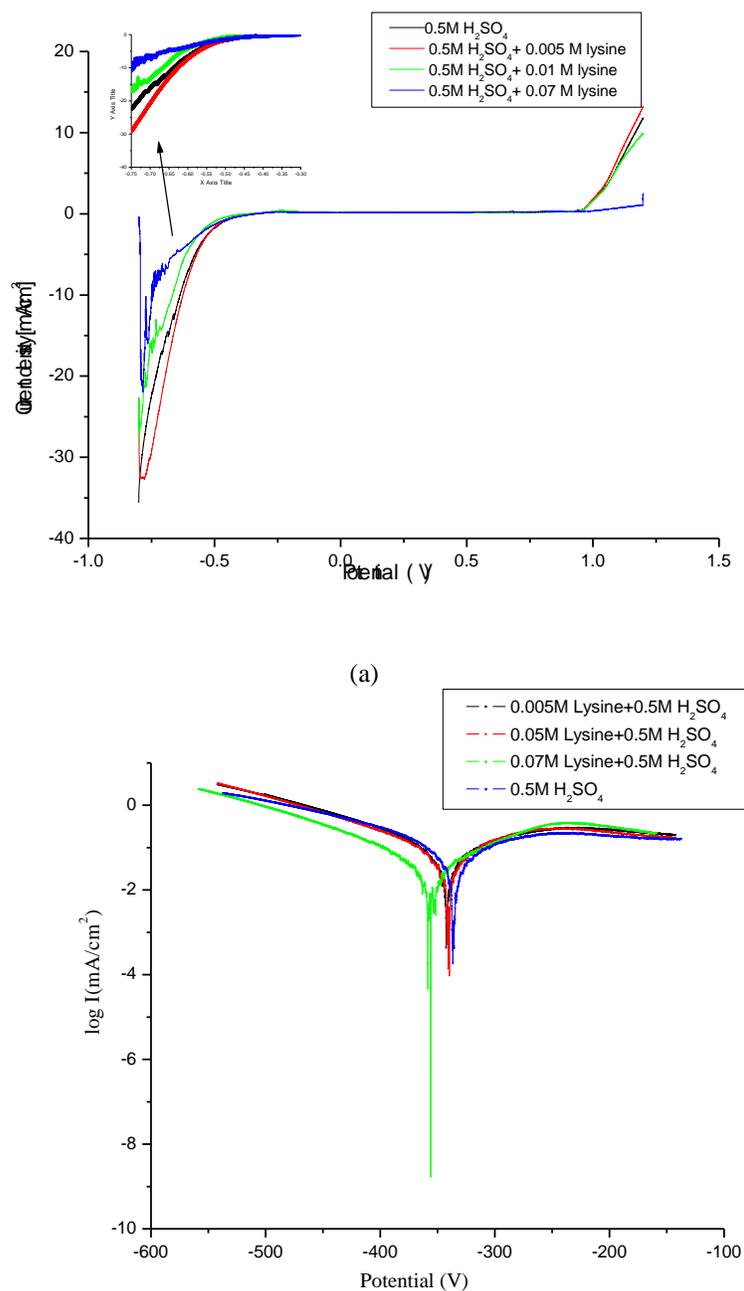


Fig.2. Cathodic and anodic polarization curves for the effect of different concentrations of lysine on the potentiodynamic behaviour of 316L stainless steel in 0.5 M H₂SO₄ solution.

The inhibition efficiency increases as the inhibitor concentration increases and reaches maximum values of 57.07% at 7×10^{-2} M. Generally with increasing inhibitor concentration, the corrosion current density

and corrosion rate decrease as shown in Fig. 3 (a and b).

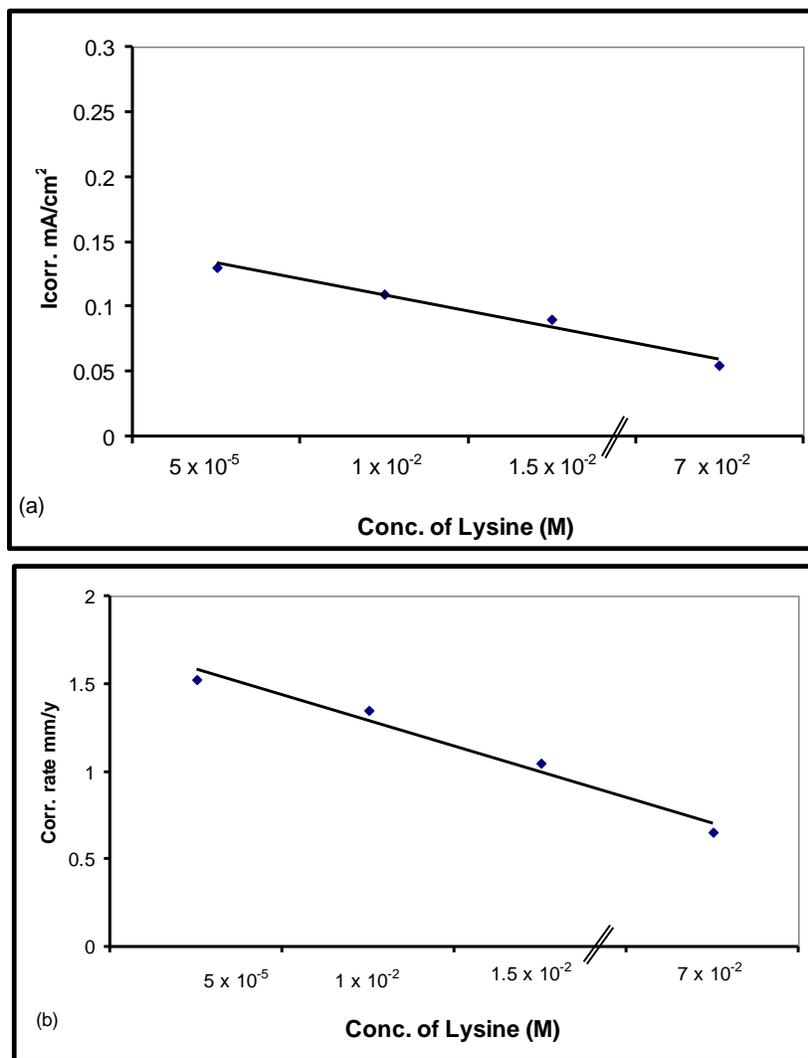


Fig. 3. Effect of lysine concentration on I_{corr} .(a), and on corrosion rate (b) of 316L stainless steel electrode in 0.5 M H_2SO_4 solution.

It is clear from the potentiodynamic polarization experiments that, the presence of lysine decreases the corrosion rate, i.e. the value of I_{corr} decreases. Particularly, the cathodic reaction is inhibited to larger extent than the anodic reaction. Since the transfer of oxygen from the bulk solution to the stainless steel/solution interface will strongly affect the rate of oxygen reduction, it can be inferred that the adsorbed layer behaves as a cathodic inhibitor to 316L stainless steel corrosion by retarding the transfer of O_2 to the cathodic sites of the 316L stainless steel surface.

The cathodic peaks observed at -750 mV, which increase in number by increasing the concentration of lysine.

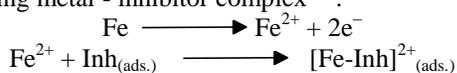
3-3- The inhibition mechanism

The adsorption mechanism for a given inhibitor depends on such factors, as the nature of metal corrosion medium, the pH and the concentration of the inhibitor as well as the functional groups present in its molecule [15]. The corrosion inhibition process is based on the adsorption of the amino acid molecules on the active sites and/or deposition of the corrosion products on the alloy surface [16,17]. Thus it is possible to suggest that at low concentration, the amount of lysine in the solution was insufficient to form a compact complex with the metal ions, so that the resulting adsorbed intermediate was readily soluble in the acidic environment. As the concentration is increased, more lysine molecules become available for complex formation, which subsequently diminishes the solubility of the surface layer, leading to improved inhibiting effect [15].

The increase in efficiency of inhibition with concentration indicates that more lysine molecules are adsorbed on the metal surface at higher concentration, leading to greater surface coverage. The reduced effectiveness is observed at low inhibitor concentrations, including the relatively small molecular area of lysine. It is generally accepted that the first step in the adsorption of an organic inhibitor on a metal surface usually involves the replacement of one or more water molecules adsorbed at the metal surface [18].

$$\text{Inh}_{(\text{sol.})} + x \text{H}_2\text{O}_{(\text{ads.})} \rightleftharpoons \text{Inh}_{(\text{ads.})} + x \text{H}_2\text{O}_{(\text{sol.})}$$

The inhibitor may then combine with freshly generated Fe^{2+} ions on the stainless steel surface, forming metal - inhibitor complex⁽¹⁸⁾:



The adsorption behaviour of various amino acids on 316L stainless steel surface was investigated [19]. These investigations suggest that the acidic and basic amino acids are adsorbed through two electrostatic interactions of two ionized groups in the amino acid with 316L stainless steel surface. However, it has been reported that the number of –OH groups on the stainless steel surface is nearly the same regardless of the crystal forms of the metal oxide on the surface and thickness of the passive films [20,21]. The calculated configurations for the basic amino acids such as lysine and arginine show that the symmetric axis of $-\text{NH}_3^+$ groups and the guanidine groups of the basic amino acids are directed to O^- . Such orientations of the anionic and cationic groups of the acidic and basic amino acids were quite consistent with those indicated by the results from FT-IR analyses [19].

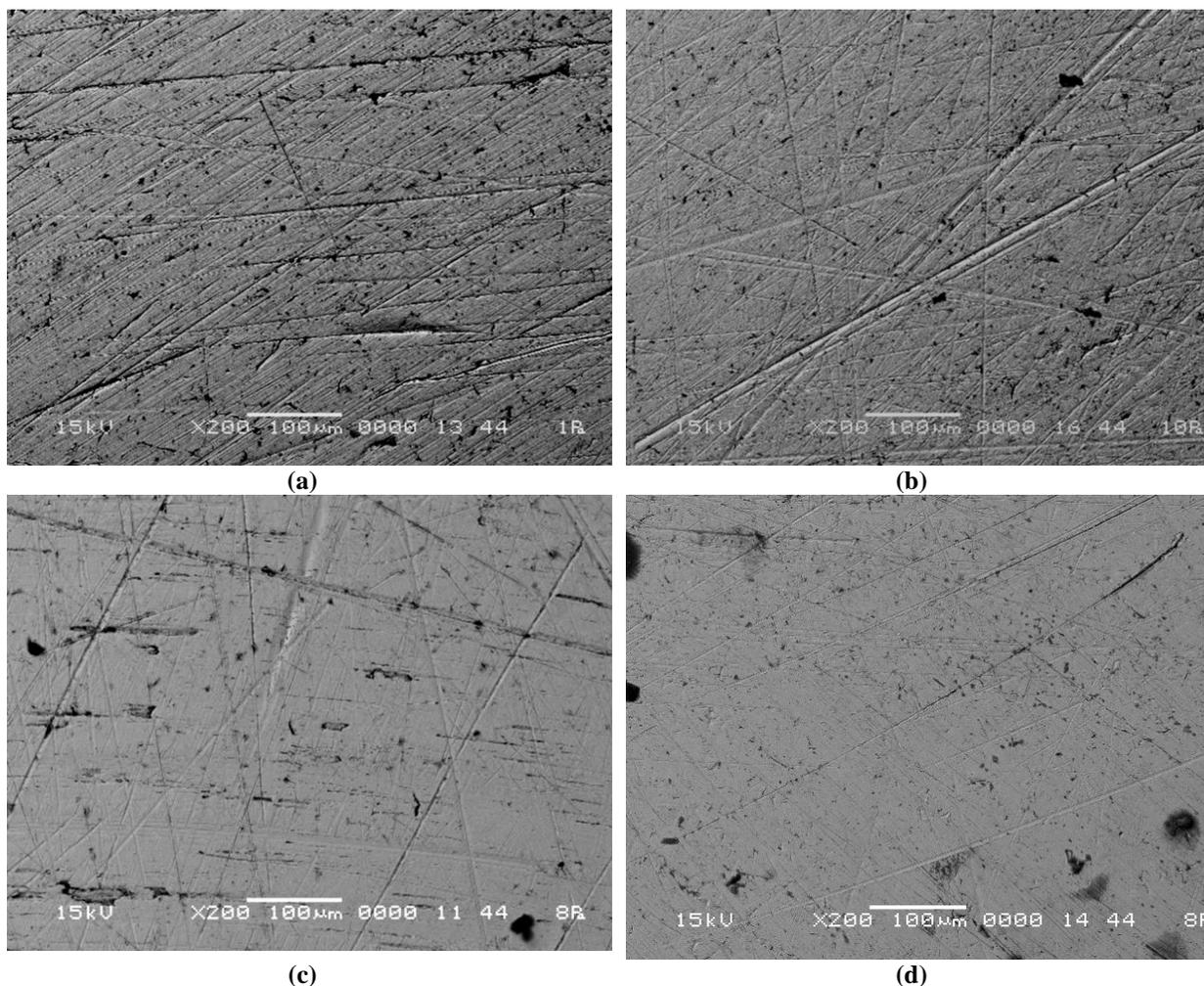


Fig. 4. SEM images of 316L stainless steel surface at 200 magnification, (a) polished surface, (b) stainless steel surface after immersion 2 hr in 0.5 M H_2SO_4 solution without lysine, (c) stainless steel surface after immersion 2 hr in 0.5 M H_2SO_4 containing 5×10^{-3} M lysine, (d) stainless steel surface after immersion 2 hr in 0.5 M H_2SO_4 containing 7×10^{-2} M lysine.

3-4- SEM analysis

The surface morphology of 316L stainless steel studied by scanning electron microscopy (SEM), surface was observed after 2 hs of immersion in 0.5 M H₂SO₄ at room temperature before and after addition of inhibitor corrosion (lysine). Fig. 4a shows the polished surface of 316L stainless steel before being exposed to the testing environment, it was observed as a uniform surface along with the presence of dark spots. Fig. 4b shows the SEM image after immersion in 0.5 M H₂SO₄ (Blank solution) without lysine, showing presence of small number of pits. These results is in agreement with Refaey *et al.* [22]. These results show that, the pitting corrosion of 316L stainless steel depends on the acid concentration. The increase of H₂SO₄ concentration leads to increase of pitting potential towards the more positive direction, i.e. decrease of the pitting corrosion [22]. SEM investigations of the 316L stainless steel surface, data showed that the surface was covered with a lower pit density for H₂SO₄ [22]. Fig. 4 (c and d), shows the stainless steel surface protects after adding lower and higher concentration (5×10^{-3} & 7×10^{-2}) of lysine, respectively. It is observed that, the protective film is thicker in case of higher concentration of lysine than in case of its lower concentration. These results are in agreement with the above discussion.

4- Conclusion

From the above studies, it can be concluded that:

- 1- Lysine is a good cathodic inhibitor for corrosion of stainless steel in 0.5 M H₂SO₄ solution.
- 2- Corrosion inhibition efficiency of lysine increases with increasing its concentration and reaches a maximum value at 7×10^{-2} M.
- 3- Corrosion inhibition by lysine takes place by adsorption of the inhibitor on the metal surface and formation of a protective layer (Fe-lysine complex film) on the metal surface.
- 4- The SEM images confirm the inhibitive character of lysine and the degree of inhibition increases with increase in concentration.

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Predictors of mortality among neonates admitted to neonatal intensive care unit in pediatric Assiut University Hospital, Egypt

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Abstract: Neonatal period is the most hazardous period of life because of various problems/ diseases which a neonate faces. There is great overlap between the risks associated with morbidity and mortality in the perinatal and neonatal periods. The present study aimed to identify the profile and risk factors for neonatal mortality among neonates admitted to neonatal intensive care unit (NICU) in pediatric Assiut University Hospital (AUH). A prospective study was conducted in NICU of pediatric AUH. Study population included all neonates admitted to NICU over a period of one year. The data collected included detailed antenatal and natal histories, details of clinical examination, primary diagnosis, progress during the hospital stay and outcome. The outcome measure was in-hospital death. Survival was defined as the discharge of a live infant from the NICU. Differences between deceased and survived neonates were estimated by the chi-square test and t-test. The association between risk factors and neonatal mortality were estimated by relative risk. The significance level used was p-value of less than 0.05. A total of 990 neonates were included in the study, of which 582 neonates (58.8%) died during their hospital stay. The mortality rate decreased with the increase in birth weight, as well as gestational age. Respiratory distress was the commonest primary diagnosis (94.5%) among all admitted neonates, followed by very low birth weight (VLBW) (36.7%), congenital malformations (8.2%), and infections (4.4%). Significant risk factors ($P < 0.05$) associated with neonatal mortality were: vaginal delivery, multiple births, low Apgar score at 5 minutes, neonatal respiratory distress, prematurity, and low birth weight (LBW). It is concluded that majority of the causes of neonatal mortality are preventable. Surveillance programs for neonatal death should include preventive actions and interventions for the perinatal period. Focused initiatives for quality improvement may also be necessary.

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Key words: mortality, neonates, admission, neonatal intensive care unit.

1. Introduction:

Neonatal death is a serious concern, both in the developing and developed worlds. While infant mortality rates have been decreasing steadily all over the world, changes in neonatal mortality have been much slower^(1,2).

Accurate documentation of fetal and neonatal deaths enables analysis of change in perinatal death rates over time and assessment of their preventability. It is recommended that such audit should occur both regionally and nationally⁽³⁾.

Neonatal period (0 to 28 days of life) is the most hazardous period of life because of various problems/diseases, which a neonate faces. A large majority of newborn babies do not develop any serious problem or difficulties and require only minimal care, which can be provided by the mother if properly supervised by a health worker. High risk mothers are likely to give birth to preterm or low birth weight babies who suffer a large number of problems⁽⁴⁾. Majority of the causes of neonatal morbidity are preventable⁽⁵⁾. Some of the newborns in developing countries have an impaired growth right

during their intrauterine life, reflecting the nutritional status of the mother⁽⁶⁾. About 42% of the infant deaths in our country occur within first 28 days of life⁽⁷⁾. Prematurity accounts for majority of high risk newborns as they face a large number of problems⁽⁸⁾.

Neonatal morbidity and mortality is on increase day by day due to lack of the available resources in developing countries. This can be reduced by proper and timely intervention⁽⁹⁾.

A considerable share of these deaths results from avoidable causes, which means that interventions could have been effective. However, reducing neonatal mortality is hindered by the complex and close relationship between biological and social factors, and by the coverage and quality of health services during prenatal care, delivery and neonatal period.⁽¹⁰⁾ For better neonatal care and prevention of the preventable causes of neonatal morbidity and mortality, this study was conducted in neonatal intensive care unit (NICU) in pediatric Assiut University Hospital in order to identify the profile and risk factors for neonatal mortality among admitted neonates.

2. Subjects and Methods

A prospective study was conducted in neonatal intensive care unit (NICU) in pediatric Assiut University Hospital (AUH), Assiut city, Egypt. Study population included all neonates admitted to NICU over a period of one year. The outcome measure was in hospital death. Survival was defined as the discharge of a live infant from the hospital.

The indications for admission in NICU in pediatric AUH are preterm birth or premature (<37 weeks of gestation), respiratory distress, infections, congenital malformations, birth asphyxia, multiple births, VLBW (<1500), and others.

Data collected included detailed antenatal and natal histories; gestational age, gender, birth weight, single or multiple births, presence of meconium-stained amniotic fluid and type of delivery (vaginal or caesarian section). In addition, data included maternal variables as parity, history of abortion, obstructed labor, bleeding and antenatal morbidity. Apgar scores at 5 minutes, details of clinical examination, primary diagnosis and progress during the hospital stay, and outcome were recorded. Data were obtained from hospital records and oral communication with the attending physicians, as well.

All data were revised, coded and subjected to computer entry and analysis. Statistical analysis was performed using statistical package for social sciences (SPSS) version 11. Descriptive statistics (frequency and percentage) were used to present distribution of study population. Differences between survived and deceased neonates were estimated by the chi-square test and t-test. The association between risk factors and mortality were estimated by relative risk (RR) and their corresponding 95% confidence interval (CI). The significance level used was P-value of less than 0.05.

3. Results

A total of 990 neonates fulfilled the inclusion criteria of the study; of which a total of 582 (58.8%) babies died during the hospital stay. Most neonatal

deaths (n=449, 77.1%) occurred during the first week after admission to NICU. Premature neonates (n = 768) constituted 77.6%, and very low birth weight (n = 363) constituted 36.7% of all neonates admitted to NICU during the period of the study. Mean birth weight of survived neonates was significantly more than that of deceased ($2.37\text{kg} \pm 0.77$ versus $1.64\text{kg} \pm 0.76$, $p < 0.0001$). (data not in table).

The mortality rate decreased with the increase in birth weight as well as gestational age. None of the neonates below 27 weeks gestational age survived, and 96.1% of those weighing less than 1000g died (Table 1).

Primary causes of mortality are summarized in table (2). Common causes of mortality in LBW neonates (<2500g) were respiratory distress and prematurity, and both of them decreased as the birth weight increased. Among those with normal birth weight, common causes of mortality were respiratory distress (90.4%), prematurity (27.7%), congenital malformations (26.5%), hypoglycemia (14.5%), infections (8.4%) and brain insult due to hypoxia (8.4%).

Table (3) shows a comparison between premature and full term neonates as regards primary cause of death. Among premature neonates the most important was respiratory distress syndrome (97.9%). Among full term, in addition to respiratory distress (82.9%), other important causes were congenital malformations (21.6%), hypoglycemia (10.8%), infections (9.0%) and brain insult (8.6%).

Maternal and fetal variables were compared between the survived and the deceased neonates (Table 4). Risk factors significantly associated with mortality were twin pregnancy (RR 1.36), vaginal delivery (Vs. caesarian) (RR 1.22), and low Apgar score at 5 minutes (RR 1.30).

Table (5) shows relative risk of various morbidities. The risk factors most closely associated with neonatal mortality were respiratory distress (RR 1.92), prematurity (RR 1.84), low birth weight (RR 2.0), and very low birth weight (RR 2.02).

Table (1): Distribution of neonates admitted to NICU by birth weight and gestational age

Birth weight (g)	Gestational age (weeks)														Total	Mortality No. (%)
	25-26		27-28		29-30		31-32		33-34		35-36		≥ 37			
	T	D	T	D	T	D	T	D	T	D	T	D	T	D		
500 -	35	35	46	44	16	14	5	5	0	0	0	0	1	1	103	99 (96.1)
1000 -	3	3	70	62	104	98	48	34	24	12	8	5	3	1	260	215 (82.7)
1500 -	0	0	11	9	46	31	75	39	64	37	13	7	10	4	219	127 (58.0)
2000 -	0	0	0	0	6	5	17	8	46	16	52	16	40	13	161	58 (36.0)
> 2500	0	0	2	2	3	0	4	4	12	3	58	14	168	60	247	83 (33.6)
Total	38	38	129	117	175	148	149	90	146	68	131	42	222	79	990	582 (58.8)

T: Total, D: Died

Table (2): Distribution of deceased neonates by birth weight and primary cause of death

Cause of death	Birth wt (g)					Total (n=582) No. (%)
	500- (n=99) No. (%)	1000- (n=215) No. (%)	1500- (n=127) No. (%)	2000 – (n=58) No. (%)	≥ 2500 (n=83) No. (%)	
Respiratory disease	96 (97)	212 (98.6)	126 (99.2)	56 (96.6)	75 (90.4)	565 (97.1)
Prematurity	98 (99)	214 (99.5)	123 (96.9)	45 (77.6)	23 (27.7)	503 (86.4)
Congenital malformations	0 (0.0)	4 (1.9)	6 (4.7)	12 (20.7)	22 (26.5)	44 (7.6)
Infections	2 (2.0)	7 (3.3)	5 (3.9)	1 (1.7)	7 (8.4)	22 (3.8)
Hypoglycemia	0 (0.0)	1 (0.5)	1 (0.8)	1 (1.7)	12 (14.5)	15 (2.6)
Brain insult	0 (0.0)	0 (0.0)	1 (0.8)	2 (3.4)	7 (8.4)	10 (1.7)
Coagulopathies	1 (1.0)	1 (0.5)	1 (0.8)	1 (1.7)	1 (1.2)	5 (0.9)
Birth injuries	0 (0.0)	1 (0.5)	0 (0.0)	1 (1.7)	1 (1.2)	3 (0.5)
Haemolysis and blood diseases	0 (0.0)	0 (0.0)	3 (2.4)	0 (0.0)	2 (2.4)	5 (0.9)

Table (3): Primary diagnosis among preterm and full-term neonates admitted to NICU

Disease	Preterm (n=768) No. (%)	Full term (n=222) No. (%)	Total (n=990) No. (%)	P-value
Respiratory system disease	752 (97.9)	184 (82.9)	936 (94.5)	0.000
Very low birth weight (<1500g)	359 (46.7)	4 (1.8)	363 (36.7)	0.000
Congenital malformations	33 (4.3)	48 (21.6)	81 (8.2)	0.000
Infections	24 (3.1)	20 (9.0)	44 (4.4)	0.000
Endocrinopathies	13 (1.7)	24 (10.8)	37 (3.7)	0.000
Brain insult	6 (0.8)	19 (8.6)	25 (2.5)	0.000
Hypoglycemia	6 (0.8)	6 (2.7)	12 (1.2)	0.030
Birth injuries	3 (0.4)	4 (1.8)	7 (0.7)	0.049
Haemolysis and blood disease	9 (1.2)	13 (5.9)	22 (2.2)	0.000

Table (4): Comparison of maternal and infant variables between survived and died neonates

variable	Survived (n=408) No. (%)	Died (n=582) No. (%)	P-value	Relative risk (95% CI)
Primipara	25 (6.1)	42 (7.2)	0.295	1.07 (0.88 – 1.30)
History of abortion	107 (26.2)	165 (28.4)	0.253	1.04 (0.93 – 1.17)
Maternal Diabetes	12 (2.9)	6 (1.0)	0.025	0.56 (0.29 – 1.08)
Hypertensive disease of pregnancy	63 (15.4)	92 (15.8)	0.475	1.01 (0.88 – 1.17)
Bleeding per vagina	30 (7.4)	51 (8.8)	0.250	1.08 (0.90 – 1.29)
Obstructed labor	14 (3.4)	9 (1.5)	0.043	0.66 (0.40 – 1.10)
Female neonate	142 (34.8)	230 (39.5)	0.075	1.09 (0.98 – 1.21)
Twin pregnancy	79 (19.4)	208 (35.7)	0.000	1.36 (1.23 – 1.51)
Vaginal delivery	160 (39.2)	298 (51.2)	0.000	1.22 (1.10 – 1.35)
Meconium- stained amniotic fluid	20 (4.9)	9 (1.5)	0.002	0.52 (0.30 – 0.89)
Apgar score < 5 at 5 minutes	29 (7.1)	81 (13.9)	0.048	1.30 (0.98 – 1.32)

Table (5): Relative risk of various morbidities among neonates admitted to NICU

Primary diagnosis	Discharged (n=408) No. (%)	Died (n=582) No. (%)	P-value	Relative risk (95% CI)
Low birth weight (<2500 g)	244 (59.8)	499 (85.7)	0.000	2.00 (1.67 – 2.40)
Very low birth weight (<1500 g)	49 (12)	314 (54.0)	0.000	2.02 (1.83 – 2.24)
Respiratory distress	371 (90.9)	565 (97.1)	0.000	1.92 (1.29 – 2.85)
Prematurity	265 (65)	503 (86.4)	0.000	1.84 (1.53 – 2.21)
Congenital malformations	37 (9.1)	44 (7.6)	0.231	0.92 (0.75 – 1.13)
Infection	22 (5.4)	22 (3.8)	0.146	0.85 (0.63 – 1.14)
Hypoglycemia	22 (5.4)	15 (2.6)	0.026	0.68 (0.46 – 1.01)
Brain insult	15 (3.7)	10 (1.7)	0.043	0.68 (0.42 – 1.09)
Coagulopathies	7 (1.7)	5 (0.9)	0.179	0.71 (0.36 – 1.38)
Birth injuries	4 (1.0)	3 (0.5)	0.313	0.73 (0.31 – 1.71)
Haemolysis and blood diseases	17 (4.2)	5 (0.9)	0.001	0.38 (0.18 – 0.83)

4. Discussion:

A considerable variation of mortality rates across NICUs was found. In our study, we documented a very high mortality rate of 58.8%, compared to other studies reporting mortality at NICUs. This may be contributed to higher percentages of preterm and LBW which are the commonest predisposing factors of neonatal mortality. In addition, it is notable that our study was conducted in a university hospital, which serves exclusively the public health sector and is the reference center for high risk pregnancies in the whole governorate. Furthermore, complicated deliveries are usually referred after many failed trials at the primary level with poor equipment and less experienced staff. Other studies have documented a mortality rate varying from 23% to 37%^(11,12,13,14). Most of these studies were Indian. A wide variations in the mortality rates was found among NICUs in a Brazilian study (10 – 48%)⁽¹⁰⁾. A large Canadian study investigated mortality rates for infants admitted to 17 NICUs (n = 19,265), and reported a very low overall mortality rate of 4%. Variations in mortality rates are important, as they would reflect variations in quality of care⁽¹⁵⁾.

Prognosis depends not only on birth weight and gestational age, but also on other perinatal factors and

physiological conditions of the individual infants, in particular, disease severity in the first hours of life⁽¹⁾.

Birth weight and 5-min Apgar score were found to be independent predictors of neonatal mortality and had similar accuracy in discriminating the groups of newborns at high risk for death. While Apgar score can be somewhat inaccurate due to subjective evaluation, birth weight provides a more precise measurement for screening neonates at risk of dying. The cutoff value of 2,500g for birth weight achieved the best performance for predicting neonatal death with sensitivity higher than 70%. Birth weight has been widely recognized as a powerful predictor of infant death, alone or in conjunction with other potential risk variables^(10,16).

In the present study, the mean birth weight of newborns admitted to the NICU was 1,944g ± 842g. The risk of dying was found to decrease with the increase in birth weight and gestational age. Apgar score was found to be a significant variable in the study. The mean Apgar scores at 5 min were significantly lower in the deceased group.

Results of several studies conducted in developing and developed regions have found gestational age as a powerful predictor of neonatal mortality^(15,17). The present study showed that preterm newborns had higher risk of dying (RR, 1.84) compared to full term newborns.

A national study of perinatal/neonatal mortality confirmed the suspicion that Egypt has transitioned in to a different epidemiological model where immediate complications of delivery and prematurity have become more significant contributors to neonatal mortality than infection. The study documented that prematurity and respiratory distress contributed to 57% of deaths while infection represented only 7% of neonatal deaths⁽²⁾. This was in agreement with our study.

We found that congenital anomalies caused 7.6% of neonatal deaths in accordance with the national study, but in contrast to others in developed countries. Wong *et al.*⁽³⁾ found that congenital malformations (29.6%) represented the commonest cause of neonatal deaths despite of thorough antenatal and early termination of pregnancy in presence of major congenital malformations. On the other hand respiratory distress caused only 9.6% of neonatal mortality. The same was reported by Sankaran *et al.*⁽¹⁵⁾. These differences in pattern of neonatal mortality may be due to marked advances in the developed countries concerning neonatal mechanical ventilation and management of preterm neonates together with dealing properly with neurological sequels of hypoxia and routine use of surfactant in respiratory distress syndrome. All these factors caused regression of respiratory distress and prematurity as main contributors to neonatal deaths.

A number of antenatal and intrapartum factors have been reported in the literature to be significantly associated with perinatal and neonatal deaths. In the present study, only maternal risk factors found to be significantly associated with mortality of neonates were multiple births and vaginal delivery. Maternal factors found to be significantly associated with neonatal mortality were history of abortion, bleeding per vagina and failure to give steroids antenatally at least 24 hours prior to childbirth^(1,18).

Forssas *et al.*⁽¹⁹⁾ found that among maternal predictors of perinatal mortality are: in-vitro fertilization, previous stillbirth, higher maternal age, maternal diabetes, lower socioeconomic status, smoking during pregnancy, and first birth. They also conclude that excess mortality due to maternal risk factors occurred mainly through their tendency to cause LBW. However, the excess mortality associated with low socioeconomic status and diabetes was mediated by other mechanisms in addition to LBW.

Our study showed that the risk factors most closely associated with neonatal mortality in NICU were respiratory distress (RR, 1.92), prematurity (RR, 1.84), low birth weight (RR, 2.00), and very low birth weight (RR, 2.02). Female gender, multiple births,

vaginal delivery, and low Apgar score at 5 minutes also posed neonates at higher risk of mortality.

Locatelli *et al.*⁽²⁰⁾ showed that smaller gestational age and birth weight, female gender, low five-minute Apgar score and failure of steroid administration were independent predictors of survival.

Chen *et al.*⁽²¹⁾ found that, with multiple logistic regression analysis, only low birth weight and intraventricular haemorrhage grades were the significant predictors of unfavorable outcomes.

Brito *et al.*⁽¹¹⁾ showed that very low birth weight infants with birth weight less than 750g, less than 29 weeks gestational age and CRIB (clinical risk index for babies) scores above ten had higher mortality rate.

Some limitations of the present study should be addressed. Data were restricted to infants admitted to NICU and hence did not cover deaths of those who did not reach any specialized care. Combining data on NICU deaths with data on deaths occurring in other settings should yield information on predictors of neonatal deaths for all infants born in the community, which may be helpful for those counseling pregnant women. In this sense, further studies should assess suitable algorithms useful for screening all neonates. Moreover, there was a lack of refined clinical information on disease severity, a potential confounder. These data are not recorded on a standardized basis in NICU thus they could not be used as a source of data. Therefore, some clinical information on pregnancy and delivery is out of the scope of this study.

In conclusion, most NICU deaths occurred within the first few days after admission. Respiratory distress, low birth weight, prematurity, congenital malformations were the major causes of neonatal admission to NICU in our study. Low birth weight, respiratory distress, and prematurity were the conditions which posed the admitted neonates at higher risk of death.

The strong association between NICU mortality rates on the hand and low birth weight and prematurity on the other indicates the importance of antenatal care, prevention of preterm deliveries and transfer of mothers with high risk pregnancies to tertiary-level perinatal centers before delivery as the uterus is the best incubator for a premature baby.

The results of the present study suggest that surveillance programs for neonatal death should include preventive actions and interventions for the delivery period. Focused initiatives for quality improvement may also be necessary. Development of strategies aimed at addressing these issues is a key to further reduction of NICU deaths.

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Spousal violence against Egyptian women and its impact on reproductive indicators

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Abstract: Domestic violence against women is increasingly recognized as a global problem. It poses a direct threat to women's health and has serious reproductive health consequences. The study aims to identify the relationship between women exposure to spousal violence and some reproductive health indicators. Data from the 2005 Egyptian Demographic and Health Survey (EDHS) were secondary analyzed for 5,613 ever-married women aged 15-49 years. The results revealed that more than three in ten women had an experience with any form of spousal violence. Fertility was higher among women have experienced violence than among women who have not (mean number of children ever born was 3.4 ± 2.1 versus 2.9 ± 2.4). Total family planning need was higher among women who have experienced violence than among women who have not. Self reported prevalence of sexually transmitted infections was higher among women who have ever or recently experienced violence than women who have not (21.4%, 26.1% versus. 18.5%). It is concluded that marital violence is related to various negative reproductive health outcomes. Violence against women is a vicious circle that needs to be broken. Actions must be taken to make women and men understand that violence against women is not legitimate or acceptable and that everybody pays a high price for it.

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Key words: Domestic violence – intimate partner- reproductive indicators- health impact

1. Introduction:

Violence against women has been acknowledged worldwide as a violation of basic human rights (United Nations General Assembly, 1991; Pan American Health Organization, 2001). The term “domestic violence” is usually used to define violence exerted toward the woman by a family member (most commonly the husband or the intimate male partner) (Crowell and Burgess, 1996). Violence against women has become a top priority on the agendas of many international health organizations. The Pan American Health Organization has estimated that women lose an average of 1 out of 5 days of healthy life during their reproductive years because of violence (Castro and Vand Ruiz, 2003).

Domestic violence not only poses a direct threat to women's health, but also has adverse consequences for other aspects of women's health and well-being and for the survival and well-being of children (Kishor and Johnson, 2004). Exposure to psychological assault and physical assault demonstrated significant influence on wives' participation in contraceptive decision-making (Chapagain, 2005). Women who reported physical or sexual violence by a partner were also more likely to report having had at least one induced abortion or miscarriage than those who did not report violence (WHO, 2005).

Women who are coerced into sex, or who face abuse from partners are less likely to be in a position

to use contraception. Therefore, they more exposed to unintended pregnancy than others. Women who have experienced a sexual assault often fear pregnancy and delay medical examination or health care (Glander *et al.*, 1998). Research reveals an association of violence and higher fertility, although the direction of causality remains unclear (Ellsberg *et al.*, 1999). Up to 40% of women attending for pregnancy termination have experienced sexual and/ or physical abuse at some stage of their lives (Allanson and Astbury, 2001).

A review of over 50 population-based studies performed in 35 countries prior to 1999 indicated that between 10% and 52% of women around the world report that they have been physically abused by an intimate partner at some point in their lives, and between 10% and 30% that they have experienced sexual violence by an intimate partner. Between 10% and 27% of women and girls reported having been sexually abused, either as children or as adults (WHO, 2005).

In the developing countries, large-scale studies have been conducted, between 10 and 69 per cent of women report they have been physically abused by an intimate partner in their lifetime (UNFPA, 2005).

According to Egypt Demographic and Health Survey, 2005, almost half of ever-married women in the reproductive ages have experienced violence at some point since they were 15 years and around one in five reported experiencing violence in the 12

months preceding the survey. The main perpetrators are husbands and physical violence is the most common form of violence (El-Zanaty and Way, 2006).

In Egypt as elsewhere around the world, wife beating is related to various negative health outcomes. Diop-Sbibé *et al.* (2006) found that thirty-four percent of women in their study were ever beaten by their current husband, while 16% were beaten in the past year. Ever-beaten women were more likely to report health problems necessitating medical attention as were women beaten in the past year compared to never-beaten women. Regarding reproductive health, higher frequency of beating was associated with non-use of a female contraceptive method, while antenatal care (ANC) by a health professional for the most recent baby born in the past year was less likely among ever-beaten women.

As domestic violence against women is increasingly recognized and discussed, this study used the available information of EDHS, 2005 about the association between intimate partner violence and reproductive health, which is currently lacking, and can be used to advocate for improved programmatic and policy efforts to address the problem.

Aim of the study:

This study aims to identify the relationship between women exposure to spousal violence and some reproductive health indicators.

2. Material and Methods

Data from the 2005 Egyptian Demographic and Health Survey were secondary analyzed for 5,613 ever-married women aged 15-49 who responded to both the main questionnaire and a special module on women's status. EDHS 2005 used a multistage sampling technique. Survey questionnaires were administered face-to-face by female interviewers. The overall response rate to EDHS-2005 for eligible women was 99.5% in all areas.

The DHS Household Questionnaire collects data on sex, age, education, residence, household possessions and household access to various amenities such as toilet facilities, water and electricity. The DHS Women's Questionnaire collects data for women age 15-49 years on a variety of characteristic, including age, education, marital status, parity, contraceptive use, employment and empowerment status, as well as their husbands' occupation, education.

Domestic violence section was administered to women in the subsample of households (one-third of households). One eligible woman was selected randomly from each of the households in the subsample to be asked the domestic violence section.

Weights were incorporated into the calculations to account for the sampling design.

Statistical analysis:

Data analysis was performed using SPSS version 16. Descriptive statistics were calculated. Then cross tabulations and chi-square were performed for categorical data. T-test was used for numerical data. Missing values were excluded in analysis. The 0.05 level was chosen as the level of significance and 95% confidence interval.

According to the experience of violence, women were categorized into the following four groups: ever-experienced violence, experienced violence in the past 12 months preceding the survey (recent violence), ever-experienced violence but not in the past year and never experienced violence.

For assessment the extent to which marital violence affect reproductive health of women, indicators of women's reproductive health were examined for women reported experiencing spousal violence. These indicators included measures of women fertility and their fertility planning status, the occurrence of non-live births, contraceptive use and the self-reported prevalence of sexually transmitted infections. It also included women's access to maternal health care. The analysis of contraceptive use and self reported prevalence of sexually transmitted infections was restricted to currently married women because some of the variables were more appropriate for them. The study examined women's physical health through two measures of nutritional status: body mass index (BMI) and anemia status.

Anemia level was detected based on the measured hemoglobin (gm/ dL) for non-pregnant women: Mild: 10-<12, Moderate: 7- < 10, Severe: < 7 and any anemia: < 12, while for pregnant women: Mild: 10-< 11, Moderate: 7-<10, Severe: < 7 and any anemia < 11.

3. Results

Table (1) presents selected background characteristics of the women in the research sample. Most of them were rural Moslem women and did not work for pay. About 40% of women had complete secondary or higher education.

The percentages of women ever-experienced any form of violence were 35.9% among ever-married women. The rates of experience of recent violence in the year preceding the survey were 20.7%. The most common type of violence was physical violence, followed by emotional form and the least one was sexual form (Table 2).

As shown in Figure (1), pregnancy did not protect women from being abused by their husbands.

Among women who had ever been pregnant, 5% of ever-married women have experienced physical violence during pregnancy by their husbands.

Table (1): Background characteristics of women in the EDHS 2005 domestic violence sample

Background characteristics	Ever-married women	
	No.	%
Current age:		
15-19	251	4.5
20-29	1871	33.3
30-39	1876	33.4
40-49	1614	28.8
Marital status:		
Married	5240	93.4
Divorced/separated	158	2.8
Widowed	215	3.8
Religion:*		
Moslem	5318	94.7
Christian	289	5.1
Residence:		
Urban	2339	41.7
Rural	3274	58.3
Education:		
No education	1922	34.2
Incomplete primary	649	11.6
Complete primary/ some secondary	780	13.9
Complete secondary and higher	2262	40.3
Working status:		
Working for cash	973	17.3
Not working for cash	4640	82.7
Wealth quintile:		
Lowest	1048	18.7
Second	1018	18.1
Middle	1129	20.1
Fourth	1226	21.8
Highest	1192	21.2
Total number of women	5613	

* There were 6 missing values

Table (3) shows the mean number of children ever born to ever-married women by age group and the ever-experienced of violence. Results revealed a significant association of violence and higher fertility, as ever-married women who have ever-experienced violence have a higher mean number of children ever born (3.4 ± 2.1) than women who have never experienced violence (2.9 ± 2.2), $P= 0.000$. Also, the table shows that the mean number of births in all age groups tends to be higher for women who

have experienced violence than for women who have not.

Women who have experienced violence were less likely to say that their last birth was wanted when it was conceived (72.3%), compared with women who have never experienced violence (79.6 %, $P= 0.000$), (Table 4).

The result revealed that women who have experienced violence were more likely to be currently using contraception than women who have not experienced violence. About 63% of women who have ever-experienced violence and 63.3 percent of women who have experienced violence in the past year were currently using contraception comparing with 56.1% among women who never experienced violence (Figure 2).

Table (5) shows that women who have spousal violence tend to have higher total need for family planning than women who have not experienced violence. presents that the percent of total need for family planning was 76.8% and 75.3% among women who have experienced violence ever and in the past year, respectively compared with 67.2% among women who have not experienced violence ($P < 0.05$). Also, the table shows that women who have ever-experienced violence have a higher unmet need for limiting births (10.8%) than women who have never experienced violence (6.4%). Despite the higher current contraceptive use rate among women who have experienced violence, the higher need is also manifested in higher unmet need.

Table (6) presents women's access to antenatal care (ANC) and average number of antenatal care visits they made for the last baby born in the last 5 years. Women who have experienced spousal violence received ANC for 64.9% of last births compared to 74.9% among women who never experienced violence ($P < 0.05$). The percent of women who made more than 4 ANC visits was 84.4% among women who have experienced violence compared to 87% among women who not abused. The table also shows that the percentage of last births delivered with the assistance of a medical professional was 70.6% among women who have experienced marital violence compared to 78.6% among women who never experienced violence. The percentage of births delivered by Caesarian section was lower for women who were abused (17.7%) than for women who were not abused (23.8%).

Table (7) shows that women who have ever-experienced spousal violence were more likely to have had a non-live birth (26.7%) compared with women who have never experienced violence (22.5%). The difference was statistically significant ($P= 0.000$).

The EDHS survey asked all women whether they had a sexually transmitted infection in past year; figure (3) shows how this self-reported prevalence of sexually transmitted infections varies by the violence status of women. The proportion of women reporting a sexually transmitted infection was higher among women who have recently experienced violence (26.1%) than among those have ever-experienced violence (21.4%) and those have never experienced violence (18.5%), $P=0.000$.

Table (8) shows that the percentage of obesity among women who have ever-experienced violence was significantly higher (49.5%) than among women who have never experienced violence (45.3%), $P<0.05$. On the other hand, there was no statistically significant association between anemia and the experience of violence (Table 9).

Table (2): Prevalence of different forms of spousal violence among ever-married women age 15-49, EDHS 2005

Forms of violence	Ever-married women aged 15-49 years			
	Ever-experienced violence		Experienced violence in 12 months preceding the survey	
	No.	%	No.	%
Physical	1863	33.2	1022	18.2
Emotional	981	17.5	575	10.2
Sexual	372	6.6	217	3.9
Any form	2015	35.9	1160	20.7
Number of women	5613		5613	

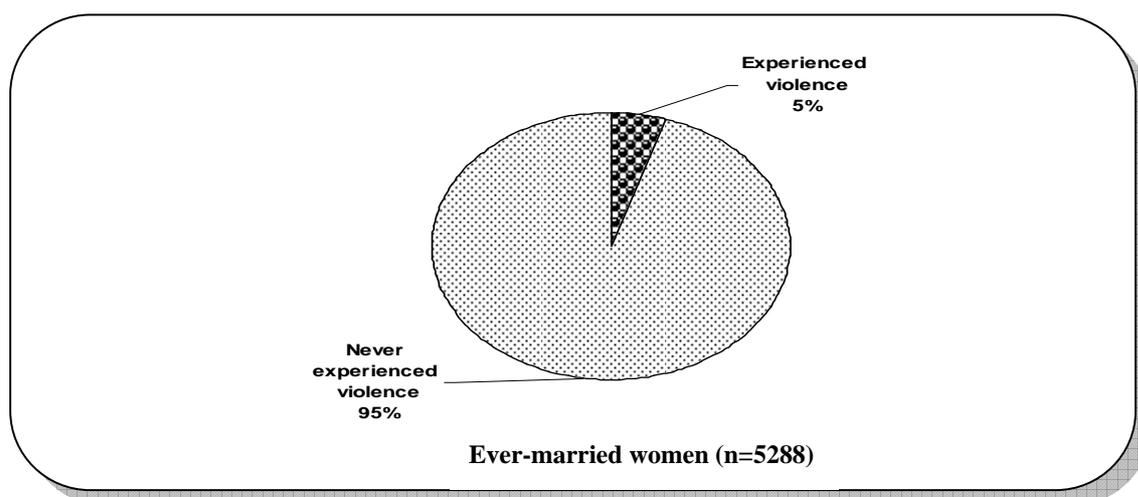


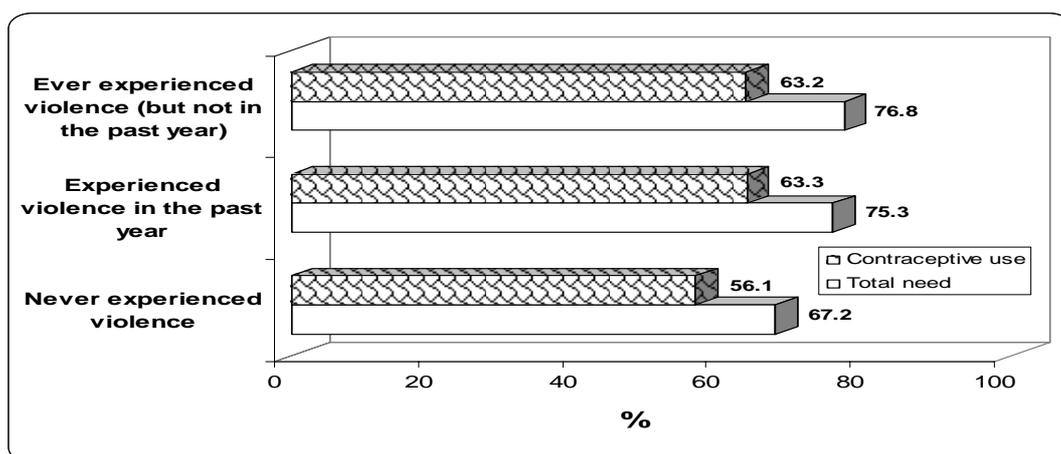
Table (3): Mean number of children ever-born to ever-married women by age according to whether they have experienced spousal violence or not EDHS 2005

Experienced of violence	Age groups in years				Ever-married women 15-49 (n=5612)	Total no. of women
	15-19 (n=251)	20-29 (n=1871)	30-39 (n=1876)	40-49 (n=1614)		
Ever-experienced violence	1.0 ± 0.8	2.2 ± 1.2	3.7 ± 1.8	4.7 ± 2.3	3.4 ± 2.1	2015
Never experienced violence	0.4 ± 0.5	1.7 ± 1.2	3.4 ± 1.9	4.4 ± 2.4	2.9 ± 2.4	3597
P-value	0.000	0.000	0.000	0.000	0.000	-

Bivariate relationships are significant according to unpaired t-test.

Table (4): Fertility planning status of ever-married women for last child born in the last 5 years period according to the experience of spousal violence, EDHS, 2005

Experience of violence	Last child born in the last 5 years period			
	Wanted then	Wanted later	Not wanted at all	Total number of last births
Ever-experienced	741 (72.3%)	97 (9.5%)	187 (18.2%)	1,025
Never experienced	1,408 (79.6%)	124 (7.0%)	237 (13.4%)	1,769
P-value	0.000			

**Fig. (2): Percentage of currently contraceptive use of currently married women and total family planning need according to whether they have experienced spousal violence ever, in the past year or never, EDHS 2005****Table (5): Family planning need of currently married women according to whether they have experienced spousal violence ever, in the past year or never, EDHS 2005**

Family planning need	Ever-experienced violence (but not in the past year)		Experienced violence in the past year		Never experienced violence	
	No.	%	No.	%	No.	%
Unmet need:¹						
For spacing	16	2.3	41	3.6	125	3.7
For limiting	76	10.8	76	6.7	218	6.4
Total	92	13.1	117	10.3	343	10.1
Met need:²						
For spacing	44	6.3	149	13.2	423	12.4
For limiting	403	57.2	568	50.2	1486	43.8
Total	447	63.5	717	63.4	1909	56.2
Contraceptive failure	3	0.4	18	1.6	28	0.8
Not in need:						
Desire birth < 2 years	60	8.5	182	16.1	727	21.4
Infecund/ menopausal	103	14.6	97	8.6	386	11.4
Total need for family planning³	541	76.8	852	75.3	2281	67.2
Total no. of women	704		1131		3394	

N.B.: All bivariate relationships are statistically significant based on the chi-square test.

¹ Unmet need for spacing includes: pregnant women whose pregnancy is mistimed, amenorrheic women whose last birth was mistimed and non-users who are neither pregnant nor amenorrheic and who either want to delay the next birth at least two or more years, are unsure whether they want another child or want another child, but are unsure when to have the birth. Unmet need for limiting includes: pregnant women whose pregnancy is unwanted, amenorrheic women whose last child was unwanted; and nonusers who are neither pregnant nor amenorrheic and who want no more children.

² Met need includes women who are currently using contraception.

³ Total need for family planning represents the sum of unmet need and met need. It also includes pregnant and amenorrheic women who became pregnant while using contraception.

Table (6): Access to antenatal and delivery care for the last child born according to whether the mother has ever-experienced spousal violence or not EDHS 2005

	Ever- experienced violence		Never experienced violence	
	No.	%	No.	%
Antenatal care:				
Yes	659	64.9	1299	74.9
No	357	35.1	435	25.1
Total number of births	1016	100.0	1734	100.0
Number of ANC visits:				
1-3	103	15.6	169	13
4+	556	84.4	1130	87.0
Delivery assisted by medical professional:				
Yes	721	70.6	1383	78.6
No	300	29.4	376	21.4
Total number of births	1021	100.0	1759	100.0
Delivery by caesarian section:				
Yes	181	17.7	420	23.8
No	840	82.3	1343	76.2
Total number of births	1021	100.0	1763	100.0

N.B.: Last births with missing information were excluded.

All bivariate relationships are statistically significant based on the chi-square test except no. of antenatal visits.

Table (7): Percentage of ever-married women who have ever had a terminated pregnancy (stillbirth, miscarriage or abortion), according to whether they have ever-experienced spousal violence or not, EDHS 2005

Experience of violence	Ever had a terminated pregnancy		Never had a terminated pregnancy		No. of women have ever had a birth *
	No.	%	No.	%	
Ever-experienced violence	514	26.7	1413	73.3	1927
Never experienced violence	720	22.5	2474	77.5	3194
P-value	0.000				

* Women who have never pregnant are excluded.

* Because the timing of the non-live births is not known, data are not presented separately for women who have recently experienced violence (in the past year).

Table (8): Body mass index of ever-married women according to the experienced of spousal violence, EDHS 2005

BMI	Ever-experienced violence		Never experienced violence	
	No.	%	No.	%
Under weight (< 18.5)	7	0.3	11	0.3
Normal range (18.5 – < 25)	357	17.9	724	20.3
Overweight (25 - < 30)	646	32.3	1213	34.1
Obese (≥ 30)	989	49.5	1611	45.3
Total number of women	1999	100.0	3559	100.0

P-value= 0.017

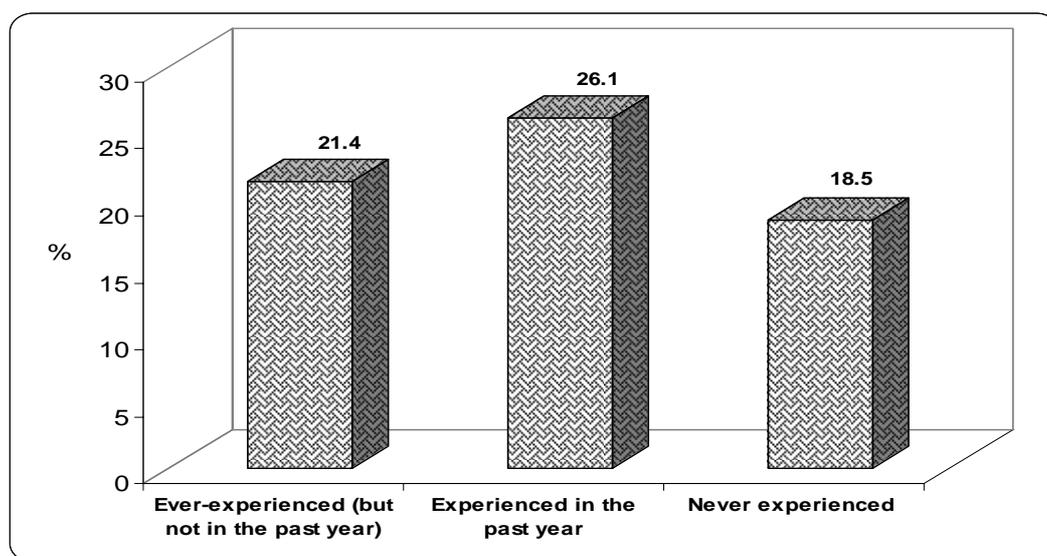


Fig. (3): Prevalence of self-reported sexually transmitted infections in the past year among currently married women according to the experience of spousal violence, EDHS 2005

Table (9): Prevalence of anemia among ever-married women aged 15- 49 years according to the experience of spousal violence, EDHS 2005

Anemia Level	Ever-experienced violence (but not in the past year)		Experienced violence (in the past year)		Never experienced violence	
	No.	%	No.	%	No.	%
Any anemia:	320	38.5	447	39.0	1426	40.4
Mild	263	31.6	363	31.7	1179	33.4
Moderate	54	6.5	83	7.2	237	6.7
Severe	3	0.4	1	0.1	10	0.3
Not anemic	512	61.5	699	61.0	2107	59.6
Total number of women measured hemoglobin	832		1146		3533	

P-value= 0.498

4. Discussion

There is often a culture of silence around the topic of domestic violence, which makes the collection of data in this topic particularly challenging. So data from the 2005 Egyptian Demographic and Health Survey were secondary analyzed. Violence against women is now recognized as a priority issue in many international agencies and local non-governmental organizations (NGOs) around the world. Women in Egypt face a myriad of problems and inequities, and domestic violence is one of the most serious health problems. In the present study the researchers examined the impact of spousal violence on reproductive health of Egyptian women from a nationally representative sample of ever-married women.

Prevalence of different types of domestic violence

Prevalence studies with samples of representative populations are relatively new in developing countries (UNICEF, 2000). Data from developing countries was, however, generally lacking (García-Moreno *et al.*, 2005; Ntaganira *et al.*, 2008; Silverman *et al.*, 2008). There are very few studies concerning domestic violence in Middle-Eastern countries where religion plays an important role in shaping society, the results of which indicate that in countries such as Egypt, Palestine, Israel and Tunisia at least one out of three women is beaten by her husband (Haj-Yahia, 2002; Douki, *et al.*, 2003).

The present study revealed that about one third of the Egyptian women ever-experienced any form of marital violence and one fifth of them experienced a recent violence in the year preceding the 2005 DHS survey. The most common type of violence was

physical violence, followed by emotional form and the least one was sexual form. Bakr and Ismail (2005) found that out of 509 women attending out-patient clinics in Ain Shams University Hospitals, Cairo, 89.8% had experienced one or more episodes of spousal violence and about 34.2% had been beaten by their husbands. In a multi countries study conducted by WHO physical and sexual violence against women was strikingly common. In every setting except Japan, more than a quarter of women in the study had been physically or sexually assaulted at least once since the age of 15 years (García-Moreno *et al.*, 2005). Silverman and his colleagues (2008) found that one third of married Indian women (35.5%) reported experiencing physical intimate partner violence with or without sexual violence from their husbands. In a study conducted in Sudan, the prevalence of physical abuse by husbands reported by the women was 80% (Ahmed and Elmardi, 2005).

On the other hand, the present findings were higher than the result found by Kocacik and his colleagues in Turkey (2007) as 27.5% of studied women have experienced domestic violence by their husbands. Also, American National Violence against Women Survey found that 22% of surveyed women experienced intimate partner violence and reported that they were physically assaulted by a current or former spouse; 1.3% reported experiencing such violence in the previous 12 months (Menard, 2008).

Although pregnancy is often thought of as a time when women should be protected, among women who had ever been pregnant, it was found that 5% of women have experienced physical violence during pregnancy by their husbands. This similar with WHO findings about 5% of the women reported exposure to physical violence during pregnancy. In most study locations, between 4% and 12% of women who had been pregnant reported being beaten during pregnancy (WHO, 2005). This result is much lower than that reported by women in EDHS (1995) as 32% were beaten during pregnancy (El-Zanaty *et al.*, 1996). In a household survey, it was found that pregnant women are about two thirds more likely to be beaten than women who are not pregnant. Violence is cited as a pregnancy complication more often than diabetes, hypertension or any other serious Complication (CDC, 1998). Each year over 300,000 pregnant women in the U.S. are battered by the men in their lives, often the father of their child (Gazmararian *et al.*, 2000). In a study conducted on pregnant women in Rwanda, 35% reported intimate partner violence in the last 12 months (Ntaganira *et al.*, 2008).

Impact on Reproductive health

Experience of violence has long-term negative health consequences. These effects can manifest as poor health status, poor quality of life, and negative outcomes for women and children health high use of health (Campbell, 2002). Women who have ever-experienced domestic violence are less likely to have had a birth that was wanted at the time of conception than women who have never experienced violence and also related with higher rates of ever use of contraceptive methods. Intimate partner violence has been noted in 3–13% of pregnancies in many studies from around the world, and is associated with detrimental outcomes to mothers and infants (Campbell, 2002). Sakar (2008) has reported that physical violence on pregnant women increases the risk for low birth weight infants, pre-term delivery and neonatal death and negatively affects breast feeding postpartum.

The findings from this study confirm that marital violence is associated with negative reproductive health outcomes. The findings reveal an association of violence and high fertility. The direction of the relationship is unclear- whether increased fertility leads to violence or violence leads to high fertility. However, the relationship may work in the opposite direction when there are more children in a household; there is less income per capita as insufficient resources may lead to exacerbated levels of stress for the husband, which may lead to violence (Martin *et al.*, 1999). DHS 2005 data show that fertility of women who have experienced violence was higher than that of women who have not. Women experienced violence had a higher mean number of children ever born (3.4 ± 2.1) than women did not (2.9 ± 2.4). Women who are subjects to partner violence may be less able to control their fertility than other women (Kishor and Johnson, 2004).

The analysis revealed that women who have ever experienced violence were significantly less likely to have had the last birth that was wanted at the time of conception than women who have never experienced violence (72.3% versus 79.6%). The hypothesized lack of sexual autonomy among abused women suggests that abused women should be at a greater risk of having a mistimed as well as an unwanted birth. Diop-Sbibé and other researchers (2006) found that wife beating was associated with non-use of female contraceptive methods. Forty percent of pregnant women who have been exposed to abuse report that their pregnancy was unintended, compared to just eight percent of non-abused women (Hathaway *et al.*, 2000). The results of Stephenson *et al.*, 2008 demonstrate a clear relationship between a woman's experience of physical violence from her husband and her ability to achieve her fertility

intentions. Women who have been sexually abused are more likely to have had their partner stop them from using contraception. Salam *et al.*, (2006) found that abused women used contraception significantly less than non-abused women. One study of 474 low-income adolescent mothers found that 66% of abused women had experienced birth control sabotage, versus 34 % of non-abused women (Outlook, 2002).

In most sites, women who reported physical or sexual violence, or both, by a partner were significantly more likely to report having had at least one induced abortion or miscarriage than those who did not report violence, with the association being stronger for induced abortions than for miscarriages (WHO, 2005). The studies show that women with past or current history of abuse had a significantly higher incidence of spontaneous abortions and neonatal deaths. The greater the severity of the acts of aggression, the higher the proportion of women with multiple abortions (Diniz and d'Oliveira, 1998). Saifuddin and his colleagues (2006) found the risks for perinatal mortality were more than two-fold higher among births to mothers who experienced such violence. Fetal deaths have also been associated with the experience of domestic violence during pregnancy in India (Jejeebhoy, 1998).

In this study, antenatal care for the most recent baby born in the past five years was less likely among women experienced violence. The postulated negative relationship between marital violence and antenatal care visits was supported. In Egypt, Kishor and Johnson (2004) found that mothers who were abused received ANC for only 32% of births, compared with 41% of births mother who were not abused. In other study, there was no difference in the use of antenatal services by abused and non-abused women who had had a live birth in the 5 years preceding the interview. However, in urban Bangladesh, Ethiopia, and provincial United Republic of Tanzania, women who were ever physically or sexually abused by their partner were significantly less likely to have attended an antenatal service for the most recent live birth (WHO, 2005).

Our findings revealed that exposure to marital violence related to increases sexually transmitted infections that is consistent with demonstrated by Silverman *et al.*, 2008. Women in violent situations are less able to use contraception or negotiate safer sex, and therefore run a high risk of contracting sexually transmitted diseases and HIV/AIDS. According to a study by Harvard University, one in three teens tested for STIs and HIV/AIDS have experienced domestic violence (Family Violence Prevention Fund, 2009). Women disclosing physical violence are nearly three times more likely to experience a sexually transmitted infection than

women who don't disclose physical abuse (Coker, 2000). Studies have hypothesized that women who suffer physical violence are less likely to be in a position to negotiate safe sex or condom use with their husbands. There is also evidence that men who admit perpetrating violence on their wives also admit multiple partner sexual relations and non-use of condoms. Data reveal that abusive men are more likely to engage in extra-marital sex and have symptoms of STIs, thereby placing their wives at risk of acquiring infection (Verma and Collumbien, 2003; Salam *et al.*, 2006).

Research suggests that the risk of severe obesity is higher among abused women, particularly women who have experienced abuse in childhood (Williamson *et al.*, 2002). Our results revealed that women who have experienced violence were significantly more likely to be abused (49.5%) than women who have never experience violence (45.3%). In India, women who have experienced violence (34%) to be underweight (Kishor and Johnson, 2004). As regards the prevalence of anemia, the study did not provide support for significant positive relationship between women experience of violence and their anemia status. However, Kishor and Johnson (2004) found that in India, women who have experienced violence were more likely (41%) to be underweight. Also, the prevalence of anemia was more between women who have recently experienced violence (57%) and women who have never experienced violence (51%).

This study has some limitations. The EDHS 2005 was cross sectional design and purely quantitative. Such design may provide an indication of the prevalence rate of domestic violence but it is inappropriate for measuring the incidence rate. Also, causality and ordering of the events are uncertain. The other limitation is that the data were derived from women self-reports and, therefore, are liable to all self-report bias.

5. Conclusion

This study concluded that violence against women is alarming, and highlight the urgent need for government and civil society to address the issue and end this scourge that hinders progress toward Egypt's development goals. Violence against women is a vicious circle that needs to be broken. Experience of violence results in negative outcomes for women and children health.

The main recommendations are summarized as the followings:

- Include the subjects of domestic violence in population education, which target the

public at large as well as specific subgroups of the population and using different communication strategies.

- Actions must be taken to make women and men understand that violence against women is not legitimate or acceptable and that everybody pays a high price for it.
- Make use of the regional broadcasting TV and Radio to raise public awareness on the health and social consequences of domestic violence. The message has to be clear and scientific and agreed upon by religious people.
- Provision of health services and counseling places to help the abused women. This could be integrated into the existing maternal and child health services.
- Additional studies focusing extensively on domestic violence against women are needed to emphasize health, psychological and social dimensions of this problem.

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Physicochemical and Sensorial Quality of Semolina-Defatted Guava Seeds Flour Composite Pasta

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Abstract: Guava seeds flour (≥ 40 mesh) characterized with its higher contents of crude fiber, fat and lowest moisture if compared with semolina flour. Farinograph parameter indicated that, water absorption, arrival time and dough weakening increased and stability decreased by increasing supplementation level of guava seeds flour compared to semolina flour. Supplemented pasta with guava seeds flour (10 & 20%) characterized with its higher volume than control pasta; and cooking loss not affected with replacement of 10% if compared with control pasta. Sensory evaluation showed that, stickiness, appearance, flavor and tenderness not affected with replacing level up to 30%, 20% and 10%, respectively, while color of different replacement level affected. Chemically, supplemented pasta with guava seeds flour caused an acceptable gradual increase in moisture, protein, fat, ash and crude fiber; and decrease in carbohydrates. Guava seeds flour characterized with its higher essential mineral if compared with semolina. FT-IR spectra of guava seeds flour showed two specific bands at 3417 cm^{-1} , 1040 cm^{-1} and 1746 cm^{-1} for stretching (OH), stretching (C-O) and stretching (C=O). While, pasta of 100% semolina was characterized with bending (CH) at 1421 cm^{-1} and stretching (C-C) at 1081 cm^{-1} .

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Keywords: Guava seeds - pasta – supplemented flour – high fiber pasta - Farinograph.

1. Introduction:

Guava (*Psidium guajava*) is one of the most widely processed fruit in many parts of the world. Guava juice and nectar are the most popular bottled fruit beverages in Egypt. The pulp (88 g/100 g of fruit weight) is used for juice production, but seeds (12 g/100 g of fruit weight) are discarded. One of the most common problems in food processing industry is the disposal of the sub products generated. This “waste material” produces ecological problems related to the proliferation of insects and rodents, and an economical burden because of transportation to repositories. Therefore, strategies for the profitable use of these materials are needed. Kanner *et al.*, (2001), Melo *et al.*, (2008), and Norshazila *et al.*, (2010) found that, Guava wastes have high antioxidant potential, because they are rich in compounds that can delay oxidation; and also, Packer *et al.*, (2010) concluded that Guava peel and seeds extracts are effective in retarding lipid oxidation in processed chicken meat at concentration of 60 mg total phenolic compounds/kg of meat. Opute (1978) and Aly (1981) reported that guava seeds contained 9.0% lipids which consisted almost of neutral compounds (triglycerides). Habib (1986) found that the chloroform methanol extracted lipids amounted to 9.1% on a dry weight basis and contained 12 fatty acids which are similar to that of cotton seed oil. The protein content of guava seeds was 9.73% on dry matter basis and consisted of 15 amino acids of which arginine, glutamic acid, aspartic acid, glycine

and leucine presented 67% (Adsule and Kadam, 1995). Several researchers studied the possibility of utilizing guava seeds waste, where Shams El-Din and Yassen (1997) used guava seeds as an additional source of fiber in cookies; they found that, using 9% guava seed meal gave an acceptable, but comparatively inferior product. They found that, increasing the ratio of guava seeds meal caused a decrease in water absorption, dough development time and stability; and increased dough weakening. They found also that, adding guava seed meal to wheat flour improved volume, specific volume, diameter, and thickness of the cookies after baking. While, Abd El-Aal, (1992) studied the optimum conditions for preparing protein isolates from ground, defatted guava seed flour that could be used as a value added products.

Guava seeds gave coarse particle after milling, difficult to be applied at industrial scale. This research is consider as an attempts towards preparing fine ground fractions that could be used to add a nutritive value and cooking quality to pasta.

2. Materials and Methods

Materials:

Guava seeds were washed, dried (air oven at 55°C), defatted (hexane) and milled using Quadrumat Junior flour mill. Milling process was carried out three times to obtain three fractions by sieving through ≥ 40 , < 40 & < 20 meshes. The first fine

fraction (≥ 40 mesh) was mixed with semolina at 10, 20 and 30% replacement levels.

Methods:

Pasta samples were prepared according to AACC (2000) using a lab pasta machine (Matic 1000 Simac Machine Corporation, Milano, Italy). Pasta hydrated for 15 min under atmospheric air, dried in a cabinet dryer at 70°C for 10 hrs (Berglund *et al.*, 1987). , then cooled at room temperature, packed in polyethylene bags and kept at room temperature for analysis.

Cooking quality of pasta were carried out by measuring the increases in weight, volume and cooking loss after cooking according the methods of AACC (2000).

Analytical methods

Moisture, ash, crude protein, fat and crude fiber contents of semolina, guava seeds mill and pasta were determined according to the methods outlined in AOAC (2000), while carbohydrates were calculated by difference as mentioned by Tadrus (1989).

Minerals contents (calcium, magnesium, sodium, potassium, copper, zinc, Manganese and iron) of guava seeds mill fraction 1, semolina, and their blended pasta products were determined using Perkin Elmer 2380 Atomic Absorption according to the method of AOAC (2000).

The spectra of semolina, guava seeds mill fraction 1 and pasta replaced with 10% guava seeds mill fraction 1 were obtained using FT-IR spectroscopy. The samples of FT-IR (FT-IR-6100 Jasco, Japan) were prepared by using potassium bromide disks.

Rheological properties of the doughs were determined using a Farinograph according to AACC (2000).

Color quality of Processed Products:

The color parameter of semolina, guava seeds mill and pasta were evaluated using Hunter, Lab Scan XE, Reston VA., calibrated with a white standard tile

of Hunter Lab color standard (LX No. 16379) $x = 77.26$, $y = 81.94$ and $z = 88.14$ ($L^* = 92.43$, $a^* = -0.88$, $b^* = 0.21$).

Cooked pasta was organoleptically evaluated by ten panelists for its appearance (10), color (10), flavor (10), tenderness (10) and stickiness (10) as described by Hallabo *et al.*, (1985).

The obtained results were evaluated statistically using analysis of variance as reported by McClave & Benson (1991).

3. Results and discussion

Chemical composition of guava seeds and semolina:

Three fractions of guava seeds (≥ 40 , < 40 & < 20 mesh) were prepared as a fiber source. Figure (1) showed the percentage of each fraction referred to guava seeds. The obtained guava seed fractions and semolina were evaluated chemically as shown in Table (1). The obtained three fractions of guava seeds contained the highest crude fiber, fat and lowest moisture compared to semolina, where, the crude fibers of fractions (1), (2) and (3) were 17.18, 10.98 and 20.19%, respectively, while it was 0.7% in semolina. These results are in agreement with those reported by Uchoa *et al.*, 2009.

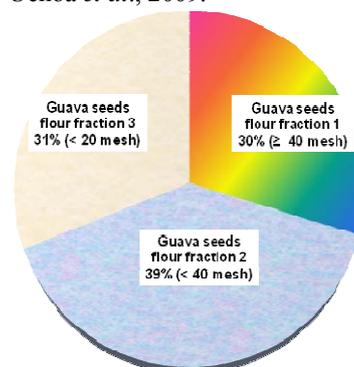
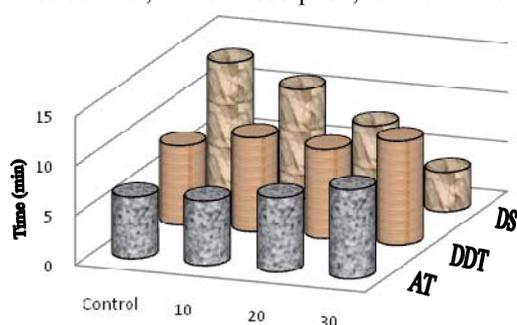


Figure (1): Flour fractions percentage of guava seeds.

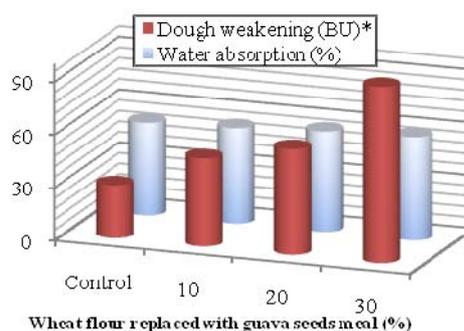
Table (1): Chemical composition of semolina and fractions of guava seeds flour (dry weight basis).

Samples	Moisture	Protein	Fat	Ash	Crude fiber	Carbohydrate
Semolina	11.22± 0.5	13.86± 0.2	0.2± 0.01	0.82± 0.05	0.7± 0.06	76.32± 3
Fraction (1)	6.52± 0.4	16.91± 0.1	5.02± 0.19	1.65± 0.1	17.18± 0.3	59.24± 0.4
Fraction (2)	5.71± 0.3	11.07± 0.1	2.6± 0.08	1.19± 0.1	10.98± 0.2	74.16± 0.5
Fraction (3)	3.75± 0.4	5.2± 0.1	1.02± 0.05	0.64± 0.1	20.19± 0.2	72.95± 0.6

Preliminary study on the palatability of the three fractions of guava seed flours showed that, fraction 2 and 3 were unaccepted for their roughness like sand (< 20 & < 40 mesh), but fraction 1 (≥ 40 mesh) was accepted for its lower granule size. Rheological study was carried out to select the best replacement level of guava seeds flour fraction 1 with semolina to produce high fiber pasta. Farinograph parameters of semolina and different blends of semolina with guava seed flours (10, 20 and 30%) illustrated in Figure (2). The obtained results indicated that, water absorption, arrival time and



dough weakening increased and stability decreased by increasing the level of fraction 1 compared to control (semolina 100%). The increasing water absorption is mainly due to the strong water-binding ability of fibers. The longer dough development time and lower dough stability could result from the dilution of gluten and the difficulty of mixing fibers and semolina homogeneously. Such results were in agreement with those obtained by Jinzhou, *et al.*, (2002), Gomez, *et al.*, (2003) and Yaseen & Shouk (2007).



Wheat flour replaced with guava seeds meal (%)

AT = Arrival time DDT = Dough development time
DS = Dough stability

Figure (2): Farinograph parameters of semolina dough as affected by replacement level of guava seeds meal fraction (1).

Cooking quality of pasta prepared by partial replacement of semolina with different levels of fraction 1 is shown in Table (2). Data revealed that, the volume (swelling %) of high fiber pasta (10 & 20%) increased if compared with control pasta (semolina 100%), while weight decreased in all replacement levels of guava seeds fraction 1 if compared with control pasta sample. This result indicated that, increasing fiber level led to decrease weight of cooked pasta. Cooking loss (represent loss of solids in cooking water) was evaluated and

presented in Table (2). Results showed that, there was no significant difference in cooking loss of control pasta and replaced pasta with 10% guava seeds flour, while increasing replacing level led to increase cooking loss of pasta. The undesirable effect of guava seed flour on cooking loss may be due to the dilution of gluten, and the interaction between gluten and fiber that allowed starch to be leached out during cooking. Such results were in agreement with those obtained by Yaseen & Shouk (2007)

Table (2): Effect of replacing semolina with guava seed flour on cooking quality of pasta at three levels of replacement.

Pasta Sample	Weight increase (%)	Volume increase (%)	Cooking loss (%)
Control (Semolina 100%)	330	300	8
Replacing level of guava seeds meal fraction (1)			
10 (%)	287.5	350	8
20 (%)	262.5	320	10
30 (%)	250	250	12

Table (3) showed that, there were significant difference in color parameter of uncooked pasta as

affected with replacing level of semolina with guava seed flour, where increasing replacing level from 10,

20 and 30% led to a decline in lightness (L^*) to 78.22, 72.47 and 68.29; respectively; and at the same time, redness and yellowness were increased. Table (3) showed that, cooking pasta caused significant decrease in lightness (L^*) and increase in redness (a^*), where uncooked control pasta (100% semolina) were 86.56 (L^*) and 1.38 (b^*), while cooked control

pasta decreased to 66.17 (L^*) and 0.237 (a^*). Also, increasing replacing levels of guava seeds flour caused significant increase in darkness, where lightness (L^*) decreased to 53.64, 49.60 and 49.40; and redness increased to 4.32, 4.71 and 5.02 at replacement levels 10, 20 and 30%, respectively.

Table (3): Effect of replacing semolina with guava seeds meal fraction (1) on color quality of uncooked and cooked pasta.

Pasta	Uncooked Pasta Sample			Cooked Pasta Sample		
	L^*	a^*	b^*	L^*	a^*	b^*
Control	86.56 ^a	1.83 ^b	18.68 ^d	66.17 ^a	0.237 ^d	12.51 ^c
10 %	78.22 ^b	2.46 ^b	21.36 ^c	53.64 ^b	4.32 ^c	15.19 ^{ab}
20 %	72.47 ^c	5.06 ^a	23.02 ^b	49.60 ^c	4.71 ^b	14.95 ^b
30 %	68.29 ^d	5.96 ^a	23.97 ^a	49.40 ^c	5.02 ^a	15.59 ^a
LSD at 5%	2.807	2.084	0.599	2.196	0.2	0.581

Influence of replacing semolina with different levels of guava seeds flour to pasta was also evaluated sensorial. Table (4) revealed that, appearance of control pasta not affected significantly with increasing replacing levels of guava seeds flour up to 10 or 20%; while flavor and tenderness not affected significantly with replacement level 10%. But, color of different replacement level affected significantly if compared with pasta of control sample, this result is confirmed with the previous color parameter (L , a & b) of Table (3), where

darkness was increased with increasing replacement of guava seeds flour. Also, the obtained color result agreed with Kordonowy & Young (1985), who stated that color of control spaghetti ranked higher than those of replaced bran spaghetti. Stickiness is one of the most important characteristics in judging pasta quality. The obtained sensorial results indicated that, stickiness not affected significantly, where control pasta was 8.3, while replaced pasta with different levels of guava seeds flour ranged between 8.4 - 7.6.

Table (4): Effect of replacing semolina with guava seeds meal fraction (1) on Sensory quality of pasta.

Cooked pasta Sample	Appearance (10)	Color (10)	Flavor (10)	Tenderness (10)	Stickiness (10)
Control (Wheat flour 100%)	8.5 ^a	9.2 ^a	8.3 ^a	8.4 ^a	8.3 ^a
Replacing level of guava seeds meal fraction (1)					
10	7.8 ^a	7.7 ^b	7.7 ^{ab}	8.6 ^a	8.4 ^a
20	7.1 ^{ab}	6.4 ^c	6.4 ^{bc}	7.3 ^b	8.2 ^a
30	6.2 ^b	5.3 ^c	5.9 ^c	7.7 ^{ab}	7.6 ^a
LSD at 5%	1.234	1.181	1.335	0.998	1.124

LSD = least significant differences at 5% level.

There is no significant difference between two means (within the same property) designed by the same letter.

Table (5) indicated that, pasta containing guava seeds flour caused an acceptable gradual increase in moisture, protein, fat, ash and crude fiber;

and decrease in carbohydrates as a replacement of guava seeds flour level increased.

Table (5): Effect of replacing semolina with guava seeds meal fraction (1) on gross chemical composition pasta.

Pasta Samples	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Crude fiber (%)	Carbohydrate (%)
Control	11.0	12.5	0.5	0.82	0.76	85.42
Replacing level of guava seeds meal fraction (1)						
10	11.50	12.90	1.05	1.02	2.26	82.77
20	11.70	13.22	1.52	1.12	3.65	80.49
30	12.00	13.50	1.95	1.22	4.86	78.47

Moreover, chemical active groups that represent the fingerprints of the studied semolina, guava seeds flour and their blends were identified using FT-IR. Table (6) and figure (3) contained the FT-IR spectral bands of the previously mentioned samples. The broad band around 3417-3351 cm^{-1} is the characteristic absorption peak of hydroxyl group of lipid in guava seeds at 3417 cm^{-1} and stretching (OH and NH) in wheat flour and their blends with guava seeds flour. Stretching (CH_2) asymmetric vibration was identified as weak absorption peak at 2926-2928 cm^{-1} .

Stretching (CH_2) symmetric vibration (2856 cm^{-1}), stretching carbonyl group (1746), Bending

(CH_2 at 1375 cm^{-1}) and stretching (C-O) of ester (1040 cm^{-1}) peaks were identified in guava seeds powder only and that attributed to its lipid content.

The absorption spectral bands at 1654-1652 cm^{-1} and 1541-1540 cm^{-1} that corresponding to the carbonyl group of amide I and amide II (stretching C-N with bending N-H), respectively (Chen *et al*, 2008 and Goormaghtigh *et al*, 1996). The major peaks corresponding to carbohydrate content were located in the range 1157—1159 cm^{-1} (stretching C-O-C) , 1019 cm^{-1} (stretching C-O) and 860 cm^{-1} (stretching C-O-C-O) these results in agreement with Kacura'kova' *et al.*, (2001).

Table (6): FT-IR spectra and assignments of Semolina, guava seeds flour fraction 1 and semolina replaced with 10% guava seeds flour fraction 1.

Assignments	FT-IR spectra (cm^{-1})		
	Guava seeds flour	Pasta of 100% Semolina	Pasta of 10% Guava seeds flour
Stretching (OH) vibration	3417	---	---
Stretching (OH and NH)	---	3351	3383
Stretching (CH_2) asymmetrical	2926	2928	2926
CH_2 stretching symmetrical	2856	---	---
C=O stretching of ester	1746	---	---
Amide I (C=O amide)	1653	1652	1654
Amide II (C-N stretching with NH bending mode)	---	1541	1540
CH bending of lipids	---	1421	---
Bending (CH_2)	1375	---	---
stretching (C-O) of ester	1238	---	---
stretching (C-O-C) of carbohydrate	1159	1157	1158
stretching (C-C) of carbohydrate	---	1081	---
C-O stretching of ester	1040	---	---
c-o of carbohydrate stretching	---	1019	1019
C-O-C stretching	---	860	860

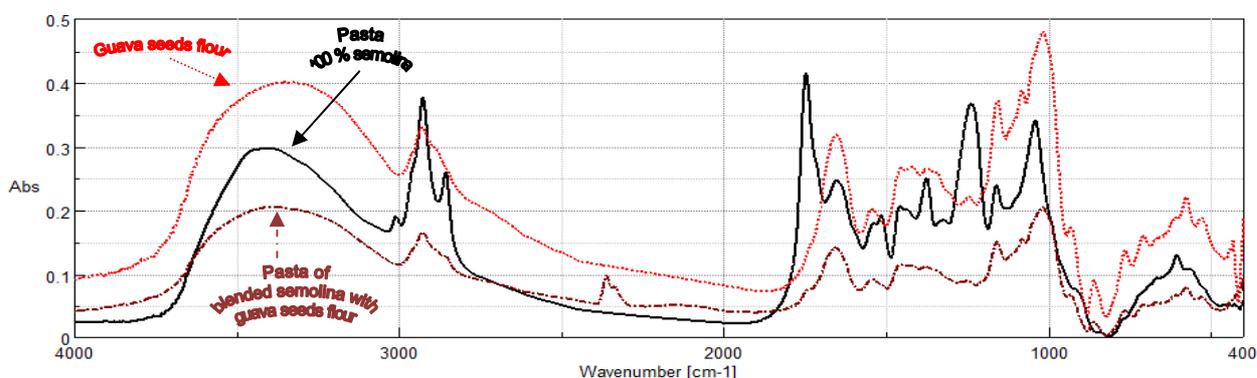


Figure (3): FT-IR spectra of guava seeds flour, control pasta sample (100% semolina) and pasta of 10% guava seeds flour.

Magnesium, calcium, potassium, iron, copper and zinc are considered as essential elements to human being. Table (7) showed that, guava seeds flour fraction 1 characterized with its higher mineral

contents if compared with semolina. So, replacing guava seeds flour improved the minerals content of the blended flour, especially at a higher replacement level.

Table (7): Effect of replacing semolina with guava seeds meal fraction (1) on minerals content of pasta (dry weight basis).

Minerals (mg/100g)	Guava seeds Fraction 1	Control (Semolina 100%)	Replacing level of guava seeds meal fraction (1)		
			10 %	20 %	30 %
Magnesium	158.65	104.61	122.19	128.62	148.35
Calcium	172.36	53.00	83.55	111.32	128.43
Potassium	895.0	102.0	202.32	268.34	326.49
Iron	11.71	1.31	2.03	3.37	6.19
Copper	1.379	0.11	0.18	0.26	702.74
Sodium	750.86	630.18	650.76	680.26	702.74
Manganese	1.38	0.53	0.66	0.75	0.91
Znic	1.84	0.33	0.46	0.62	0.81

Conclusion

From the previous results, it could be concluded to use guava seeds flour fraction 1 (≥ 40 mesh) to produce pasta characterized with its lower content of carbohydrate and at the same time increasing its availability with essential minerals, crude fiber and protein. FT-IR spectroscopy was used as beneficial instrument to detect the chemical composition of food matrix.

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Preparation of Layer Nano-Silicate/Alumina Castable Composites

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Abstract: The effect of adding nano scale particles on rheological and mechanical properties of ultra low cement alumina castables was investigated. After clay purification by mechanical methods and obtaining nano-silicate layers materials, the characterization was conducted by using XRD. Then, the produced nano-silicate particles were added to the ultra low cement Alumina castable containing microsilica and reactive Alumina. Mechanical and rheological properties of castable were studied before and after firing at 1500 °C. The results showed that d-spacing between nano-silicate layers was about 1.2 nm. Flow ability of the castables showed an increase of 5%, indicating decreasing the presence of some filler materials such as microsilica and reactive Alumina. Finally XRD results of fired samples indicated the existence of mulite as a desired phase in the samples.

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Keywords: Layer nano-silicate; Alumina castable; Rheology; mulite phase

1. Introduction

The advantages of monolithic refractories are the main driving force for increasing researchers in this area which have shown great progress. The development of low and ultra low-cement castables (LCC & ULCC) started in the late 1970s. Low and ultra low-cement castables are relatively new class of refractories. They offer various advantages over conventional refractory bricks in terms of application rate as well as cost and flexibility, making them attractive to all other industrial users [1-5]. Also, they have the great advantage of setting and hardening quickly at room temperature so they can be used for building structures as well as for patching and coating bricks. Also, they offer various advantages over conventional refractory bricks in terms of application rate as well as cost and flexibility, making them attractive to all other industrial users [6-9].

Although, Evaluation of optimum amount and proportion of micro silica to reactive alumina for using in castables yields appropriate properties such as flowability and formation of desired mulite phase, but determination of the optimum ratio is one of the main scientists encountering difficulties.

From other hand the application of nano materials in refractories researchers have recently started which might end in unexpected results. It has been indicated that by replacing a part of these cements with nano scale particles, physical and mechanical properties of these materials have improved.

Successful performance of these castables during the installation and their high-temperature properties have been attributed to the ability of fine and ultra fine particles to fill in the voids between

aggregates, resulting in the higher packing density [2,3]. Due to reduced cement content and higher packing density, the water demand in high-alumina castables is decreased remarkably. Therefore, both LCC and ULCC reinforced with nano clay exhibit better physical properties than the conventional medium-cement castables [1-4, 10]. Using nano particles in castables have also investigated in a limited extend. Most of the studies have been focused on self-flowing and electrical conductivity properties, for example [11,12]. In the present work, some modified nano clay was added in one kind of ULCC castable. The influence of adding nano particles to low cement alumina castables on the flowability, cold compression strength and formation of the desired mulite phase was then evaluated and compared with ULCC conventional castables.

2. Experimental procedure

The local sodium bentonite with the mean particle size of 75 μm was used which its chemical component is shown in Table (1).

To modify the clay, a suitable modifier of (γ) - 3-aminopropyltrimethoxysilane of Sigma Aldrich was used. XRF method (Oxford-ED2000) was used for chemical analysis. After that, the clay was purified using a 2-inch Hydrosyclon apparatus. To do so, the suspension with 3 percent solid in distilled water was prepared and passed through cyclone in 1.5 Kg/cm² pressure. Montmorillonite particles with less than 6 microns were dried for using in modification process. In order to have modification after clay dispersion in distilled water, suspension with 3 percent solids was prepared and different percents of modifier materials ranging from 10 to 40 percent were used. The

mixtures were heated at 80°C for 6 hours. Then, the products were washed with distilled water and dried. The method of intercalation of samples was studied using X-ray diffraction (XRD system, model Brocker).

The ULCC alumina castable was composed with Chinese bauxite ($\text{Al}_2\text{O}_3 > 88\%$), high alumina cement (Secar 70), reactive alumina, micro silica, poly propylene fibers ($< 75\mu\text{m}$) which their chemical composition are shown in Tables 2, 3 and 4 respectively.

Table 1. Chemical compounds of bentonite consumption (results of XRF tests)

Formula	Con %
L.O.I	13.2
Na_2O	2.04
MgO	2.22
Al_2O_3	14.59
SiO_2	61.03
SO_2	0.37
Cl	0.46
K_2O	0.76
CaO	0.77
TiO_2	0.22
Fe_2O_3	2.09
BaO	0.11

Table 2. Chemical compounds of Chinese bauxite

properties		Value (%)
Chemical composition	Al_2O_3	> 88
	SiO_2	% 6 , max
	Fe_2O_3	% 1.8 , max
	TiO_2	% 4 , max
density (gr/cm^3)		3.4

Table 3. Chemical compounds of high alumina cement (secar 70)

properties		Value (%)	
		Min	Max
Chemical composition	CaO	26	29
	Al_2O_3	70	-
	SiO_2	-	0.5
	TiO_2	-	-
	Fe_2O_3	-	0.5
	Na_2O	-	-
	MgO	-	0.6
Fineness	Blaine(Cm^2/gr)	4000	-

Table 4. Chemical compounds of reactive alumina

properties		Value (%)
Chemical composition	Al_2O_3	100-99
	SiO_2	0.08 max
	Fe_2O_3	0.03 max
	Na_2O	0.25 max
	MgO	0.04 max
	L.O.I 20-100	0.3 max
D50 (μm)		2-1
Green density (gr/cm^3)		2.7-2.5
Sinter density (gr/cm^3)		3.9-3.85
<u>1720°C</u> 2h		

2.1. Sample preparation

In this research, castables were prepared from a kind of bauxite as a basic mixture (according to table. 5).

Table 5. Chemical compounds of provided Castables

Sample Cod	Castable Mixture					T.P.P
	bauxite	reactive Alumina	micro Silica	High Alumina Cement	Nano Clay	
Castable with micro silica & reactive alumina A1	86	7	4	3	-	0.12
Castable with nano clay A2	86	-	-	3	11	0.12

Castables with different particle size distributions were prepared using the Andreassen equation with n-values equal to 0.28 and maximum aggregate size of 4.75 mm. A part of castable mixture with 5wt.% water prepared and its flowability was measured by flow table (ASTM C 230). The other part poured into the moulds with vibration. After demoulding, the samples were cured for 24 h at room temperature and cured samples were dried at 110 °C for 24h. Then, they were fired at various temperatures of 1000, 1250 and 1500°C, for 2 h. Then samples were tested for cold crushing strength (C.C.S) and bulk density. Also samples were characterized for phase investigation by XRD method.

3. Results and Discussion

The results of previous research [13-15] show that conventional clay by applying a suitable purification and modification process can be used in the formulation of nanocomposites. As it is shown in XRD studies (Fig.1), most of the detrimental impurities such as Quartz, Cristobalite, Calcite, Gibbsite and Feldspar were mainly separated from

clay and the final product is clay with sodium Montmorillonite as a major phase.

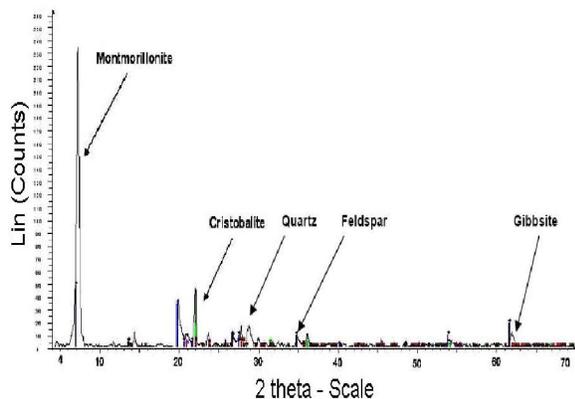


Figure 1. XRD spectrum, local pure sample

Based on Fig.2, it is obvious that interlayer spacing of 12.43Å in unmodified samples was increased to 20.43Å after modification. As it has been mentioned in the literature, the replacement of Mg with Al in Montmorillonite induces negative load in crystal which can be neutralized with sodium ions or similar ions in nature [13].

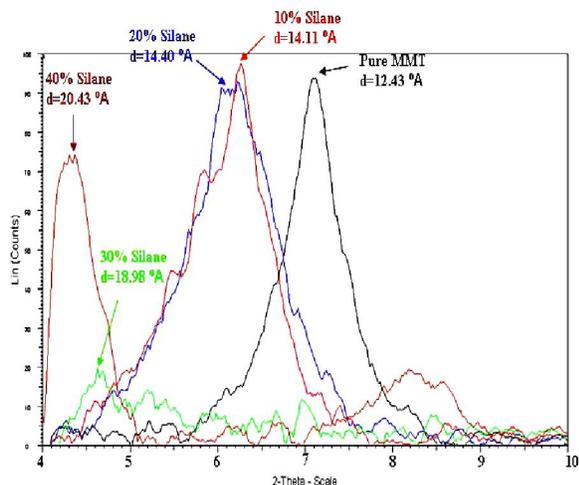


Figure 2. XRD peaks vs. Weight% of silane (For 10 to 40 wt.%)

As it is shown in the modification process, the organic compounds are placed between clay layers and the interlayer spacing was increased as a result of this process. 40 wt.% silane was selected as the optimal percent for modifier material in modification process. Using fine materials in ULCC and LCC castables causes improvement in flowability. Also, formation of suitable phases enhances compression strength and high temperature properties. Fig. 3 shows the comparison of the flowability of alumina

microsilica castable (AMC) and nano clay castable (NCC).

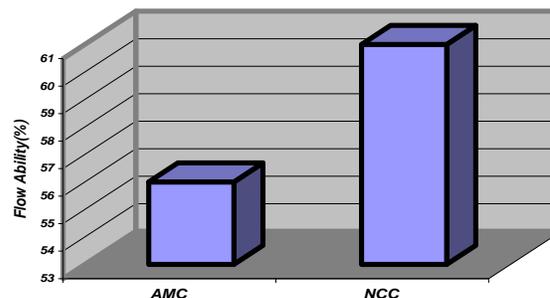


Figure 3. The comparison of AMC and NCC castable flowability

The test results revealed that the best flow was obtained for NCC castables because nano clay particles are finer than micro silica and reactive alumina as the matrix of castables.

The comparison of the effect of nano clays with microsilica and reactive alumina on castables fired in 1000, 1250 and 1500 °C is shown in fig. 4. Results indicate that NCC samples have higher strength in comparison with samples containing microsilica and reactive alumina. Based on this result, by using nano clay particles, desirable mulite phase is obtained at lower temperatures.

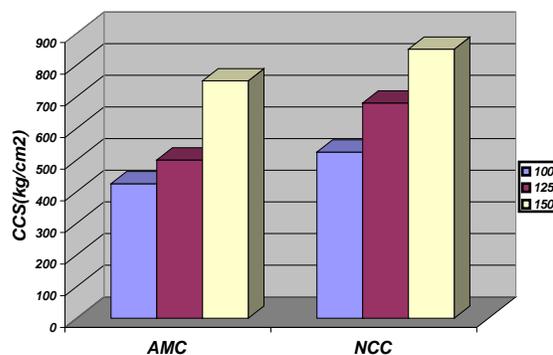


Figure 4. The comparison of the effect of nano clays with microsilica and reactive alumina on castables fired in 1000 °c, 1250 °c and 1500 °c

3.1. Phase investigation

Fig.5 shows X-Ray diffraction pattern of NCC and AMC castables in 1000 °C. As can be seen in fig. 5 the desirable mulite phase has higher intensity for NCC in comparison with AMC castables. As mentioned before, this phase has an important role in improving the mechanical strength and thermal shock resistance of the refractory. In NCC castables mulite forms from one material (nano clay) uniformly but in AMC castables this phase forms from two materials

(reactive alumina and microsilica). So, if these fine materials don't distribute uniformly in aggregates, formation of the desired mullite phase does not occur. Mullite ($3\text{Al}_2\text{O}_3-2\text{SiO}_2$) rarely occurs as a mineral in nature. It is a characteristic, strong and thermodynamically stable product in the high-temperature solid-state reaction between silica (SiO_2) and alumina (Al_2O_3) [11,12]. Mullite has recently become a candidate as a high-temperature structural material because of its good chemical stability and excellent physical properties [12]. In low and ultra low cement concretes (LCC and ULCC), fine silica and alumina powders, contained in their matrices, lead on firing to form in situ mullite in the bond phase as a network of needles at 1300°C . The elongated needle-like mullite crystals grow and lock the structure to create a strong refractory bond system so improving the mechanical properties of the castable and strengthening the microstructure of the binding matrix [4,5].

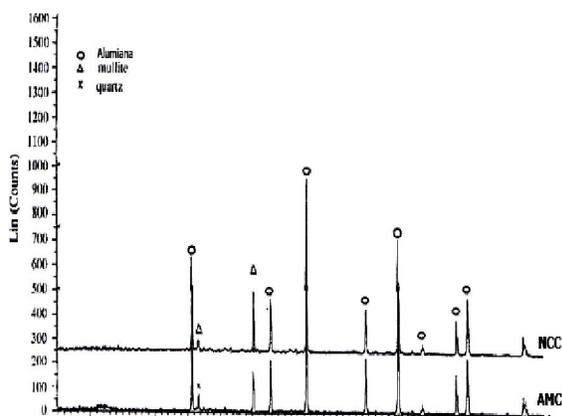


Figure 5. X-Ray diffraction pattern of NCC and AMC castables in 1000°C

4. Conclusion

The rheological and mechanical properties of nano clay castables were investigated and compared with conventional ultra low cement castables. Results indicated that as the modifier percent was increased from 10 to 40 percent, interlayer spacing was increased from 12.43 \AA in unmodified sample to 20.43 \AA after modification. Also, 40 Wt. % silane was selected as the optimum percentage of modifier material in modification process. Flowability of NCC castables improved about 5 % in comparison with AMC castables. Mechanical properties of NCC castables in high temperature are better than AMC castables. Finally, Using nano clays in castables lead to increasing of the desired mullite phase in fired samples.

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Effects of some parameters affecting the crystallization rate of calcium sulfate dihydrate in sodium chloride solution

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Abstract: Crystallization of calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) in sodium chloride solutions at different supersaturation ($\delta = 1.2-2$), $\text{pH} = 3$, ionic strength ($I = 0.5 \text{ M}$) and at 80°C was studied. The influence of aluminum and magnesium nitrates having very low concentrations ($10^{-7} \text{ mol dm}^{-3}$) on the rate of crystallization at different supersaturation was investigated. The rate of crystallization was found to be dependent of the stirring rate suggesting diffusion mechanism. The addition of Mg^{+2} or Al^{+3} retarded the rate of crystallization to an extent proportional to their amounts present. Furthermore, the retardation effect was enhanced as the supersaturation decreases. The results also revealed that the increase in both pH (3 –10) and crystallization temperature ($20 -80^\circ\text{C}$) brought about an increase in calcium sulfate crystallization rate.

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Keywords: Crystallization; Growth from solutions; Additives; Calcium sulfate; Inhibitors, metal ions

1. Introduction

Calcium sulfate is frequently encountered both in nature and in industry [1–5]. It is also the most unwelcome scalant in the production of oil and gas, in water cooling systems and in hydrometallurgical processes [6]. Crystallization of calcium sulfate dihydrate (gypsum) is of importance in view of its applications in a number of industrial and environmental precipitation processes. There are three main forms of calcium sulfate: calcium sulfate dihydrate or gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), calcium sulfate hemihydrate ($\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$), and anhydride (CaSO_4). The solubility of different forms of calcium sulfate dihydrate normally decreases by increasing temperature [7].

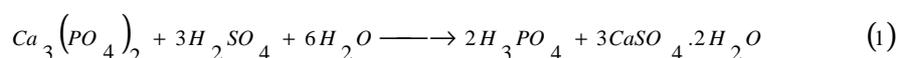
The crystallization of calcium sulfate could be initiated in presence of foreign substances or dust particles [8]. Earlier, many authors have studied the growth of seed crystals of gypsum in supersaturation solutions [3, 9–12], the crystallization of gypsum on other crystal surfaces [13], and the precipitation on heated metal surface [14]. The factors that govern this mechanism of precipitation and dissolution of the sparingly soluble salts are therefore of considerable interest, especially the influence of anions and cations which may exert a marked effect on the rate of precipitation, either through adsorption or by lattice substitution [15].

Calcium sulfate appears as an undesirable by-product in many industrial processes, mostly as scale. This results from the ubiquitous presence of the calcium ion in natural ores and is linked to the common use of sulfuric acid in industrial processing.

Phosphoric acid (H_3PO_4) is produced by two commercial methods: wet process and thermal process. Wet process phosphoric acid is used in fertilizer production. Thermal process phosphoric acid is of a much higher purity and is involved in the manufacture of high-grade chemicals, pharmaceuticals, detergents, food, and beverage products and other nonmanufacture of phosphate fertilizers products.

In a wet process, phosphoric acid is produced by reaction sulfuric acid with naturally occurring phosphate rock. The phosphate rock is dried, crushed, and then continuously fed into the reactor along with sulfuric acid. The reaction combines calcium from the phosphate rock with sulfate, forming calcium sulfate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), commonly referred to as gypsum. Gypsum is separated from the reaction solution by filtration. Phosphoric acid (H_3PO_4) is mainly produced by the dihydrate (DH) process, in which phosphate concentrate is leached with sulfuric acid (H_2SO_4). The reaction is fast; it takes from 2 to 10 minutes. However, the crystallization of the formed gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) extends from 2 to 8 hours [16].

Gypsum is either found in nature as a mineral or precipitated from aqueous solutions, as well as from the hydration of calcium sulfate hemihydrates. On the other hand, large quantities of gypsum are produced as a by-product in the production of phosphoric acid from calcium phosphate rock Eq.1



Attack of naturally occurring phosphate ores by sulfuric and/or phosphoric acid solution is the basic process for producing phosphoric acid and inorganic phosphorus fertilizers, such as superphosphate. In the wet production process, the raw phosphate ore is converted into phosphoric acid and calcium sulfate by adding solutions of sulfuric and phosphoric acids in the reactor [17]. These acids are introduced simultaneously or successively [16].

The effect of Al^{3+} and Mg^{2+} ions on calcium sulfate dihydrate (gypsum) crystallization under simulated conditions of phosphoric acid production is studied. The results showed that Al^{3+} decreases the induction time at all supersaturation ratios from 1% to 2% compared with the Mg^{2+} which increases the induction time at all supersaturation ratios. The growth efficiency increases up to 41% with addition of 1wt% Al_2O_3 and decreases by increasing Al_2O_3 content to 3wt% [18].

In contrast, the presence of 1-2 wt% MgO inhibited the crystallization process of gypsum at all supersaturation ratios. Surface energy is increased in the presence of 1% Al_2O_3 and decreased with 1 wt% MgO compared with the baseline. Nucleation rate is decreased in the presence of 1 wt% Al_2O_3 and increased with 1 wt% MgO compared with baseline. The mean diameter of the formed crystals is increased and that of the fine crystals less than 20 mm is decreased in the presence of 1% Al_2O_3 and increased in the presence of 3 wt% Al_2O_3 compared with the baseline. On the other hand, mean diameter of the formed crystals is decreased and that of the fine crystals less than 20 mm is increased in the presence of MgO. Interestingly, the majority of the formed crystals are clusters with 1 wt% Al_2O_3 and needle-like type with MgO and baseline [18].

The presence of aluminum in phosphoric acid has a positive influence on the crystal habits, size, and consequently filterability [16, 19]. Aluminum is said to promote regular crystal growth in all directions by yielding much thicker crystals. This reduces the surface to volume ratio of the crystals and hence improving the filtration rate [20–22].

Budz et al. [23] showed that aluminum reduces the nucleation and growth rates of gypsum but promoted the agglomeration of the smaller crystals. In case of magnesium, it is believed that magnesium ions hinder the gypsum filtration by either increasing the viscosity of the filtrate or affecting the gypsum crystal size [16 and 19].

However, wet process phosphoric acid could be produced from high MgO phosphate rock by accepting a weaker filter acid, higher filtration temperature, and thinner gypsum cake thickness [24 and 25]. Li et al. [26] showed that the presence of magnesium ions alone decreased the crystal size of gypsum crystals. On the other hand, Lin et al. [27] showed that the presence of Mg and Fe together during the reaction of calcium monohydrogen phosphate with sulfuric acid at 60°C increased the width of gypsum crystals.

The present work aims at studying the crystallization of gypsum under conditions simulating the production of phosphoric acid with and without addition of $Al(NO_3)_3$ and $Mg(NO_3)_2$ using pure chemicals.

2. Materials and Methods

2.1. Materials

Calcium chloride $CaCl_2$ and sodium sulfate Na_2SO_4 (BDH, England) were used to prepare seed crystals. Hydrochloric acid HCl (MERCK, Germany) was used to adjust pH. Aluminum Nitrate $Al(NO_3)_3$ and magnesium nitrate $Mg(NO_3)_2$ (FLUKA, Switzerland) were used as a source of aluminum and magnesium ions, respectively. Sodium chloride NaCl from El-Nasr Pharmaceutical chemicals (ADWIC, Egypt) was chemical reagent grade. All solutions were prepared with deionized water of high quality (conductivity < 0.1 μS cm⁻¹). A closed thermostatic double-walled vessel of 300 cm³ was used for all the experiments. The experiments were performed in the temperature range of 78–80 °C, and the systems were mechanically agitated with a flat-bladed stirrer at a constant rate (250 rpm).

2.2. Preparation of polycrystalline calcium sulfate dihydrate

Calcium sulfate dihydrate crystals were prepared by precipitation from calcium chloride and sodium sulfate solutions, as described previously by Lui and Nancollas [28]. The obtained solid was aged at least for one month before being filtered to obtain the dry crystals that were used in crystal growth experiments. The crystals were identified as gypsum by X-ray powder diffraction (Shimadzu XD-3 diffractometer) and IR analysis by scanning electron microscopy. The crystallization of calcium sulfate dihydrate carried out under various conditions was done in a thermostatted double-walled Pyrex glass vessel of 500 mL capacity and were adjusted to the required temperatures by circulating thermostatted

water through the outer jacket. Stemming was effected using a variable-space magnetic stirrer with a Teflon stirring bar. Nitrogen gas was first bubbled into a solution of the electrolyte at the temperature of the reaction for saturation with water vapor and then into the reaction vessel throughout the duration of the experiment.

2.3. Supersaturated solutions of calcium sulfate dihydrate

Supersaturated solutions of calcium sulfate dihydrate were prepared by the addition of thermostatted known volumes of calcium chloride solutions followed by careful addition of the appropriate amounts of sodium sulfate solutions in the cell which adjusted to the required ionic strength (0.5 M) with sodium chloride solutions. The reaction vessel was fitted with a Teflon cover with holes for the electrodes and sampling. At the beginning of the experiment, the pH of the supersaturated solutions was adjusted to the desired value (3) by the controlled addition of hydrochloric acid standard solutions. The pH of solutions was measured using a combination electrode (Jenway 3330) standardized before and after each experiment with NBS primary standard buffer solution.

The mineralization reactions were initiated by inoculation with dry seed crystals in the reaction vessel. The crystallization rate followed conductometry with time using Jenway 3330. The degree of supersaturation maintained at constant levels by the simultaneous addition of ionic species. Inhibitor solutions were also introduced as titrants in order to compensate for dilution effects. In addition, samples were periodically withdrawn and filtered at the reaction temperature through Millipore filters (0.22 μm), prior to solution and solid-phase analysis. The data confirmed that the lattice-ion and inhibitor concentrations were constant to within 1%.

For the calcium sulfate dihydrate crystallization growth experiments, the seed crystals of calcium sulfate dihydrate were prepared by a dropwise addition of 500 cm^3 of a 0.6 mol dm^{-3} CaCl_2 solution to 500 cm^3 of a 0.6 mol dm^{-3} Na_2SO_4 solution with a continuous magnetic stirring at 70°C over a period of 2 hours. The crystals obtained were filtered through a 0.22 mm membrane filter and washed repeatedly with deionized water until becoming free of NaCl. Then, the crystals were dried in an electric oven at about 105°C overnight.

3. Results and discussion

The concentrations of free ionic species in the solutions were computed by successive approximations for the ionic strength, I , as described previously [29] using activity coefficients calculated

from the extended form of the Debye–Hückel equation proposed by Davies [30]. The rate of precipitation, R , may be expressed in terms of the degree of saturation by Eq. 2:

in which m is the number of moles precipitated in

$$R = dm / dt = R_s d^n \dots (2)$$

time t , R a rate constant, n the effective order of reaction, and s proportional to the number of growth sites available on the seed crystals. The degree of saturations is defined in terms of ionic products and solubility products for the calcium sulfate dihydrate salt as in Eq. 3

$$d = \frac{(IP)^{1/2} - K_{SO}^{1/2}}{K_{SO}^{1/2}} \dots (3)$$

where the ionic products, IP , and the solubility product, K_{SO} , are expressed in terms of the appropriate activities of the ionic species $[(Ca^{2+})(SO_4^{2-})]^{1/2}$ at time t and at equilibrium, respectively.

The degree of supersaturated (δ) of the solutions, which is defined as the ratio of the activity products divided by the thermodynamic solubility product of the mineral (K_{sp}), is

$$d = \left\{ \frac{(Ca^{2+})(SO_4^{2-})}{K_{sp}} \right\}^{1/2} - 1, \dots (4)$$

where parentheses denote activities of the respective ions and K_{sp} is the thermodynamic solubility product of the precipitating solid. The activity coefficients of divalent cations and anions were assumed equal and were obtained using the extended Debye-Huckel equation as proposed by Davies: [30]

$$-\log f_Z = 0.5115 Z^2 \left\{ \frac{I^{1/2}}{(1+I^{1/2})} - 0.3 I \right\}, (5)$$

where " f " are the activity coefficients for the Z valent ions and I is the solution ionic strength. The value of K_{sp} was calculated as a function of temperature by means of the following relationship obtained by Marshall and Shlusher [31] for calcium sulfate dihydrate in aqueous solutions from 0 to 110°C.

Crystal growth experimental conditions are summarized in Table 1 in which $[Ca]_i$ and $[SO_4]_i$ are the total molar concentration of calcium and sulfate, respectively. Typical time plots of the amount of gypsum per moles precipitate, calculated from the titrants addition.

$$\log \left(K_{sp} \right) = 390.9619 - 152.6246 \log T - \frac{12,545.62}{T} + 0.0818493 T \dots (6)$$

Table (1): Crystallization of calcium sulfate dihydrate crystals, $T_{ca} : T_{so2} = 1 : 1$ at $T=80$ °c, $pH = 3$, $I = 0.5$, and $\delta = 1.32$.

EXP. NO.	$T_{ca^{2+}}/10^{-6} \text{ mol dm}^{-1}$	$\delta 10^{-1}$	seed/Mg	$R \times 10^{-6} \text{ mol min}^{-1} \text{ m}^{-2}$
1	9.48	12	50	1.86
2	9.99	13.2	50	2.09
3 _b	9.99	13.2	100	2.11
4 _a	9.99	13.2	100	2.08
5	9.99	13.2	150	2.13
6	10.10	13.5	50	2.18
7	10.10	13.5	100	2.20
8	10.10	13.5	200	2.23
9	10.77	15	50	2.45
10	10.77	15	100	2.48
11	10.77	15	200	2.52
12 _b	11.63	17	50	2.75
13 _a	11.63	17	50	2.79
14	11.63	17	200	2.84
15	12.39	20	50	3.16
16	12.39	20	100	3.19
17	12.39	20	200	3.24
18 _b	9.99	13.2	50	2.10
19 _a	9.99	13.2	50	2.12
20 _c	9.99	13.2	50	3.11

Stirring speed: 300 rpm for experiments (a), 500 rpm for experiment (c) and 250 for all others.

The results cited in Table 1 show that the rate of crystal growth of calcium sulfate dihydrate was proportional to the mass of seed crystals used to initiate the reaction. The suggestion of a predominantly diffusion mechanism over a range of relative supersaturations may also be supported by the observed dependence of the experimental rate of precipitation on changes in fluid dynamics, as shown in Table 1 (compare experiments a, b and c), which

conclude that the reaction is a mass transfer limited [32]. A similar mechanism for the crystal growth of calcium sulfate dihydrate has been observed [32 and 33].

The effective order of reaction was determined from the slope of typical plots of $-\log R$ against $\log \delta$, as depicted in Figure 1 which confirms a first-order dependence upon relative supersaturation ($n = 1$) in Eq. (2).

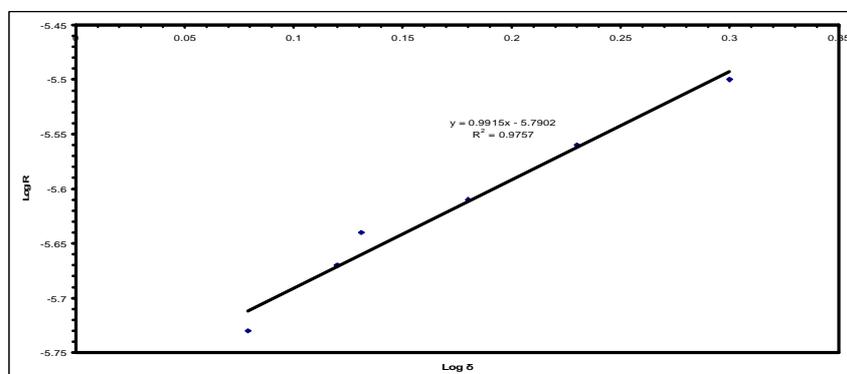


Fig (1): Plots of Log R against Log δ .

Additives play an important role in the theory of crystallization and dissolution. Recently, it is found that the presence of metal ions in the reaction medium inhibited the rate of precipitation of calcium sulfate dihydrate. The effects of Al^{3+} and Mg^{2+} on the rate of crystallization of calcium sulfate dihydrate crystals were studied. Pervious studies showed that Al^{3+} ions promote the agglomeration of small crystals of calcium sulfate dihydrate, and high Al^{3+} ions (about 3wt% Al_2O_3) increase the viscosity of the medium and inhibit the crystallization growth rate [34,35], and Mg^{2+} also retarded the crystallization rate.

3.1. Effect of concentration of the inhibitors concentration Al^{3+} and Mg^{2+} inhibitors on the crystallization process

The effect of magnesium and aluminum ions upon the rate of crystallization of gypsum in sodium chloride solution was studied at 80°C ; stirring speed of 250 rpm, weight of seed crystals of gypsum 50 mg at solution ($\text{pH} = 3$), and a relative supersaturation ($\delta = 1.32$) results obtained are illustrated in Figure (2).

It is clear from Figure (2) that the addition of a very small amount of Al^{3+} or Mg^{2+} ions retarded the rate of crystallization to an extent proportional to the amount added. The decrease was, however, more pronounced in the case of Al^{3+} ion. In fact, the presence of 10^{-6} mol% decreased the crystallization rate to 71% and 37% for Al^{3+} and Mg^{2+} , respectively.

The presence of Al^{3+} ions may increase the viscosity of the filtrate resulting in retarding the crystallization of calcium sulfate dehydrate rate much more than Mg^{2+} [16 and 19].

The mechanism of Al^{3+} in retardation of the rate of crystallization of calcium sulfate dihydrate has been studied via carrying out the crystallization process at 80°C , $\text{pH} = 3$, $I = 0.5 \text{ mol dm}^{-3}$, and $\delta = 1.32$ in the presence of $10^{-7} \text{ mol dm}^{-3}$ $\text{Al}(\text{NO}_3)_3$ as a source of Al^{3+} ions. Calculated volumes of CaCl_2 , Na_2SO_4 , NaCl and $\text{Al}(\text{NO}_3)_3$, respectively, are added in the same order. After the end of reaction, the solution was filtered and the produced solid was characterized using XRD and SEM techniques.

Figure (3) shows both of the diffractograms of solid left after the formation of calcium sulfate in absence of Al^{3+} ions and the diffractogram of calcium sulfate in presence of a known amount of $(\text{Al}(\text{NO}_3)_3 10^{-7} \text{ mol dm}^{-3})$.

It is seems from Figure (3) that all diffractonal picks of calcite were detected in the diffractogram of the solid produced in absence of any inhibitors while the addition of $\text{Al}(\text{NO}_3)_3$ inhibitors at the beginning of the crystallization process led to the formation of Na_2SO_3 as a major phase and NaAlCl_4 as a minor phase.

SEM microscopic investigation of different solid left after the crystallization process in absence and in presence of $\text{Al}(\text{NO}_3)_3$ was carried out. The obtained SEM images are illustrated in Figure (4)

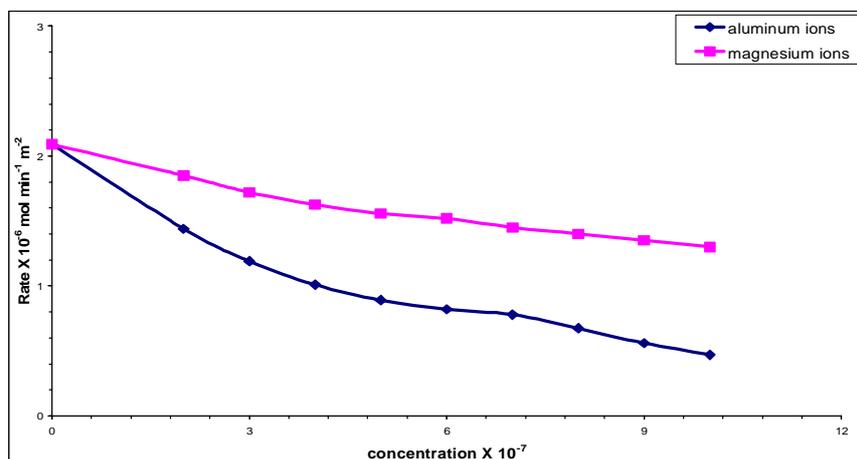


Fig (2) :Effect of Mg^{2+} and Al^{3+} on the rates of crystallization of calcium sulfate dihydrate crystals at $\delta = 1.32$, $I = 0.5 \text{ mol dm}^{-3}$, and 50 mg seed.

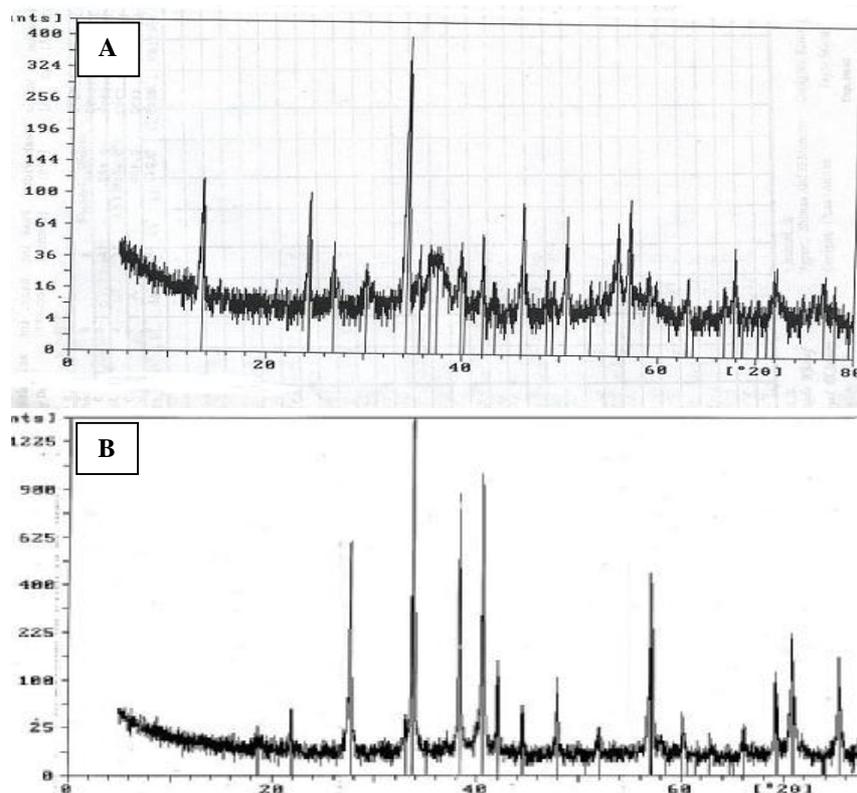


Fig (3): XRD analysis of calcium sulfate dihydrate (A) in absence of Al^{3+} (B) in the presence of 10^{-7} M of $\text{Al}(\text{NO}_3)_3$.

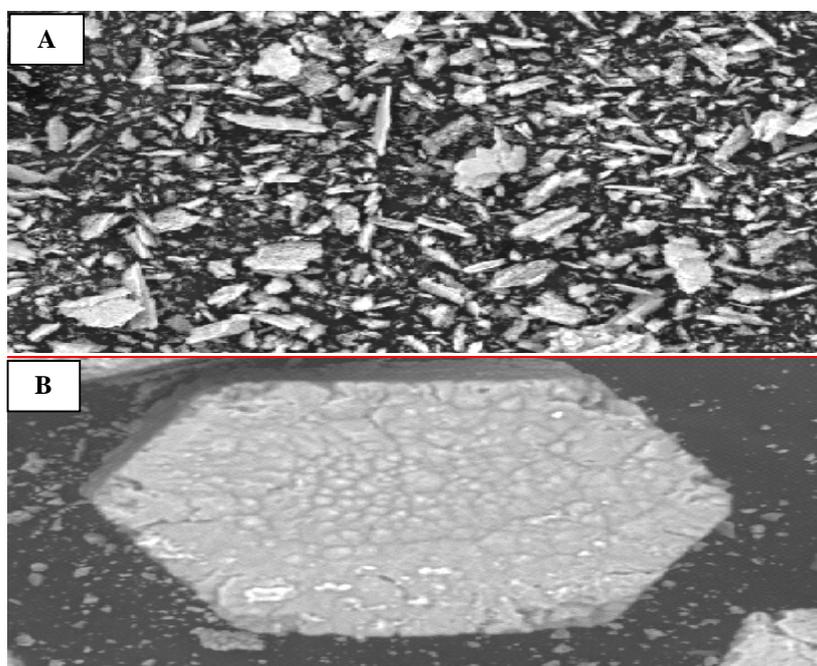


Fig (4) Scanning electron micrographs of calcium sulfate dihydrate (4a) in absence of Al^{3+} (4b) in the presence of 10^{-7} M of $\text{Al}(\text{NO}_3)_3$.

Scanning electron micrographs of the produced solid in the presence of $\text{Al}(\text{NO}_3)_3$ shows that only the crystals of Na_2SO_3 appeared, which means that NO_3^- ions reduce SO_4^{2-} ions to SO_3^{2-} ions in the presence of NaCl , so NaAlCl_4 and $\text{CaSO}_4(\text{aq})$ are produced.

3.2. Effect of supersaturation degree (δ) on calcium sulfate dihydrate crystallization rate

To investigate the effect of supersaturation degree (δ) on calcium sulfate dihydrate crystallization rates in sodium chloride solution, the crystallization

of calcium sulfate in absence and in the presence of Al^{3+} ions was investigated at different degrees of supersaturation from 1.2 to 2.0. The other parameters were fixed at an ionic strength solution (I) of 0.5 mol dm^{-3} , reaction temperature of 80°C , stirring speed of 250 rpm, and weight of seed crystals of gypsum of 50 mg at solution ($\text{pH} = 3$). The experimental results are given in Figure (5) as a relation between degree of supersaturation and calcium sulfate dihydrate crystallization rate.

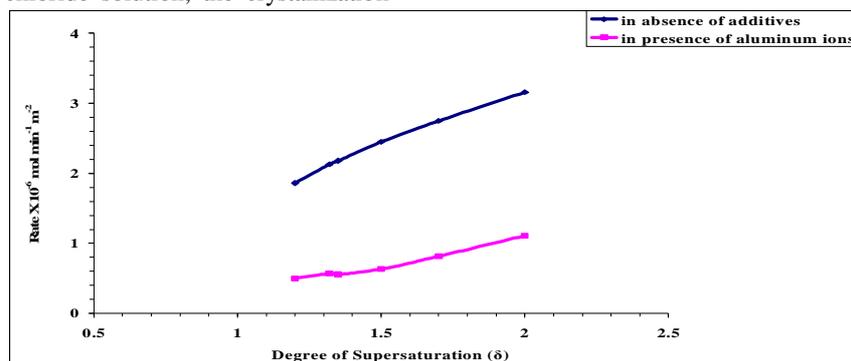


Fig (5): Effect of supersaturation degree (δ) on the rate of crystallization of calcium sulfate dihydrate crystals at $\text{pH}=3$, $T = 80^\circ\text{C}$, $I = 0.5 \text{ mol dm}^{-3}$, and 50 mg seed in absence of inhibitors and in presence of Al^{3+} inhibitor.

From the figure, it is clear that, as the degree of supersaturation increased from 1.2 to 2.0, the gypsum crystallization rate increased from 1.86 to $3.16 \text{ mol min}^{-1} \text{ m}^{-2}$ in absence of inhibitors and from 0.5 to $1.11 \text{ mol min}^{-1} \text{ m}^{-2}$ in presence of Al^{3+} inhibitor. The order in the presence of Al^{3+} ions was found to be equal to ($n=1$), which suggests diffusion mechanism.

3.3. Effect of pH on calcium sulfate dihydrate crystallization rate

The effects of solution pH on the crystallization growth of calcium sulfate dihydrate in

the absence and in the presence of Al^{3+} ions were studied at different pH range (3–10). Other experiments conditions were fixed at a reaction temperature of 80°C , stirring speed of 250 rpm, weight of seed crystals of calcium sulfate dihydrate 50 mg at ionic strength ($I = 0.5 \text{ M}$), and a relative supersaturation ($\delta = 1.32$). The experimental results are plotted in Figure (6) as a relation between pH and the rates of crystallization of calcium sulfate dihydrate crystals.

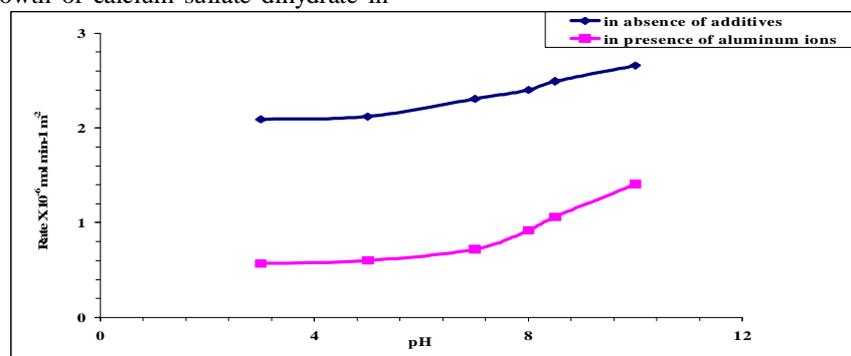


Fig (6) Effect of pH on the rate of crystallization of calcium sulfate dihydrate crystals at $\delta = 1.32$, $T = 80^\circ\text{C}$, $I = 0.5 \text{ mol dm}^{-3}$, and 50 mg seed in absence of inhibitors and in presence of Al^{3+} inhibitor.

From the above figure, it is clear that with the increase of pH from 3–7, the calcium sulfate dihydrate crystallization rate slightly increased from about 2.09 to 2.3 mol min⁻¹ m⁻² in absence of inhibitors and from 0.57 to 0.72 mol min⁻¹ m⁻² in presence of Al³⁺ ions. This means that pH over a wide range (3-7) does not affect the calcium sulfate dihydrate [36, 37, and 38]. Further increase in solution pH from 7 to 10 led to increase the calcium sulfate dihydrate rates crystallization from 2.3 to 2.6 mol min⁻¹ m⁻² and from 0.72 to 1.4 mol min⁻¹ m⁻² in absence and in presence of Al³⁺ [38,39, and 40]. This may be due to the increase in degree of deprotonation [41 and 42].

3.4. Effect of ionic strength (I) on calcium sulfate dihydrate crystallization rate

The effect of ionic strength of the crystallization medium on the calcium sulfate dihydrate crystallization rate in sodium chloride solution is studied; several experiments are carried out in absence and in the presence of Al³⁺ ions at different ionic strength from 0.1 to 0.5 M. The other parameters are fixed at reaction temperature of 80°C, stirring speed of 250 rpm, weight of seed crystals of gypsum 50 mg at solution (pH = 3) and a relative supersaturation ($\delta = 1.32$). The experimental results are given in Figure (7) as a relation between ionic strength and the rates of crystallization of calcium sulfate dihydrate crystals.

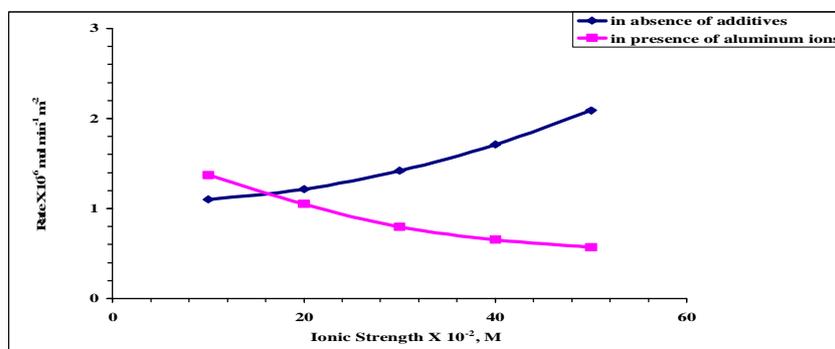


Fig (7): Effect of ionic strength (I) on the rate of crystallization of calcium sulfate dihydrate crystals at $\delta = 1.32$, pH=3, T = 80 °c and 50 mg seed in absence of inhibitors and in presence of Al³⁺ inhibitor.

From the figure, it is clear that as the ionic strength increases from 0.1 to 0.5 M, the calcium sulfate dihydrate crystallization rates increased from about 1.1 to 2.09 mol min⁻¹ m⁻² in absence of inhibitors while it decreased from 1.3 to 0.57 mol min⁻¹ m⁻² in presence of Al³⁺ ions. This means that, the effect of ionic strength on the rate of crystallizations indicates that the reaction is ionic in its nature.

3.5. The effect of temperature on Calcium sulfate dihydrate crystallization rate

The rate of crystallization of calcium sulfate dihydrate is studied in absence of inhibitors and in the presence of Al³⁺ ions at temperature range of 20 to 80°C. The experimental results are given in Figure (8) as a relation between temperature and the rates of crystallization of calcium sulfate dihydrate crystals.

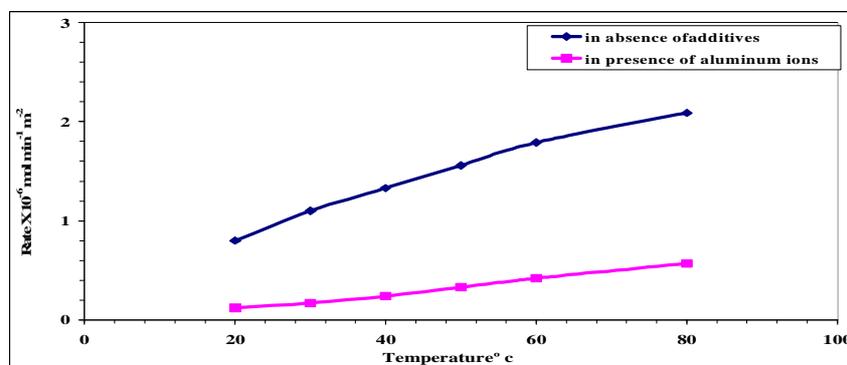


Fig (8) Effect of temperature on the rate of crystallization of calcium sulfate dihydrate crystals at $\delta = 1.32$, pH=3, I = 0.5 mol dm⁻³ and 50 mg seed in absence of inhibitors and in presence of Al³⁺ inhibitor.

Figure (8) shows clearly that by increasing the temperature from 20 to 80 °C, the rate of crystallization increases from 0.8 to 2.09 mol min⁻¹ m⁻² in absence of inhibitors while it increases from 0.12 to 0.57 mol min⁻¹ m⁻² in presence of Al³⁺ ions. The growth rates of calcium sulfate dihydrate crystals markedly increase with the increase in the growth temperature.

According to Arrhenius equation, the activation energies of calcium sulfate dihydrate in (Ea₁) and in presence of Al³⁺ ions (Ea₂) could be calculated at constant $\delta = 1.32$, $I = 0.5 \text{ mol dm}^{-3}$ and 50 mg seed by plotting relation between ln K against 1/T as shown in Figure (9).

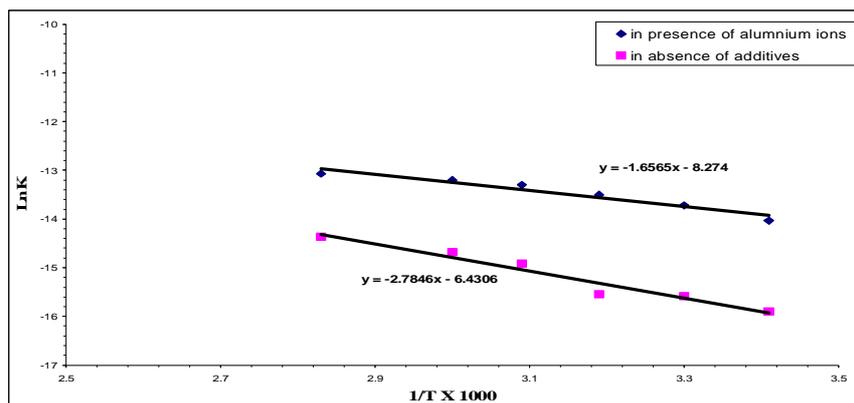


Fig (9) Arrhenius plot, for rate of crystallization of calcium sulfate dihydrate crystals at $\delta = 1.32$, pH=3, T = 80 °C, I = 0.5 mol dm⁻³ and 50 mg seed in absence of inhibitors and in presence of Al³⁺ inhibitor.

From the figure, the activation energies of calcium sulfate dihydrate in absence of inhibitors (Ea₁) and in presence of Al³⁺ ions (Ea₂) were calculated and found to be equal to 13.76 and 23.14 KJ/mol. These activation energies agree with the reported activation energy for the seeded crystals growth of calcium sulfate dihydrate in salt-free solutions at a relatively lower temperature [43].

4. Conclusions

The analysis of the results shows that the presence of Al³⁺ and Mg²⁺ ions in the reaction medium inhibited the rate of precipitation of calcium sulfate dihydrate (gypsum). The degree of inhibition depends on the concentration of metal ions and degree of saturation. Precipitation is inhibited and a precipitation rate is decreased in the following order: Al³⁺ > Mg²⁺. Complete inhibition of precipitation of gypsum was not found in any concentration of these metal ions and degree of saturations.

The inhibition of these metals was found due to reduction of NO₃⁻ ions of SO₄⁻² ions to SO₃⁻² ions. This reduction occurs only in the presence of NaCl solution. The degree of inhibition of Al³⁺ ions (as an example of inhibitors) increases in acidic medium, lower ionic strength, higher degree of supersaturation, and lower temperature.

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Evaluation of Antibacterial Activity of *Cynodon dactylon* on Multi-Drug Resistant Bacterial Isolates in Comparing with Ciprofloxacin

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Abstract: *Cynodon dactylon* regarded to possess various medicinal properties as an anticancer, antidiabetic, anti-inflammatory and antioxidative agent, but there are a few studies on its antibacterial effects. The aim of the present study was the evaluation of the antibacterial activity of *Cynodon dactylon* on 100 Multi Drug Resistant isolates of *S. aureus*, *A. baumannii*, *P. aeruginosa*, *Klebsiella* and *E. coli*. *Cynodon dactylon* samples were collected from the fields of North West of Iran. Plant roots were cut, and powder was prepared. Powdered roots were extracted by maceration at room temperature for 72 hours. Bacterial isolates were collected from clinical specimens from different wards of educational hospitals in Urmia, Iran during a 12 months period. The susceptibility of isolates to *Cynodon dactylon* root extracts was determined using a broth microdilution method. Considering to the wide application of ciprofloxacin in treatment of bacterial nosocomial infections, the antibacterial effects of ciprofloxacin on isolates also determined. All the multi- drug resistant bacterial isolates were sensitive to different concentrations of *Cynodon dactylon* root hydroalcoholic extract, the most sensitive bacterial isolates to *Cynodon dactylon* root extracts were *P.aeruginosa* isolates, however 69% of isolates were resistant to ciprofloxacin. Results demonstrate that this herbal drug could represent a new source of antimicrobial agents, for the control of hospital acquired infections. However, more adequate studies must be carried out to verify the possibility of using it for fighting these bacteria in human body infections.

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<http://www.americanscience.org>.

Keywords: herbal medicine, ciprofloxacin, resistant bacteria, antimicrobials, hospital acquired infections

1. Introduction

Cynodon dactylon family Poaceae is considered as a sacred herb (Balasubramanian, et al, 2008). It has been used in the folk medicine of many countries. It has been regarded to possess various medicinal properties as an antidiabetic agent in traditional system of Medicine. The aqueous plant extract is used as anti-inflammatory, cardioprotective diuretic, antioxidative, anti-emetic and purifying agent (Singh et al., 2007). Anticancer potential of *C. dactylon* in experimentally induced colon carcinogenesis in rats has been demonstrated before (Albert-Baskar and Ignacimuthu, 2010). Also it has been demonstrated that the Fresh juice of *Cynodon dactylon* (Bermudagrass) has DNA protective activity and immunomodulatory properties (Mangathayaru et al, 2009). The plant posses antimicrobial, and antiviral activity (Singh et al., 2007) and has also been used to treat urinary tract infection, calculi and prostatitis. Balasubramanian et al also showed that

the Oral administration of plant extract of *C. dactylon* to be highly effective in preventing of white spot syndrome virus (WSSV) infection (2008). It also has significant application in treating dysentery, dropsy and secondary syphilis (Singh et al., 2007). *Rhizoctonia* sp. (Cy064), an endophytic fungus in the leaf of *Cynodon dactylon* used locally for treating hepatitis and metabolites were extracted from this fungus has anti-*H. pylori* effects (Ma et al, 2004).

Resistant Gram-positive pathogens, such as *Staphylococcus aureus* have become a serious problem in the medical community. *Staphylococcus aureus* is an organism with several virulent factors and resistance mechanisms at its disposal. It is also a significant cause of a wide range of infectious diseases in humans. *S. aureus* often causes life-threatening deep seated infections like bacteremia, endocarditis and pneumonia (Kanafani and Fowler 2006).

Acinetobacter baumannii is a gram-negative opportunistic bacillus. It is found in many hospital environments and can be colonize in human body in the hospital environments. The combination of its environmental colonization and its very high resistance to antimicrobials renders it as a successful nosocomial pathogen. The MDR strains of *A. baumannii* often spread to cause outbreaks throughout hospital wards. *A. baumannii* cause a wide range of clinical complications, such as pneumonia, septicemia, urinary tract infection, wound infection, and meningitis, especially in immunocompromised patients (Nordmann, 2004).

P. aeruginosa is an opportunistic pathogen found as part of the normal flora of the human skin (Larson and Ramphal, 2002). In immunocompromised host, *P. aeruginosa* can colonize and infect the burn and wound sites, it can rapidly disseminate from the wounds into other organs via the bloodstream and can produce severe infections such as endotoxic shock (Dale et al., 2004). Antibiotics are generally ineffective against most serious infections especially burn wounds infections by *P. aeruginosa*, treatment of these infections is frequently complicated by antibiotic resistance, a problem that is increasing in the recent years. *Klebsiella* sp. is a group of gram negative rods and they can cause different kinds of infections especially in a hospital setting. They are resistant to numerous antibiotics. Their resistance to antibiotics restricts the choice of antibiotics for therapy (Keynan and Rubinstein, 2007). Hospital acquired urinary tract infections account for 35-45% of the nosocomial infections (Kamat et al, 2009). *E. coli* is the main agent of this disease. Antibiotic therapy is the gold standard of treatment of such infections; however, long-term therapy may result in many side-effects and cause selection of resistant bacteria. So, we need new treatments that could replace antibiotic therapy (Jazani et al 2007).

In respect of high resistance of nosocomial isolates of mentioned bacteria to antimicrobials, introducing of the new antimicrobial agents against these kind of microorganisms is one of the most important goals in treatment of such infections (Perez et al., 2007). In this study we evaluated the antibacterial activity of *Cynodon dactylon* root on 100 Multi Drug Resistant isolates of *Staphylococcus aureus*, *Acinetobacter baumannii*, *P. aeruginosa*, *Klebsiella* and *E. coli*.

2. Material and Methods

Extract preparation: *Cynodon dactylon* samples were collected from the fields of Salmas road (Iran) and identities were confirmed by the

Botanist. Plant roots were cut, chopped and dried and powder was prepared. Powdered roots were extracted by maceration at room temperature for 72 hours. The hydroalcoholic extracts were combined and concentrated to yield a dried powder. This hydroalcoholic extract was kept in refrigerator for all experiments (Garjani et al, 2009).

Bacterial strains and culture media: A total of 100 isolates of *Staphylococcus aureus*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Klebsiella* and *E. coli* (20 isolates from each kind) were collected from clinical specimens of different wards of educational hospitals in Urmia, Iran during a 12 months period between April 2006-2007. The isolates were further processed by the standard methods to identify as the *Staphylococcus aureus*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Klebsiella* and *E. coli* isolates (Baron and Finegold, 1990). The susceptibilities of isolates to different antibiotics were tested using agar disk diffusion method and Multidrug resistant isolates was selected for further experiments. Isolated bacteria were maintained for long storage on skimmed milk medium (BBL) by adding 10% glycerol in -60°C, cultures were maintained for daily use on Nutrient agar (BBL) slants on 4°C. The Muller Hinton Agar (MHA) and Muller Hinton Broth (MHB) medium (Pronadisa) were used for detection of antibiotic resistance of isolates. *Acinetobacter calcoaceticus* PTCC 1318, *Enterococcus faecalis* ATCC29212, *Pseudomonas aeruginosa* ATCC27853, *Pseudomonas aeruginosa* PAO1, *E.coli* ATCC25922, *Klebsiella pneumoniae* ATCC10031, *Staphylococcus aureus* PTCC1112 and *Staphylococcus aureus* ATCC25923 have been used as reference strains.

Determination of antimicrobial activity of *Cynodon dactylon* root extracts: The susceptibility of isolates to *Cynodon dactylon* root extracts was determined using a broth microdilution method based on CLSI guidelines. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of *Cynodon dactylon* root extracts for isolates were determined in Muller-Hinton Broth (MHB; Oxoid) medium (Jazani et al, 2009) (Papadopoulos et al., 2006). 10 mg of *Cynodon dactylon* root powder was dissolved in 1000 µL of Dimethylsulfoxide (DMSO, Sigma). The initial concentration of *Cynodon dactylon* root powder in the first tube contains MHB was 500 µg/mL. This was used to prepare serial doubling dilutions over the range 500-3.9 µg/mL. 1.5×10^6 inoculums of the isolates were added to each concentration in MHB. A tube containing growth medium without *Cynodon dactylon* root extracts and an un-inoculated tube were used as a positive and negative growth control respectively. Antibacterial activity was measured by

determining MICs and MBCs. The MIC was the lowest concentration of essential oil that resulted in a clear tube. Ten microlitres from each tube was spot-inoculated onto Nutrient Agar (NA) and incubated overnight at 37 °C to determine the MBC. The highest dilution that inhibits bacterial growth on nutrient agar after overnight incubation was taken as MBC (Baron and Finegold, 1990),(Papadopoulos et al., 2006). Experiments were performed at least three times and the modal value selected.

Determination of antimicrobial activity of ciprofloxacin: Considering to the wide application of ciprofloxacin in treatment of bacterial nosocomial infections, the antibacterial effects of ciprofloxacin on isolates also determined and the effectiveness was compared with *Cynodon dactylon* root extracts. Ciprofloxacin powder was kindly provided by Exir pharmaceutical company, Tehran, Iran. The pure content of active ciprofloxacin was 96% in the provided powder. For determining of the bacterial isolates sensitivity to ciprofloxacin, classic broth dilution susceptibility test were used (Sahm and Weissfeld, 2002). MIC and MBC of isolates to ciprofloxacin were determined. The initial concentration of antibiotic in the first tube was 500 $\mu\text{g mL}^{-1}$, this solution was diluted serially in 8 steps. 1.5×10^6 inoculums of the isolates were added to each concentration of ciprofloxacin in MHB. A tube containing growth medium without ciprofloxacin and an un-inoculated tube were used as a positive and negative growth control respectively. *In vitro* resistance was defined as MBC of 4 or more $\mu\text{g mL}^{-1}$ for bacterial isolates (Chaudhry et al., 1999).

3. Results

A total of 100 multi-drug resistant isolates with nosocomial origin of gram negative and gram positive bacteria were collected from clinical specimens submitted to the educational hospital clinical microbiology laboratories of selected hospitals in Urmia, Iran. The Sensitivity of bacterial isolates to *Cynodon dactylon* root hydroalcoholic extract has been shown in Figure 1.

Also the MIC and MBC of *Cynodon dactylon* root hydroalcoholic extract against standard bacterial strains has been shown in Table 1.

The Sensitivity of bacterial isolates to ciprofloxacin has been shown in Figure 2. 69 isolates (69% of all isolates) were resistant ($\text{MBC} \geq 4$ or $\mu\text{g mL}^{-1}$) and the other isolates were sensitive to ciprofloxacin ($\text{MBC} \leq 4$ $\mu\text{g mL}^{-1}$) (Figure 2).

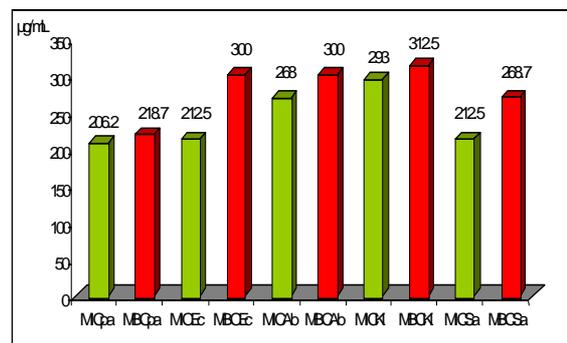


Figure 1: Antibacterial activity of *Cynodon dactylon* root hydroalcoholic extract against 100 nosocomial isolates of multi drug resistant gram negative and gram positive bacteria. Pa: *Pseudomonas aeruginosa*, Ec: *E. coli*, Ab: *Acinetobacter baumannii*, Kl: *Klebsiella Sp*, Sa: *Staphylococcus aureus*. MIC: Minimum Inhibitory Concentration, MBC: Minimum Bactericidal Concentration.

Table 1: The MIC and MBC of *Cynodon dactylon* root hydroalcoholic extract against standard bacterial strains.

Standard Bacterial isolates	<i>Cynodon dactylon</i> root hydroalcoholic extract($\mu\text{g/mL}$)
<i>Acinetobacter caluaceticus</i> PTCC 1318	MIC= MBC=125
<i>Enterococcus faecalis</i> ATCC29212	MIC= MBC=250
<i>Pseudomonas aeruginosa</i> ATCC27853	MIC= MBC=250
<i>E.coli</i> ATCC25922	MIC= MBC=125
<i>Klebsiella pneumoniae</i> ATCC10031	MIC=125, MBC=250
<i>Staphylococcus aureus</i> PTCC1112	MIC= MBC=250
<i>Staphylococcus aureus</i> ATCC25923	MIC= MBC=125
<i>Pseudomonas aeruginosa</i> PAO1	MIC= MBC=250

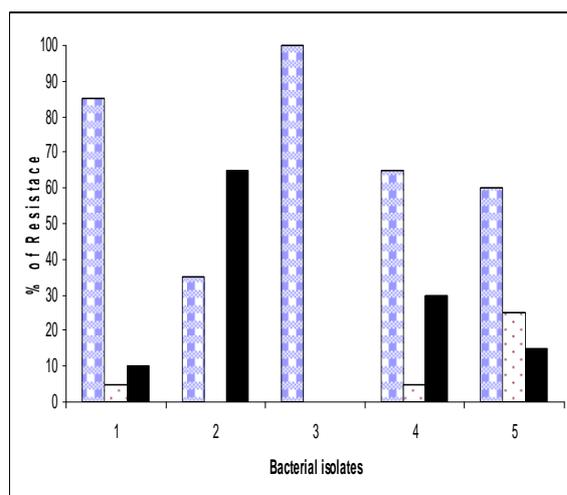


Figure 2: The rates of resistance to Ciprofloxacin for 100 clinical isolates of multi-drug resistant bacteria. Resistant (checked), Intermediate (spotted), Sensitive (black). 1: *Staphylococcus aureus*, 2: *E. coli*, 3: *Acinetobacter baumannii*, 4: *Klebsiella Sp.* And 5: *Pseudomonas aeruginosa*

4. Discussions

Antibiotics are generally ineffective against most serious infections by multi drug resistant bacteria, treatment of these infections is frequently complicated by antibiotic resistance, a problem that is increasing in recent years, so introducing of the new antimicrobial agents against these kinds of bacteria is one of the most important goals in treatment of such infections. However there are limited studies on investigation of the antibacterial effects of *Cynodon dactylon* root extract on multi drug resistant bacteria.

C. dactylon is used in traditional medicine as an anti-inflammatory, diuretic, anti-emetic and purifying agent, and to treat dysentery (Artizzu et al, 1996).

White spot disease is one of the major causes of severe mortality in farmed black tiger shrimp all over the world. The antiviral activity of extract of *C. dactylon* on white spot syndrome virus (WSSV) in black tiger shrimp has been shown by in vivo testing after oral administration previously (Balasubramanian et al, 2008).

Artizzu et al reported that the essential oil of the aerial parts of *C. dactylon* did not exhibit antimicrobial properties, but agropyrene one of the compounds of this essential oil exhibited weak activity against *Candida albicans*, *Saccharomyces cerevisiae*, *Staphylococcus aureus* and *Bacillus subtilis* (1996), however in the present study we examine the root of the plant for antimicrobial effects.

Parekh et al (2005) reported that the aqueous extracts of *C. dactylon* was inactive against some of defined bacterial strains, while methanol extracts could inhibit only *S. epidermidis* and *B. subtilis*, however they mentioned that successful prediction of plant compounds from is largely dependent on the type of solvent used in the extraction procedure. water as the solvent is used with more frequency in compare with organic solvent (for example methanol), but organic solvents provide more consistent antimicrobial activity compared to those botanical compounds extracted in water (Parekh et al, 2005), in this research we also use organic solvent (hydroalcoholic extraction method) for evaluation of the antibacterial activity of the *C. dactylon* root.

Srinivasan et al (2001) prepared an extract from leaves, flowers and bulb of the *C. dactylon* and examined its antimicrobial activities against 10 different strains of fungi and gram positive and gram negative bacteria, however they didn't find any antimicrobial effects for this extract, however they didn't use the root of the plant for preparing this extract. In this research we used only the root extract of the *C. dactylon* for determining the antibacterial effects (Srinivasan et al, 2001).

Punitha et al (2008) isolated *Vibrio harveyi* from the wounds of the infected fish, and determined the *in vivo* and *in vitro* antibacterial activity of *C. dactylon* on this bacterium. In the challenge experiments of the fish with this isolate, the control group had the highest and fastest mortality, however survival rate was significantly increased in the group fed with this herb, Also different kinds of organic solvent extracts of the *C. dactylon* showed antibacterial effects on this bacterial isolate (Punitha et al, 2008), this finding is in agreement with our findings in showing the antibacterial effects of *C. dactylon*.

It has been previously demonstrated that *A. fumigatus* residing in *C. dactylon* is a versatile producer of new and bioactive metabolites, also it has been shown that these metabolites have antifungal effects on *C. albicans*, *T. rubrum* and *A. niger* (Liu, et al., 2004).

The antibacterial effects of the *Rhizoctonia* sp., an endophytic fungus in the leaf of *C. dactylon* has been shown previously (Ma et al 2004). This finding is also in agreement with our data, because we didn't any efforts for isolating the entophytic fungus from the surface of the roots of this plant, so the antibacterial effects of the *C. dactylon* has been observed in this research may be at least in part due to entophytic fungi living as Symbiotic microorganisms on the surface of this herbal plant.

Also two new metabolites from the endophytic fungus *Chaetomium globosum* residing inside the root of *C.dactylon* have been isolated recently. These Compounds showed antimicrobial activity against the gram-positive bacteria. This finding is also in agreement with the hypothesis that the antibacterial effects has been showed in the present study can be attributed to the Symbiotic fungi living on the root of *C. dactylon* (Ge et al, 2010).

In contrast with the results obtained by Parekh et al (2005), the findings of this study indicate that *C.dactylon* root hydroalcoholic extract had a significant antibacterial effect on all multi-drug resistant isolates of gram negative and gram positive bacteria. These difference may due in part to the different extractions methods used in these studies, moreover Parekh et al(2005) sterilized the extracts by autoclave at 121 °C and 15 lbs pressure, this procedure may destroy bioactive compounds in the extract, however in our study we use 0.45 µ filters for sterilizing of the *C.dactylon* root hydroalcoholic extract.

In the present study all the multi- drug bacterial isolates were sensitive to different concentrations of *C.dactylon* root hydroalcoholic extract, the most sensitive bacterial isolates to Bermudagrass root extracts were *P. aeruginosa* isolates(Fig 1), Also *A.calcuteticus* PTCC 1318, *E.coli* ATCC25922 and *S.aureus* ATCC25923 were the most sensitive strains among the standard isolates (MIC= MBC=125) (Table 1), however clinical isolates showed high resistance to ciprofloxacin (Fig 3). In the present study results showed that the *C.dactylon* root hydroalcoholic extract possessed antibacterial effect against all multi-drug resistant bacterial isolates, furthermore, beside the confirmation of the popular use, the obtained results demonstrate that this herbal drug could represent a new source of antimicrobial agents, for the control of hospital acquired infections. However, more adequate studies must be carried out to verify the possibility of using it for fighting these bacteria in human body infections.

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Golden Words in the Veterinary Medicine among Azerbaijani people

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Abstract: Veterinary holds a great and long experience among the Turkish people like the other nations especially in folkloric literature and the part of literature which has prolonged among the villagers and conserved its own existence but its terms have not registered in their written forms. In a glimpse over the terms like rabies, enterotoxaemia, foot and mouth disease, contagious agalactia and lots of other disease put an apparent persistence on its long experience among native Azerbaijani people (Iran) in its veterinarian aspect. We try our best to have a good clarification over these terms.

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1. Introduction

The first signs of the relationship of animals and human beings are found in the rock-carvings in caves (Menges, 1968). The question of "who has trained the animals for the first time?" can not be completely answered. It seems that each tribe of human beings has to make a kind of companionship with the animals in order to draw on animals in support of their needs and life styles. Meanwhile the Turkish people can not be considered as an exception. The close association with animals before settling down and taking up agriculture made them proficient horsemen and warriors (Heyat, 2001).

Several Turkish leaders in history provided precious input to veterinary medicine. Tamer lane (13th century A.D.) who was a Turkish king, was a horse breeder, and at first made his efforts in pathology publishing on necropsies performed at his dead horses (Tadjbakhsh, 1993).

The appreciation of animals among these people has had a great impact on Turkish literature, especially on folkloric literature, the literature that deals with the life styles and the traditional behavior of people (Tadjbakhsh, 1993). The availability among the people of traditional terms in a great variety, going beyond the authority in comparison with their scientific equivalents, sounds whimsical.

These terms based on clinical signs and pathological lesions are not passed down in written form. This paper tries its best to elucidate some of these valuable terms in use among Azerbaijani people in northwest Iran and still persisting with them.

2. Material and Methods

These words are a part of many words collected by the authors and some students of Veterinary Department of their University from different vicinities of Azerbaijani provinces (Ardabil, East and West Azerbaijan) of Iran in four years. For this purpose, we prepared a questionnaire including information about the word or meaning of the word related to veterinary medicine. Then, students were sent to different regions of Azerbaijani provinces. After filling out the questionnaire by student and native vets, they were collected and put into alphabetical orders.

In the next stage, the abovementioned collected materials were matched with available related literature for original meanings and spelling, etymological and veterinary meaning analysis.

3. Results and Discussion

The authors had the opportunity to bring together over 400 terms that born reference to Azerbaijani native culture and could analyze some of them using available literature. Followings are some examples of these analyzed words.

Rabies:

Agglutinated language is said of a language that forms words by joining together simpler words or word elements, each of which correspondents to a particular element of meaning. If the Sumerian language is not considered as an agglutinate language and its mention of rabies as mad dog or uridim is not considered as a common property of the agglutinates

(Halloran, 2006), the first mention of rabies in Turkish texts (Turkish Agglutinates) can be found in the encyclopedia of Mahmoud Kashgari (1072 AD) entitled *Divan-u Lugat-it Türk* (Kashgari, 2004). The term قوتوز (gutuz) means 'mad cow' as the term ایت قوتوز (gutuz it) means rabid dog or mad cow in this dictionary (Kashgari, 2004). In other Turkish dictionaries such as Sanglax (Astarabadi, 18th century AD) and Suleyman Efendi (16th century AD) the term gutuz is available too (Astarabadi, 1995; Bukhari, 1920). Nowadays, the term gutuz that has been changed into قودوز (guduz) in Azeri Turkish and also is available in Ottoman Turkish (kutuz) (Behzadi, 1996; Olğun, 1979). In Azerbaijan (Iran), the term guduz is also used among the villagers.

Among these people there is an expression which is considerable in the view of veterinary medicine. The sense of this expression, used for cunning people is as follows: قورد ییب قودوز اولوب (Gurd yiyib guduz olub) that is 'He has eaten the wolf and has become rabid!' (Farahmand, 2003). This shows that the people of Azerbaijan were aware of a reservoir for this disease in wolves. The role of wolf in transferring of the disease is noticeable in Azerbaijan.

Enterotoxaemia:

Two forms of enterotoxaemia, caused by B and D types of *Clostridium perfringens* have been found in this region (Quinn, 2003). This is not only confirmed by epidemiological studies, but also the native vocabularies, current in this region, point to these different diseases. The disease related to D type (lamb dysentery), is called چرلتمه (çərlətmə), meaning disgusting odour (Behzadi, 1996).

This name is associated with the smell, caused by diarrhea. The other name, سو آما (su-alma), indicates ascites and water collection in cavities of the body. In the villages around Tabriz, capital of Azerbaijan (Iran), the word اوره گی سو آما (ürəgi-su-alma), exactly means hydropericarditis and is the pathological sign of this disease (Quinn, 2003). The disease, related to B type (overeating disease) is called دلجه (dəlicə) which means 'mad', indicating the neurological signs of this disease.

Foot and Mouth Disease:

There is a term in Dədə-Gurgud historical stories (13th century AD) as اویسل (oysel) picturing salivation sign (Ergin, 2000; Deda-gurgud, 1979). Although we can not identify this disease with this sign as foot and mouth disease, but today's writers and poets translate it to دبابخ (dabbax) (Qarachorlu, 2003). Dabbax is a famous native word, meaning foot and mouth disease in Azerbaijan. It seems that this word is composed of two stems (dab+ax or ag). Dab

or Tab corresponds to the equivalent word for 'disease' in the Sumerian dictionary and to 'scar' in *Divan-u Lugat-it Türk* (Halloran, 2006; Kashgari, 2004). Besides in other Turkish manuscripts this word means foot print (Clauson, 1972). Dab signifies the scars of the cattle with foot and mouth disease. Ag (ax) is a suffix that makes "dab" as a noun (Farzane, 1979). In Turkey, the native people believe that this disease is brought around by the wind, and this implies the awareness of the Turkish people of the air-born nature of transmission of the disease, long years ago (Dinçer, 1967).

Contagious agalactia:

Contagious agalactia has various names in Azerbaijan (Iran). Among these words یل بوژ (yel-boz) is highly valuable in comparison with the other froms the aspect of veterinary medicine. Yel, mainly used for 'wound', has been known to be used for arthritis, too (Behzadi, 1996; Olğun, 1979). This word denotes, therefore, one of main signs associated with this disease (Quinn, 2003). Boz, another part of this compound word, means gray, pertaining to conjunctivitis in eyes of sheep with this disease, which can be turned into grayish (Behzadi, 1996; Quinn, 2003). If we compare yel-boz with agalactia, it turns out that the Turkish words are more catching than their Latin equivalent which consists of two terms: 'a' (without) and 'galactia' (milk) pertaining only to only one of the disease signs.

4. Epilogue

Such terms in Turkish traditional texts and the native culture of Turk regions are widespread. Study of these terminological questions makes one curious about the working of the human mind. It can provide a deep and respectful view on the different cultures of the world that are the common heritage of mankind. It is an obligation of man to take care of this heritage.

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The Effects Of Long Term Physical Activity On The Changes In The Rates Of In Apo Proteins A And B In Nonathlete

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Abstract: The Present study aims to evaluate the effects of a one-year-long volleyball practice on the changes in the rates of Apo proteins A and B in the blood serum of non-athlete men. In order to do so, 30 subjects were selected randomly from among non-athlete male students and then were divided into two control and experimental groups. The experimental group on average aged 23 ± 2 . Their average height was 172.2 ± 3 cm and the average weight was 69.6 ± 3.1 kg. On the other hand, the control group aged on average 22 ± 2 and their average height and weight were 170.3 ± 3.8 cm and 69.3 ± 2.7 kg. The experimental group went through a one-year-long volleyball exercise program in which they had to practice for 90 minutes three times in a week. The control group did not have any special practice. The covariance analysis was used to probe the rates of Apo A and B and analyze the data. The rates of Apo proteins, measured before the test in both groups, were taken as the covariate to correct the groups' mean, increase the test's precision and lessen the error risk. The test results revealed that in the experimental group a one-year-long sport exercises has meaningfully changed the level of Apo A in the blood ($P= 0.01$). There was not a significant difference in the rates of Apo A in the posttest measurements in both groups ($P= 0.01$). The amount of Apo B was also meaningfully different in pre and posttest in the experimental groups but the changes in the rates of Apo B in both control and experimental groups did not differ meaningfully. [Karim Salehzadeh, Yousef aghdam, Morteza Jourkesh. **The Effects Of Long Term Physical Activity On The Changes In The Rates Of In Apo Proteins A And B In Nonathlete.** Journal of American Science 2011; 7(6):654-662].(ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Long-Term Physical Activity; Apo Protein A; Apo Protein B; Non-Athlete.

1. Introduction

The proteins in the body of lipoproteins are called Apo lipoproteins or Apo proteins (Espinosa-Larranaga, F, et al., 2005). Lipoproteins are composed of so-called lipid proteins which are constructed by free cholesterol, Strifiet cholesterol, triglycerides, phospholipids and quartet lipids (Ernst J. Schaefer, 2002). Although Apo proteins take the minimal amount of 1% of Shilomicrones, they make nearly 60% of the high density HDLs. One or more types of Apo lipoproteins exist in each lipoprotein (L. Holme, et al., 2007). The major Apo protein in the HDL is called A and the major one in the LDL is called B (Martin, R et al., 2002). One of the important prognostic factors in cardiac diseases is the Apo proteins A and B ratio. This ratio must not fall below 0.5 (Mercedes R. 2009). Apo protein A for example acts as the cofactor for the lisitin-cholesterol asile transferaze enzyme (Mestek, M. L. 2009 and Parish S, et al., 2009). It also takes the role of the lipid carrier proteins like Apo protein D in carrying HDL and finally acts as ligands connecting lipoproteins to receiving molecules on the cells in different tissues such as Apo protein B100 and E for LDL receivers and Apo protein A1 for HDL cellular receivers (Durheim, M. T, et al., 2008).

Nowadays cardiovascular diseases are killing many people for they have inactive lifestyles and bad

nutritional habits (Haram, P. et al., 2009). Different studies have revealed that the decrease in Apo protein A and increase in Apo protein B rate is the main cause of cardiovascular diseases (Parish, S et al., 2009). Thus, the rate of Apo protein A is an anti risk factor and its comparison to Apo protein B is a risk factor. This risk is larger in non athletes but about Apo protein B it is the opposite (Kodama, S et al., 2007 and Durheim, M. T et al., 2008). Nicklas, B. et al., (2009); Arthur S. (2009); Amy E. (2009) and other scholars' findings show that Apo protein B in the men and women's blood serum decreased meaningfully after a period of stamina practices.

Miller et al. (2006) and Espinosa et al. (2005) studied the amounts of HDL lipoprotein and Apo proteins A and B after long aerobic exercises. They found that in elder women, the HDL and Apo protein B decreased significantly in the subjects' blood however the Apo protein A did not have a big change. Parish et al. (2009), Green J. et al., (2005) and Kodama (2007) investigated athletes and non-athletes and revealed that in spite of other studies' findings, the rate of HDL and Apo protein A in athletes' body was larger than non athletes. Tokmakidis (2003) studied the effect of aerobic and stamina exercises on the rate of Apo protein A and HDL and concluded that their rate increases in both groups (William E. et al., 2003). In

regressions for the experimental group which is $E(y_i) = (B_0 + B_2) + (B_1 + B_3)X_{1i}$ and is $E(y_i) = B_0 + B_1X_{1i}$ for the control group.

Table 1. Volleyball exercises program of a session, three times a week for one year. Cholesterol, triglyceride, and LDL-HDL-VLDL were measured by an auto analyzer set (Co BAS miRAS) using photometric method. This set was made by Roche in Switzerland. The measurement was done by diagnostic laboratory gates of Pasteur Laboratory. Spectrophotometric method with Randox was used to identify Apo proteins A and B by an auto analyzer set (RA1000) made in England.

exercise	stretches and flexibility	aerobic running	muscles warm-up	skills' practices	game of volleyball	recovery	the whole session
length of session (minutes)	8	12	7	18	40	5	90
severity of exercise (HR max)		70%					

3. Results

The descriptive data for the subjects are presented in table 2. on the other hand other tables show the relationship between Apo proteins A and B in the subjects of both experimental and control groups.

Table 2. least square means of Apo protein A in control and experimental groups accompanied by standard error and P value.

Group	Apo protein A Lsmeans(mg/dl)	Standard Error	P-Value
Control	119.783	1.1185	<0.0001
Experimental	127.951	1.1185	

Table 3. least square means of Apo protein B in control and experimental groups accompanied by standard error and P value.

Group	Apo protein B Lsmeans(mg/dl)	Standard Error	P-Value
Control	108.438	1.0256	0.0006
Experimental	102.362	1.0256	

The difference between two groups in the amount of Apo protein B based on P=0.0006 is meaningful.

Table 4. Means, standard error, t value and P-value of differences of pre and post trial values of Apo proteins in experimental group.

Variable	Mean(mg/dl)	Standard Error	T Value	P-Value
(Apo protein A 1- Apo protein A0)	6.06666	1.9284	3.15	0.0071
(Apo protein B 1- Apo protein B0)	-4.80000	1.1514	-4.17	0.0009

Table 5. Means, standard error, t value and P-value of differences of pre and post trial values of Apo proteins in control group.

Variable	Mean(mg/dl)	Standard Error	T Value	P-Value
(Apo protein A 1- Apo protein A0)	-2.06666	0.98786	-2.09	0.0551
(Apo protein B 1- Apo protein B0)	-2.60000	0.70912	3.67	0.0025

Apo proteins A and B amounts in pretest and posttest of experimental group.

Table 6. comparison of $\frac{B}{A}$ ratio in both control and experimental groups.

Subjects	test phases	Apo B/A ratio	Changes in Apo B/A ratio	meaningful difference
experimental group	pretest	95%		
experimental group	posttest	86%	9.3% decrease	
control group	pretest	79%	3.4% increase	12.7% is not meaningful
control group	posttest	83%		

Apo protein A

The P value for B₁, B₂ and B₃ were meaningful (P<0.05) and the regression slope was not similar in two groups.

The estimated regression for Apo protein A in control group was:

$$\text{Apo A} = 16.153 + 0.850413(\text{Apo A}_0)$$

The estimated regression for the experimental group is as follows:

$$\text{Apo A} = 52.7027 + 0.61753(\text{Apo A}_0)$$

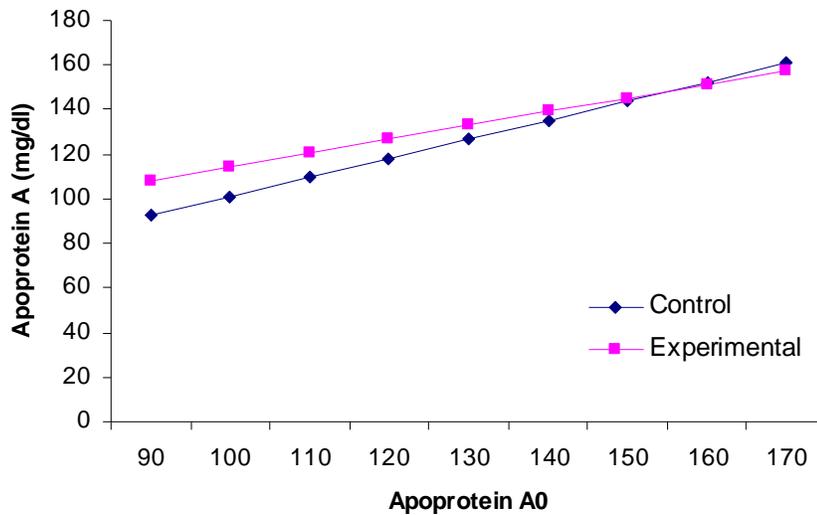


Figure 1. The changes in Apo protein A in both experimental groups dependent on initial Apo protein measurements in two pretests.

Apo protein B

The P value for B₁ and B₂ were meaningful in P<0.05, but for the B₃ that was not meaningful. The regression slope for different groups were different and the estimated regression on Apo protein B in the control group is as follows:

$$\text{Apo B} = 11.20778 + 0.9112599(\text{Apo B}_0)$$

The estimated regression in the experimental group is as follows:

$$\text{Apo B} = 2.9028 + 0.983645 (\text{Apo B}_0)$$

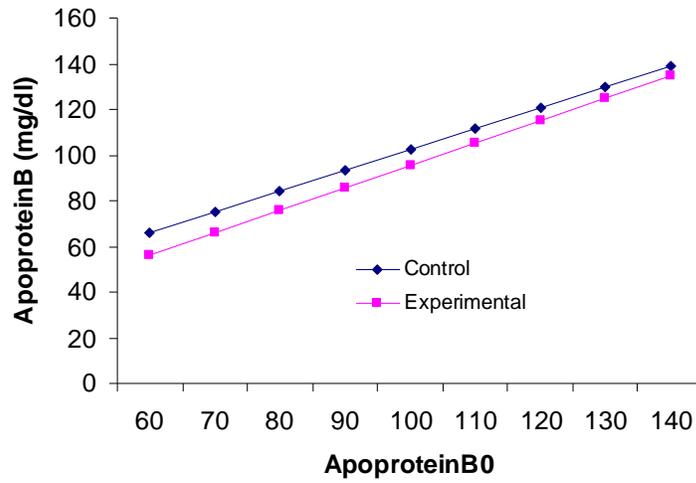


Figure 2. Apo protein B changes in both control and experimental groups dependent on initial Apo protein measurements in the pretest

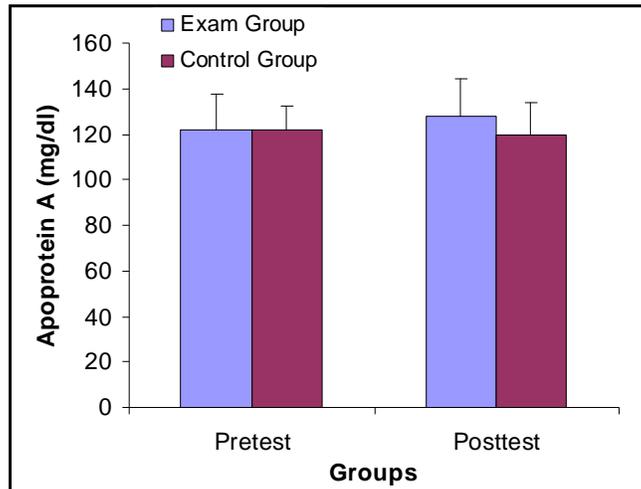


Figure 3. Comparison of Apo protein A changes in both control and experimental groups

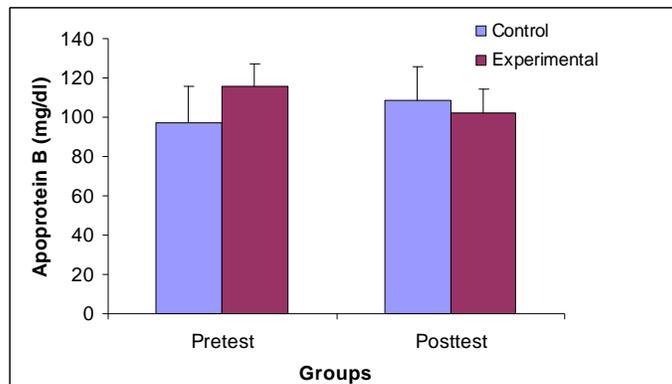


Figure 4. Comparison of Apoprotein B changes in both control and experimental groups

4. Discussion

Different studies in modern countries have revealed that Apoproteins A and B ratio is an important factor in estimating the risk of cardiovascular diseases (Miller G. et al., 2006; Konstantinos et al., 2009). Several methods have been used to change this ratio and the most important one is physical activities. However different studies have reached different conclusions. Each of these studies have focused on a specific sport. Green et al., (2005) studied 24 weeks of cycling with 50 and 80 percent of Vo_{2max} on the ratio of

Apoproteins $\frac{B}{A}$ and reached similar results (Green J. et al., 2005).

Despite the results of the above-mentioned study and other similar ones demonstrate that regular physical activities increase the HDL and decrease LDL and VLDL. the increase in HDL hinders cholesterol sedimentation in blood vessels (O'Donovan, G and et al., 2005; Jacobs et al., 2006; Durham et al., 2008; Haram et al., 2009; Jenkins et al., 2009; Konstantinos et al. 2009; Michael L et al., 2009). As the HDL raises, Apoprotein A being a major part of it raises as well (Press et al., 2003; Sharma, A et al., 2003; O'Donovan, G et al., 2005; Michael L. Mestek., 2009; Parish S et al., 2009) LDL triglycerides catabolize as the lipoprotein lipase enzymes begin activity through Apoprotein A on the blood vessels. Accordingly, as the Apoproteins increase by physical activities, catabolism of LDL and VLDL triglycerides grows (Tall, A, 2002; Sharma, A et al., 2003; Von Stengel, Simon 2004; Stefan Branth et al., 2006; Parish S et al., 2009). Most of the studies conducted approve the positive role of physical activities and show that they affect the increase in Apoprotein A and decrease in Apoprotein B meaningfully. In spite of these findings, some other studies have rejected them (Green J. et al. 2005; Espinosa-Larranaga F. et al. 2005; Miller G. et al. 2006; Fontana L. et al. 2007; Kodama S. and et al. 2007; Parish S. et al. 2009). In order to clarify a bit more on the topic and considering the fact that many people have turned from individual sports to ball games to block the risk of cardiovascular diseases, the present study have studied the effects of a long-term volleyball exercise on the changes in the Apoprotein A and B rates in non-athlete men. the results reveal that these activities do not change the Apoprotein A's amount in non-athlete subjects ($P=0.01$). The difference in the control and experimental groups' Apoprotein A is not meaningful ($P=0.01$). on the other hand, comparison of Apoprotein B in both control and experimental group in pretest and posttest shows a meaningful difference ($P=0.01$). This meaningful difference in the pretest and posttest of control group have been caused by the one-year-long volleyball exercises in which many factors

including nutrition, physical activities and heredity are also important. As it can be seen, this exercise may change the Apoprotein rate slightly in the subjects in experimental group in pretest and posttest. Although this slight increase in the amounts measured in the pretest and posttest is equal (+6.06666), in the control group this rate shows a little fall (+2.60000). This difference in the mean of the subjects in both control and experimental groups have made the $T=3.15$ and $P=0.0071$ so it can be inferred that the change in the Apoprotein A rate has been sufficient in the experimental group and it can be defined and thus it is meaningful. the findings of the present study are in complete concordance with the findings of Green (2005); Haram et al. (2009); Jacobs et al. (2006); O'donovan et al. (2005); Parish et al. (2009); Arthur S. Leon (2009); Micheal et al. (2009); Von Stengel (2004); Slentz et al. (2007); Nicholas et al. (2009); Metsios et al. (2008) and disagrees with findings of Espinosa et al. (2005); Fahlman (2002); Haram et al. (2009); Kodama (2007); Fontana et al. (2007); Amy E. et al. (2008) and William et al. (2003). The present findings show that although the rate of Apoprotein has changed in the experimental group significantly, analyzing the results on Apoprotein B present no meaningful differences in both control and experimental groups in the pretest and posttest ($P=0.01$). In this group Apoprotein B has decreased significantly (-4.8000) and this decrease may have huge effects on the cardiovascular diseases' risk factors and reduce them (Fahlman, 2002; William, E et al., 2003; Von Stengel, Simon., 2004; O'Donovan, G. et al., 2005; Stefan Branth et al., 2006; Miller, G. et al., 2006; Fontana, L et al., 2007; L.Holme, A., 2007; Yourka D Tchoukalova et al., 2008). Thus it can be said that these activities had a meaningful effect on the Apoprotein B rate in the subjects under study. Overall it is proved that the Apoprotein B to A ratio is a prognostic factor in cardiac muscles' defects (Green j et al., 2005; Miller. G et al., 2006; Parish S et al., 2009; Jenkins et al 2009). In the subjects of the control group

this ratio $\left\{ \frac{\text{pretest}}{\text{posttest}} = \frac{0/79}{0/83} \right\}$ had a 0.43 raise and in

the subjects of the experimental group $\left\{ \frac{\text{pretest}}{\text{posttest}} = \frac{95}{86} \right\}$ had a 9.3% fall. The difference in the B/A ratio was 12.7%, which was a huge difference, compared to the standard difference, and may be the cause of a big risk. It can be concluded that activities like the ones tested here cannot be supposed as the hindering factors against cardiovascular diseases risk factors (Miller. G et al., 2006; Kodama, S et al., 2007; Amy E. Griel et al., 2008; Parish S et al., 2009). However, a huge fall can be seen for Apo protein B (Table 6), and findings of this research are in concordance with Michael et al.,

(2009); Parish et al., (2009); Arthur S. Leon, (2009); Metsios et al., (2008); Jacobs et al., (2006); Haram P. et al., (2009); and do not concord with the findings of Von, (2004); Green (2005); Parish S. et al., (2009); Miller et al., (2006). It should be noted that beside long-term physical activities, other factors like nutrition, sessions' number in a week, length and severity of exercises, caloric cost, smoking and medicines which were not controlled are of high importance in decreasing the amount of Apo protein B (Lee, I-M et al., 2003; [Eisenmann JC.](#), 2004; Fontana, L et al., 2007; Annie Motard and et al., 2008; Mercedes R. Carnethon, 2009). It is highly important for the caloric cost of individuals, amount of fat in the body, heredity, personal exercising methods are among the factors affecting amount of Apo proteins A, and B in both pretest and posttest levels and influence the research results (Sharma A. et al. 2003; [Tokmakidis SP](#), [Volaklis KA](#), 2003; Metsios, G.et al.,2008; [Parish S](#) et al.,2009; Mestek, M.L. 2009; Michael L. Mestek,2009). Overall conclusion can be drawn from this study that even if a one-year-long physical activity in the form of a three-session volleyball exercise increases Apo protein A rate meaningfully, higher increase may have a huge role in safety from cardiovascular diseases. Besides, these exercises may decrease the amount of Apo protein B meaningfully and bring the Apo protein B to Apo protein A ratio to the standard one. Accordingly, in both cases it can be said that biochemical, physiological, and physical shape is in a way that can be effective on cardiovascular condition and reduce the risk of diseases (Lee, I-M et al., 2003; William, E et al., 2003; Miller G et al., 2006; Slentz, C et al., 2007; Yourka D Tchoukalova et al., 2008; Parish S et al ., 2009; Michael L. Mestek, 2009). Changing lifestyles from an idle and static one to a more dynamic and active one may increase the energy usage (Martin R. et al., 2002; Jenkins et al. 2009; Parish S. et al., 2009; Mercedes R. Carnethon, 2009) and help have a healthier heart. Finally, it should be noted that there are many factors affecting the amount of Apo protein A and B as cardiovascular risk factors, and more studies are needed to clarify more on these factors and identify mechanisms of changes in Apo proteins A and B.

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Relationship Between Geopotential Height Anomalies Over North America and Europe and the USA Landfall Atlantic Hurricanes Activity

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Abstract: The present paper investigates the relationship between geopotential height anomalies at level of 500 hpa over North America and Europe, and the USA landfall Atlantic hurricanes activity. The decadal data of the number of hurricanes by category which stroked the mainland USA for each decade through the period (1851-2006) are used through the present study. The daily NCEP/NCAR reanalysis data composites for geopotential height at 500 hpa level over North America and Europe for the period of (1949-2006) are used too. Hurricane datasets and anomalies in geopotential height are analyzed and correlated together. The results revealed that there are significant positive correlations between the anomalies in geopotential height over North America and East Europe simultaneously, and existence of Atlantic hurricanes of category 3 that strike USA. In addition to that, significant positive correlations between the anomalies in geopotential height over North America and existence of major hurricanes (category 3, 4 and 5) that landfall USA is found too. However, significant negative correlations between the anomalies in geopotential height over North Atlantic and existence of all USA Landfall Atlantic Hurricane categories are existed else category 1. In general one can conclude that anomalies in geopotential height at 500 hpa level over North America and Europe are control the USA landfall Atlantic hurricanes activity.

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Keywords: Atlantic hurricanes; Geopotential height anomalies; North America; USA

1. Introduction

The USA landfall Atlantic hurricanes activity and its causes had been challenged in several scientific literatures (e.g., Elsner et al., 1999; Gray 2001; Goldenberg, et al., 2001, Landsea 2005; Mann and Emanuel 2006; Elsner 2006 and 2008; Asbury et al., 2006; Trenberth and Shea 2006; Vecchi and Knutson 2008 and Hafez 2008). However, increases in key measures of Atlantic hurricane activity over recent decades were believed to reflect, in large part, contemporaneous increases in tropical Atlantic warmth (e.g., Emanuel, 2005). Some studies (e.g., Goldenberg et al., 2001) had attributed these increases to a natural climate cycle termed the Atlantic Multidecadal Oscillation (AMO); while other studies suggest that climate change may instead be playing the dominant role (Emanuel, 2005; and Webster et al., 2005). Also, the global warming arguments had been given much attention by many media references to recent papers claiming to show such a linkage. Despite the global warming of the sea surface that has taken place over the last three decades, the global numbers of hurricanes and their intensity have not shown increases in recent years except for the Atlantic, Klotzbach (2006). In addition to that, processes affecting hurricane development over the North Atlantic like the El Nino Southern Oscillation (ENSO), the stratospheric Quasi-Biennial Oscillation (QBO) and Sea Surface Temperatures

(SSTs) were discussed. Global coupled climate model simulations cannot answer directly the question on enhancement of hurricane activities (or its absence) under increased greenhouse gas concentrations because of their too coarse resolution. Therefore large-scale quantities that affect hurricane formation were investigated in a future warmer climate. However, more frequent or more intense hurricanes were expected from an increase in the local SST, from more latent heat flux from the ocean to the atmosphere, from more westerly winds in the tropical stratosphere that reduces the occurrence of strong easterly phases of the QBO and from a more moist-unstable stratification of the atmosphere. However, a stronger vertical wind shear similar to the difference between El Nino and La Nina events suggested fewer hurricanes in the northern Atlantic. Also a more dry-stable atmosphere would lead to fewer hurricanes (Gray 1984; and Arpe and Leroy 2008). Meanwhile, the USA landfall of major hurricanes Dennis, Katrina, Rita and Wilma in 2005 and the four Southeast landfall hurricanes of 2004 (Charley, Frances, Ivan and Jeanne) raised questions about the possible role that global warming played in these two unusually destructive seasons (Klotzbach and Gray 2008). In fact, Hafez (2008) found that blocking systems over the Northern Hemisphere played a great role in USA landfall of strongest hurricanes Katrina, Rita and Wilma in 2005 season

and also in the activity of hurricane Andrew 1992. Hafez (2009) gets a model for extratropical cyclone Klaus that developed over the North Atlantic Ocean and invade southern France and northern Spain on January 2009. He found that, Azores high played a great role in developing of cyclone Klaus. However, recently, Klotzbach (2010) found that the large-scale equatorial circulation which known as the Madden-Julian Oscillation (MJO) impacts on tropical cyclone activity in several basins around the globe. Large differences in frequency and intensity of tropical cyclone activity were seen; both in the tropical Atlantic as well as in the northwest Caribbean and Gulf of Mexico depended on the MJO phase. Coherent changes in upper- and lower-level winds and relative humidity are likely responsible for these differences. In the present work, author will try to uncover the key for answer the following question, what is the actual response that controlling of USA landfall Atlantic hurricanes activity.

2. Data and Methods

The decadal data of number of hurricanes by category which stroked the mainland USA for each decade through the period (1851-2006), Updated from Blake et al., 2005, are used through the present study. The daily NCEP/NCAR reanalysis data for geopotential height at 500 hpa level over North America, North Atlantic Ocean and Europe for the period of (1949-2006) (Kalnay et al., 1996) are used too. This data set obtained from the NOAA - CIRES, Climate Diagnostics Centre (CDC) through the Web Site (<http://www.cdc.noaa.gov>). For the purpose of the present study, it is liable to divide the area of study to four zones. First zone, zone A, is the North America (100° W- 20° W) latitudes and (60° N – 30° N) longitudes. Second zone, zone B, is the North Atlantic Ocean (20° W – 00° E) latitudes and (60° N – 30° N) longitudes. Third zone, zone C, is the West Europe (00° E – 40° E) latitudes and (60° N – 30° N) longitudes. The last one, zone D, is the East Europe (40° E – 60° E) latitudes and (60° N – 30° N) longitudes. In the present work, these datasets are analyzed using of anomalies methodology and linear correlation coefficient techniques, Spiegel (1961).

3. Results

3.1 Analysis of geopotential height over 500 hpa over North America and Europe in the period (1948-2006)

Through the present study, time series analysis of datasets of geopotential height of 500 hpa level for the period (1948-2006) for four distinct zones over North America and Europe is done. For the purpose of study these zones are (zone A, zone B, zone C, and zone D). The results revealed that for zone A, (North

America), geopotential height varies from year to year with minimum value (5627 m) in year 1976 and maximum value (5675 m) in year 2005. Maximum values of geopotential height are existed through the period (2001-2005). Figure 1a illustrates these variations. for zone B, (North Atlantic Ocean), geopotential height values varies rapidly from year to year with minimum value (5635 m) in year 1960 and maximum value (5730 m) in year 1978. Figure 1b shows these variations. Zone C, (West Europe), characterized by dramatically increases in geopotential height values through the period (1981-2006) rather than the period (1948-1980) with maximum value (5710 m) in year 2005. Figure 1c shows this dramatically variation. In addition to that, through zone D (East Europe) two maxima and two minima of geopotential height are existed. The two maxima are (5718 and 5722 m) for years of 1952 and 2005 respectively. Meanwhile two minima (5638 m) for years 1956 and 1973, see Figure 1d.

3.2 Analysis of geopotential height anomalies over 500 hpa over North America and Europe through period (1948-2006)

In this section, geopotential height anomalies over 500 hpa over North America, North Atlantic Ocean, West Europe and East Europe through (1948-2006) period are analyzed. For zone A, it is clear that geopotential height anomaly values vary from year to year around its mean value (5649 m). With maximum value (+27 m) existed on year 2005. Meanwhile, the minimum value (-20 m) recorded on year 1976 through the study period as it is shown in Figure 2a. There is a positive anomaly trend exist from year 1964 until 2005. See the black straight line in Figure 2a. In addition to that, for zone B, the geopotential height anomaly values vary dramatically from year to year around its mean value (5685 m). Maximum anomaly value (+35 m) existed on year 1978. The minimum value (-50 m) observed on year 1960 through the study period as it is illustrate in Figure 2b. It is clear that, through the first half period of study, from year 1948 to 1980, there is a negative anomaly trend. Meanwhile, there is a positive anomaly trend exist for the second half of the study period from 1981 to 2005 year. The trend is shown by black straight line in Figure 2b. The Analysis for zone C revealed that the mean value is (5678 m) for this zone. The maximum anomaly value (+32 m) is observed on year 2005 and the minimum value (-30 m) occurred on year 1965 as it is clear in Figure 2c. Positive trend occurred from year 1969 to 2005. As clear from black straight line trend in Figure 2c. For the last zone D, it is record the highest maximum anomaly value for all zones (+ 50 m) on year 2005. Meanwhile (-36 m) is the minimum value on 1973. However, the

mean value is (5673 m) for this zone, see Figure 2d. Positive trend is observed from year 1960 to 2005 as it is clear from black line shown in Figure 2d. The results of the analysis of geopotential height anomaly through the period (1948-2005) for four zones revealed that there exist positive trends in anomaly values almost of the study period with highest maximum values on year 2005 except for North Atlantic Ocean, zone B.

3.3 Analysis of the decadal timeseries for USA landfall Atlantic hurricanes activity

Through this section, data of the decadal number of Atlantic hurricanes by category that stroke the mainland USA through the period (1851-2006) were analyzed using of timeseries analysis. The category of Atlantic hurricanes obtained according to the Saffir- Simpson scale of hurricanes. The Saffir-Simpson hurricane Scale is a 1-5 rating based on the hurricane's present intensity, Zebrowski and Judith (2005). The results revealed that, hurricanes for category 1 varies from decade to decade with maximum number of 10 hurricanes occurred through the two decades (1901-1910) and (1911-1920). Meanwhile, with minimum number 3 hurricanes existed two times on (1961-1970) and (1991-2000). The average number of category 1 is 7.1 h/d (hurricane/decade) see Table 1 and Figure 3a. In addition to that, the trend of Atlantic hurricanes of category 1 that stroke USA is a negative trend through the period of (1851-2006), Figure 3a (red line). For category 2, it is found that the maximum number recorded is 9 h/d on (1881-1890) and minimum number is 1 h/d for decade of (1951-1960). The average number of category 2 is 4.7 h/d with negative trend, Figure 3b. The same numbers, like category 2, occurred for category 3 but for the decades (1941-1950) and (1861-1870) respectively but with average number is 4.8 h/d, see Table 1 and Figure 3c. The trend of category 3 variation with time is a positive trend through the period of study, Figure 3c (red line). It is noticed that, for category 4 there are several decades without any existence of episode of hurricanes. The maximum number is 4h/d occurred on the two decades of (1891-1900) and (1951-1960). See Table 1 and Figure 3d. The average number of category 4 is 1.2 h/d, with a very little negative trend, see Figure 3d (red line). The existence of category 5 hurricanes is very little, whereas the maximum number is 1 h/d during the period of study. It is occurred only three times for (1931-1940), (1961-1970) and (1991-2000) decades. Its average number is 0.2 h/d, as it is clear from Table 1 and Figure 3e. In general there exist a positive trend of category 5, see Figure 3e (red line). For all categories (1, 2, 3, 4 and 5), analysis shows that, maximum

number is 24 h/d while minimum number is 12 h/d for the two decades (1941-1950) and (1971-1980) respectively, within average value is 17.9 h/d and negative trend through the period of study, see Table 1 and Figure 3f (red line). Major hurricanes of categories (3, 4 and 5) has 10 h/d as a maximum number and 1 h/d is a minimum number occurred on (1941-1950) and (1861-1870) decades respectively. The average number of it is 6.2 h/d with a slightly positive trend through the study period, as shown in Table 1 and Figure 4.

3.4 Relationship between geopotential height anomalies over North America and Europe and the USA landfall Atlantic hurricanes activity

Decadal data of geopotential height anomalies over North America and Europe and the USA landfall Atlantic hurricanes activity through the period of (1951-2006) has been correlated through this section. Table 2 illustrates the location for four distinct zones over North America and Europe. Table 3 shows the values of correlation coefficient between geopotential height anomalies over North America and Europe and the USA landfall Atlantic hurricanes activity. The correlation coefficient analysis revealed that there are significant positive correlations between the anomalies in geopotential height over northern America and Eastern Europe simultaneously and existence of Atlantic hurricanes of category 3. There are significant positive correlations between the anomalies in geopotential height over northern America and the existence of major hurricanes (3, 4, and 5) that strike USA. In addition to that, there are significant negative correlations between anomalies in geopotential height over northern Atlantic and existence of major and all Atlantic hurricane categories that strike USA except category 1.

4. Discussions

Almost of the previous studies of Atlantic hurricanes activity is referred it to global warming or to increase of SST in tropical region of the Atlantic Ocean, or ENSO conditions. The results of the present study uncovered that the anomalies in geopotential height values at 500 hpa over North America, North Atlantic, West and East Europe are controlling the activity of Atlantic hurricanes that landfall USA. Whereas, there are significant relationship between the existence of positive anomalies over North America and east Europe simultaneously and occurrence of category 3 hurricanes. In addition to that there are outstanding negative relationship between Atlantic hurricane of all categories that strike USA except category 1 and anomalies in geopotential height at 500 hpa levels which existed over the North Atlantic Ocean zone.

Major hurricanes have been strongly correlated to positive anomalies in geopotential height over North

America simultaneously with negative anomalies over north Atlantic region. In particular, in year 2005.

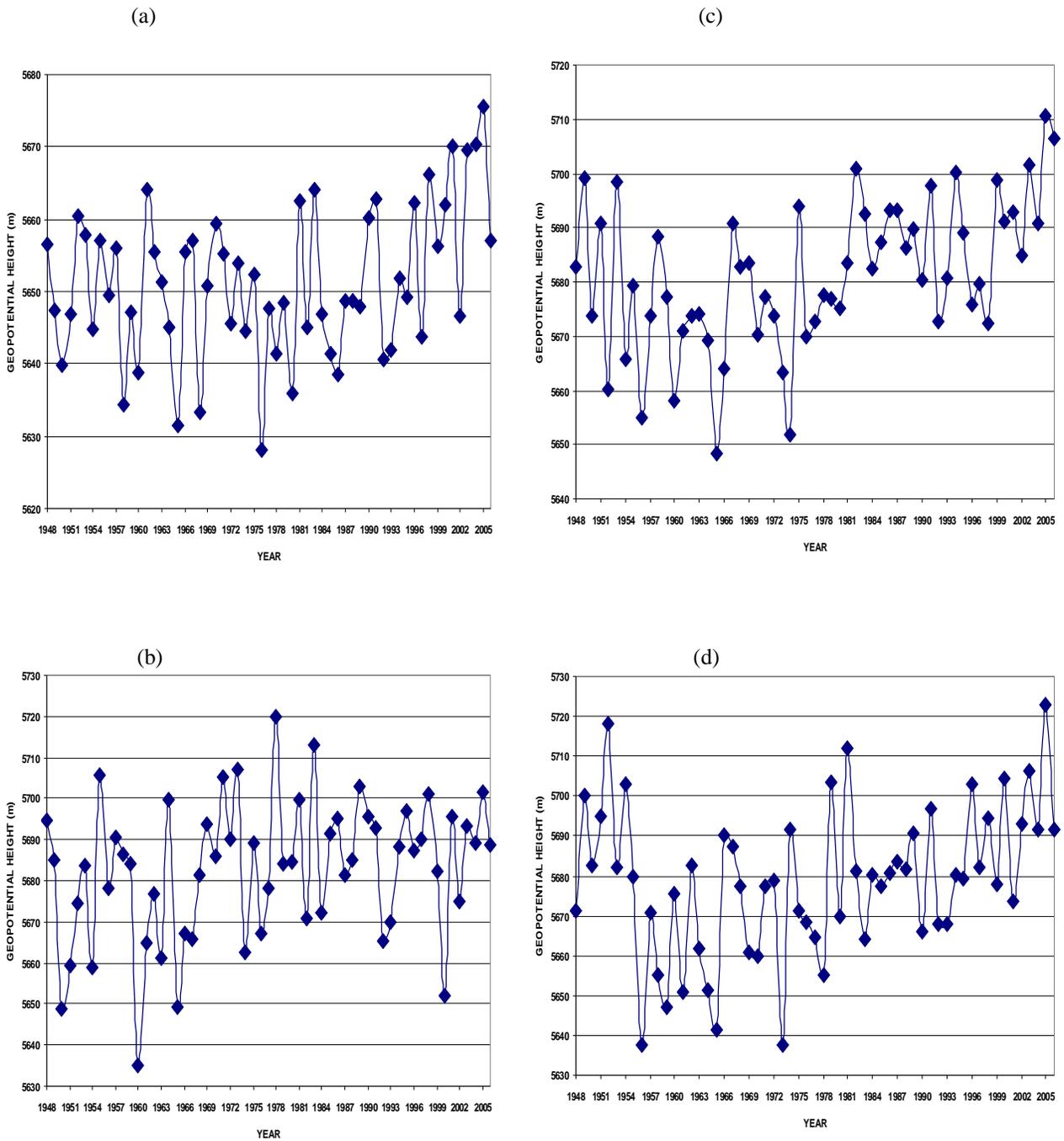


Figure 1. Time series of geopotential height at 500 hpa level for North America , North Atlantic, West Europe, and East Europe, four zones A, B, C and D respectively, through the period (1949-2006).

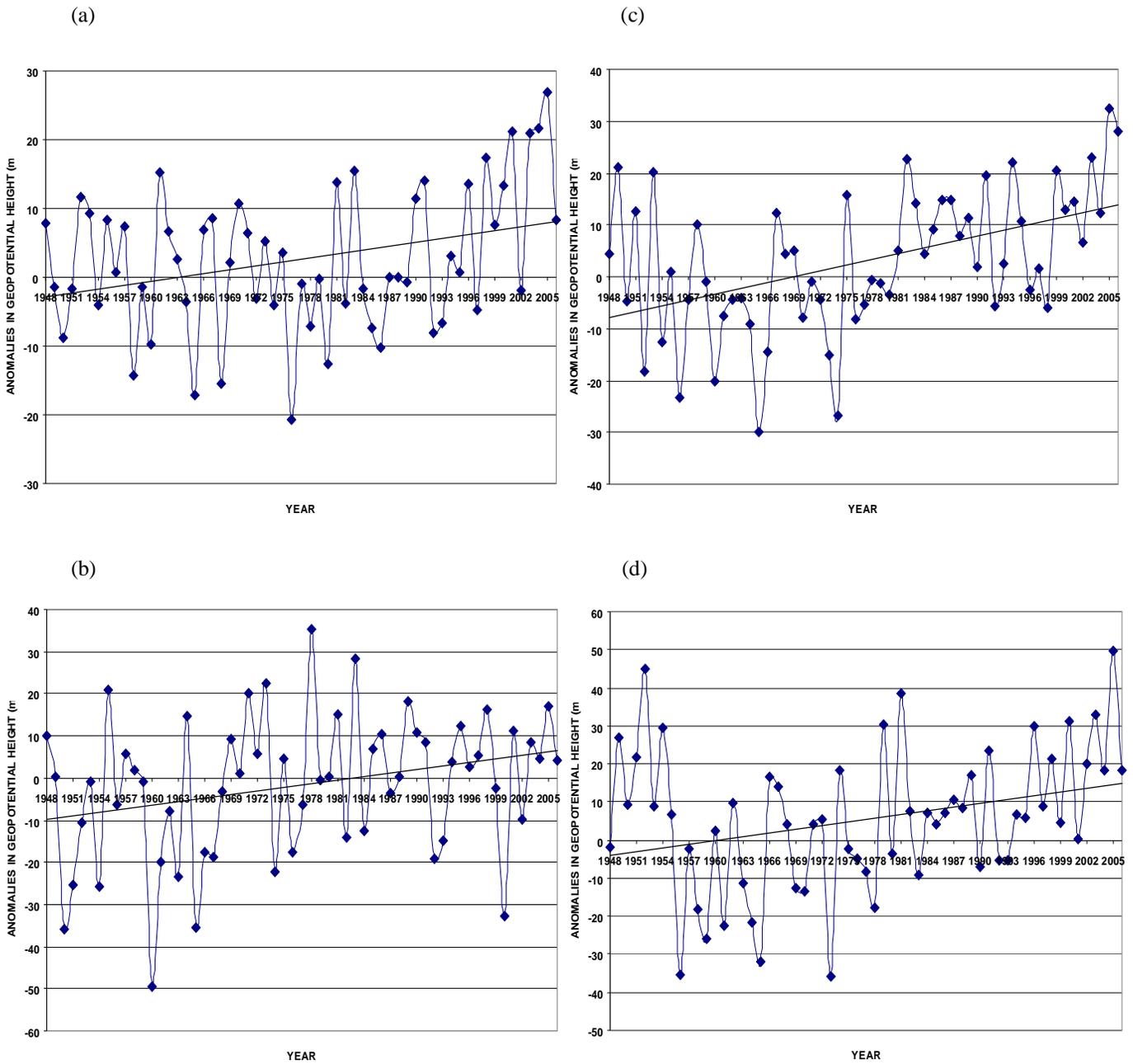


Figure 2. Time series analysis for anomalies in geopotential height at 500 hpa level and its trend for North America , North Atlantic, West Europe, and East Europe , four zones A, B, C and D respectively, through the period (1949-2006).

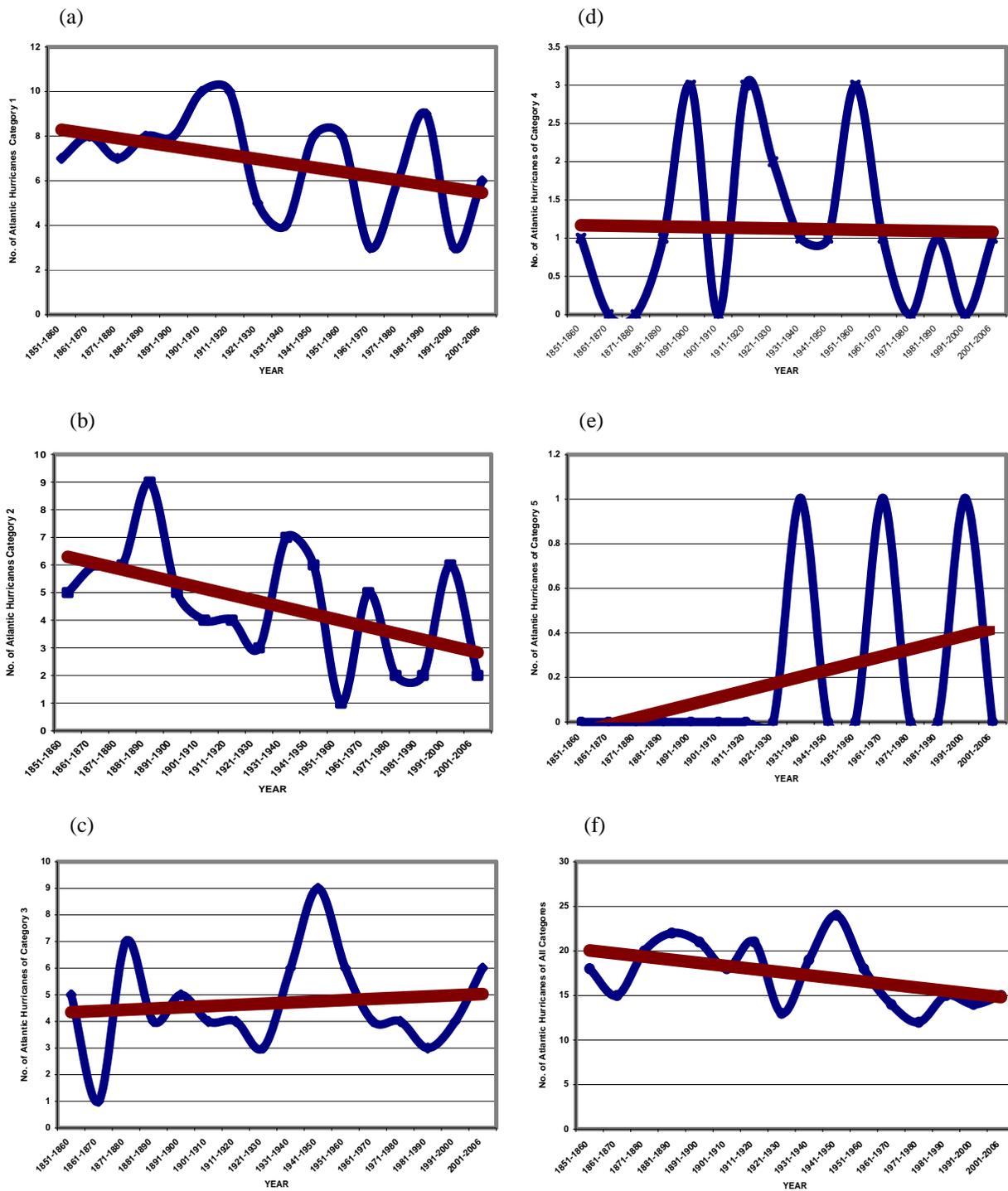


Figure 3. Represents the decadal timeseries for USA landfall Atlantic hurricanes by category and its trend for the period of (1851-2006). Whereas, Figure 3a for category 1, Figure 3b for category 2, Figure 3c for category 3, Figure 3d for category 4, Figure 3e for category 5, and Figure 3f for all categories.

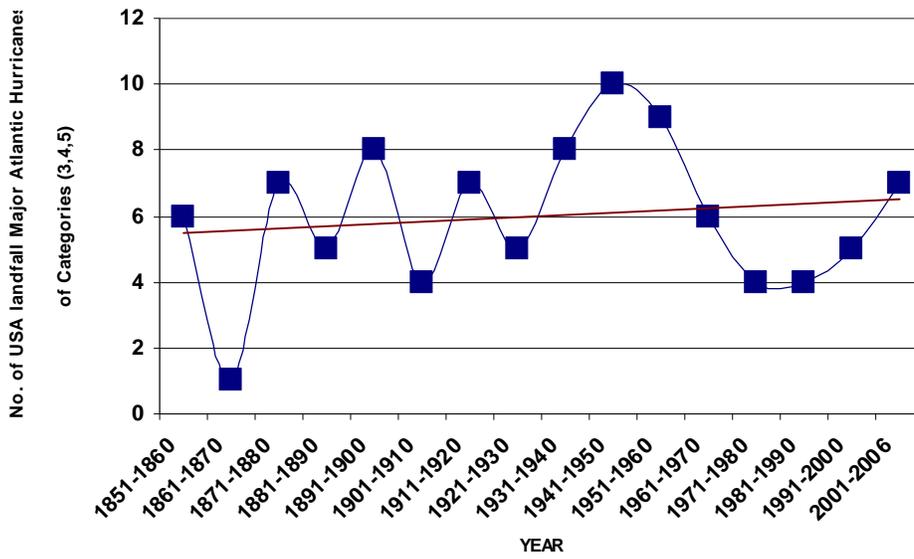


Figure 4. Represents the decadal timeseries for USA landfall major Atlantic hurricanes of categories (3, 4, and 5), and its trend for the period of (1851-2006).

Table 1. The decadal number of hurricanes by category that stroke the mainland USA through the period (1851-2006). (Updated from Blake et al., 2005 and 2007). Note: Only the highest category to affect the U.S. has been used.

DECADE	CATEGORY					ALL	MAJOR
	1	2	3	4	5	1,2,3,4,5	3,4,5
1851-1860	7	5	5	1	0	18	6
1861-1870	8	6	1	0	0	15	1
1871-1880	7	6	7	0	0	20	7
1881-1890	8	9	4	1	0	22	5
1891-1900	8	5	5	3	0	21	8
1901-1910	10	4	4	0	0	18	4
1911-1920	10	4	4	3	0	21	7
1921-1930	5	3	3	2	0	13	5
1931-1940	4	7	6	1	1	19	8
1941-1950	8	6	9	1	0	24	10
1951-1960	8	1	6	3	0	18	9
1961-1970	3	5	4	1	1	14	6
1971-1980	6	2	4	0	0	12	4
1981-1990	9	2	3	1	0	15	4
1991-2000	3	6	4	0	1	14	5
2001-2006	6	2	6	1	0	15	7
1851-2006	110	73	75	18	3	279	96
Average per decade	7.1	4.7	4.8	1.2	0.2	17.9	6.2

Table 2. The location for four distinct zones over North America and Europe.

ZONES	LATITUDES	LONGITUDES
Zone A (North America)	100° W- 20° W	60° N – 30° N
Zone B (North Atlantic)	20° W – 00° E	60° N – 30° N
Zone C (West Europe)	00° E – 40° E	60° N – 30° N
Zone D (East Europe)	40° E – 60° E	60° N – 30° N

Table 3. Shows the values of correlation coefficient between decadal of geopotential height anomalies over North America and Europe and the USA landfall Atlantic hurricanes activity through the period (1951-2006).

Hurricane activity Correlation coefficient	Category of USA landfall Atlantic hurricanes activity						
	1	2	3	4	5	All (1,2,3,4,5)	Major (3,4,5)
Anomalies in geopotential height at:							
Zone (A)	-0.121	0.039	0.511	-0.011	-0.034	0.189	0.306
Zone (B)	0.389	-0.329	-0.216	-0.499	-0.548	-0.400	-0.564
Zone (C)	0.178	-0.062	0.149	-0.172	-0.220	0.101	-0.061
Zone (D)	0.170	-0.132	0.384	-0.072	-0.279	0.206	0.127

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The Effects of Micronutrient application on soybean seed yield and on seed oil and protein content

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Abstract: In order to study the effects of applying the micronutrients zinc, manganese, and boron, and to compare the effects that incorporating them in the soil and spraying them on the crop on seed oil and protein contents and percentages, a study was conducted based on the factorial design with the two factors of incorporating these micronutrients in the soil and spraying them on the crop, in 16 treatments and four replications (a total of 64 trials), in 2009-2010 in Dasht-e-Naz in Sari of northern Iran. The treatments were as follows: T1=control, T2=Zns, T3=Mns, T4=Bs, T5=Zns, T6=Zns+Bf, T7=Zns+Mnf, T8=Zns+Znf, T9=Mns, T10=Mns+Bf, T11=Mns+Mnf, T12=Mns+znf, T13=Bs, T14=Bs+Bf, T15=Bs+Mns, T16=Bs+Znf. Results obtained showed that the highest seed oil percentage (25.03%) was achieved by spraying zinc on the crop, and that the biggest seed oil yield (359.31 Kg.h) was obtained by applying manganese to the soil. Results of the comparison of the means indicated that the highest seed protein content (36.12%) was achieved by spraying boron on the crop, and the greatest seed protein yield (545.54 Kg.h) was obtained when manganese was added to the soil. These results also showed that the largest number of total pods per plant (71.05), and the biggest seed yield (152.9 g.m⁻²) were achieved by applying manganese to the soil. In the comparison of the interaction effects of the data, it was also shown that, although the highest seed oil percentage belonged to the spraying of zinc on the crop, yet the greatest seed yield among all the treatments (170.7 g.m⁻²) was that of the treatment of adding manganese to the soil plus spraying zinc on the crop, in which the greatest number of pods per plant (77.87) and the highest seed protein yield (631.1 Kg.h) and the highest seed oil yield (284.5 Kg.h) were obtained.

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Keywords: Boron, manganese, oil, protein, soybean, zinc

1. Introduction

Excessive application of macronutrient fertilizers, such as nitrogen and phosphorus, the fact that micronutrients are not used in crop production in Mazandaran, and also the calcareous nature of soils in the fields of eastern Mazandaran, have resulted in micronutrient deficiencies. Study of the trend of fertilizer application in the past decade reveals that more than 90 percent of the fertilizers applied during this period were nitrogen and phosphorous fertilizers, with the ratio of N, P, K, and S fertilizers to fertilizers containing micronutrients being 100, 68, 4.5, and 0.065, respectively (Malakooti and Tehrani, 1999). Studies carried out in east Mazandaran showed that deficiencies of these elements are one of the limiting factors in achieving the maximum seed yield and seed oil and protein yield and percentages in the prevailing crop growing conditions (Assadi and Mahmoodi, 2001). Undoubtedly, the optimal application of plant nutrients has a significant role in increasing the yield and quality of soybean and its oil. Zinc deficiency is one of the most important and widespread micronutrient deficiencies in the world, and it reduces the yield of crop plants (Grewal et al., 1997; Cakmak, 2000). Soybean is sensitive to boron

deficiency (Victor et al., 1990); and boron is very influential in soybean seed formation and in increasing its seed oil content (Grant and Baily, 1992). Soybean is also very sensitive to manganese deficiency, a prevalent condition in neutral or alkali soil with high pH, and this deficiency results in short plants having yellow leaves. Manganese deficiency also has a negative influence on soybean seed oil content. Alley et al., (2008) reported that adding manganese sulphate to the soil and spraying it on the crop resulted in an increase in manganese absorption and in seed and oil yield of soybean.

Since Mazandaran is the center of soybean production in the north of the country, studying the effects of micronutrients on the qualitative features of soybean seed, such as the oil and protein yields and percentages, is very important. Therefore, this study was conducted in the region of Dasht-e-Naz to investigate the effects of applying the microelements zinc, manganese, and boron (and to compare the effects of the methods of applying them –i.e., incorporating them in the soil or spraying them on the crop) on the seed oil percentage and seed oil and protein yields.

2. Material and Methods

This study was carried out on the basis of the factorial experimental design with the two factors of adding the micronutrients to the soil and spraying them on the crop, with 16 treatments and 4 replications (a total of 64 trials). The treatments were as follows: T1=control, T2=Zns, T3=Mns, T4=Bs, T5=Zns, T6=Zns+Bf, T7=Zns+Mnf, T8=Zns+Znf, T9=Mns, T10=Mns+Bf, T11=Mns+Mnf, T12=Mns+Znf, T13=Bs, T14=Bs+Bf, T15=Bs+Mns, and T16=Bs+Znf. On the basis of the soil test carried out, the required amounts of the micronutrients, including zinc (40 Kg of zinc sulphate per hectare), manganese (30 Kg of manganese sulphate per hectare), and boron (10 Kg of boric acid per hectare) were added to the soil before seeding. In the spraying treatments, zinc and manganese (0.3 %) and boron (0.2 %) were sprayed at the start of stem elongation and at flower bud formation. At harvest, samples of the plants were taken from each plot and the yields and yield components of the different plots were statistically analyzed. After harvest, seed samples were sent to the soil and water laboratory of the Mazandaran Agriculture and Natural Resources Research Center for the determination of the percentage oil and protein contents.

3. Results

Oil Percentage

Results of the analysis of the variance of the data showed that the effects of the different levels of applying the micronutrients to the soil, the effects of the different levels of spraying the micronutrients on the crop, and the interaction effects of adding the micronutrients to the soil and spraying them on the crop on seed oil percentage were significant at the one percent probability level (Table 1). Results of the comparison of the means indicated that, among the treatments of applying the micronutrients to the soil, the highest seed oil content (23.99%) was obtained when boron was added to the soil, and that this treatment had a statistically significant difference with the others. In the treatments of adding manganese and zinc to the soil, the oil percentages observed were 23.5 and 22.73%, respectively, which were higher than that of the control (22.23%) (Table 2). These results also showed that, among the spraying treatments, the highest seed oil percentage (25.03%) was achieved when zinc was sprayed on the crop, and this treatment had a statistically significant difference with the others. The lowest seed oil percentage was observed in the control (21.69%) (Table 3). Results of the comparison of the means also indicated that the highest seed oil percentage (28.5%) was obtained when zinc was sprayed on the crop, and that the least seed oil content (17.5%)

belonged to the treatment of adding manganese to the soil plus spraying boron on the crop (Fig 1).

Oil Yield

Results of the analysis of the variance of the data showed that the effects of the different levels of applying the micronutrients to the soil, the effects of the different levels of spraying the micronutrients on the crop, and the interaction effects of applying the micronutrients to the soil and spraying them on the crop on seed oil yield were significant at the one percent probability level (Table 1). Results of the analysis of variance indicated that, among the treatments of adding the micronutrients to the soil, the highest seed oil yield (359.32 Kg.h) was obtained when manganese was added to the soil, and that this treatment had a statistically significant difference with the others. The treatments of adding zinc and boron to the soil came second and third with 321.85 and 293.39 Kg.h, respectively, while the least seed oil yield belonged to the control (249.64 Kg.h) (Table 2). These results indicated that, among the treatments of spraying the micronutrients on the crop, the highest seed oil yield (317.71 Kg.h) was achieved when manganese was sprayed on the crop, and that this treatment had a statistically significant difference with the others. The least seed oil yield (255.29 Kg.h) belonged to the control (Table 3). Results of the comparison of the mutual effects of the data showed that the highest seed oil yield (284.5 Kg.h) was obtained by adding manganese to the soil plus spraying zinc on the crop, and that the lowest seed oil yield (137.89 Kg.h) belonged to the control (Fig 2).

Seed Protein Percentage

Results of the analysis of the variance of the data indicated that the effects of applying different levels of the micronutrients to the soil, the effects of spraying different levels of micronutrients on the crop, and the mutual effects of adding the micronutrients to the soil and spraying them on the crop on seed protein percentage were significant at the one percent probability level (Table 1). Results of the comparison of the means showed that, among the treatments of adding the micronutrients to the soil, the highest seed protein percentage (35.67%) was obtained when manganese was added to the soil. The treatments of adding zinc to the soil and the control came second and third with 35.45 and 35.09 percent, respectively, while the lowest seed protein percentage (32.73%) was observed in the treatment of adding boron to the soil (Table 2). These results indicated that, among the treatments of spraying the micronutrients on the crop, the highest seed protein percentage (36.12%) was achieved when boron was sprayed on the crop, while the lowest seed protein

percentage (32.24%) belonged to the treatment of spraying zinc on the crop (Table 3). Results of the comparison of the mutual effects of the data showed that the highest seed protein percentage (37.21%) was obtained by spraying zinc on the crop, while the least seed protein percentage (27.2%) was observed in the treatment of adding boron to the soil plus spraying boron on the crop (Fig 3).

Protein Yield

Results of the analysis of the variance of the data showed that the effects of applying different levels of the micronutrients to the soil, the effects of spraying different levels of the micronutrients on the crop, and the mutual effects of adding the micronutrients to the soil and spraying them on the crop on the protein yield were significant at the one percent probability level (Table 1). Results of the comparison of the means indicated that, among the treatments of adding the micronutrients to the soil, the highest protein yield (545.54 Kg.h) was obtained when manganese was added to the soil. The treatments of adding zinc and boron to the soil came second and third with 501.97 and 400.28 Kg.h, respectively, while the control had the least protein yield (397.06 Kg.h) (Table 2). Results of the comparison of the means showed that, among the treatments of spraying the micronutrients on the crop, the highest protein yield (528.43 Kg.h) was observed when zinc was sprayed on the crop, while the lowest protein yield (395.11 Kg.h) was that of the control (Table 3). Results of the comparison of the mutual effects of the data indicated that the highest protein yield (631.1 Kg.h) was observed by adding manganese to the soil plus spraying zinc on the crop, while the lowest protein yield (276.8 Kg.h) was obtained by adding boron to the soil plus spraying it on the crop (Fig 4).

Total Number of Pods per Plant

Results of the analysis of the variance of the data indicated that the effects of adding different levels of the micronutrients to the soil, the effects of spraying different levels of the micronutrients on the crop, and the interaction effects on the total number of pods per plant were significant at the five percent probability level (Table 1). Results of the comparison of the means showed that, among the treatments of adding the micronutrients to the soil, the largest total number of pods per plant (71.05) was obtained when manganese was added to the soil, and that this treatment could statistically be placed in one group with the treatment of adding zinc to the soil (in which the total number of pods per plant was 66.79). The treatment of adding boron to the soil and the control, with 57.04 and 55.14 pods per plant, respectively,

could statistically be placed in one group, as well (Table 2). These results also indicated that, among the treatments of spraying the micronutrients on the crop, the largest total number of pods per plant (68.33) was observed when zinc was sprayed on the crop, which could statistically be placed in one group with the treatment of spraying manganese on the crop (in which the total number of pods per plant was 65.81). The lowest total number of pods per plant (56.64) was that of the control (Table 3).

Results of the interaction effects of the data also indicated that the largest total number of pods per plant (77.87) among all the treatments was obtained by adding manganese to the soil plus spraying zinc on the crop, and that this treatment was statistically in one group with the treatment of adding manganese to the soil plus spraying it on the crop (in which the total number of pods per plant was 72.37). As was the case in the number of pods on the main stem, the lowest total numbers of pods per plant were observed in the treatment of adding boron to the soil plus spraying it on the crop and in the control with 42.77 and 44.43 pods per plant, respectively (Fig 5).

Seed Yield

Results of the analysis of the variance of the data showed that the effects of applying different levels of the micronutrients to the soil, the effects of spraying different levels of the micronutrients on the crop, and their mutual effects on seed yield were significant at the one percent probability level (Table 1). Results of the comparison of the means indicated that, among the treatments of adding the micronutrients to the soil, the highest seed yield (152.9 g.m⁻²) was obtained by adding manganese to the soil. The treatments of applying zinc and boron to the soil came second and third with 141.6 and 122.3 g.m⁻², respectively. The lowest seed yield (112.3 g.m⁻²) belonged to the control (Table 2). These results also showed that, among the treatments of spraying the micronutrients on the crop, the highest seed yield (146.3 g.m⁻²) was obtained when zinc was sprayed on the crop, with the treatments of spraying manganese and boron on the crop coming second and third with 138.5 and 126.6 g.m⁻², respectively. Other researchers, such as Maftoon and Karimian (1988), Darajeh et al. (1991), and Cakman, I (2000), have reported similar results. The lowest seed yield (117.7 g.m⁻²) was that of the control (Table 3).

Table 1. Analysis of Variation of the studied traits

SOV	DOF	Mean Square					
		Oil %	Oil Yield	Pr %	Pr Yield	Pods/Plant	Seed Yield
Replication	3	**	**	ns	ns	ns	ns
Basal Application (A)	3	**	**	**	**	**	**
Spray Application (B)	3	**	**	**	**	**	**
AXB	9	**	**	**	**	*	**
Error	30	0.067	1.032	2.092	11.827	ns	ns
CV (%)		1.12	0.7	4.16	0.73	6.42	7.67

SOV: Source of Variation, DOF: Degree of Freedom, * and ** show the least differences at 1 and 5 level of probability respectively and ns shows none significant difference

Table 2- Comparison of the means of the data related to the addition of zinc, manganese, and boron to the soil on seed oil and protein, yield, and number of Pod.

Treatment	Oil %	Oil Yield (Kg.h)	Pr %	Pr Yield (Kg.h)	Pods per Plant	Seed Yield (g.m ⁻²)
Control	22.23 D	249.64 D	35.09 AB	394.06 D	55.14 B	112.3 D
Zn to Soil	22.73 C	321.85 B	35.45 A	501.97 B	66.79 A	141.6 B
Mn to Soil	23.50 B	359.31 A	35.68 A	545.54 A	71.05 A	152.9 A
B to Soil	23.99 A	293.39 C	32.73 B	400.28 C	57.04 B	122.3 C
LSD (0.05)	0.431	41.12	2.412	5.735	6.68	5.91

Numbers having common letters in each column are not significantly different at the probability level of 5 percent.

Results of the interaction effects of the data also indicated that the highest seed yield (170.7 g.m⁻²) among all the treatments was achieved by adding manganese to the soil plus spraying zinc on the crop, and that this treatment could not be placed in one group with any other treatment. The treatments of adding manganese to the soil plus spraying it on the crop and of adding manganese to the soil plus spraying boron on the crop came second and third with 153 and 149 g.m⁻², respectively. The lowest seed yield (88 g.m⁻²) belonged to the control (Fig 6).

Table 3- Comparison of the means of the data related to spraying the micronutrients zinc, manganese, and boron on soybean yield and yield components.

Treatment	Oil %	Oil Yield (Kg.h)	Pr %	Pr Yield (Kg.h)	Pods per Plant	Seed Yield (g.m ⁻²)
Control	21.69 D	255.29 C	33.57 B	395.11 D	56.64 C	117.7 D
Zn Foliar	25.03 A	366.18 A	33.24 B	528.43 A	68.33 A	146.3 A
Mn Foliar	22.94 C	317.71 B	36.02 A	498.87 B	65.81 AB	138.5 B
B Foliar	23.78 B	300.81 B	36.12 A	420.86 C	9.24 BC	126.5 C
LSD (0.05)	0.431	41.12	2.412	5.735	6.68	5.91

Numbers having common letters in each column are not significantly different at the probability level of 5 percent.

Figure 1. Interaction effects of Basal and Foliar application of micronutrients on seed oil percent

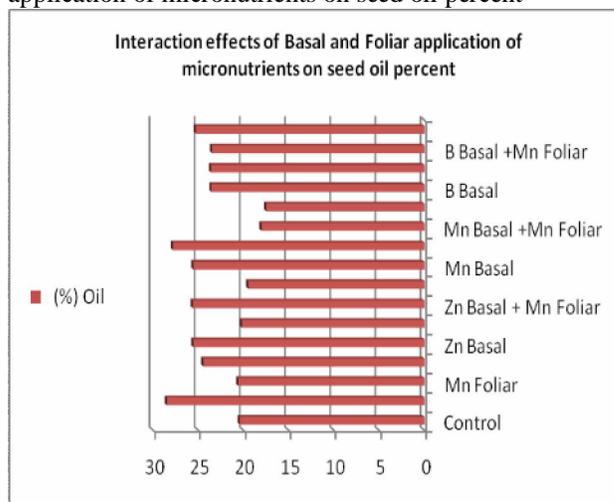


Figure 2. Interaction effects of Basal and Foliar application of micronutrients on oil yield

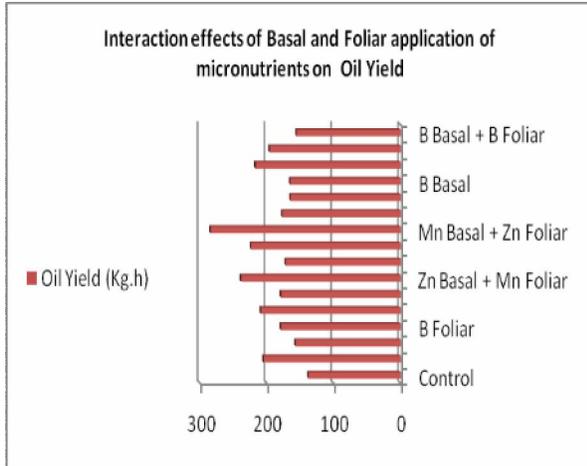


Figure 3. Interaction effects of Basal and Foliar application of micronutrients on protein percentage

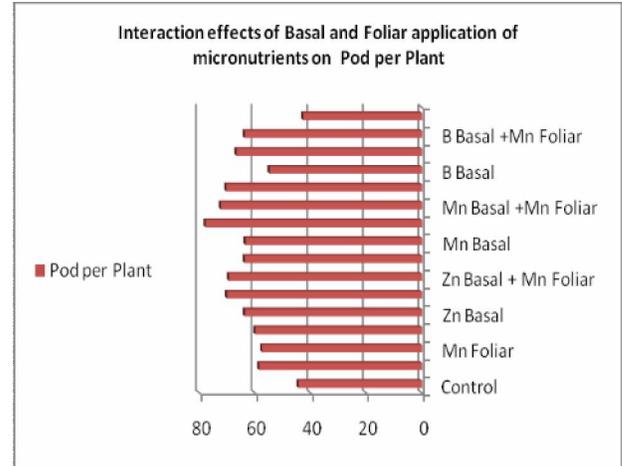


Figure 6. Interaction effects of Basal and Foliar application of micronutrients on seed yield

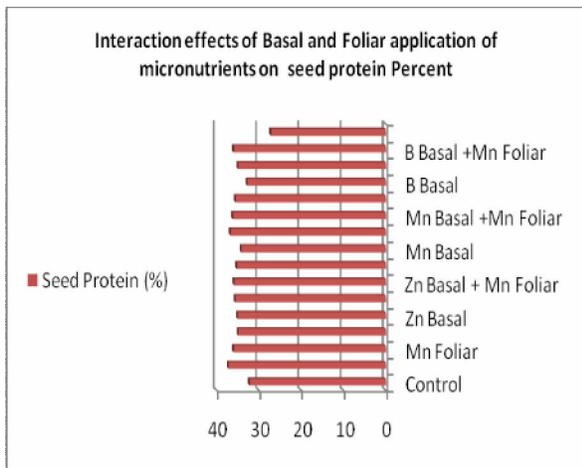


Figure 4. Interaction effects of Basal and Foliar application of micronutrients on protein yield

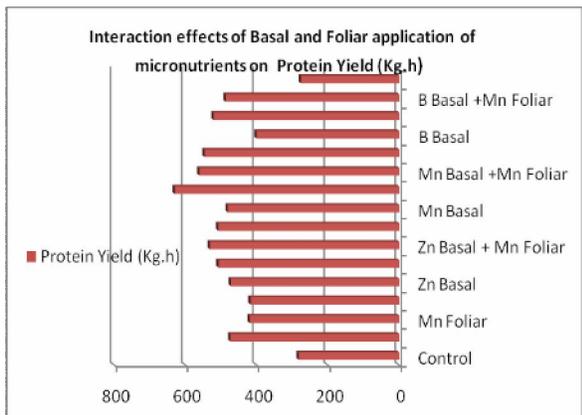
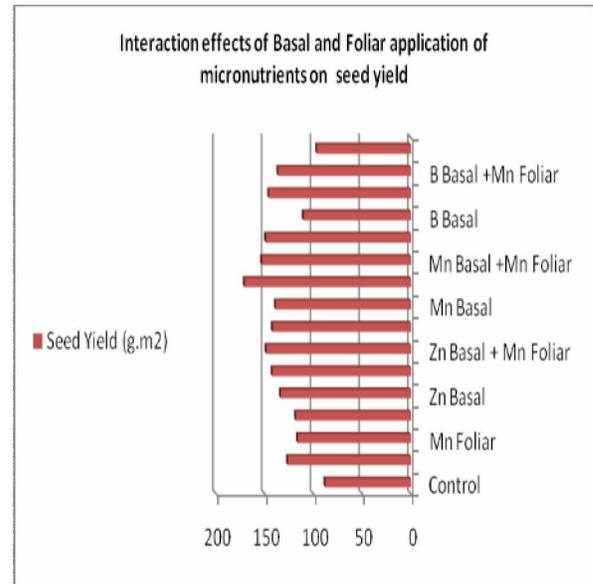


Figure 5. Interaction effects of Basal and Foliar application of micronutrients on number of pod per plant

4. Discussions

Results of this study showed that, although the highest oil percentage (28.5%) was achieved by spraying zinc on the crop, yet the highest seed yield (170.7 g.m⁻²) among all the treatments was obtained by adding manganese to the soil plus spraying zinc on the crop, and that this treatment had the largest number of pods per plant (77.87), the highest seed protein yield (631.1 Kg.h), and the largest oil yield (284.5 Kg.h). Therefore, the treatment of adding manganese to the soil plus spraying zinc on the crop can be considered the best among all the treatments studied.

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Effects of Water Infiltration to Soil in Increasing Yield and Water Use Efficiency in Peanut

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Abstract: An experiment was conducted to evaluate the Effects of water infiltration to soil in increasing yield and water use efficiency in peanut in Astaneh Ashrafiyeh, North of Iran. A was studied split-plot in a complete random block plan with 3 replications in the 2009 crop year. Irrigation management included no irrigation (dryland) and irrigations with 6, results of this research indicated that average final infiltration was 9.4 (cm/day) and the highest biomass, pods and seeds values for the 6 days irrigation management were 9453, 4093 and 2345 (kg/ha), respectively. The highest water use efficiency based on biomass, pods and seeds in the 6 days irrigation treatment were 2.88, 1.24 and 0.71(kg/m³). Volumetric moisture variations in different depths indicated that the moisture content in upper soil layers such as 0-20 cm and 20-40 cm was less than those of 40-60 cm and 60-80 cm layers which was due to water absorption in the first and second layers by the plant.

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1. Introduction

Surface irrigation is one of the oldest irrigation methods in which water is distributed as an open flow throughout a field. In fact, influenced by the gravity, water flows and moisturizes the whole surface of the field or part of it (Sohrabi and Paydar, 2009). Infiltration is considered as one of the important parameters for designing irrigation systems based on which irrigation management and planning is done (Sohrabi and Behnia, 2007). At the beginning, the infiltration rate is high, but in the long-run, it gradually decreases until it reaches an approximately constant rate. Hence, the infiltration rate is of great significance in terms of irrigation because it is a determining factor for storing a certain amount of water in the soil. Final soil infiltration is the permeability which the soil shows in long durations. Moreover, during early stages, soil moisture is more effective on the infiltration rate. When air becomes stuck between the wetting front and the confining layer, its pressure increases and in turn, reduces the infiltration rate (Sohrabi and Paydar, 2009).

Peanut is a perennial shrub of the pea family and has a main straight root. It is cultivated in tropical and semi-tropical regions and is quite rich in terms of its oil quality and protein content [3]. This crop is used for its oil and also as a dry nut by human beings (2002). At the moment, drought is one of the limiting factors of the yield in plants such as peanut (Reddy *et al*, 2004). Thus, certain planning for water consumption level and how to optimize it should be done (Deming *et al*, 1999; Reddy *et al*, 2004). Bingru

and Hongwen (2000) believe that supplying sufficient water for a plant during its growth and development and prior to the occurrence of adverse effects of water stress are very important for physiological processes inside a plant. In their study results, Li *at al*. [8] showed that under recommended complete irrigation conditions and supplementary irrigation programs, plants would have higher yields compared with those without any irrigation. Also, Lai and Katul (2000) reported that under water deficit conditions in the soil, the plant's physiological characteristics and root density at different layers are of great significance. For example, as stress occurs in surface layers, roots in lower layers are more effective and efficient in terms of water absorption. By examining eleven peanut cultivars under stress and unstressed irrigations, Songsri *et al*. (2009) concluded that drought stress results in the reduced efficiency of seeds' water consumption. Improved efficiency is usually accompanied by consuming water under limited water resources conditions and helps increase the yield. Furthermore, by studying four peanut cultivars under stressful and unstressed conditions, Vorasoot *et al*. (2003) concluded that under the latter conditions, pods had higher yield than in the former. El-Boraei *et al*. (2009) studied the effect of alternative irrigation with 1, 2 and 3 days intervals and obtained results revealed that peanuts irrigated on a daily basis had the highest yield. In their researches on peanut cultivars, Songsri *et al*. (2008) and Haro *et al*. (2008) observed that under complete irrigation conditions, the total biomass was more than in the water stress condition. The present

research was done with the purpose of studying the effects of infiltration on increased yield and water consumption efficiency of peanut in Astaneh Ashrafiyeh in the north of Iran.

2. Material and Methods

This experiment was done in Astaneh Ashrafiyeh in the north of Iran situated at 37 16' and 46 56' with an average altitude of 3m [above the sea level), based on the studied split-plot in a complete random block plan with 3 replications in the 2009 crop year. Meteorological data were obtained from the respective stations in Astaneh Ashrafiyeh (Table 1). Prior to tillage, in order to determine physical and chemical properties of the soil, samples were taken from different parts of the field (Table 2). Each experimental unit was 6×2.5m in dimensions consisting of 7 rows. Irrigation management included no irrigation (dryland) and irrigations with 6, 12 and 18-days intervals. At first, the field went under a complete tillage on May 5, 2009 and followed by creating ridges and furrows, cultivation of NC₂ variety seeds started. Prior to cultivation, the seeds were disinfected in 2:1000 carboxin thiram as a fungicide (Craufurrd *et al*, 2002). Crop management operations included weeding (to control weeds) and side dressing around the root. Harvest was done on September 20, 2009. Surface irrigation method used in this research was of the ridges and furrows system type where the distance between the ridges was 80 cm with the distance between plants in each ridge being 30cm. Soil moisture content was measured using a TRIME-FM model TDR device in 0-20 cm, 20-40 cm, 40-60 cm and 60-80 cm depths based on moisture volume percentage during the growth period in different irrigation managements at 4 spots and in the center of each plot. Water level for each irrigation was determined based on soil moisture Deficit up was to 60 cm deep (effective root depth) in each plot. Then, 6, 12 and 18 days intervals irrigation managements were applied in the field.

Consumed water level during the growth period was determined through measuring the amount of irrigation water and the precipitation level. In order to measure the amount of Water for irrigation for each experimental unit, a contour was used. For 6, 12 and 18 days irrigation managements, 8, 4 and 3 irrigation frequencies were considered, respectively in which 328, 300 and 264 mm water was consumed. In order to measure the infiltration rate in the field, the Double cylinder method was used. To determine the total biomass (dry matter) at maturity, after excluding two rows on both sides in each plot, 12 plants were randomly selected. Then, pods, leaves and stems were placed in a 70°C oven for 48 hours. When dried, initially, mature pods' weight for each plant was

measured by the ratio of mature pods weight to the number of mature pods per 12 plants.

To estimate seed and pod yields, after the exclusion of two rows on the sides, mature pods and seeds were weighed using an accurate laboratory scale. Calculation of efficient water consumption rate based on total biomass, seeds and pods was done through the values of the total biomass and produced weeds and pods (kg) divided by the amount of the consumed water (m³) (Andrade *et al*, 2002). For variance analysis and the comparison of mean values (Duncan test, probability level of 5%) and in order to draw relevant diagrams, *MSTATC* and *Excel* software were used.

Table 1. Information on meteorological data

	Month			
	May	Jun	Jul	Aug
Max Temperature (C)	27.3	41.9	29.5	28.4
Min Temperature (C)	17.3	20	18.8	18.5
Sun Shine (h)	6.5	8.5	3.9	4.4
Rain fall (mm)	39.5	0	149.5	11
Wind Speed (m/s)	1.2	0.9	0.3	0.9
Max Humidity (%)	92	85.5	93.4	91.3
Min Humidity (%)	58.9	49	66.9	63.8

Table 2. Characteristics of soil in the study area

	Soil depths (Cm)			
	0-20	20-40	40-60	60-80
Sand (%)	49	49	45	45
Silt (%)	32	32	38	38
Clay (%)	19	19	17	17
Total nitrogen (%)	0.084	0.065	0.051	0.036
Organic carbon (%)	0.68	0.66	0.36	0.30
Potassium absorbent(ppm)	239	191	119	119
Phosphor absorbent(ppm)	0.07	2.17	0	0
Potassium absorbent(ds/m)	0.631	0.565	0.681	0.755

3. Results

Results from this research showed that after 130 minutes of measurement, infiltration intensity reached the constant rate of 0.39 (cm/h) which was equal to 9.4 (cm/day) (Fig 1). It seemed that the infiltration process depended on the physical properties of the soil surface, initial distribution of water in soil prior to irrigation and the flow of water on and in the soil (Rashidi and Seyfi, 2007). Mean values of the cumulative infiltration [D] (cm) and average infiltration intensity [i] (cm/h) as a function of time [t] (min) indicated that the infiltration rate was high at the beginning and then decreased with the passage of time until it reached a constant rate (Fig 1). Accuracy of water advance and depth infiltration equations will have significant effects on the success of irrigation design and management

(Sohrabi and Behnia, 2007). Results from the volumetric moisture changes of different depths revealed that the moisture content in upper soil layers such as 0-20 cm and 20-40 cm was less than those of 40-60 cm and 60-80cm layers which was due to the absorption of water in the first and second layers by the plant. In all depths, without-irrigation management and 6 days irrigation management led to the minimum and maximum moisture contents, respectively in superficial depths during the growth period which was attributed to using more water for irrigation. However, in lower layers, the moisture content of 6 and 12 days irrigation managements were close to each other (Fig. 2). Moisture variations in different layers along with water level in irrigated layers at different times suggested that before applying water stress, moisture conditions were equal in all layers. However, as stress was applied, the upper layers lost their moisture. These layers affected the continuation of the plant's growth such that for the existing roots, water was not absorbable. By studying the moisture rate in soil depths (30, 60 and 90 cm) under stress and irrigation conditions for peanut, Songsri *et al.* (2008) observed that moisture content difference in surface layers was quite apparent, while in lower layers this difference for irrigation managements was negligible in a way that moisture rates were corresponding during the growth period. Results showed that irrigation management had a significant effect ($P<0.01$) on the seed yield (Table 3) and the 6 days irrigation treatment had the highest seed yield ($M=2345$ kg/ha) compared with other treatments (Table 4). By studying the effect of drought stress on peanut, Vorasoot *et al.* (2003) and El-Boraei *et al.* (2009) concluded that under stress conditions, the yield decreases. Results from their research showed that irrigation management had a significant effect ($P<0.01$) on the pod yield (Table 3) and that the highest pod yield ($M=4093$ kg/ha) was that of the 6-days irrigation management. Also, in his research, Abou Kheira (2009) revealed that drought stress during different peanut growth stages caused a significant decrease of seed and pod yields. Irrigation management was an indication of the insignificance of the total biomass at the probability level of 1% (Table 3) and that the total biomass of the 6 days irrigation treatment ($M=9453$ kg/ha) was the highest relative to others (Table 4). This research confirmed the findings of Songsri *et al.* (2008). In their results, the total biomass of the irrigation condition was more than that of the stressful condition. Also, Haro *et al.* (2008) studied two peanut cultivars under stressful and irrigation conditions for two years and concluded that the total biomass under stressful conditions was 34 to 67% less than under irrigation conditions. Water shortage is usually accompanied by reduced

accumulation of aerial organs and the production of photosynthesis substances which seemed to be due to reduced absorption of nutrients and the production and transfer of processed substances. It is likely that increased dry matter production in the 6 days irrigation management causes the extension of the leaf surface. Water use efficiency in the irrigation management based on total biomass, seeds and pods was significant ($P<0.01$) (Table 3). In the 6 days irrigation treatment for the total biomass, pods and seeds, this efficiency was 2.88, 1.24 and 0.71kg/ha, respectively (Table 4). Results obtained from the study conducted by Songsri *et al.* [10] showed that drought stress resulted in the reduced efficiency of the seeds water consumption from 1.69 (kg/ha) under unstressed conditions to 0.98 (kg/ha) under stressful conditions in different peanut cultivars.

Table 3. Mean squares form the combined ANOVA for Biomass yield, pod yield, seed yield, $WUE_{Biomass}$, WUE_{Pod} and WUE_{Seed}

Source	Irrigation	CV(%)
Biomass yield	**	6.90
Pod yield	**	6.80
Seed yield	**	7.71
$WUE_{Biomass}$	**	6.05
WUE_{Pod}	**	7.55
WUE_{Seed}	**	7.63

** : Significant at 1% level

Table 4. Mean comparative on Biomass yield, pod yield, seed yield, $WUE_{Biomass}$, WUE_{Pod} and WUE_{Seed}

	Irrigation			
	non irrigation	6 day	12 day	18 day
Biomass (kg/ha)	4612d	9453a	7200a	6111c
pod yield (kg/ha)	2618c	4093a	3021b	2846b
seed yield (kg/ha)	955.5c	2345a	1510b	1423b
$WUE_{Biomass}(kg/m^3)$	2.30b	2.88a	2.39b	2.26c
$WUE_{Pod}(kg/m^3)$	1.30a	1.254a	1.00b	1.05b
$WUE_{Seed}(kg/m^3)$	0.47c	0.71a	0.5bc	0.52b

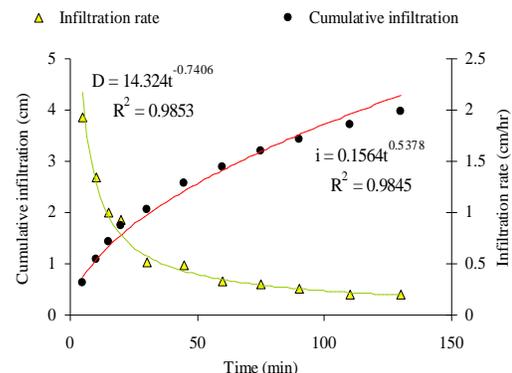


Figure 1. mean infiltration rate (cm/hr) and mean cumulative infiltration (cm)

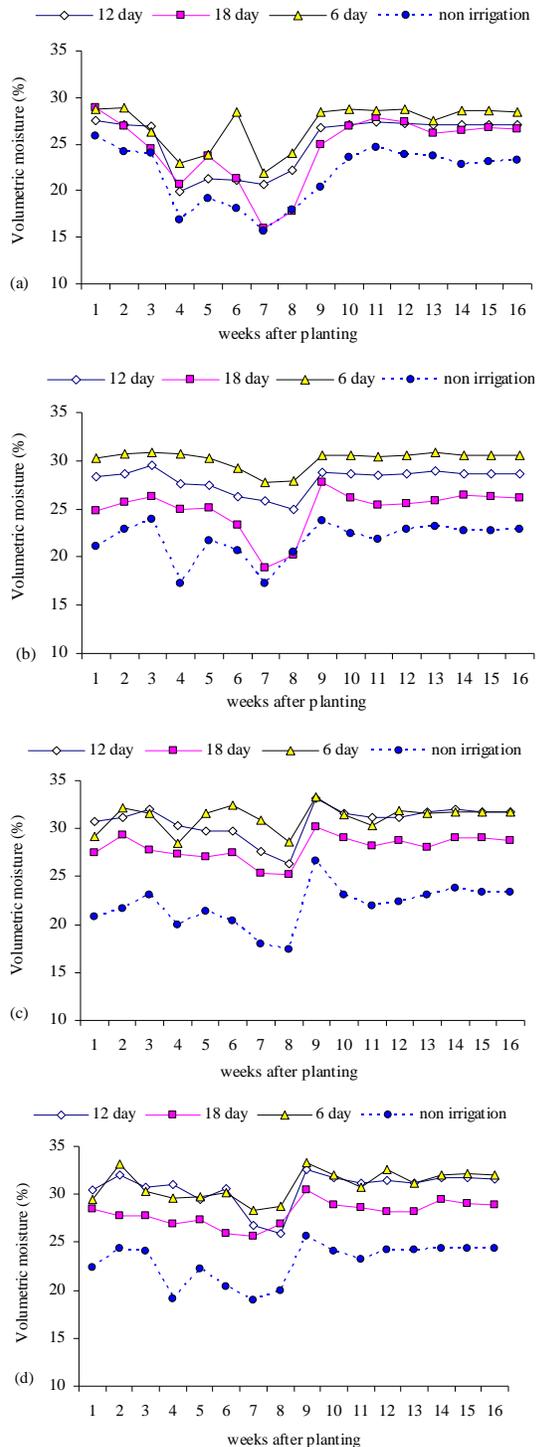


Figure 2. Trend Volumetric moisture in deeps the 0-20cm (a),20-40 cm (b),40-60 cm (c),60-80cm (d)

4. Discussions

In general, results of this research indicated that average final infiltration was 9.4 (cm/day) and the highest biomass, pods and seeds values for the 6

days irrigation management were 9453, 4093 and 2345 (kg/ha) respectively. The highest water use efficiency based on biomass, pods and seeds in the 6 days irrigation treatment were 2.88, 1.24 and 0.71(kg/m³). Volumetric moisture variations in different depths indicated that the moisture content in upper soil layers such as 0-20 cm and 20-40 cm was less than those of 40-60 cm and 60-80 cm layers which was due to water absorption in the first and second layers by the plant. Hence, irrigation time should be reduced so that by compensating the infiltration reduction, water consumption efficiency would increase. In the present experiment, it can be concluded that by applying irrigation managements and providing sufficient water during sensitive growth stages of peanut, economizing the consumed water, maximum seed yield and water consumption efficiency could be achieved. Also, applying deficit irrigation treatments during early growth stages would increase exploiting valuable water resources without any adverse effects; hence, the stability of agricultural systems could be improved.

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Moisture desorption isotherms of *Lavandula officinalis* L. flowers at three temperatures

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Abstract

Lavender has been used as a medicinal plant and to treat several diseases. Knowledge of moisture desorption isotherms is useful in food dehydration and drying. The equilibrium moisture content for *Lavandula officinalis* L. flowers were measured by using the gravimetric static method with water activity ranging from 11% to 85% and three temperatures of 30, 40 and 50°C. Five mathematical models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfost and GAB equations) were used to fit the experimental data of desorption. The modified Halsey model was found to be the best model for describing desorption isotherms curves.

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Keywords: *Lavandula officinalis*; Equilibrium moisture content; Desorption

1. Introduction

Lavender is an important medicinal plant of the Labiatae family. Linalool and linalyl acetate are the main component of lavender oils. The relationship between Equilibrium Relative Humidity (ERH) and Equilibrium Moisture Content (EMC) is normally defined by Moisture sorption isotherms (Soysal and Öztekin, 1999). Moisture desorption isotherms help us to determine the maximum moisture that the plant can be allowed to lose during drying. Since all the agricultural products are generally hygroscopic, it is important to determine their equilibrium moisture content for drying, storing, mixing and packaging operations. Having different physical and chemical structures, agricultural crops demonstrate different EMCs under similar conditions (Ahmadi Chenarbon et al., 2010). Medicinal and aromatic plants are used extensively in food, cosmetic, and pharmaceutical industries for the production of spice, essential oils and drugs (Soysal and Öztekin, 2001). Due to their high moisture content and vulnerability to microorganisms, it is very important to provide optimum drying and storage conditions in order to prevent quality spoilage. EMC is defined as the moisture content of hygroscopic material in equilibrium with a particular environment in terms of temperature and relative humidity (Soysal and Öztekin, 1999). In practice, the result of moisture exchange between the product and the surrounding air yields a relative humidity which is known as the Equilibrium Relative Humidity (ERH) (Silakul and Jindal, 2002). The common technique for measuring sorption properties is the static method. This method benefits from the ability to maintain constant conditions (Arnosti et al., 1999; Barrozo et al., 1994). Temperature and relative humidity of the environment

in which samples are placed, are adjusted. When sample mass attains a constant level, sample moisture content is measured and adopted as the Equilibrium Moisture Content (EMC) value. Several empirical and semi-empirical equations have been reported to provide a correlation for the sorption isotherm values of agricultural and food products, including aromatic and medicinal plants (Belghit et al., 2000; Park et al., 2002). However, no single equation is comprehensive enough to predict the relationship between the EMC of agricultural and food products and the relative humidity over a wide range of temperature (Lahsasni et al., 2004; Park et al., 2002). The objective of this study was to determine the desorption isotherms of *Lavandula officinalis* L. flowers at relative humidity and temperature levels ranging from 11 to 85% and from 30 to 50°C, respectively. Five popular models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfost and GAB equations) in the literature were fitted to the experimental data in order to verify their adequacy to describe the EMC of the *Lavandula officinalis* L. flowers (Chung and Pfost, 1967; Halsey, 1985; Oswin, 1946).

2. Materials and Methods

2.1. Experimental procedure: The *Lavandula officinalis* L. fresh flowers used in desorption experiments have been grown in the Institute of Medicinal Plant of Iran in 2010. After harvesting, the flowers were cut from stems immediately. 1g (± 0.0001) samples of fresh flowers for desorption experiments were weighed and placed into the glass jars. The equilibrium moisture content of *Lavandula officinalis* L. flowers were determined by using the static gravimetric method at 30, 40 and 50°C. These temperatures are

often used for drying of medicinal plants. In this method, seven saturated salt solutions (LiCl, CH₃COOK, Mg Cl₂, K₂ CO₃, NaNO₂, NaCl and KCl) with relative humidities ranging from 11 to 85% were used

to maintain relative humidities in the jars (Greenspan, 1976). Table1 gives the equivalent relative humidities for the selected salt solutions at three temperatures.

Nomenclature			
C ₁ , C ₂ , C ₃ , C ₄	equation coefficients	RSS	Residual Sum of Square
C ₅ , C ₆ and C ₇		SEE	Standard Error Estimation
T	Temperature, ° C	MRD	Mean Relative Deviation
Ta	absolute temperature. K	df	degrees of freedom
R	universal gas constant, kJ/kmol k	EMC	Equilibrium Moisture Content
R ²	determination coefficient	d.b	dry basis
ERH	Equilibrium Relative Humidity (decimal)	m	Number of samples
i	sample number		

Table1. Saturated Salt solutions and Equilibrium Relative Humidities at different temperatures

Salt type	Equilibrium Relative Humidity (ERH)		
	T=30°C	T=40°C	T=50°C
LiCl	0.113	0.112	0.111
CH ₃ COOK	0.216	0.204	0.192
MgCl ₂	0.324	0.316	0.305
K ₂ CO ₃	0.432	0.432	0.433
NaNO ₂	0.643	0.616	0.597
NaCl	0.751	0.747	0.744
KCl	0.836	0.823	0.812

Samples were weighted every three days until constant weight was reached. Crystalline thymol was used in the jars to prevent microbial spoilage. Constant weight was reached after about 3 weeks in different levels of temperature and relative humidities. The moisture content of each sample was determined in a drying oven at 105°C for 24h (Anon1996; AOAC, 1990).

2.2. Data analysis: Five models, namely, modified Henderson, Oswin, Halsey, Chung – Pfof and GAB equations were used for correlating and defining the relationship between the equilibrium moisture content data and relative humidity at three temperatures (Table 2).

Table 2. Mathematical relationships applied for desorption modeling of *Lavandula officinalis* L.

Model name	Model expression	References
Modified Henderson	$EMC = \left(-\frac{1}{c_2(T+c_2)} \ln(1 - ERH) \right)^{1/c_3}$	(Thompson <i>et al.</i> 1968)
Modified Halsey	$EMC = \left(\frac{-\exp(C_1+C_2T)}{\ln(ERH)} \right)^{1/C_3}$	(Iglesias and Chirife 1976)
Modified Oswin	$EMC = (C_1 + C_2T) \left(\frac{ERH}{1-ERH} \right)^{1/C_3}$	(Brooker <i>et al.</i> 1974)
Modified Chung-Pfof	$EMC = \frac{1}{c_2} \ln \left(\ln(ERH) \frac{(C_2-T)}{c_3} \right)$	(Chung and Pfof 1967)
GAB equation	$EMC = \frac{C_2 C_3 (ERH)}{[1-C_2(ERH)][1-C_2(ERH)+C_2 C_3(ERH)]}$	(Van den Berg and Bruin 1981)

C₂ and C₃ in the GAB equation were determined by using the following equations (Arabhosseini *et al.*, 2005).

$$C_2 = C_4 \exp\left(\frac{C_6}{RTa}\right) \tag{1}$$

$$C_3 = C_5 \exp\left(\frac{C_7}{RTa}\right) \tag{2}$$

Nonlinear regression analysis was used to estimate the constants of models in desorption experiment (Chen, 2002; Peleg, 1993). Mean relative deviation (MRD), determination coefficient (R^2), residual sum of squares (RSS), and standard error estimation (SEE) were used to evaluate the fitting quality of models.

$$SEE = \sqrt{\frac{\sum_{i=1}^m (EMC - \overline{EMC})^2}{df}} \tag{3}$$

$$MRD = \frac{1}{m} \sum_{i=1}^m \frac{|EMC - \overline{EMC}|}{EMC} \tag{4}$$

$$RSS = \sum_{i=1}^m (EMC - \overline{EMC})^2$$

3. Results and discussion

3.1.Experimental Results: Fig.1, 2 and 3 illustrates desorption isotherms of *Lavandula officinalis* L. flowers obtained at various water activities for three temperature levels of 30, 40 and 50°C. As shown, S- shaped curves were found for all three temperatures similar to the most biological products (Ait Mohamed et al., 2005; Kouhila et al., 2002; Lahsasni et al., 2003). On the other hand the full range of water activities and temperatures had a significant effect on EMC and with decreasing temperature in a constant relative humidity, the EMC was increased (Fig.1-3). Such behavior may be explained by considering the excitation state of molecules. At high temperatures, molecules are in an increased state of excitation, leading to weaker attractive forces. This in turn, results in a decrease in the degree of water sorption at a given relative humidity with increasing temperature (Kouhila et al., 2002).

3.2.Fitting of the desorption models to equilibrium moisture data: Desorption curves of *Lavandula officinalis* L. were fitted to five isotherm models. The results of non- linear regression analysis at the three temperatures are listed in Tables 3 and 4. As inferred from the tables, parameters were found to be temperature dependent for all the models. The modified Halsey equation provided the best fit to experimental data of desorption isotherms with the maximum $R^2 = 0.99$ and the lowest MRD = 0.101and SEE=0.081, respectively.

Table3. Model parameters, determination coefficients and mean relative errors in fitting of desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters			
	Henderson	Halsey	Oswin	Chung – ppost
C ₁	0.243 ± 0.013	- 2.202 ±0.052	1.422 ± 0.083	6.652± 0.384
C ₂	279.18 ± 21.00	-3.82 ± 0.38 × 10 ⁻⁴	-5.82 ± 3.14 × 10 ⁻³	20.02 ± 11.33
C ₃	2.011±0.061	2.18 ± 0.14	6.182 ± 0.032	83.53± 62.00
RSS	0.0431	0.0301	0.044	0.0320
MRD	0.375	0.101	0.221	0.187
SEE	0.120	0.081	0.107	0.094
Residual	Systematic	Random	Systematic	Systematic

Table4. Coefficients and error parameters of the GAB equation fitted to desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters
	GAB
C ₁	4.352 ± 0.062
C ₄	3.305 ± 0.087
C ₅	3.23 ± 2.201 × 10 ⁻⁴
C ₆	654 ± 31
C ₇	493
RSS	0.045
MRD	0.237
SEE	0.108
Residual	Systematic

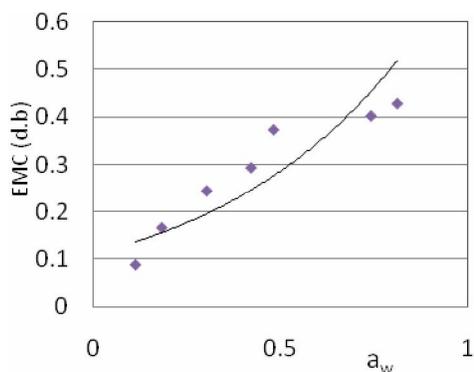


Figure 1. Desorption isotherms data of *Lavandula officinalis* L. flowers at 30°C and fitted curve of the Halsey model

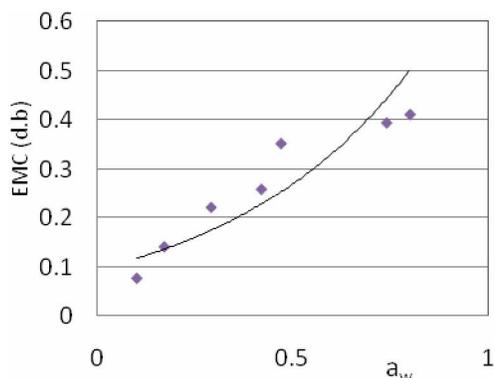


Figure 2. Desorption isotherms data of *Lavandula officinalis* L. flowers at 40°C and fitted curve of the Halsey model

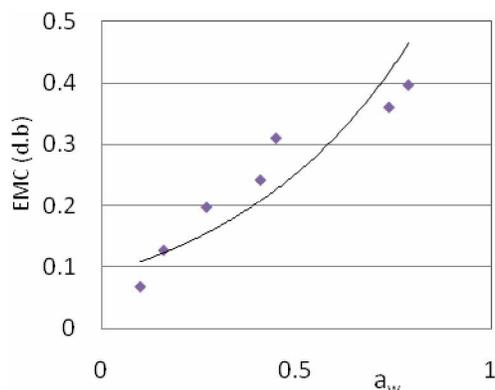


Figure 3. Desorption isotherms data of *Lavandula officinalis* L. flowers at 50°C and fitted curve of the Halsey model

4. Conclusions

Moisture desorption curves of *Lavandula officinalis* L. flowers were obtained at three temperatures (30, 40, 50°C) and relative humidity levels ranging from 11 to 85%. Statistical analysis was used to determine the best equation for predicting the desorption curves of *Lavandula officinalis* L. flowers. Halsey equation was the best fit with lowest error.

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Blood Utilization for Elective Surgeries at Main University Hospital in Alexandria, Egypt

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Abstract: This study aimed to determine the efficiency of blood ordering and transfusion practices for patients undergoing elective surgical procedures and to assess the compliance with the international blood transfusion clinical practice guidelines. Auditing of blood bank registers for patients who underwent elective surgical procedures was done at the Main University hospital in Alexandria governorate. The total number of adult patients who had elective surgery for which requests for cross matching were made was 4844; of them only 1788 patients were transfused. A total of 13389 units of blood were cross-matched, but only 3373 units were transfused. Only 25.2% of total blood cross matched was utilized, leaving 74.8% unutilized. The overall C/T ratio was 3.9, the overall %T was 36.9% and the overall TI was 0.69. The overall percentage compliance with Scottish Intercollegiate Guidelines was 27.7%. Institution-specific blood ordering schedules and protocols should be formulated to reduce exposure to transfusion and to screen for high-risk patient. Ongoing audit and monitoring of blood ordering and transfusion practices in the hospital are essential for improving the ordering, distribution, handling and administration of blood components.

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Key words: blood ordering practices, transfusion practices, utilization indices

1. Introduction:

Increasing demand for blood and blood products together with rising cost and transfusion associated morbidity led to a number of studies in the late 1970s reviewing blood ordering and transfusion practice [1]. Moreover, in recent years there has been an increased emphasis on the potential hazards of transfusion as well as evidence supporting the use of lower transfusion thresholds [2].

Since the introduction of blood transfusion into clinical practice, its appropriate use has been the subject for debate. It has been reported that only 30% of cross-matched blood is used in elective surgery. Therefore, awareness of the hazards of blood transfusion is becoming more obvious due to the expansion of various aspects of blood transfusion services and the increased understanding of transfusion science in recent years [3].

Blood transfusion plays a major role in the resuscitation and management of surgical patients, but surgeons most of the times over estimate the anticipated blood loss thereby, over-ordering blood. Moreover, a number of studies in many countries of the world have shown over ordering of blood by surgeons with utilization ranging from 5-40 % [1].

Many units of blood routinely ordered by surgeons are not utilized but are held in reserve and thus are unavailable for other needy patients. This can impose inventory problems for blood bank, loss of shelf life and wastage of blood [4]. In South Africa for example, 7-10% of blood is wasted annually

because of over-ordering of blood [1]. Also reports from different parts of the world revealed an unintentional misuse of the blood bank services causing a great burden on its resources, namely wastage of blood, reagents and manpower [3].

Wide variations in transfusion practice exist between countries and institutions and even between the individual clinicians within the same institution [5]. Blood use audits in Scotland show that, large variations also exist among individual practitioners or operating teams within a hospital [6].

Variations in rates of transfusion may be due to many factors, including differing opinions on the threshold level of hemoglobin below which a patient needs blood transfusion, differences in surgical and anesthetic techniques, differences in case mix, pre-operative anemia, and lack of availability of transfusion protocols. This may reflect uncertainty about the relative benefits and risks of transfusion and the different perceptions of the value of minimizing blood loss and subsequent transfusion [6]. Moreover, many surgeons prescribing blood are unaware of recommended published guidelines for transfusion practice and still adhere to historical practice and not evidence [7].

In nineteenth a study conducted in Kuwait reported that, only 28.3% of cross matched blood for elective surgery was actually transfused. In addition, it documented monthly mean wastage (\pm SD) of 45 (\pm 13) blood units due to the absence of a blood ordering policy. It was estimated that, a technician

can cross-match three units per hour. This results in wastage of 54.5% of technician working time, leading to an average blood bank annual loss of US \$25,000.00 for one 120-bed department of surgery [8]. This can be decreased by simple means of changing the blood cross-matching and ordering schedule depending upon the type of surgery performed [4]. Moreover, implementation of the recommended maximum surgical blood-order schedule and introduction of type and screen for eligible surgical procedures is considered as a safe, effective and economic solution to preoperative over-ordering of blood [9].

A careful assessment of the risks and benefits of blood transfusion is essential for a good patient outcome. In addition, it is essential that the utilization of blood and blood products be rationalized and they are saved for critical situations. Appropriate placement of blood requests according to a planned schedule most often averts the consequences of indiscriminate ordering of blood. This requires streamlining blood ordering schedule keeping in view the blood bank resources, time, as well as money [10]. Based on available evidence, institution-specific protocols should screen for high-risk patients including advanced age, low preoperative red blood cell volume, preoperative antiplatelet or antithrombotic drugs, complex procedures where blood conservation interventions are likely to be most productive for this high-risk subset [11].

Studies assessing blood ordering and transfusion practices couldn't be traced in developing countries especially Egypt. Therefore, the aim of this study is to determine the efficiency of blood ordering and transfusion practices for patients undergoing elective surgical procedures and to assess the compliance with the international blood transfusion clinical practice guidelines.

2. Material and Methods

A. Study Setting:

The study was conducted at the surgical departments pertaining to Main University hospital in Alexandria governorate. It is multi-specialty 1700 bed hospital; of which, 700 surgical beds pertained to thirteen surgical departments performing about 10500 major elective adult surgical procedures per year.

B. Study Population:

Adult patients who underwent elective surgical procedures over a period of 1 year from July 2009 to June 2010 were included in the study.

C. Sampling Design:

Retrospective audit of blood bank registers was performed which covered all adult patients who

underwent elective surgical procedures in all surgical departments pertaining to the study hospital and for which cross matching was requested during the study period. Overall, a total of 4844 records were included in the study.

D. Data Collection Methods:

Data were collected using review of registers technique. Blood ordering and transfusion practices for elective surgical procedures in the surgical departments pertaining to the study hospital were assessed according to certain indices including; Cross match to Transfusion ratio, Transfusion Probability, and Transfusion Index [12-13]. These indicators were computed using the following equations;

$$1- \text{Cross match to Transfusion ratio (C/T ratio)} = \frac{\text{No. of units cross matched}}{\text{No. of units transfused}}$$

$$2- \text{Transfusion Probability (\%T)} = \frac{\text{No. of patients transfused}}{\text{No. of patients cross matched}}$$

$$3- \text{Transfusion Index (T I)} = \frac{\text{No. of units transfused}}{\text{No. of patients cross matched}}$$

$$\text{Scottish Intercollegiate Guidelines Network recommended cross match to transfusion ratio (C/T ratio) for evaluating blood transfusion practices [6]. According to this guideline, C/T ratio shouldn't exceed 2:1. In the present study, compliance with these guidelines was assessed to evaluate blood utilization practices at the selected hospital. The percent of blood cross-matched that was utilized was calculated as = } \frac{\text{No of units transfused}}{\text{No of units cross matched}} \times 100$$

calculated as = $\frac{\text{No of units transfused}}{\text{No of units cross matched}} \times 100$

E. Statistical Analysis:

Data were statistically analyzed using Statistical Package for Social Science (SPSS) version 11.5 (SPSS Inc., Chicago IL, USA). Frequencies were calculated for all variables and Pearson's Chi-Square test was used to assess the statistical significance of difference in blood utilization between surgical departments pertained to the study

3. Results

The number of adult patients who had elective surgery and for which crosshatching was requested totaled 4844 patients. Male patients constituted the higher percentage (54.2%). The mean age of patients was 42 years with the highest percentage of patients was within age group "from 40 to less than 50" (31.8%), while the lowest percentage was within age group "60 years and more" (7.1%). Neurosurgery was the department of the highest admission rate (29.0%).

On the other hand, renal-transplant and otolaryngology were the departments of the lowest admission rates (0.1% and 2.7%, respectively).

Table 1 shows that, among a total 4844 patients, only 1788 patients were actually transfused. Neurosurgery was the department of the highest number of both patients cross matched (28.9%) and patients transfused (26.0%). On the other hand, renal-transplant was the department of the lowest number of both patients cross matched (0.06%) and patients transfused (0.16%). Blood utilization was 100% only in renal-transplant department, where the number of patients cross matched and the number of patients transfused were equal (3 patients).

As shown in Table 2, a total of 13389 units of blood were cross-matched, however, only 3373 units were transfused. Neurosurgery was the department of the highest number of both blood units cross matched (30.1%) and blood units transfused (28.2%), while renal-transplant was the department of the lowest number of both blood units cross matched (0.1%) and blood units transfused (0.2%).

Only 25.2% of total blood cross-matched was utilized. The highest percentage of blood cross matched was utilized in Renal-transplant department (56.2%), while Urology-endoscopy was the department of the lowest percentage of blood cross matched that was utilized (9.4%).

The highest percentage of blood cross matched was utilized in Renal-transplant department (56.2%), while Urology-endoscopy was the department of the lowest percentage of blood cross matched that was utilized (9.4%), as shown in Figure 1.

Data from table 3 revealed the blood utilization indices in different surgical departments of the selected hospital. In relation to C/T ratio, urology-endoscopy was the surgical department of highest the C/T ratio and renal-transplant was the department of the lowest C/T ratio (1.7) with overall C/T ratio of 3.9. The overall %T was 36.9%, ranged from 100.0% in renal-transplant department to 15.7% in Urology- endoscopy department. The overall TI was 0.69 that ranged from 3.00 in renal-transplant department to 0.18 in Urology- endoscopy department.

The overall percentage compliance was 27.7% with the highest percentage compliance in renal-transplant department (66.7%) followed by Plastic surgery department (56.6%). On the other hand, Urology- endoscopy was the department of the lowest percentage compliance (11.7%), followed by vascular surgery department (16.0%). There was statistically significant difference between the different surgical departments at the selected hospital regarding the percentage compliance with guidelines ($p=0.003$), as shown in Table 4.

Table 1: Comparison between the number of adult patients cross-matched and those who were transfused at Main University hospital, Alexandria, 2010.

Department	No. of Patients cross-matched		No. of Patients transfused	
	No.	%	No.	%
Neurosurgery	1403	28.9	466	26.0
Urology	855	17.6	242	13.5
Urology- endoscopy.	197	4.0	31	1.7
Hepato- billiary	295	6.0	112	6.2
Colo-rectal	361	7.4	132	7.3
Gastro-intestinal	401	8.2	128	7.1
Cardio-thoracic	511	10.5	277	15.4
Vascular-surgery	162	3.3	33	1.8
Tumor excisions	159	3.2	129	7.2
Plastic surgery	159	3.2	111	6.2
Otolaryngology	131	2.7	55	3.0
Renal-transplant	3	0.06	3	0.1
Maxillofacial	207	4.2	69	3.8
Total	4844	100.0	1788	100.0

Table 2: Comparison between the number of blood units cross-matched and that were transfused for adult patients who had elective surgery at Main University hospital, Alexandria region, 2010.

Department	No. of blood units cross matched		No. of blood units transfused	
	No.	%	No.	%
Neurosurgery	4033	30.1	954	28.2
Urology	2166	16.1	399	11.8
Urology-endoscopy	382	2.8	36	1.0
Hepato- biliary	802	5.9	192	5.6
Colo-rectal	889	6.6	186	5.5
Gastro-intestinal	1090	8.1	204	6.0
Cardio-thoracic	1539	11.4	561	16.6
Vascular -surgeries	387	2.8	54	1.6
Tumor- excisions	635	4.7	303	8.9
Plastic - surgeries	543	4.0	272	8.0
Otolaryngology	402	3.0	91	2.6
Renal-transplant	16	0.1	9	0.2
Maxillofacial	505	3.7	112	3.3
Total	13389	100	3373	100

Table 3: Blood utilization indices in the surgical departments at the selected hospital, Alexandria, 2010.

Department	Blood utilization indices								
	C/T ratio			T%			TI		
	N	D	I	N	D	I	N	D	I
Neurosurgery	4033	954	4.2	466	1403	33.2	954	1403	0.68
Urology	2166	399	5.4	242	855	28.3	399	855	0.47
Urology-endoscopy	382	36	10.6	31	197	15.7	36	197	0.18
Hepato- biliary	802	192	4.1	112	295	37.9	192	295	0.65
Colo-rectal	889	186	4.7	132	361	36.5	186	361	0.52
Gastro-intestinal	1090	204	5.3	128	401	31.9	204	401	0.51
Cardio-thoracic	1539	561	2.7	277	511	54.2	561	511	1.10
Vascular-surgery	387	54	7.1	33	162	20.3	54	162	0.33
Tumor excisions	635	303	2.1	129	159	81.1	303	159	1.91
Plastic surgery	543	272	2.0	111	159	69.8	272	159	1.71
Otolaryngology	402	91	4.4	55	131	41.9	91	131	0.69
Renal-transplant	16	9	1.7	3	3	100.	9	3	3.00
Maxillofacial	505	112	4.5	69	207	33.3	112	207	0.54
Total	13389	3373	3.9	1788	4844	36.9	3373	4844	0.69

N stands for Numerator; D stands for Dominator; I stands for Index

Table 4: Percentage compliance with blood transfusion guidelines at the different surgical departments at the selected hospital, Alexandria, 2010.

Department	Percentage compliance with guideline	
	No.	%
Neurosurgery	360 (n=1403)	25.7
Urology	192 (n=855)	22.5
Urology- endoscopy	23 (n=197)	11.7
Hepato- biliary	84 (n=295)	28.5
Colo-rectal	81 (n=361)	22.4
Gastro-intestinal	96 (n=401)	23.9
Cardio-thoracic	218 (n=511)	42.7
Vascular surgery	26 (n=162)	16.0
Tumor excisions	82 (n=159)	51.6
Plastic surgery	90 (n=159)	56.6

Otolaryngology	30 (n=131)	22.9
Renal transplant	2 (n=3)	66.7
Maxillofacial	60 (n=207)	29.0
Total	4844	27.7

Test of significance* p =0.003

n= Total number of adult patients who had elective surgery for which requests for cross-matching were made

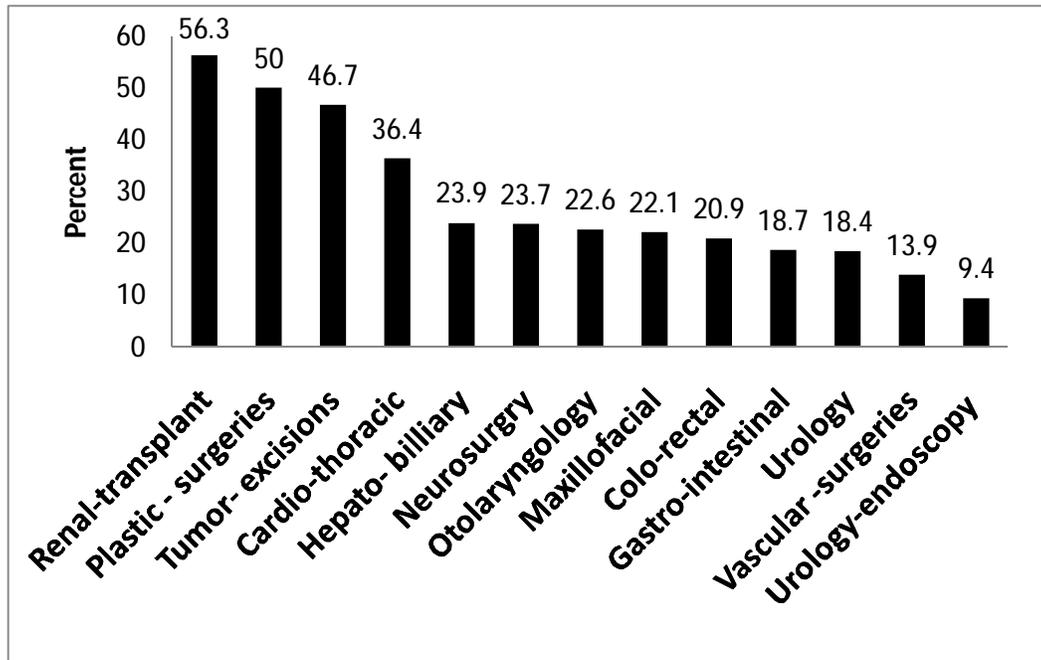


Figure 1: Percentage of blood units utilized per department at the different surgical departments at the selected hospital, Alexandria, 2010.

4. Discussion

Blood and blood components are critical in elective surgery patient care, but with limited supply, unnecessary ordering, unnecessary utilization, and significant cost, careful assessment of ordering and benefits of transfusion is essential for a good management of resources [10]. Data from developing countries have shown gross over ordering of blood in 40% to 70% of patients transfused [14]. Therefore, it is essential that the usage of blood and blood products be rationalized and saved for crisis situations [10]. The current study reveals that, 74.8% of the cross- matched blood was unutilized which mean it was unnecessary. This finding is nearly similar to that was reported in an Indian study where 76.9% of blood cross-matched was unutilized.

Other studies as those conducted in Ilorin Teaching Hospital, [1] and University of Benin Teaching Hospital, in Nigeria reported similar values of unutilized blood (69.7% and 70.0%, respectively) [15]. This might indicate that this malpractice is common in developing countries.

The use of cross-match to transfusion ratio (C/T ratio) was first suggested by Boral Henry in 1975 [12]. Subsequently, a number of authors used C/T ratio for evaluating blood transfusion practices. Ideally, this ratio should be 1.0, but a ratio of 2.5 and below was suggested to be indicative of efficient blood usage. (1) According to these recommendations, the overall C/T ratio of 3.9 that reported in current study was considered to be indicative of inefficient blood usage except for Renal-transplant (1.7), Plastic surgery (2.0), and Tumor excisions departments (2.1). This ratio is higher than that reported by a study conducted in Nigeria (2.2) [15], and lower than that reported by a study conducted in in Malaysia (5.0) [16].

The results of the present study demonstrated that, C/T ratio varied widely across the surgical departments under the study from 10.7 at urology-endoscopy department to 1.7 at renal-transplant department. This was somewhat similar to that reported in a Nigerian study but to a lesser extent where the C/T ratio values ranged from 1.6 in obstetrics and gynecology department to 3.3 in

Orthopedics and accident and emergency departments [15]. Variations in rates of transfusion in the current study are due to the fact that, there is a great tendency in most departments of surgery to request more units of blood for elective procedures than what is actually required. This over ordering of blood is more often guided by habits and hospital routines rather than clinical needs. This attitude is defended by the simple excuse that, it provides a safety measure in the event of excessive unexpected blood loss during surgery.

The probability of transfusion for a given department is denoted by %T and was suggested by Mead et al. (1980) [13]. A value of 30% and above has been suggested to be appropriate and signifies the appropriateness of numbers of units cross-matched [12]. According to what is recommended in the literature, the probability of transfusion values reported in the current study for the different surgical departments under the study are considered appropriate except for Urology (28.3%), Urology-endoscopy (15.7%) and Vascular-surgery department (20.3%). The results of the present study revealed an overall %T of 36.9%. This finding was higher than that has been found in study conducted in Indian tertiary care hospital where %T ranged from 11.1% to 25% [17].

Regarding TI, a value of 0.5 or more is indicative of efficient blood usage and signifies the appropriateness of numbers of units transfused [12]. The TI reported in the current study as an overall value (0.69) and the values of the different surgical departments under the study are considered appropriate except for the department of Urology (0.47), Vascular-surgery (0.33), Urology-endoscopy (0.18) and Cardio-thoracic (0.10). This finding was higher than that has been found in a study conducted in Indian tertiary care hospital where TI ranged from .36 in September 2002 to .15 in November [17].

Practice guidelines are systematically developed recommendations that assist the practitioner in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints. The purposes of these guidelines are to improve the perioperative management of blood transfusion and adjuvant therapies and to reduce the risk of adverse outcomes associated with transfusions [18].

The ratio of the number of units of crossmatched red cells for a given operation to the number of units actually transfused – the C:T ratio – should not exceed 2:1 [6, 19]. According to these guidelines the results of the present study revealed that, the overall percentage compliance with blood transfusion guidelines was 27.7%. In the current study the percentage compliance with guidelines varied widely among the individual surgical departments under the study with

a range from 66.7% in renal-transplant department to 11.7% in urology-endoscopy department. In Egypt, surgeons order cross-matched blood on the basis of habit. The criteria for ordering blood are often vague and the established policies, if there any existed, may be outdated.

In addition, the percentage compliance with guidelines in cardio- thoracic surgery department was 42.7%. Blood transfusions in cardiac surgery patients are performed inappropriately and transfusion rates would improve if more restrictive strategies for performing them were employed. However, in one large observational study, investigators reported that, despite the availability of practice guidelines for blood transfusion, rates of transfusion among cardiac surgery patients vary dramatically among hospitals in the United States [20].

We acknowledge that there are limitations to the present study. The pre-operative data including hemoglobin level and co-morbidities and intra-operative data including duration of surgery and amount of blood loss are very important for correlating the results, but, some logistics preventing us from obtaining these data. Also, the magnitude of cost implication of unnecessary cross-match can be calculated. Therefore, further work is needed to examine these issues.

Trust, confidence and cooperation of clinicians are critical for success of blood conservation policies. Continuous monitoring by members of the transfusion staff is necessary for the success of these Policies. The clinicians need to be confident that the transfusion medicine unit is capable of supplying blood on time when there is an urgent need before being willing to accept the Group Screen and Hold schedule practice. Moreover, it is necessary to continually educate incoming house surgeons and new attending surgeons concerning the value of the Group Screen and Hold schedule procedure and the cross-matching guidelines.

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Sparkle of Existential Time as a Sanctuary in Marital Counselling

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Abstract: Nowadays, Existential thought is considered to be a practical approach among psychologists and counsellors. Nevertheless, what seems to be ignored is paying thoughtful attention to all dimensions of Existential thought which is an essential matter among counsellors and psychologists. Moreover, some issues in Existential thought such as time are disregarded among marital counsellors as well as individual counsellors. The goal of this article is to allocate exhausting existential time to benefit marital counsellors. Findings show that existential time has full potential to be applied for marital counselling. Furthermore, review of the related literature demonstrates that there is not enough experimental and descriptive research to evaluate the effect of existential time on matrimony.

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Keywords: Existential thought; existential time; marital counselling

1. Introduction

Over the years, existential thinkers and existential counsellors have strived to play an indispensable role in matrimony as well as individual life. The existence of potentials and possibilities in this line of thought has benefited, even unconsciously, social workers, psychologists, and counsellors. In fact, what is encouraging for some psychologists and counsellors is to use these existential issues in the form of different kinds of treatments and interventions in Existential thought that can be classified as some human concerns such as responsibility, freedom, meaning of life, living in the world, and trying to become aware of them (Cooper, 2003; Deurzen, 2006; Kalantarkousheh & Hassan, 2010b; Kalantarkousheh, Hassan, Kadir, & Talib, 2011a; Spinelli, 2007; Steger, 2009; Weixel-Dixon & Strasser, 2005). Existential time seems to have a considerable impact on existential counselling. This article aims to outline and give an account of the function of existential time as a fundamental element in couple counselling as well as individual counselling.

2. Existentialism

2.1. What is Existential Thought?

Existential thought considered as a philosophy became popular and more well-known in both Europe and the United States after World War II (Kalantarkousheh & Hassan, 2009c; Lantz, 1994c; May, 1967). Even though philosophers are by and large involved in abstract concepts; existential philosophers' concerns are concrete issues. Indeed, real abilities consist of concrete concepts such as human flexibility, human intentionality, human

freedom, human adaptability, and the ability to respond in a large variety of ways to the essences of life establishing a real attitude toward world and life. These abilities and adaptabilities are known as Existential thought (Cooper, 2003; Kalantarkousheh, et al., 2011a; Lantz, 1994a; Tillich, 1960). These concepts of Existential thought, emphasizing human abilities and possibilities, separate this attitude from others that depend on a deterministic thought.

2.1. Existential Time

Believing in human abilities, existential philosophers put great emphasis on existential time. Existential time like physical time has a present, past and future which is not distinct from human dimensions. Indeed, a human being, in the course of his life, will achieve or fail; in this sense, time is a reciprocal element from an Existential thought (Strasser & Strasser, 1997; Straus, 1967; Weixel-Dixon & Strasser, 2005). It means that human being, as a temporal individual is constituted by future possibilities and past facilities leading to some limitations and abilities for him or her. Furthermore, from Existential thought, in one time, an individual lives in three times; "by memory has brought his past with him into the present and by anticipation and imagination he has already laid hold on his future and projects himself into it" (Macquarrie, 1973, p. 156). From Existential thought, paying close attention to three times in one time is an exceptional human ability. However, a human being, at the extreme end of the scale, may come to now-centered which is the main characteristic of the thing or animal. Existential counsellors following existential philosophers try best to guide others to self-awareness of human

conditions, meaning that, past and future are real concepts and we, as human beings, allow them to live in the present.

2.3. Existential World

Existential time does not have any meaning without existential world. Based on Existential thought, human limitations and human possibilities are under existential world and existential time. Lantz and Gregoire (2003a) following Frankl (1959) believe that existence is manifested or disrupted at the being “of” the world, “in” the world and “for” the world dimensions of existence.

“Being of the world” refers to the fact that the human being has a body and “must” obey the rules of the biological and physical world (Frankl, 1959; Lantz & Gregoire, 2003b). In this dimension, nobody can prevent some matters. By way of exemplification, all family members must die if they are deprived of food, water, or shelter for an extended period of time. There is not any will or choice in such a situation. The past time is also one of the instances of being of the world. Indeed, the past is actualized and formed forever. Nobody can change or deny the reality of what has happened in the past.

The phrase “being in the world” refers to the fact that the human being has some freedoms in his or her existence and “can” make many different choices, and reactions to difficulties and opportunities in life (Lantz & Gregoire, 2003b). Frankl (1984) describes this dimension of existence as the “can”, where individuals have the rewards of “intentionality” and “freedom” in that “can” is used to respond to their limitations and opportunities of life. In reality, the “can” dimension of a human being is related to present time meaning that individuals can increase their quality of life and actualize their potentials of life if they want.

“Being for the world” is a dimension in which human beings answer the call of life. Frankl (1984) refers to this dimension as the “ought” dimension. It means that individuals should listen to the “call of life” to be able to discover what they “ought” to do and find a sense of meaning and purpose in life. Lantz and Gregoire(2003b) believe that when such a sense of meaning and purpose in life is frustrated, disrupted, or ignored, individuals develop a psychological “existential vacuum” that either becomes filled with a developing sense of meaning and purpose or with symptoms such as depression and anxiety.

What is worthwhile to mention is that “being in the world” and “being for the world” are arenas of decision making, freedom and then responsibility.

Moreover,” being in” and “for” the world belong to present and future because only present and future are under decision-making. There is no must or force in present and future so that we as human beings can follow the call of life or reject it. We have choice to refuse or accept present or future matters except for those issues that are related to the past, even though the past is formed by ourselves.

3. Existential Counselling

Existential counselling is an approach originating from the ideas, concepts, and insights found in Existential thought (Frankl, 1988; Kalantarkousheh & Hassan, 2010b; Lantz, 1997; Lantz & Raiz, 2004; May, 1983; Yalom, 1980). Existential counsellors attempt to help individuals to open up their world in a way that they can find their place in the world. Through this goal, individuals can manage their different and difficult situations encountered during their lifetime. Indeed, awareness of their abilities and limitations guides them to find their position in the world and to utilize creativity, their freedom, and responsibility (Frankl, 1988; Kalantarkousheh & Hassan, 2009a; May, 1994; Van Deurzen, 2006; Yalom, 1995). In Existential thought, unlike the others that assume changes in patterns of behaviors and interaction lead to internal experiences, these changes come from internal experience and the discovery of authentic existence (Haldane & McCluskey, 1982; May, 1983).

Something worth mentioning is that the existence of a range of potentials in Existential thought leads to the formation and the establishment of several existential counselling theories during a few past decades. Daseinsanalysis, Logotherapy, American Existential Humanistic theory, and British School of Existential Analysis are all theories based on Existential thought (Cooper, 2003). In a study conducted by Kalantarkousheh and his colleagues (2011a), gathered existential issues extracted from the four existential counselling theories and stated that the existential issues can be useful to apply for marital counselling as well as individual counselling.

Descriptive field studies, additionally, accentuate that existential counselling can be considered a useful approach for clients dealing with problems such as chronic illness, migrating issues, assault, rape, and cancer (Frankl, 1988; Kalantarkousheh & Hassan, 2010c; Kang, et al., 2009; Lantz, 1996b; Lantz & Raiz, 2004; Yalom, 1980).

4. The Role of Existential Time in Existential Counselling

‘Time’ has been discussed in different approaches of counselling and psychology. From an essence-oriented approach, the ‘time’ cannot be past which leads to depression and cannot be future that comes

into anxiety but present is considered to have an essential role. Existential philosophers and existential counsellors point out different approach so that the 'time' is known as an important and innermost aspect of existential counselling (Frankl, 1988; Heidegger, 1962; Lantz, 2004b; Sapienza & Bugental, 2000; Strasser & Strasser, 1997). They suppose that, regarding each part of time, individuals have different responsibilities. Indeed, mental problems come from lack of attention to the relationship among responsibility, each part of time, and different dimensions of the world. It is the role of the existential counsellor to help individuals become aware of the relationship between each part of time and related responsibility. The relationship among existential time; dimensions of the existential world and human being's responsibility towards each part of existential time beside dimensions of existential world is shown in Table 1.

Table 1: the relationship among Existential Time, Dimensions of Existential World and Responsibility

Existential Time	Three dimensions of human world	Responsibility
Future	Ought dimension	Noticing
Present	Can dimension	Actualizing
Past	Must dimension	Honoring

In *present* time, individuals have a responsibility to actualize the potentials of meaning in their life. Frankl (1988) believes that the present is the period in which human beings can utilize courage, wisdom, good faith, and responsibility to actualize and make use of the potentials and opportunities presented by life. Frankl (1986, 1988) also points out that the present is the period of time in which individuals can use "bad faith" and "irresponsibility" by avoiding the actualization of the potentials that are presented in life.

Future is the minute of time in which individuals have responsibility to notice meaning potentials in their future life. Frankl (1984, 1986, 1988) states that *future* is the side of time that holds the potentials of meaning and opportunities of human life. Individuals, in this part, ought to pay attention to the call for meaning. However, they have the choice to select the call.

The *past* is a point of time as a 'storehouse' in which all actualized potentials of meaning are placed and are forever real. This is a must dimension of human beings so that nobody can change his/ her past. It is the responsibility of individuals, by

recollection, to encounter, accept the reality and then honor their past in order to settle and form their shining present and brilliant future (Frankl, 1959; Kalantarkousheh & Hassan, 2009a; Lantz & Ahern, 1998; May, Angel, & Ellenberger, 1958; Strasser & Strasser, 1997; Weixel-Dixon & Strasser, 2005).

5. Function of Existential Time in Existential Marital Counselling

From existential marital counselling, many marital problems happen when spouses do not discover, experience, and make use of the meanings and the potentials of meaning in marriage (Lantz, 1974; Lantz, 1994b). In other words, the awareness of meaning within the marriage has a positive effect on healthy interaction, whereas lack of awareness about meanings within the matrimony can stimulate dysfunctional interaction (Kalantarkousheh & Hassan, 2010c; Lantz, 1986; Yalom, 1980). Lantz (1999), as a testimony, in a study with post parental couples, found out that existential treatment with the couples is an effective approach and it was useful with the population group. This achievement happened when the couples discovered and experienced a sense of meaning and purpose in intimate life (Frankl, 1988; Lantz, 1993). Therefore, it is the existential counsellors' duty to help spouses extract the covered potentials from an unconscious level into conscious awareness to be used in marriage (Lantz & Raiz, 2004). For this purpose, existential time has a brilliant role in existential marital counselling. In other words, finding and making meaning in marriage depends on existential time and each part of time namely present, past and future has an important role in actualizing the meaning in matrimony. Hence, the existential marital counsellor has the responsibility to give awareness about all parts of time.

Regarding the present, an existential counsellor has the duty to facilitate conditions for spouses to actualize the potentials for meaning in life. The counsellor has the responsibility to remind the spouses, in the present time, of the potential to look towards the past of their marital life based on new interpretation. In addition, spouses should be made aware that their future will be made based on how they see their future.

Furthermore, existential marital counsellors have the duty to help spouses pay close attention to their past as an honoring responsibility. They need to remember even though they have some limitations in their past matrimony they achieved in many cases during that time. By doing so, spouses can find and give meaning to their marriage. Indeed, considering the 'can' dimension, spouses 'can' choose their attitudes towards life to be able to show their abilities

in giving response to life situations (Lantz & Gregoire, 2003b). It is believed that common marriage problems originating from this dimension include both structural and communicative problems. Re-collection which is related to the past occurs every evening when each of the spouses share their achievements, problems and joys with the other in a regular and consistent way (Lantz, 1993; Lantz, 1996a). Indeed, re-collection is a responsibility for spouses looking for a successful marriage. This responsibility helps spouses to recover and recollect forgotten meanings that have been deposited in the past (Frankl, 1955; Lantz, 1995, 1996a; Lantz & Alford, 1995). This recollection leads and provides considerable energy to the marriage. From an existential counselling "forget the past" will create a marital meaning vacuum in which symptoms grow and flourish (Lantz, 1993; Lantz & Ahern, 1998). In other words, symptoms and problems grow and develop among couples when they cannot discover and experience a sense of meaning and purpose in life (Lantz, 1999). Helping spouses to remember the meanings that have been actualized and deposited in the past is a mainly useful way to "shrink" the marital meaning vacuum and those symptoms that grow and flourish in this existential meaning vacuum (Lantz & Ahern, 1998). Additionally, changing the past to a good interpretation motivates spouses to notice and actualize the present and future of their marriage creatively, logically and out of responsibility. Therefore, focusing on the past provides an enhanced understanding of the future and the present (Lantz, 1995; Lantz & Ahern, 1998).

From an existential point of view, it is believed that change among couples occurs only when spouses are able to find a reason or purpose for change, namely through the dimension of life which is related to the future. Hence, another responsibility of existential counsellors is to help the couples become aware of potentials of the meaning that are useful for the future of their marriage (Frankl, 1988; Lantz, 2004b).

6. Conclusion

This article represents an attempt to present the application of existential time in existential marital counselling. Inevitably, the consequence necessitates investigating and considering existential time as a fundamental factor in counselling. As already indicated, there is a close relationship between parts of existential time and meaning of life, which is a need in marriage. More specifically, it is the existential counsellors' responsibility to use existential time for helping couples to enrich their life on three dimensions of existence, three parts of time and three responsibilities. However, it seems that, up

to now, there is a lack of adequate descriptive and experimental research in existential time. Therefore, further research needs to be done to provide more empirical evidence for existential time as a sanctuary in marital counselling.

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Discovering A Transformational Science of Marketing in Corporate, Social And Knowledge Perspectives: Is Not It About Time That A Marketing Scholar Becomes A Nobel Laureate?

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Abstract: This paper is for marketers who strive to bring about a change in marketing to change this world. This paper aimed at fulfilling this far reaching end by configuring and devising a transformational philosophical logic. This logic is composed of transformational postulates reaching out to transformational edges of marketing as a science. Such process would be reflected within transformational domains to be magnified and streamlined by transformational edges of marketing theory and practice. Firstly, transformational postulates are illuminated by the backbone argument of pragmatic versus dogmatic marketing creeds. This gives rise to four subsequent core controversial arguments, contrasting the critical issues of empiricism, valorization, context specificity and multidisciplinary against their rival extremes of theorization, generalized universality, global transcendence, and original authenticity. Second, these heated intellectual polarizations take marketing ideologies on a journey of revisits and blurring, to reconsider transformational marketing edges consolidated in the boundaries of customer orientation, convergence marketing, value-based marketing, knowledge-based marketing, interdisciplinary marketing, and contextual marketing. Third, such revisits are expected to fulfill their full transformational potential when viewed through the lenses of transformational marketing domains including corporate, social and knowledge perspectives, which telescope (focus?) the transformational influences of marketing thought and practice. Fourth, and conclusively, the paper is a proactive endeavor to unleash the transformational leverages of marketing actions in order to perpetuate the transformational thrust of marketing research and practice through the deliberate adoption of, and capitalization on, transformational agendas, methodologies and deliverable outputs. Thus the authors propose a cohesive progressive philosophy of marketing science that optimizes its change-catalyst extremes in order to broaden the horizons of academic marketing breakthroughs and decision/policy initiatives. The aim is to justify a well-earned legitimacy for marketing scholars to be Nobel Laureates, for their contributions to transforming their economic, moral and scientific universes.

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Keywords: Transformational Science of Marketing in Corporate; Social; Knowledge; Perspective; Nobel

Introduction and Synthesis

This concept paper argues for a main controversy with four subsequent sequel controversies within the scope of three perspectives that should augment the credentials of marketing as a transformational scientific area of inquiry with wide range and far reaching basic and applied contributions to human knowledge and welfare of mankind. Subsequently this solid standing should boost marketing scholars on equal foot with their counterpart social scientists in their eligibility for Nobel prizes and other highly recognized and self actualizing scientific awards reflecting their dedication to and excellence in creating rigorous and fruitful transformational human knowledge. The main controversy that is argued to be pursued for anchoring this legacy for marketing science and scientists is that of pragmatic versus dogmatic discipline of marketing and four related subsequent controversies. These controversies in turn, are argued

to bring about their full conceptual and intellectual impact on making the marketing discipline an influentially transformational area of scientific inquiry, when viewed through three perspectives reflecting somehow diverse priorities for empirical and abstract marketing intelligentsia. These perspectives are corporate perspective reflecting business targets of entrepreneurs and their organizational settings, a social perspective raising public welfare and moral concerns toward marketing institutions and organizations and a knowledge perspective addressing the uses and implications of marketing knowledge processes and platforms to marketing trends and ideologies. The transformational influence of revisiting the above controversies through bearing the views of business entities, social inertias, and knowledge breakthroughs ought to serve as catalysts for real transformational marketing edges.

These controversies are arguably expected to serve as an effective vehicle for revisiting the boundaries of marketing science as envisioned through the three perspectives to make it more transformational in terms of its agenda, methodologies and quality of produced outputs. The paper concludes with a suggested research agenda as an impetus for embarking down the road map to make marketing thought transformational to earn its due place among contemporary and future world disciplines. This road map as expressed in the research agenda and its logically sequenced progression emphasizes a holistic transition of marketing thought and practice according to a crafted outlook looking to trigger an integrated stream of transformational marketing ideology and eventually a supportive best practice. The proposed paper's synthesis is depicted by Figure (1).

Literature Review

Transformational marketing addresses the role of marketing in driving organizational, social, community and environmental change. In particular, transformational marketing encourages, facilitates and inspires investigations that are framed by a fundamental problem or opportunity to: move marketing from the back room to the boardroom (Kumar and Shah, 2004); respect, uphold, and improve life in relation to the myriad conditions, demands, potentialities, and effects of consumption (Mick, 2006); focus on research which carries significant implications for both theory development and social action (DeBerry-Spence, 2008 and Lai, 2010).

To that end, transformational marketing is the process by making marketing the catalyst for corporate and social change, and for advancing human knowledge to increase the welfare of human beings. Applying marketing thought and activities to the threats and opportunities of consumption (e.g. community networks, family coherence, ecological stability) could direct radical, new solutions and synergies to organizational and consumer behaviors (Broderick, 2010). In addition, placing interactive thinking at the core of marketing strategy and offering interactive channels as the foundation of marketing delivery should facilitate these solutions and create the potential to transform organizations, markets, societies and knowledge (Romani and Kumar, 2008).

Although transformative marketing research has an immediate practical perspectives and orientations, it does not forsake rigorous methodology or perceptible theory. In fact, it is mostly—if not only—through meticulous description and compelling explanation that the findings can lead

to constructive and actionable implications (Mick, 2006). This will be outlined and discussed in the next sections.

The Need for Further Research

The question of why no marketing scholar has ever become a Nobel laureate is not a lust for fame and fortune but a serious scientific query that hammers the essence of scientific marketing knowledge. Any scientific discipline earns its due place as a breeding ground for Nobel laureates through its rigorous endeavors and broad scope paradigms that promises and strives to advance human knowledge, scientifically pursue human causes and welfare and ultimately seek the scientific truth that transform this world into a more virtuous and sustainable place for mankind to live and prosper (Gronroos, 2008 and Benton and Craib, 2001). There is a clear need for research into venues, platforms, perspectives, controversies and drives that possess the conceptual and empirical sense of direction into a clear transformational role and contributions.

Aim of Research

This concept paper aims to devise each of the above controversy to revisit one or more of the above boundaries of marketing as a science within the three perspectives to enable it to produce scientific marketing theories and best practices that are characterized by significant transformational traits. These transformational traits include truthfulness, valid essence, relevance, universality, multidisciplinary, authenticity, localization and globalization. The paper will also seek to demonstrate that the arguably robust drive and action mechanism for making marketing transformational would be through: 1) adopting a more transformational marketing agenda, 2) developing more transformational research methodologies and 3) producing drastically transformational scientific marketing outputs.

Conceptual Framework

The logic of the proposed conceptual framework is hung up on three pillars, namely: 1) The main core controversy and its subsequent four transformational revisits of marketing controversies and their implications to marketing boundaries, 2) the three transformational perspectives as a breeding ground for these revisits, and 3) the synergistic functioning resulting from doing the revisits within the spectrum of the three perspectives and its expected transformational outcomes to marketing theory and practice. The configuration of the proposed conceptual framework for discovering a

transformational science of marketing is depicted in Figure (1).

Pillar One: Core Controversies, Revisits and Boundaries for Transformational Marketing

The main controversy that is argued to be pursued for anchoring this legacy for marketing science and scientists is that of pragmatic versus dogmatic discipline of marketing and four related subsequent controversies. The four subsequent controversies resulting from raising the main controversy of the pragmatic/dogmatic research creed and identity of marketing science are: 1) pragmatic empirical substantiation versus dogmatic conceptual framing for theorizing marketing phenomena, 2) pragmatic valorization versus dogmatic generalization of marketing knowledge, 3) pragmatic

interdisciplinary synergy versus dogmatic genuine authenticity of marketing discipline's contributions and 4) pragmatic cross-context specificity versus global human transcendence of scientific marketing findings and revelations. These controversies are arguably expected to serve as an effective vehicle for revisiting the boundaries of marketing science to make it more transformational in terms of its agenda, methodologies and quality of produced knowledge. The main boundaries of marketing discipline that are proposed by this paper as most influenced by raising the above controversies are namely; customer-orientation (which can be looked at as the mainland boundary for scientific premises of marketing) , exchange management, knowledge-based marketing, value-based marketing, convergence marketing and multi-disciplinary marketing paradigms.

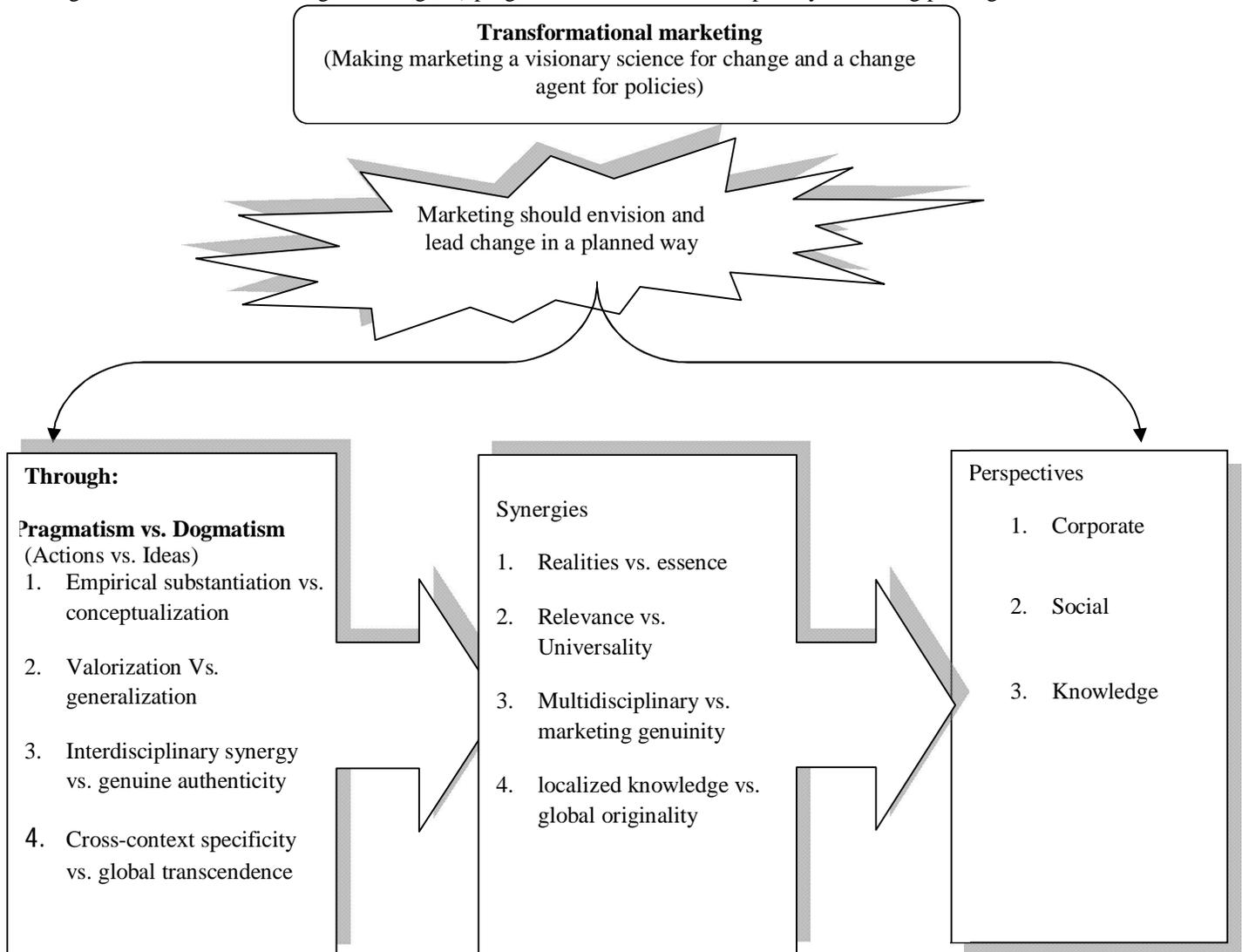


Figure 1: The Conceptual Framework for Discovering and Triggering Transformational Marketing

Core Revisit: Pragmatic versus dogmatic marketing – what orientation should marketing hold toward which customers?

The genesis, mainstream, and frontiers of marketing science and all its paradigms can be comfortably classified as pragmatism-oriented. Nevertheless such pragmatic dominance of science in marketing is not something marketing scholars have to feel apologetic about. Pragmatic marketing has and still is bringing about significant contributions and even virtues to the long-standing and status of marketing as a science (Kortam, 2004). The pragmatic creed of research in marketing made scientific marketing thought and most of its implications a highly responsive discipline to problem-solving needs of rapidly changing marketing (internal/ micro and macro) and stakeholders (especially marketing decision makers) which mainly helped to reform academic understandings and managerial practices of marketing phenomena live up to the challenges imposed by evident constant environmental changes and sometimes turbulences.

It seems that it was commonly thought that if marketing scholars aimed to adapt their research to an established social/physical sciences theory or a human dogma, this is expected to invade the outputs of marketing knowledge an ideological and flavour. Such idealistic tone is then claimed to be somehow counterproductive and luxurious to the ever pressing pragmatic agenda and action-oriented demands of the marketing discipline's prime beneficiaries, i.e., marketing executives at the front lines and edges of marketing realities (Gronroos, 2008 and Kelemen and Rumens, 2008). On the contrary to this argument, this paper suggests that such strong pragmatic orientation of research in marketing could deprive it as a science from a more proactive and broad-scoped transformational role.

Dogmatic marketing is argued to have a strong orientation to future outlooks and a broader base of stakeholders. Highly regarded and recognized scientific theories and human/social dogmas concern themselves with sensing the future of universe and all various segments of mankind.

Consequently, if marketing scholars aimed to address more prevalent and widely accepted theories and dogmas, this should lead to a kind of customer orientation for the discipline of marketing that: 1) does not only address the nagging needs of present and potential customers and 2) adopt a broader definition of customers to include other influential and important stakeholders including external and internal customers, suppliers, distributors, governments and general publics. Admittedly, research in marketing can be easily found guilty of over-emphasis on reacting to short-term and acute

issues for the sake of one main group of stakeholders which is marketing decision makers. Other groups are only considered in the best interest of main group of stakeholders in many instances.

Dogmatic marketing is not mutually exclusive to pragmatic marketing since grounding marketing theories on practical evidence and scientific ideologies on equal foot are complimentary rather than competing methodologies (Benton and Craib, 2001). In the main, this can be attributed to that the proposed dual-identity and well-blended research creed is expected to add a transformational virtue to the already existing highly valued reformvirtue of the science of marketing. This transformational contribution should result from making research in marketing more proactive to anticipated, foreseen or prophesied deliberate environmental changes that affect a much broader base of stakeholders and their agenda's like the well-being rather than the satisfaction of external and internal customers (Gronroos, 2007), win/win situations for distributors and suppliers, public welfare for government social values for general public and peace of mind, joy and happiness for the world . It is pragmatic/dogmatic disciplines where "reality influences thought" and "thought creates reality" that devise scholarly work that combines present needs with future aspirations of mankind in an equitable methodology to cater to legitimate felt deprivations and reasonable ambitions of all various stakeholders' groups.

In order to enact and augment this research creed of transformational science of marketing, four main measures expressed as further revisits of boundaries of marketing science. These proposed revisits are supposed to serve as trade-off mechanisms that create the needed balance between strongly present pragmatism and vigorously promised dogmatism for scientific marketing paradigm. The expected ultimate destination of this paradigm shift in scientific marketing inquiries is giving transformational marketing a greater room in subtle and revolutionary research endeavors in marketing.

The implications of each revisit to one or more marketing boundaries are briefly explained below.

Subsequent Revisit 1: Pragmatic empirical substantiation versus dogmatic conceptual framing for theorizing marketing phenomena – expanding the scope of knowledge-based marketing to embrace higher levels of abstraction.

Pragmatic empiricism marketing has produced heavy reliance on positivistic methodologies producing highly supported and applicable yet myopic marketing knowledge. Thus, marketing discipline is rendered as a much more realistic reformer and a much less visionary transformer

(Chaston, 2004). Dogmatic conceptual marketing is supposed to produce more normative generalisable marketing knowledge across different settings over an extended period of time which leads to higher levels of abstraction in marketing theories. These new horizons of abstraction play a profound role in triggering a true futurology of marketing as a transformational science that manages promise/dream/change agencies thus improving its ranking among universally welcomed and rewarded privileged disciplines.

Subsequent Revisit 2: Pragmatic valorization versus dogmatic generalization of marketing knowledge – Searching for new sources and constructs of marketing-attributed values.

It can be obviously acknowledged that pragmatic marketing has made significant contributions to the measurement, creation and sustenance of marketing-attributed values from owners' and customers' perspectives. These values are often smartly and rigorously expressed in financial terms in shorter rather longer time horizons (Doyle, 2004 and Dubois *et al.*, 2007). Dogmatic marketing would be expected to explore and move research in marketing attributed-values toward other social, scientific, universal and broadly human values reflected in more stochastic and possibly qualitative measures with longer-term outlook.

Subsequent Revisit 3: pragmatic interdisciplinary synergy versus dogmatic genuine authenticity of marketing discipline's contributions – devising multi-disciplinary means to achieve exclusive ends of marketing discipline.

It can be argued that pragmatic marketing has made significant contributions through offering marketing perspectives on other disciplines' phenomena and variables without equally drawing on other disciplines to shed novice light on marketing phenomena and variables (Gronroos, 2008 and Kelemen and Rumens, 2008). On the other hand, dogmatic marketing can capitalize on other disciplines' theories and constructs to produce really new and genuine insights and extensions of theoretical marketing propositions and conceptual frameworks.

Subsequent Revisit 4: pragmatic cross-context specificity versus global human transcendence of scientific marketing findings and revelations – creating marketing convergences and exchanges beyond contexts of companies, industries, technologies, cultures and countries – reaching out to planet, galaxy and eternity horizons.

Pragmatic marketing deserves substantial credit for producing highly adapted marketing knowledge to specific contexts which properly triggered and guided context-friendly specific exchange and convergence processes within each context (Gronroos, 2007). Dogmatic marketing ought to find ways to rise above context-specific levels of analysis to produce universally applicable marketing knowledge across all contexts. Consequently, improving the essence of exchange and convergence processes across all contexts. These research efforts holds an unprecedented promise of promoting a reciprocal and uniform science of marketing that goes beyond geographical, demographical, time, psychographic and other narrow divisions to broadest possible contexts hand to hand with other globally esteemed physical and social disciplines.

Pillar Two: Perspectives on Transformational Marketing

On the other hand, this conceptual framework proposes that the above revisits can only deliver their potential transformational influences when realized three main perspectives in which marketing phenomena and variables function and take place. These perspectives were deliberately selected from the various environmental perspectives through which marketing issues can be tackled.

There are three layers of environments, the internal environment to which the corporate perspective belongs, the micro environment to which the knowledge perspective belongs and the macro environment to which the social perspective belongs. This paper focuses on these three specific environments because they are expected to reflect transcending, sustainable leveraged transformational impacts as below illustrated and explained for each perspective.

This is mainly because corporate perspective represents important marketing organizational settings such as marketers, suppliers, distributors, business customers, government, media, etc. As a marketing guru once said, marketing has changed from a "field of dreams" to a "field of deals" (Kumar and Shah, 2004). To restore and/or create the genuine role of marketing as a science and an organizational function, marketing should be a transformational agent for corporations, for societies and for human knowledge in general. Specifically, marketing should shift from focusing on the tactical four Ps to create and/or facilitate the transformational initiatives and waves of corporate, society and scientific knowledge.

On the corporate frontier, marketing must aspire to participate in shaping the firm's destiny. Instead of doing things better, marketing must transform to do better things (Kumar *et al.*, 2009;

Donthu et al., 2005). In this line of reasoning, marketing should shift from implementation focus to strategic focus (Rust (a)*et al.*, 2004; Venkatesan and Kumar, 2004). Marketing, therefore, should help the organizations to seek strategic leadership by exploiting new business opportunities, redefine industry boundaries and reinvent the value network (Kumar *et al.*, 2009).

Accordingly, there are many transformational frontiers that marketing can lead this strategic agenda by focusing on: being market-driving rather than being market-driven, providing solutions rather than selling products (Kumar and Shah, 2004); building strategic segments rather than developing market segments (Crittenden, 2005; Reinartz and Kumar, 2000); creating value network rather than managing the supply chain (Rust (b)*et al.*, 2004; Romani and Kumar, 2008); seeking global distribution partners rather than creating branded bulldozers (Nwokah, 2008).

In this line of reasoning, marketing should be more strategic, more cross-functional, and more bottom-line oriented to be able to play this transformational role in organizations (Allee, 2008, Crittenden, 2005, Trim, 2004).

The Social perspective is selected due to its unique importance and sensitivity to marketing as a science advocating social exchange processes with highly controversial social implications like socially acceptable/friendly products, IMC, green marketing, macdonaldization, privacy, gender infringement, children fallacies, characters and celebrities social falsifications, patriotism/citizenship campaigns, political marketing, etc. It has long been argued that the role of the marketing function is to create utilities and values to customers and to society in large (Kotler and Lee, 2009). The marketing functions not only positively to firm performance and shareholders wealth, but also they have unique and significant implications to customer, society, community and environment. In fact, the marketing activities result in greater employment opportunities, income generating potential, and arguably more product alternatives, more choices within product categories, and better customer value (Kotler and Lee, 2009). Nowadays, there is an increased buzz that marketing can and must do more to augment individual customer value and societal welfare (Andreasen, 2002). To this end, some marketing scholars have introduced the concept of stakeholder marketing and proposed that marketing can be an agent of change to enhance societal welfare (Czinkota and Ronkainen, 2007). Others have undertaken transformative consumer research that focuses on improving consumers' welfare and quality of life (Mick *et al.*, 2011).

Marketing can play a special role in creating the potentials to transform markets, societies and environments through addressing the threats and opportunities of consumption (e.g. community networks, family coherence, ecological stability) (Broderick, 2010), engaging in interactive communication with customers, facilitated through changes in technology (Romani and Kumar, 2008), and offering interactive channels as the foundation of marketing delivery (Broderick, 2010). In this vein, the challenge for marketing scholars and practitioners alike is to consider marketing efforts from the lens of creating customer value, while simultaneously enhancing societal welfare. Therefore, there are many arenas that should be tackled by scholars to assist practitioners in achieving the aforementioned goal, such as how can firms be socially responsible and yet remain viable (Burke and Logsdon, 1996); how can firms serve underprivileged segments, and still make required returns rates (Mick *et al.*, 2011); how can marketers embrace new information technologies for commercial purposes, and yet respect the privacy of consumers (Malhotra *et al.*, 2004); how can firms develop more green products and processes, and how can marketers create user friendly products and/or advertising campaigns. These are but a few of the numerous arenas that are worthy of attention.

The third platform focuses on the knowledge perspective which embraces various technologies, philosophies, sources and disseminations of marketing knowledge such as students evaluations, eye tracking, CRM, data mining and warehousing, database marketing, internet marketing, SMS advertising, TV shopping, digital marketing research and intelligence.

In any competitive environment, knowledge is the principal source of competitive advantage. In marketing, attracting customers is the mission a business to accomplish, and the competitors are the forces it is encountering to fulfill its mandate. Without sufficient marketing knowledge of both customers and competitors, a business is severely hindered in developing marketing strategies to gain customers and grow market share.

A marketing knowledge advantage is necessary to develop a successful oblique strategy. Partial knowledge may seem an advantage, but often results in reactive strategies. A business with excellent customer knowledge but limited competitor knowledge will likely overreact to customer demands. Similarly, having excellent competitor knowledge without adequate customer knowledge will likely result in overreaction to competitors' moves.

Businesses that lack both customer and competitor knowledge are working with an inside-

the-box strategy as they make competitive moves from an in-house perspective with no real market knowledge. These businesses can make only blind attempts at success, usually in the end losing more ground than they hoped to gain. Other businesses with partial intelligence on customers or competitors are likely to employ reactive strategies, which is the normal response to customer and/or competitor pressures when a business sees only one dimension of the marketplace. An oblique marketing strategy requires superior customer profiling and superior competitor intelligence (Chaston, 2004).

With a marketing knowledge advantage, a transformational market-based strategy can be devised to achieve desirable gains without sustaining excessive losses. Such transformational market-based strategies that leverage a marketing knowledge advantage with respect to both customers and competitors can be implemented with a non-confrontational approach that keeps losses to a minimum. This is labeled as an oblique marketing strategy because it seeks to gain a competitive advantage without direct confrontation. A competitive marketing strategy with limited or partial marketing knowledge could be more easily drawn into a frontal attack strategy - a direct attack on a competitor's position leading to unjustified and unnecessary losses (Best, 2009).

The above analysis supports the preventive and initiative role of the knowledge perspective to transformational marketing.

Pillar Three: Synergy among Revisits and Perspectives for Framing and Functioning Transformational Marketing Logic and Inertia

It is expected that making the four revisits within the three perspectives would lead to enacting the following theoretical and practical functioning for creating a sustainable thrust of transformations in marketing philosophic foundations and actions postulates, as follows:

- 1- The revisit of empirical substantiation versus conceptualization processes of marketing thought tackling the boundaries of customer-orientation and knowledge-based marketing will reflect solidly grounded marketing realities and deeper understandings of marketing essences thus resulting in transformational bases and postulates across all three perspectives.
- 2- The revisit of valorization versus generalization of marketing findings tackling the boundary of marketing values would demonstrate relevance of advanced marketing applications and universality of marketing theories thus allowing transformational frameworks across all three perspectives.

- 3- The revisit of interdisciplinary synergy versus genuine authenticity of scientific marketing truths tackling the boundary of multidisciplinary marketing capitalizes on multidimensional insights and genuine marketing contributions to result in transformational templates across all three perspectives.
- 4- The revisit of cross-context specificity versus global transcendence of marketing insights tackling the boundaries of convergence marketing and exchange management produces localized marketing solutions and global originality of marketing blueprints resulting in transformational drives across all three perspectives.
- 5- The road map and action mechanism of this framework focuses on devising the agendas, methodologies and outputs framework as vehicles for making and sustaining a transformational stream of scientific marketing thinking and theorizations across these three perspectives.

Conclusive Embarks And Research Agenda

This research aimed to trigger a sparkle among marketing scholars, scientific communities and bodies to go down the long and promising road toward giving the science of marketing a new age of universally recognized and esteemed renaissance through transforming its research agenda, methodologies and output knowledge. With a view toward doing this, three possibly useful venues are proposed. First, starting a collective initiative for recognizing and defining of the universal crisis that the marketing discipline is going through. Second, deciding on the key controversies that need to be raised and critically and innovatively tackled to hit the roots of the crisis and pave the way for a road map for transformational marketing. Third, deciding on the action mechanisms for research in marketing to reflect the proposed solutions in individual and institutional research initiatives and projects constituting the new main stream and breakthroughs of the discipline of marketing. While concept paper advocates for the triggering and leveraging drives of agendas, methodologies and outputs, the horizons for transformational marketing is widely open for further views and reviews.

Consequently, The following proposed research agenda is viewed by the authors as a first step in this long yet rewarding journey in earning the discipline of marketing and its resulting practice its long due status as a science that makes a difference in human intelligentsia and destiny.

Research Stream One: Setting the Stage for Transformational Marketing Contributions through looking for more revisits, perspectives and embarks.

Research Stream Two: Examining a Corporate Perspective for Transformational Marketing

Research Stream Three: Examining a Social Perspective for Transformational Marketing:

Research Stream Four: Examining a Knowledge Perspective for Transformational Marketing:

Research Stream Five: Encompassing a Road Map For Transformational Marketing - The Transformational Roles of Agendas, Methodologies and Outputs for shifting marketers From Highly Profiled Backstage Slogans To Highly Valued Board Room Contributions.

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Effect of canola oil on mucosal leucine aminopeptidase activity enzymes in small intestine of turkey chicks

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Abstract: Canola is one of the rapeseed varieties and is in temperate and cold climate areas. Contains 94% unsaturated fatty acid and 6% saturated fatty acid, thus, has best fatty acid composition among other oils. Canola oil causes alteration in pancreatic enzymes such as leucine aminopeptidase activity. The aim of this study was assessment of mucosal leucine aminopeptidase activity enzymes subsequently using of canola oil on turkey chicks diet. According to this survey results revealed that using of canola oil in turkey chick's diet causes increasing of leucine aminopeptidase activity (in 5% treatment than control and 2.5% treatments). It seems that use of different amounts of canola oil in turkey chick's diet causes increasing of leucine aminopeptidase activity, because this enzyme play a important role in protein hydrolyzing and this enzyme activity be more subsequently reducing of digesta transient ratio. [Jamshid Ghiasi Ghalehkandi, Ramin Salamat Doust Nobar, Abolfazl ghorbai, Ali Asghar Gharachorlu, Rahim Behesti, Alireza Fani. Effect of canola oil on mucosal leucine aminopeptidase activity enzymes in small intestine of turkey chicks. Journal of American Science 2011;7(6):704-707]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: canola oil, leucine aminopeptidase, intestine, turkey chicks.

1. Introduction

Canola is one of the rapeseed varieties and is in temperate and cold climate areas. Canola is rich of sulfurous amino acids and vitamins. Canola meal has about 40% protein. Its erucic acid is less than 2% of total fatty acids (Pajohan Mehr et al., 2008). Consist of less than 30 micromole glucosinolate per oil free dry matter. Contains 94% unsaturated fatty acid and 6% saturated fatty acid, thus, has best fatty acid composition among other oils. Because of having 61% of oleic acid, considered as full resources of unsaturated fatty acids and from this aspect, occupied in second class after olive oil. Its tocopherol is higher than olive and soya oils, that from this aspect can be attribute high antioxidant effect to it. Canola oil combination is inserted in table 1 (Pajohan mehr et al., 2008, Mohammadi et al., 2007).

Leucine aminopeptidase (LAPs) are enzymes that preferentially catalyze the hydrolysis of leucine residues at the N-terminus of peptides and proteins. Other N-terminal residues can also be cleaved, however, LAPs have been found across super kingdoms (Strater et al., 1999).

Identified LAPs include bovine lens LAP, porcine LAP, E. coli LAP (also known as PepA or XerB), and the solanaceous-specific acidic LAP

(LAP-A) in tomato (Gu et al., 2002). Historically, the mechanisms of carboxypeptidase and endoprotease have been much more well-studied and understood by researchers. Work within the past two decades has provided vital knowledge regarding the mechanisms of aminopeptidase. In this mechanism, the bicarbonate ion acts as a general base. For LAP-A, R1 could be the R group of leucine, methionine, or arginine (Kraft et al., 2006). Leucine aminopeptidase is brush border and cytosolic enzyme which hydrolyses small peptides from terminal of long peptide chains. Peptidase enzymes activity elicit to protein digestion in diet (Doçgan et al., 1999; Talebali and Farzinpour, 2006).

2. Materials and methods

2.1. Animals and diet

This research was performed one 108 Iranian native turkey chicks (from 4th to 20th week of age). In this study, the turkey chicks by chance divided into 3 treatments and each treatment divided into 3 replicates and each replicate was contained 12 turkey chicks and were fed in separate cage with 0, 2.5 and 5 percent of canola oil. The experimental diets formulated isonitrogenous and isoenergetic and balanced according to 1994 national research council

(NRC, 1994). The birds were given access to water and diets ad-libitum. The composition and calculated nutrient composition of the mixture of treatment is shown in Table 2.

2.2. Sample collection

In the Rearing period, all conditions such as temperature, humidity, light, ventilation and management were appropriate and similar for all broilers and 20th week of age of end the rearing period, after 5 hours of starvation, 2 broilers from every group (totally 18 chickens of sampling) which weighed nearly equal to the average weight of each replicate have been chosen and slaughtered. The abdominal cavity was opened, and the entire gastrointestinal tract was removed. The small intestine was isolated, and the length of intestine was determined by a graduate ruler. The positions at 1, 10, 30, 50, 70 and 90 % of the length of small intestine for analyzing the Enzymes activity were separated with specific scissors (an 8-cm sample was taken). The samples for enzymes determination were cut open lengthwise, rinsed carefully with phosphate buffer saline (pH=7), blotted dry, then samples

envelop in vacuum packed and stored at -80°C until enzymes analysis (Teshfam, 1984).

Table 1: fatty acids contents of canola oil

Fatty acid	Percent
C12:0	0
C14:0	0
C16:0	4,73
C16:1	0,13
C18:0	2,31
C18:1cis9	61,1
C18:1cis11	0
C18:1trans9	0
C18:2cis	19,73
C18:2trans	1,78
C18:3cis	7,35
C18:3trans	0,71
C20:0	0,53
C20:1	1,18
C20:4	0
C22:0	0,25
C22:1	0,21

Table 2: Percentage composition of experimental diets in four periods

	4-8 week			8-12 week			12-16 week			16-20 week		
	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃
Corn	42.50	38.00	36.00	45.60	43.00	35.00	56.64	48.50	40.00	64.41	58.00	48.00
SBM	34.40	36.00	31.15	28.25	27.30	28.24	26.00	27.00	27.50	21.00	21.00	21.00
Oil	0.00	1.25	2.50	0.00	2.50	5.00	0.00	2.50	5.00	0.00	2.50	5.00
Fish	4.80	3.70	6.60	8.00	8.00	8.00	2.64	1.82	1.50	0.65	0.70	0.67
Starch	3.10	3.22	1.56	7.46	3.32	3.37	6.57	6.51	6.50	7.10	5.56	6.71
Alfalfa	3.47	5.00	6.00	3.00	5.00	6.00	1.50	4.00	6.00	1.00	3.80	6.00
DCP	1.38	1.52	1.11	0.63	0.61	0.62	1.03	1.15	1.18	1.17	1.15	1.15
Met	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Lys	1.50	1.50	1.50	1.50	1.50	1.50	1.40	1.50	1.50	1.50	1.50	1.50
Oyster	1.02	1.02	0.86	0.73	0.67	0.62	0.92	0.87	0.82	0.90	0.81	0.73
wheat bran	2.00	3.00	6.00	2.50	5.00	6.00	1.00	3.00	6.00	0.00	1.70	5.00
Vit suppl	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Min suppl	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Sand	3.58	3.54	4.47	0.08	0.85	3.40	0.05	0.90	1.75	0.02	1.03	1.99
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated nutrient content												
ME kcal/kg	2755	2755	2755	2850	2850	2850	2945	2945	2945	3040	3040	3040
Crude protein (%)	24.7	24.7	24.7	20.9	20.9	20.9	18.1	18.2	18.1	15.7	15.7	15.7
Calcium (%)	0.95	0.95	0.95	0.81	0.81	0.81	0.71	0.71	0.71	0.62	0.62	0.62
Available P (%)	0.48	0.48	0.48	0.40	0.40	0.40	0.36	0.36	0.36	0.31	0.31	0.31
ME/CP	112	112	112	136	136	136	163	162	163	194	194	194
Ca/P	2	2	2	2	2	2	2	2	2	2	2	2

1 Vitamin content of diets provided per kilogram of diet: vitamin A,D, E and K.

2 Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000mg; Zn, 80,000 mg; Fe, 90,000 mg; Cu, 15,000 mg; I, 1,600 mg; Se, 500 mg; Co, 600 mg

2.3 Enzyme assay

After thawing, all of vacuum packed were opened and then using a sensitive scale, 0.05 gram of the mucosal small intestine was weighed and along with 10 ml liter phosphate buffer saline (pH=7) was formed into a homogenized solution using sonic Vibracell Sonics (VCX 130 TE USA) device (Teshfam, 1984). Enzymes activity of leucine aminopeptidase was measured according to the procedure Nigel et al., (1964) method was used. For detection of enzymes activity it was needed to measure total protein which Pirogallol (calorimetric) method was used (Watanaba, et al., 1986). The level of activity of enzymes of each sample is divided into the amount of its total protein so the activity level of the enzyme is calculated according to the IU in liter/gram protein (Teshfam, 1984).

2.4 Statistical analyses

The results of the research have been statistically analyzed using the linear model of SAS software (SAS, 2001).

Analysis of variance according to the model,

$$x_{ij} = \mu + T_j + e_{ij}$$

Where,

x_{ij} = All dependent variable

μ = Overall mean

T_i = The fixed effect of RRO levels ($i = 1, 2, 3$)

e_{ij} = The effect of experimental error

Values of different parameters were expressed as the mean \pm standard deviation ($X \pm SD$). When significant difference among means was found, means were separated using Duncan's multiple range tests.

Table 3: comparison of average leucine aminopeptidase activity between treatments in different periods and segments of small intestine in broiler chicks (IU/g protein)

Intestine length Groups)	1%	10%	30%
0 % canola oil	1314.2 \pm 121.1	1053.8 ^b \pm 92.9	1567.6 ^b \pm 18.4
2.5 % canola oil	1547.2 \pm 261.5	1469.6 ^{ab} \pm 377.9	1537.3 ^b \pm 350
5 % canola oil	1504.6 \pm 181.1	1811.1 ^a \pm 360.9	1559.3 ^a \pm 414.7

a, b,.. Means in the same column with different superscripts differ significantly $X \pm SD$ ($P < 0.05$).

3. Results

According to table 3 and 4, adding different levels of canola oil to turkey chick's diet have different effects on leucine aminopeptidase activity on several regions of small intestine. in part of 1% of

small intestine there is a significant increase in 2.5 and 5% treatments than control group.

Leucine aminopeptidase activity in parts of 10 and 30% of small intestine in 5% treatment has significant increase than control and 2.5% treatments whereas; in part of 50% of small intestine in 2.5 and 5% treatments have significant increasing than control group. Also in parts of 70 and 90% of small intestine there is a significant increase in 5% treatment than 2.5% and in 2.5% than to control group ($p < 0.05$).

Table 4: comparison of average leucine aminopeptidase activity between treatments in different periods and segments of small intestine in broiler chicks (IU/g protein)

Intestine Length Groups	50%	70%	90%
0 % canola oil	1848 ^b \pm 401.6	2106.9 \pm 547.1	2643.2 ^c \pm 295
2.5% canola oil	2821.7 ^a \pm 517.2	2763.7 \pm 1011.6	3006.3 ^b \pm 420
5 % canola oil	3060.2 ^a \pm 634.8	2933 \pm 692.1	3902.5 ^a \pm 398

a, b,..Means in the same column with different superscripts differ significantly $X \pm SD$ ($P < 0.05$).

4. Discussions

In current study obtained that adding different levels of canola oil to turkey chick's diet have different effects on leucine aminopeptidase activity on several regions of small intestine, there are many studies that confirm this result.

In one research were done by Turek et al. (1991), demonstrated that Resident linseed oil had a 15% increase in LAP fluorescence compared to corn oil. In one other study were done by Chambersa et al.(1978), revealed that Saudi Arabian crude oil caused decreases in the specific activities of alkaline phosphatase, -glutamyl transpeptidase and leucine aminopeptidase, and increases in the activities of glutamic pyruvic transaminase, glutamic-oxaloacetic transaminase, lactic dehydrogenase and -hydroxybutyric dehydrogenase. In other study were done by Manuel et al. (1983), observed that rapeseed oil supplementation causes increasing in -N-Acetylglucosaminidase, n-d-glucosidase, -d-glucuronidase, -l-fucosidase and leucine aminopeptidase activities when compared with control group, that is compatible with our research results. In one other study were done by Gonzalez et al. (2001), revealed that Supplementation of casein with olive oil tended to decrease the intestinal and hepatic enzyme activity. It seems that increasing diet fat reduced transient ratio. Thus digesta more exposures to acid, pepsin and proteolytic enzymes. Therefore, Leucine aminopeptidase activity enhanced

and proteins convert to components such as amino acids. Hence, use of different amounts of canola oil in turkey chick's diet causes increasing of leucine amino peptidase activity.

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Blood Utilization for Elective Surgeries at Main University Hospital in Alexandria, Egypt

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Abstract: This study aimed to determine the efficiency of blood ordering and transfusion practices for patients undergoing elective surgical procedures and to assess the compliance with the international blood transfusion clinical practice guidelines. Auditing of blood bank registers for patients who underwent elective surgical procedures was done at the Main University hospital in Alexandria governorate. The total number of adult patients who had elective surgery for which requests for cross matching were made was 4844; of them only 1788 patients were transfused. A total of 13389 units of blood were cross-matched, but only 3373 units were transfused. Only 25.2% of total blood cross matched was utilized, leaving 74.8% unutilized. The overall Cross-match to Transfusion ratio (C/T ratio) was 3.9, the overall Transfusion Probability (%T) was 36.9% and the overall Transfusion Index (TI) was 0.69. The overall percentage compliance with Scottish Intercollegiate Guidelines was 27.7%. Institution-specific blood ordering schedules and protocols should be formulated to reduce exposure to transfusion and to screen for high-risk patient. In conclusion, ongoing audit and monitoring of blood ordering and transfusion practices in the hospital are essential for improving the ordering, distribution, handling and administration of blood components. [Samaa Z. Ibrahim, Heba M. Mamdouh, Amal M. Ramadan . Blood Utilization for Elective Surgeries at Main University Hospital in Alexandria, Egypt. Journal of American Science 2011;7(6):683-689]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: blood ordering practices, transfusion practices, utilization indices

1. Introduction:

Increasing demand for blood and blood products together with rising cost and transfusion associated morbidity led to a number of studies in the late 1970s reviewing blood ordering and transfusion practice (Olawumi & Bolaji, 2006). Moreover, in recent years there has been an increased emphasis on the potential hazards of transfusion as well as evidence supporting the use of lower transfusion thresholds (Boralessa, 2009).

Since the introduction of blood transfusion into clinical practice, its appropriate use has been the subject for debate. It has been reported that only 30% of cross-matched blood is used in elective surgery. Therefore, awareness of the hazards of blood transfusion is becoming more obvious due to the expansion of various aspects of blood transfusion services and the increased understanding of transfusion science in recent years (Abdelhadi & Bashawari, 2001).

Blood transfusion plays a major role in the resuscitation and management of surgical patients, but surgeons most of the times over estimate the anticipated blood loss thereby, over-ordering blood. Moreover, a number of studies in many countries of

the world have shown over ordering of blood by surgeons with utilization ranging from 5-40 % (Olawumi & Bolaji, 2006).

Many units of blood routinely ordered by surgeons are not utilized but are held in reserve and thus are unavailable for other needy patients. This can impose inventory problems for blood bank, loss of shelf life and wastage of blood (Vibhute, et al., 2000). In South Africa for example, 7-10% of blood is wasted annually because of over-ordering of blood (Olawumi & Bolaji, 2006). Also reports from different parts of the world revealed an unintentional misuse of the blood bank services causing a great burden on its resources, namely wastage of blood, reagents and manpower (Abdelhadi & Bashawari, 2001).

Wide variations in transfusion practice are existed between countries and institutions and even between the individual clinicians within the same institution (Western Australia Department of Health, 2010). Blood use audits in Scotland showed that, large variations are existed among individual practitioners or operating teams within a hospital (Scottish Intercollegiate Guidelines Network (SIGN), 2001). Variations in rates of transfusion may be due to many factors, including differing opinions on the threshold

level of hemoglobin below which a patient needs blood transfusion, differences in surgical and anesthetic techniques, differences in case mix, pre-operative anemia, and lack of availability of transfusion protocols. This may reflect uncertainty about the relative benefits and risks of transfusion and the different perceptions of the value of minimizing blood loss and subsequent transfusion (SIGN, 2001).

Moreover, many surgeons prescribing blood are unaware of recommended published guidelines for transfusion practice and still adhere to historical practice and not evidence (National Blood Users Group, 2001).

A study was conducted in Kuwait reported that only 28.3% of cross matched blood for elective surgery was actually transfused. In addition, it documented monthly mean wastage (\pm SD) of 45 (\pm 13) blood units due to the absence of a blood ordering policy also it was estimated that a technician can cross-match three units per hour. This results in wastage of 54.5% of technician working time, leading to an average blood bank annual loss of US \$25,000.00 for one 120-bed department of surgery (Juma et al., 1990). This can be decreased by simple means of changing the blood cross- matching and ordering schedule depending upon the type of surgery performed (Vibhute, et al., 2000). Moreover, implementation of the recommended maximum surgical blood-order schedule and introduction of type and screen for eligible surgical procedures is considered as a safe, effective and economic solution to preoperative over-ordering of blood (Bhutia et al., 1997).

A careful assessment of the risks and benefits of blood transfusion is essential for a good patient outcome. In addition, it is essential that the utilization of blood and blood products be rationalized and they are saved for critical situations. Appropriate placement of blood requests according to a planned schedule most often averts the consequences of indiscriminate ordering of blood. This requires streamlining blood ordering schedule keeping in view the blood bank resources, time, as well as money (Subramanian et al., 2010). Based on available evidence, institution-specific protocols should screen for high-risk patients including advanced age, low preoperative red blood cell volume, preoperative antiplatelet or antithrombotic drugs, complex procedures where blood conservation interventions are likely to be most productive for this high-risk subset (The Society of Thoracic Surgeons, 2007).

Studies assessing blood ordering and transfusion practices couldn't be traced in developing countries especially Egypt. Therefore, the aim of this study is to determine the efficiency of blood ordering and transfusion practices for patients undergoing elective surgical procedures and to assess the compliance with the international blood transfusion clinical practice guidelines.

2. Material and Methods

A. Study Setting:

The study was conducted at the surgical departments pertaining to Main University hospital in Alexandria governorate. It is multi-specialty 1700 bed hospital; of which, 700 surgical beds pertained to thirteen surgical departments performing about 10500 major elective adult surgical procedures per year.

B. Study Population:

Overall, a total of 4844 adult patients (2624 were males and 2220 were females) who underwent elective surgical procedures over a period of 1 year from July 2009 to June 2010 were included in the study.

C. Sampling Design:

Retrospective audit of blood bank registers was performed which covered all adult patients who underwent elective surgical procedures in all surgical departments pertaining to the study hospital and for which cross matching was requested during the study period.

D. Data Collection Methods:

Data were collected using review of registers technique. Blood ordering and transfusion practices for elective surgical procedures in the surgical departments pertaining to the study hospital were assessed according to certain indices including; Cross match to Transfusion ratio, Transfusion Probability, and Transfusion Index (Friedman et al., 1976; Mead, 1980). These indicators were computed using the following equations;

$$1- \text{Cross match to Transfusion ratio (C/T ratio)} = \frac{\text{No. of units cross matched}}{\text{No. of units transfused}}$$

$$2- \text{Transfusion Probability (\%T)} = \frac{\text{No. of patients transfused}}{\text{No. of patients cross matched}}$$

$$3- \text{Transfusion Index (T I)} = \frac{\text{No. of units transfused}}{\text{No. of patients cross-matched}}$$

Scottish Intercollegiate Guidelines Network recommended cross match to transfusion ratio (C/T ratio) for evaluating blood transfusion practices [6]. According to this guideline, C/T ratio shouldn't

exceed 2:1. In the present study, compliance with these guidelines was assessed to evaluate blood utilization practices at the selected hospital. The percent of blood cross-matched that was utilized was calculated as = $\frac{\text{No of units transfused}}{\text{No of units cross matched}} \times 100$

E. Statistical Analysis:

Data were statistically analyzed using Statistical Package for Social Science (SPSS) version 11.5 (SPSS Inc., Chicago IL, USA). Frequencies were calculated for all variables and Pearson's Chi-Square test was used to assess the statistical significance of difference in blood utilization between surgical departments pertained to the study

3. Results

The number of adult patients who had elective surgery and for which crosshatching was requested totaled 4844 patients. Male patients constituted the higher percentage (54.2%). The mean age of patients was 42 years with the highest percentage of patients was within age group "from 40 to less than 50" (31.8%), while the lowest percentage was within age group "60 years and more" (7.1%). Neurosurgery was the department of the highest admission rate (29.0%). On the other hand, renal-transplant and otolaryngology were the departments of the lowest admission rates (0.1% and 2.7%, respectively).

Table1 shows that, among a total 4844 patients, only 1788 patients were actually transfused. Neurosurgery was the department of the highest number of both patients cross matched (28.9%) and patients transfused (26.0%). On the other hand, renal-transplant was the department of the lowest number of both patients cross matched (0.06%) and patients transfused (0.16%). Blood utilization was 100% only in renal-transplant department, where the number of patients cross matched and the number of patients transfused were equal (3 patients).

As shown in Table 2, a total of 13389 units of blood were cross-matched, however, only 3373 units

were transfused. Neurosurgery was the department of the highest number of both blood units cross matched (30.1%) and blood units transfused (28.2%), while renal-transplant was the department of the lowest number of both blood units cross matched (0.1%) and blood units transfused (0.2%).

Only 25.2% of total blood cross-matched was utilized. The highest percentage of blood cross matched was utilized in Renal-transplant department (56.2%), while Urology-endoscopy was the department of the lowest percentage of blood cross matched that was utilized (9.4%).

The highest percentage of blood cross matched was utilized in Renal-transplant department (56.2%), while Urology-endoscopy was the department of the lowest percentage of blood cross matched that was utilized (9.4%), as shown in Figure 1.

Data from table 3 revealed the blood utilization indices in different surgical departments of the selected hospital. In relation to C/T ratio, urology-endoscopy was the surgical department of highest the C/T ratio and renal-transplant was the department of the lowest C/T ratio (1.7) with overall C/T ratio of 3.9. The overall %T was 36.9%, ranged from 100.0% in renal-transplant department to 15.7% in Urology- endoscopy department. The overall TI was 0.69 that ranged from 3.00 in renal-transplant department to 0.18 in Urology- endoscopy department.

The overall percentage compliance was 27.7% with the highest percentage compliance in renal-transplant department (66.7%) followed by Plastic surgery department (56.6%). On the other hand, Urology- endoscopy was the department of the lowest percentage compliance (11.7%), followed by vascular surgery department (16.0%). There was statistically significant difference between the different surgical departments at the selected hospital regarding the percentage compliance with guidelines ($p=0.003$), as shown in Table 4.

Table 1: Comparison between the number of adult patients cross-matched and those who were transfused at Main University hospital in Alexandria.

Department	No. of Patients cross-matched		No. of Patients transfused	
	No.	%	No.	%
Neurosurgery	1403	28.9	466	26.0
Urology	855	17.6	242	13.5
Urology- endoscopy.	197	4.0	31	1.7
Hepato- billiary	295	6.0	112	6.2
Colo-rectal	361	7.4	132	7.3
Gastro-intestinal	401	8.2	128	7.1
Cardio-thoracic	511	10.5	277	15.4

Vascular-surgery	162	3.3	33	1.8
Tumor excisions	159	3.2	129	7.2
Plastic surgery	159	3.2	111	6.2
Otolaryngology	131	2.7	55	3.0
Renal-transplant	3	0.06	3	0.1
Maxillofacial	207	4.2	69	3.8
Total	4844	100.0	1788	100.0

Table 2: Comparison between the number of blood units cross-matched and that were transfused for elective surgeries at Main University hospital in Alexandria.

Department	No. of blood units cross matched		No. of blood units transfused	
	No.	%	No.	%
Neurosurgery	4033	30.1	954	28.2
Urology	2166	16.1	399	11.8
Urology-endoscopy	382	2.8	36	1.0
Hepato- billiary	802	5.9	192	5.6
Colo-rectal	889	6.6	186	5.5
Gastro-intestinal	1090	8.1	204	6.0
Cardio-thoracic	1539	11.4	561	16.6
Vascular -surgeries	387	2.8	54	1.6
Tumor- excisions	635	4.7	303	8.9
Plastic - surgeries	543	4.0	272	8.0
Otolaryngology	402	3.0	91	2.6
Renal-transplant	16	0.1	9	0.2
Maxillofacial	505	3.7	112	3.3
Total	13389	100	3373	100

Table 3: Blood utilization indices in the surgical departments at the Main University hospital in Alexandria

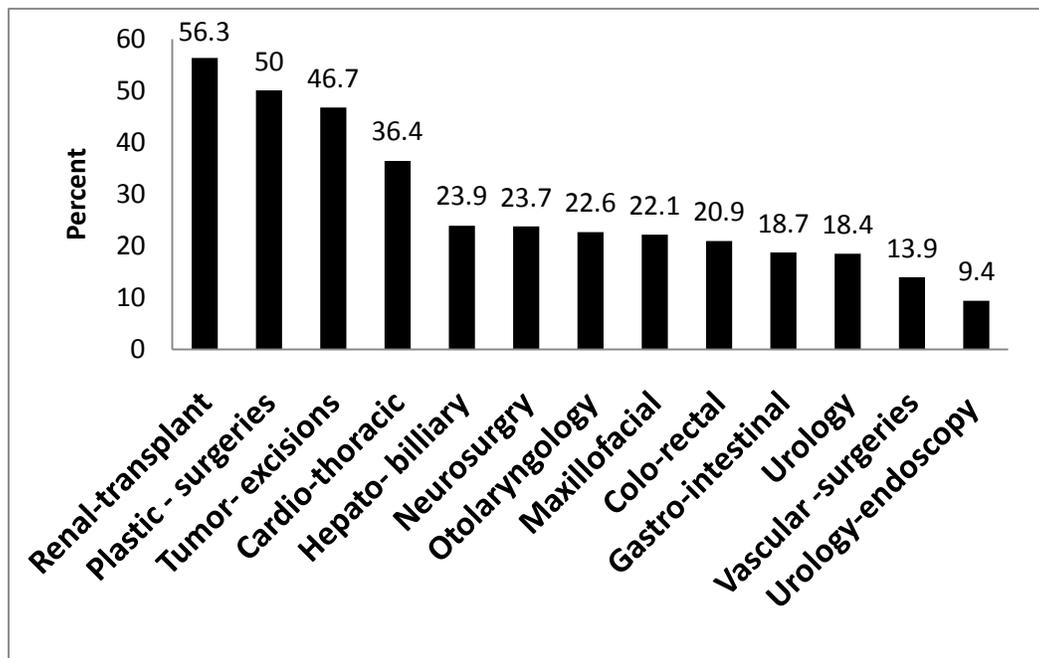
Department	Blood utilization indices								
	C/T ratio			T%			TI		
	N	D	I	N	D	I	N	D	I
Neurosurgery	4033	954	4.2	466	1403	33.2	954	1403	0.68
Urology	2166	399	5.4	242	855	28.3	399	855	0.47
Urology-endoscopy	382	36	10.6	31	197	15.7	36	197	0.18
Hepato- billiary	802	192	4.1	112	295	37.9	192	295	0.65
Colo-rectal	889	186	4.7	132	361	36.5	186	361	0.52
Gastro-intestinal	1090	204	5.3	128	401	31.9	204	401	0.51
Cardio-thoracic	1539	561	2.7	277	511	54.2	561	511	1.10
Vascular-surgery	387	54	7.1	33	162	20.3	54	162	0.33
Tumor excisions	635	303	2.1	129	159	81.1	303	159	1.91
Plastic surgery	543	272	2.0	111	159	69.8	272	159	1.71
Otolaryngology	402	91	4.4	55	131	41.9	91	131	0.69
Renal-transplant	16	9	1.7	3	3	100.	9	3	3.00
Maxillofacial	505	112	4.5	69	207	33.3	112	207	0.54
Total	13389	3373	3.9	1788	4844	36.9	3373	4844	0.69

N stands for Numerator; D stands for Dominator; I stands for Index

Table 4: Percentage compliance with blood transfusion guidelines at the different surgical departments at the Main University hospital in Alexandria.

Department	Percentage compliance with guideline	
	No.	%
Neurosurgery	360 (n=1403)	25.7
Urology	192 (n=855)	22.5
Urology- endoscopy	23 (n=197)	11.7
Hepato- billiary	84 (n=295)	28.5
Colo-rectal	81 (n=361)	22.4
Gastro-intestinal	96 (n=401)	23.9
Cardio-thoracic	218 (n=511)	42.7
Vascular surgery	26 (n=162)	16.0
Tumor excisions	82 (n=159)	51.6
Plastic surgery	90 (n=159)	56.6
Otolaryngology	30 (n=131)	22.9
Renal transplant	2 (n=3)	66.7
Maxillofacial	60 (n=207)	29.0
Total	4844	27.7
Test of significance*		p =0.003

n= Total number of adult patients who had elective surgery for which requests for cross-matching were made

**Figure 1: Percentage of blood units utilized per department at the different surgical departments at the Main University hospital in Alexandria**

4. Discussion

Blood and blood components are critical in elective surgery patient care, but with limited supply, unnecessary ordering, unnecessary utilization, and significant cost, careful assessment of ordering and benefits of transfusion is essential for a good

management of resources (Subramanian et al., 2010). Data from developing countries have shown gross over ordering of blood in 40% to 70% of patients transfused (Chawla et al., 2001). Therefore, it is essential that the usage of blood and blood products be rationalized and saved for crisis situations (Subramanian et al., 2010). The current study

revealed that, 74.8% of the cross- matched blood was unutilized which mean it was unnecessary. This finding is nearly similar to that was reported in an Indian study where 76.9% of blood cross-matched was unutilized.

Other studies as those conducted in Ilorin Teaching Hospital (Olawumi & Bolaji, 2006) and University of Benin Teaching Hospital, in Nigeria reported nearly similar values of unutilized blood (69.7% and 70.0%, respectively) (Ebose et al., 2009). This might indicate that this malpractice is common in developing countries.

The use of cross-match to transfusion ratio (C/T ratio) was first suggested by Boral Henry in 1976 (Friedman et al., 1976). Subsequently, a number of authors used C/T ratio for evaluating blood transfusion practices. Ideally, this ratio should be 1.0, but a ratio of 2.5 and below was suggested to be indicative of efficient blood usage (Olawumi & Bolaji, 2006). According to these recommendations, the overall C/T ratio of 3.9 that reported in current study was considered to be indicative of inefficient blood usage except for Renal-transplant (1.7), Plastic surgery (2.0), and Tumor excisions departments (2.1). This inefficient blood usage was reported by other studies conducted in Nigeria (2.2), and Malaysia (5.0) (Ebose et al., 2009; Jarnee et al., 2002).

The results of the present study demonstrated that, C/T ratio varied widely across the surgical departments under the study from 10.7 at urology-endoscopy department to 1.7 at renal-transplant department. This was somewhat similar to that reported in a Nigerian study but to a lesser extent where the C/T ratio values ranged from 1.6 in obstetrics and gynecology department to 3.3 in Orthopedics and accident and emergency departments (Ebose et al., 2009). Variations in rates of transfusion in the current study may be due to the fact that, there is a great tendency in most departments of surgery to request more units of blood for elective procedures than what is actually required. This over ordering of blood is more often guided by habits and hospital routines rather than clinical needs. This attitude is defended by the simple excuse that, it provides a safety measure in the event of excessive unexpected blood loss during surgery.

The probability of transfusion for a given department is denoted by %T and was suggested by Mead (1980). A value of 30% and above has long been suggested by Friedman et al., to be appropriate and signifies the appropriateness of numbers of units cross-matched. The probability of transfusion values

reported in the current study for the different surgical departments under the study are considered appropriate except for Urology (28.3%), Urology-endoscopy (15.7%) and Vascular-surgery department (20.3%). The results of the present study revealed an overall %T of 36.9%. This finding was higher than that has been found in study conducted in Indian tertiary care hospital where %T ranged from 11.1% to 25% (Niraj et al., 2003).

Regarding TI, a value of 0.5 or more is indicative of efficient blood usage and signifies the appropriateness of numbers of units transfused (Mead, 1980). The TI reported in the current study as an overall value (0.69) and the values of the different surgical departments under the study are considered appropriate except for Urology, Vascular-surgery, Urology-endoscopy and Cardio-thoracic departments. This finding was different from that has been found in a study conducted in Indian tertiary care hospital where TI ranged from 0.36 to 0.15 (Niraj et al., 2003). This difference might explained by differences between localities.

Practice guidelines are systematically developed recommendations that assist the practitioner in making decisions about health care. The recommendations might by may be adopted, modified, or rejected according to clinical needs and constraints. The purposes of the American Society of Anesthesiologists guidelines (2006) were to improve the perioperative management of blood transfusion and adjuvant therapies and to reduce the risk of adverse outcomes associated with transfusions. These guidelines recommended that the ratio of the number of units of cross-matched red cells for a given operation to the number of units actually transfused – the C:T ratio – should not exceed 2:1.

The results of the present study revealed that, the overall percentage compliance with blood transfusion guidelines was 27.7%. In the current study the percentage compliance with guidelines varied widely among the individual surgical departments under the study with a range from 66.7% in renal-transplant department to 11.7% in urology-endoscopy department. In Egypt, surgeons order cross-matched blood on the basis of habit. The criteria for ordering blood are often vague and the established policies, if there any existed, may be outdated.

In addition, the percentage compliance with guidelines in cardio- thoracic surgery department was 42.7%. Blood transfusions in cardiac surgery patients are performed inappropriately and transfusion rates would improve if more restrictive strategies for

performing them were employed. However, in one large observational study, investigators reported that, despite the availability of practice guidelines for blood transfusion, rates of transfusion among cardiac surgery patients vary dramatically among hospitals in the United States (Worcester, 2010).

We acknowledge that there are limitations to the present study. The pre-operative data including hemoglobin level and co-morbidities and intra-operative data including duration of surgery and amount of blood loss are very important for correlating the results, but, some logistics preventing us from obtaining these data. Also, the magnitude of cost implication of unnecessary cross-match can be calculated. Therefore, further work is needed to examine these issues.

Trust, confidence and cooperation of clinicians are critical for success of blood conservation policies. Continuous monitoring by members of the transfusion staff is necessary for the success of these Policies. The clinicians need to be confident that the transfusion medicine unit is capable of supplying blood on time when there is an urgent need before being willing to accept the Group Screen and Hold schedule practice. Moreover, it is necessary to continually educate incoming house surgeons and new attending surgeons concerning the value of the Group Screen and Hold schedule procedure and the cross-matching guidelines

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Information and communication technologies (ICT) and its effect on rural development¹Mojtaba Sadighi and ²Mehran Bozorgmanesh^{1,2}Damavand Branch, Islamic Azad University, Damavand, Iran*Corresponding author: sharif11070@yahoo.com

Abstract: Direct or indirect application of ICT, in rural development sector has also been referred to as “Rural Informatics”. Rural economies can be benefited from ICT by focusing on social production, social consumption and social services in the rural areas. The inculcation of a Citizen-to-Government (C2G) and Citizen-to-Citizen (C2C) interface would provide this link that would also lead to community participation in design and implementation of ICT interventions. This in return could promise better economic opportunities as well as social inclusion of rural people in the processes of governance. Such attributes in the social set up are essential prerequisites for good governance and rural development. Globalization and technological changes, the processes in the past fifteen years have been quickly lead to a new global economy have been driven with the reinforced technology and fuel (energy) that by providing information and knowledge. The global economy requires the kind of necessity and purpose of educational institutions. Since the current trend towards reducing incomplete information and access to accurate information is growing, other schools can not control time to transfer a set of prescribed information from teacher to student during a fixed time point are, but schools must to promote Culture of "Teaching for Learning For example, acquisition of knowledge and continuous learning skills which make possible during the individual's life.

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Keywords: information and communication technologies (ICT), rural development

Introduction:

The concept of development of the rural, today, is not just project initiatives and governance; it is much more beyond that. This paper uncovers a whole plethora of ICT emergence as a technology of the new millennium. Against the backdrop of the ongoing ICT boom, this paper makes an attempt towards studying its applications and usage planning process and policy making for the rural communities focusing on how it helps in aligning the key factors and reduce the problems of alienation, fragmentation and dislocation of knowledge. Review of literature shows that intervention of information and communication technologies (ICT) in rural development initiatives are capable of development, but are not successful. Lack of community participation, absence of an integrated approach and non-inclusion of traditional knowledge systems (TKS) in the project designs are the major impediments. We therefore suggest a systems-based approach in the design of e-Governance projects, and brief some future directions. Sustained development using rural informatics is possible, only if ICT interventions are able to respond to the local needs and re-adjust as per the prevailing knowledge (Traditional Knowledge Systems- TKS) of the rural areas.

Concerns about educational quality and educational opportunities with the necessity of developing those most vulnerable are the accumulation of globalization is symbiotic. Generally, "the changes of globalization in developing countries, on low-income groups,

especially women and girls and" low skill workers, as well as all groups applying for and obtaining new skills to press. (Bellamy and Taylor, 1998).

In the rural context, development involves use of physical, financial and human resources for economic growth and social development of the rural economies (Burkey, 2000). The term rural development also represents improvement in quality of life of rural people in villages. As per Chambers (1983) “Rural Development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need.” Singh (1999) defines Rural Development as “A process leading to sustainable improvement in the quality of life of rural people, especially the poor”. The fact of the matter is that three quarters of the world’s poor, about 900 million people are in rural areas, and the Millennium poverty target set by Millennium Development Goals (MDG), cannot be met unless the world addresses rural poverty. “Sustainable Rural Development can make a powerful contribution to four critical goals of: Poverty Reduction, Wider shared growth, Household, national, and global food security and Sustainable natural resource management” (World Bank, 1997). Hence worldwide there is a growing emphasis on development of rural economy of the countries. Any improvement, in the social or economic status of rural areas would not just directly benefit rural poor but would also bring down the migration-pressures on cities and contribute by positive ripple effect in global stride towards development.

The process of development in a country is to be aided by its governance. The goal of governance “should be to develop capacities that are needed to realize development that gives priority to the poor, and creates needed opportunities for employment and other livelihoods” (The World Bank, 1992, UNDP, 1994). Increased number of poor, hungry or marginalized people in a country represents decrease in its quality of governance. To promote development, various studies have proposed governance in the contextual realities of each country, including veritable participation of citizens in the governmental decision-making process (Grindle, 2004; Evans and David, 2006). Several Institutions and experts accept Governance as a reflexive process, wherein policies, institutions, outcomes and analysis interact, to maximize the process of participatory development (UNDP, 1997; Ludden, 2005; Mehta, 2006).

Information and communication technologies (ICT), including radio and television and the newer digital technologies like computers and the Internet as potentially are introduced powerful tools and activators of educational reform and changes. different ICT, when properly applied can be developed to help access to education and the relationship between training and workshops to strengthen the increasingly digital, the quality of education also helped to create teaching and learning in an active process connected to real life high take. However, the experience of being raised by ICT in the classroom and other educational sites around the world during the last few decades proves that is not automatic fully realize the potential benefits of ICT training. (Guptaand et al, 2004)

Effective integration of ICT in the educational system is a complex process that involves not only technology but also involves educational and technical training, institutional readiness, teacher competencies and long-term investment. In fact the subject of such vital importance is that the technology to get the easiest part of it. Introduced ICT information and communication technologies are for this purpose, as a different set of tools and technology resources, used to information communicate, create, release, storage and management have been defined. These technologies are including computers, internet, broadcasting technologies (radio and television) and telephone. In recent years started a wave of intense public interest about how computers and the Internet can become a better control to the efficiency and effect of education at all levels and in both formal and informal development. (Rogers and Shukla, 2001).

But nowadays, ICT is more than a technology. Although the old technologies such as telephone,

radio and television, will be less attention in the past but were used as educational tools. For example, "radio and television are used for over forty years to open and distance education. In this regard, although print remains the most expensive method and therefore available, but in developed and developing countries is provided the most prominent mechanism. ICT for developing countries, are associated a potential for increased availability and quality of training and development. ICT basis and attract a lot of knowledge and its acquisition, providing unprecedented opportunities for developing countries, adding and expanding educational systems, improve policy formulation and implementation of opportunities to expand scope of work and gives poor facilitation. One of the biggest hardships that the poor are bearing the other people, who live in the poorest countries, is the sense of isolation. Communication technologies such sensory loss, are guaranteed and also has been unthinkable facilitate access to knowledge through the ways that already. However, the reality of the digital divide (the gap between those who control access technology and those who do not have access) means that the introduction and integration of ICT are challenging at different levels and in various types of training, most commitments. Failure in this struggle to become more significant gap of knowledge and the deepening economic and social inequalities (UNDP, 1997; Ludden, 2005; Mehta, 2006).

How ICT can help developing access to education?

ICT is a potentially powerful tool for developing educational opportunities, whether formal or informal is for areas already "stated (rural and dispersed populations) ethnic minorities, women, girls, disabled and old people traditionally excluded from education groups because of cultural or social reasons are also all those financial reasons or time constraints can not register in educational centers. Any time, anywhere (defining feature ICT) capability in ICT is a passing of time and place. ICT, education or training with asynchronous features provide a time delay between education and its acceptance by students makes it possible.

ICT applications in education:

Organizations and educational policy planners should first of all about the desired educational outcomes (mentioned above) is straightforward. The broad objectives must choose different technologies used to go and how to apply the guidance to go. Potential of each technology varies according to how to use. Haddad and Draxler have been identified IT application in education at least five levels of:

1. present,
2. experimental proof,

3. practice and practice,
4. interaction,
5. collaboration

Each of the different ICT tools (print, audio cassette and video, broadcast radio and television, computer or Internet) may provide the most basic means and surfaces used to go to prove. Except for visual technology, practice and practice the maximum use of both technologies may be offered. Each of the different ICT (print, audio cassette and video, broadcast radio and television, computer or Internet) used to may provide the most basic means and surfaces. Except for visual technology, may be offered practice and practice the maximum use of both technologies. The other network computers and Internet, ICT interactive learning that are provided and they if only used for providing proof or go, was not realized can better their full potential (Jauhari, 2004)

Conclusion:

Regardless of the wide differences in ICT access between rich and poor countries and between different groups in the country, there are concerns that challenge the application of ICT in education with the existing differences among the lines of economic, social, cultural, geographic and gender will be broader. Everyone equal opportunities in terms of suitability for participation are necessary, but access to various factors, either as users or as producers through their sources is difficult and heavy. Therefore, the primary differences enhance and even grow. Consequently, programmers' international education is faced with a difficult challenge and how to help solve the problem and its development.

Promoting ICT in education, when done without careful study, can lead to the marginalization of those with more favorable conditions are unknown. For example, "women compared with men, because of illiteracy, lack of higher education, lack of time and mobility and poverty, controlling access to ICT and fewer opportunities for training are relevant. Also, more boys than girls' access to computers at home and school are not strange to say that if more boys than girls are willing to work with computers. The report of the University Association of American Women is that "Although some girls have an important gender gap have been limited, but today's technology, technology club, and boys in public schools while its own problems and programs are settled girls use computers for word processing the brand". In an assessment in four African countries, the activities organized by World links remote international cooperation on projects between

teachers and students in developing countries will promote, despite creating programs without regard to sex contacts, sexual inequalities remain Uganda and Ghana. In addition, while more girls than boys in relation to academic performance and advanced communication skills program will enjoy more than boys, but they were unable to perform their technological skills were. A set of economic factors, organizational and cultural differences involved in the social.

"The high ratio of students to computers and politics, whoever came first, the first is used in accordance with the girls wanted it." Girls travel restrictions in the early hours of daily work and home responsibilities are that this will limit their access. Also because local patriarchal beliefs dominate the boys are in the computer lab environment. Including proposed measures to address this discrimination, strategies to encourage schools to create "fair use" in the computer labs and the holding of meetings and sexual sensibilities conductivity decreased defense duties after school girls. ICT provides access to only a small part of the action is created equal. Equal attention should also be applied to ensure the technology really "is used by learners and ways of how well their needs will cure.

An educational program that reinforced this approach shows the overall program is bilingual. The program seeks to establish technology learning centers for bilingual teachers, students, teachers, parents and community members. Technical teams from each center three students, two teachers and the director of the Center with at least one female student and a teacher are female.

Another example of a general approach to the application of ICT in education, radio education project Gobi Women of Mongolia, which seeks to provide professional and educational structure of women's favorite courses around the nomads and their opportunities for income generation.

It contains topics such as livestock rearing, family support (family planning, health, nutrition and health) to create income in the application of local raw materials and basic skills for the job is a new market.

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The role of utilization Distance Education in adult education

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Abstract: Distance education dictates changes in behavior for both the teacher and the learner. The successful student develops persistence and skills in self-directing work. The successful distance education teacher becomes conversant with new technology and develops new instructional styles, moving from creating instruction to managing resources and students and disseminating views. Administrative and faculty support for distance education are critical to the success of this instructional method. Administrators should take note that the implementation of a distance education program may allow access to a greater number of students. However, the time and work associated with teaching at a distance exceeds the normal requirements of campus-based instruction. Students in distance education settings perform as well or better on assignments, class activities, and exams when compared to campus-based students. Nevertheless, students must maintain persistence and a clear focus to succeed in a distance learning situation. Self-direction, a passion for learning, and strong individual responsibility are important influences on achievement. There are indications that distance education works best for more mature, motivated, well-organized, and already accomplished learners. Distance education courses vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn.

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Keywords: Distance Education, adult education

Introduction:

Distance education is education designed for learners who live at a distance from the teaching institution or education provider. It is the enrollment and study with an educational institution that provides organized, formal learning opportunities for students. Presented in a sequential and logical order, the instruction is offered wholly or primarily by distance study, through virtually any media. Historically, its predominant medium of instruction has been printed materials, although non-print media is becoming more and more popular. It may also incorporate or make use of videotapes, CD or DVD ROM's, audio recordings, facsimiles, telephone communications, and the Internet through e-mail and Web-based delivery systems. When each lesson or segment is completed, the student makes available to the school the assigned work for correction, grading, comment, and subject matter guidance by qualified instructors. Corrected assignments are returned to the student. This exchange fosters a personalized student-instructor relationship, which is the hallmark of distance education instruction. Trainers using these new technologies were successful educational programs to millions seek learning opportunities and thereby reach out to the educational spaces, training centers to expand. With the development of long-

distance telephone system in the early twentieth century method of capacity and distance learning methods for students to access educational opportunities in the world increased Translation. But until the invention of mobile tele conference ever in the 80 and 90 and the main role in the concept of distance education did not play. Telemetry system, allowing for teachers conference provided that without the slightest delay at a time when your students can listen to them talk and sometimes they see.

Expansion of computer networks in the decade 1990 and connect millions of people through lines to the telephone networks made it possible to simply distance learning via computers and computer conferences around the world is possible (a) and Today with the development of control technology are in science and technology around the world.

Historically, most distance education courses were vocational in nature, but today courses are offered for academic, professional, and avocational purposes for students of all ages. There are numerous specialized programs, such as those for blind persons and for parents of small children with hearing impairments. Distance education is available in practically any field, from accounting to zoology. Courses are offered in gemology, high school diploma,

journalism, locksmithing, child day care management, yacht design, and many fascinating subjects. Distance education courses also vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Since 1890, more than 130 million Americans have studied at DETC member institutions, including Franklin D. Roosevelt, Walter P. Chrysler, Walter Cronkite, Barry Goldwater, Charles Schulz, and many other distinguished alumni of DETC members. Unlike most distance education courses offered by traditional colleges and universities that are semester and classroom oriented, with courses offered by most of the DETC-accredited institutions you can study any time and anywhere. Distance education is especially suited for busy people who wish to increase their knowledge and skills without giving up their jobs, leaving home, or losing income. You learn while you earn. Many courses provide complete vocational training; others prepare you for upgrading in your present job, without losing wages, experience or seniority. You receive individual attention, and you work at your own pace. In recent years, technology has played a significant role in transforming the traditional distance education school into a dynamic, interactive distance learning method using toll-free telephone lines, as well as a diverse array of personal computers, video devices, CD and DVD ROMs, online courses over the Internet, interactive devices, and other modern technological innovations. The future for distance study promises to be exciting!

Distance education can be used for some aspects of most disciplines. For example, several institutions of higher education already have developed certificate programs, undergraduate programs, and graduate programs in health and physical education that are delivered using distance education methods. Eastern Oregon University, Emporia State University, Kutztown University, LaSalle University, the Medical College of Wisconsin, University of Wisconsin at Stevens Point, and Virginia Tech are among institutions integrating distance technology into their physical education programs.

Traditional programs that are heavily based in skill development and demonstration or require laboratory work can be offered in a distance education framework using interactive video interfaced with computers to facilitate a hands-on learning approach at a distance. Classes that use lecture and laboratory experiences are easily adapted to a distance education situation. Course materials, including animals for dissection, are sent to class participants with video and written instructions and assignments.

Distance education dictates changes in behavior for both the teacher and the learner. The successful student develops persistence and skills in self-directing work. The successful distance education teacher becomes conversant with new technology and develops new instructional styles, moving from creating instruction to managing resources and students and disseminating views (Strain, 1987). Administrative and faculty support for distance education are critical to the success of this instructional method. Administrators should take note that the implementation of a distance education program may allow access to a greater number of students. However, the time and work associated with teaching at a distance exceeds the normal requirements of campus-based instruction.

Students in distance education settings perform as well or better on assignments, class activities, and exams when compared to campus-based students (St. Pierre, 1998). Nevertheless, students must maintain persistence and a clear focus to succeed in a distance learning situation. Self-direction, a passion for learning, and strong individual responsibility are important influences on achievement. There are indications that distance education works best for more mature, motivated, well-organized, and already accomplished learners (Rintala, 1998).

Garrels (1997) describes five critical elements for successful teaching at a distance:

1. Instructor enthusiasm. This requires animation and comfort in front of the camera, or with the technology utilized. Faculty support and interest are critical to the success of distance learning endeavors.
2. Organization. Teaching materials must be prepared in advance; timing, variation, and smooth transitions must be planned. Instructors should allocate from 3 to 5 hours of preparation for each hour of distance instruction. Great attention to detail is required long before the actual classroom activity occurs (Summers, 1997).
3. Strong commitment to student interaction. Whatever the modality used to teach at a distance, the instructor must encourage and facilitate ongoing communication between the students and the instructor.
4. Familiarity with the technology used in the class format. Faculty development is important before beginning any distance activities, and instructors should be trained in video use, computer use, or other forms of instructional technology used.
5. Critical support personnel. Production staff, graphic designers, and technical staff members will help the instructional setting produce successful teaching at a distance.

Distance education is any type of schooling that takes place away from a physical campus. Distance education is also known as:

- distance learning
- virtual learning
- online learning
- e-learning
- online education
- web-based training

Types of Distance Education Programs:

There are two types of programs offered by distance education schools: synchronous learning programs and asynchronous learning programs. With synchronous learning, distance education students must log on to the school's website at a set time. Often, they interact with their peers and professors via group chats, web seminars, video conferencing, and phone call-ins. With asynchronous learning, distance education students complete all coursework on their own time. They often learn via assignment sheets, message boards, email, pre-recorded video lectures, mp3s, and traditional mail correspondence. Distance education began for the delivery of courses to students who live in remote areas. Over the years, though, this form of education has become the preferred method for learning outside of the classroom.

Distance Education is now undertaken by people with busy schedules, hectic lifestyles, special needs, and also those living in isolated areas. What's more, with such flexible learning options you can choose to study at any time and from any location you like.

There are a number of different **forms of distance education** and it's important to know which method you prefer:

- **Correspondence learning:** your course materials are printed and sent out to you by mail/courier. The advantages are that you have a printed set of reference materials, you can study anywhere and you are not reliant on a computer, you can learn for long periods of time.
- **eLearning:** your course materials are provided to you in multimedia format; that is, on CD/DVD. In this way you can choose to take your study materials within you and learn anywhere in the world with just a laptop.
- **Online learning:** no materials are sent to you and you do all your learning online. The limitation is that you need to be logged onto a computer (though you may be able to download and print some of your materials yourself, though this can cost you more in ink), there is a limit to how much you can absorb and do

online, and most people's attention span on-screen is limited to 20 minutes (your eyes get tired after that).

- **Broadcast learning:** where you tune into a series of television, radio or Internet broadcasts (e.g. podcast, YouTube, etc.).
- **Teleconferencing:** where your lessons are conducted in real time through an Internet connection. Limitations are that streaming can be slow, connections can cause problems (students and teachers generally need to be computer literate) and there can be delays in talk-time, depending on software, hardware and connection capabilities.

Conclusion:

Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide. Distance learning is expanding and examples of it are increasing dramatically. Fewer than 10 states were using distance learning in 1987; today, virtually all states have an interest or effort in distance education. Distance learning systems connect the teacher with the students when physical face-to-face interaction is not possible. Telecommunications systems carry instruction, moving information instead of people. The technology at distant locations are important and affect how interaction takes place, what information resources are used, and how effective the system is likely to be.

Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend on matching technological capabilities to education needs.

Distance education places students and their instructors in separate locations using some form of

technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home.

The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS)), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

High front-end costs prevented an early widespread adoption of electronically mediated learning. Distance learning has been aggressively adopted in many areas because it can meet specific educational needs. As the concept of accountability became accepted and laws required certain courses in high school in order for students to be admitted to state colleges, telecommunications was examined as a way to provide student access to the required courses. Many rural school districts could not afford the special teachers to conduct required courses. Distance education met this need by providing courses in schools where teachers were not available or were too costly to provide for a few students. It also fulfilled a need for teacher training and staff development in locations where experts and resources were difficult to obtain. These systems link learner communities with each other and bring a wide array of experts and information to the classroom.

Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling

of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation.

The key to success in distance learning is the teacher. If the teacher is good, the technology can become almost transparent. No technology can overcome poor teaching which is actually exacerbated in distance education applications. When skilled teachers are involved, enthusiasm, expertise, and creative use of the media can enrich students beyond the four walls of their classroom.

Teachers need training in the system's technical aspects and in the educational applications of the technology. Areas for assistance include the amount of time needed to prepare and teach courses, how to establish and maintain effective communication with students, strategies for adding visual components to audio courses, ways to increase interaction between students and faculty, planning and management of organizational details, and strategies for group cohesion and student motivation.

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Income Bipolarization and Poverty: Evidence from Rural Nigeria

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Abstract: The disappearance of the middle class- income bipolarization could result into tension and social conflict. If such conflict starts in the rural area, the possible resulting revolts would clog the wheel of economic production and policy implementation and there is possibility of spreading to the urban area. The study therefore estimated income bipolarization in the rural area of Nigeria from 1980 to 2004 using Foster-Wolfson –FW- (1994) and Lasso de le Vega and Urrutia – LU- (2006) indices. Bipolarization linked poverty was estimated for the periods through the later and Foster-Wolfson bipolarization estimates were linked with the poverty status and other socio-economic features of the rural households by tobit regression analysis. Bipolarization was found to be on reduction from 1992 to 2004 moving in the direction of poverty level. FW Bipolarization was 0.6125, 0.4067, 0.4775, 0.4108 and 0.3529 in 1980, 1985, 1992, 1996 and 2004 while LU Bipolarization was 0.1676, 0.1430, 0.1610, 0.1460 and 0.1383 for the same years respectively. Poverty has highest significant positive effect on bipolarization with a marginal effect of 0.02520. The marginal effects of age was 0.00014, female head households was 0.00119. Household size, father's education, mother education, married status, farming and wage employment have significant negative marginal effects of 0.00037, 0.00027, 0.00013, 0.00636, 0.000697 and 0.00105 respectively. Income bipolarization is higher among households located in the South than their base category, the north. Poverty and its covariates have higher sum total interactive positive effect on bipolarization than their base categories, the non-poor covariates. There is need to reduce poverty for bipolarization to decline. The southern part needs more attention in bipolarization reduction strategies. All variables that reduce poverty like education would have to be harnessed further to reduce bipolarization to guide against the occurrence of its consequences.

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Key words: Middle Class, Disappearance, Bipolarization, Poverty, Rural

1. Introduction

Income distribution analysis is a phenomenon that has attracted the attention of researchers in recent times and the importance of income becomes more apparent as poverty is characterized by low income. Income refers to consumption opportunity gained by an entity (household) within a specified time frame, which is generally expressed in monetary terms (Wikipedia, 2008). Radwan (2008) reported that about 90 percent and 70 percent of Nigerians live on less than US\$2 and US\$1 per day respectively implying 10 percent living on US\$2 and above. This somehow indicates that income in Africa and Nigeria in particular, is not evenly distributed; some are in the lower part, some in the middle class and the remaining in the upper class. NBS (2007) mentioned that it is clear that high rate of poverty and income inequality have threatened the Nigerian middleclass with extinction; creating doubt about the relevance and impact of most macroeconomic reforms of the past. If the distribution is at either side of the divide, lower or upper class with the middle class shrinking or becoming extinct, such income distribution is said to exhibit polarization. (Vander puye-Orgele, 2002; Chakravarty and Majumder, 2001; Rodriguez, 2006).

According to Chakravarty and Majumder (2001), income polarization is the decline of the middle class and is of two types: The first type is if a distribution is more spread out from the middle position to the tails, thus increasing the distance between two groups below and above the median income level (polarization). And the second type is increased bipolarity (bipolarization) where incomes below or above the middle position become closer to each other as shown in figure 1, which we have decided to measure in this study as a matter of choice and for us to bring in the concept of poverty which still remain a problem in Nigeria. Therefore polarization engenders clustering of the elements in the income distribution at polar modes. This markedly shows that income polarization is quite different from income inequality another feature in income distribution analysis which means how the element spread out from the mean or median which is overall dispersion of the distribution.

Considering an income distribution continuum of $x = (x_1, \dots, x_n)$ where x_i is the positive income level of the i^{th} person and $m(x)$ is the median income of x as shown in figure 1. The figure shows polarization increasing movement which is increased bipolarization and it occurs when income levels below

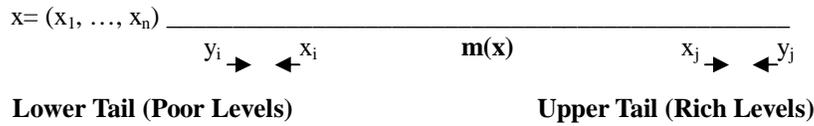


Figure 1. Increased Bipolarization (Inferred from Wang and Tsui, 2000)

or above $m(x)$ move closer to each other; bipolarization will increase if y_i and x_i below and y_j and x_j above $m(x)$ move closer to each other. y_i and x_i below and y_j and x_j above $m(x)$ become identify with reducing inequality, that is, increasing identity but increase alienation between those below and above $m(x)$. The distribution therefore features poor and rich groups (Esteban and Ray, 1994). An individual eventually falls into either of the groups; the distribution exhibiting a population that is either rich or poor with very small or no middle class bridging the gap between the two.

Presently, Nigeria economy is driven by agriculture and is rural based employing large proportion of her labour force with about 70% of the population (NBS, 2005) in the rural area and the sector was reported to have the highest contribution of 41.84% to her GDP in the year 2009 (NBS, 2010). If income distribution is therefore polarized in the rural area, the possible tension and social conflict that could arise will disrupt rural production and spill over to urban sectors with serious strikes, demonstrations, processions and revolt which Duclos, Esteban and Ray (2004) identified as consequences of polarization with implications for sustainability of policy implementation (Aigbokhan, 2000).

In spite of the relevance of income bipolarization, literature on it is very lean and much is still needed to be done and reported (Wang and Tsui, 2000) and the situation is not different in Africa. This study adds to the available literature on income polarization in Nigeria and Africa which include that of Aigbokhan (2000), Vanderpuye-Orgle (2002) and Awoyemi et al (2006). The study therefore adopted Foster Wolfson (1994) (FW) and Lasso de la Vega and Urrutia (LU) as demonstrated by Duclos Esteban and Ray (2008), and Rodriguez (2006) respectively to measure income bipolarization over some years due to available software and relative ease in their computation. With LU, bipolarization was linked with poverty.

The linkage of bipolarization and poverty is desirable due to the fact that poverty level is high in Nigeria with poverty incidence of 54.5% in 2004 while it was 43.2% and 63.3% in urban and rural areas respectively (NBS, 2004). It is therefore worth measuring income bipolarization between the poor people and the rest of society and to make policy makers aware of the possible social conflict which could be measured by the bipolarization index due to

poverty (Rodriguez, 2006). Hence the use of LU bipolarization linked poverty to establish if the rural income distribution poses a danger of social conflict in Nigeria. Consequently, the paper is aimed at addressing the pattern of bipolarization in the rural sector of Nigeria over the period 1980 to 2004, the linkage between bipolarization and rural poverty, and households' socio-economic characteristics which include their poverty status through regression. Many studies including Nnadi and Nnadi (2009) applying regression analysis often capture socio-economic features and we hypothesize that there is no significant relationship between the characteristics and bipolarization.

2. Methodology

The geographical area of this research is the rural area in Nigeria. The sample frame is all the rural households enumerated by NBS in 1980, 1985, 1992, 1996, and 2004. The same research design was used by NBS to get the five sets of data. Therefore, secondary data of the four national consumer surveys done in 1980/81, 1985/86, 1992/93 and 1996/97 by the Federal Office of Statistics (rechristened National Bureau of Statistics, NBS) were used and that of year 2004 Nigeria Living Standard Survey. The complete household level survey data set were used and were extracted from diskettes obtained from NBS. It should be noted that the surveys were done with the assistance of the World Bank and British Council (NBS, 2004). These data sets were use by NBS (2004, 2005) to analyze the published poverty profile in Nigeria. Normalized real per capita consumption expenditure of the households was used as proxy for income and analyzed as follows:

The pattern of bipolarization among the rural households:

a) Foster-Wolfson (1994) index and Lasso de la Vega and Urrutia bipolarization index were used.

i) The Foster-Wolfson index (FW) (1994) is based on the Lorenz curve and it is derived from the Gini-Coefficient and it was demonstrated by Duclos, *et al* (2008) as

$$FW(k) = 2[2[0.5 - L(k, 0.5)] - I_2(k)] \frac{\mu(k)}{Q(k, 0.5)} \dots\dots\dots (1)$$

$$= \frac{\xi(k; \rho=2) - 2GL(k, p=0.5)}{Q(k, p=0.5)} \dots\dots\dots (2)$$

Where:

- () = The Gini social welfare Index
 - GL(p) = The Generalized Lorenz Curve
 - Q(p) = The Quantile function
 - I₂(k) = The Gini index of inequality
- We use equation (1) because Gini social welfare index was not reckoned with.

ii) Lasso de la Vega and Urrutia bipolarization index as demonstrated by Rodriguez (2006) is given as

$$P^{LU}(X; \alpha, \beta) = \left[\frac{\prod_1^\alpha (1 - G_1)^\beta + \prod_2^\alpha (1 - G_2)^\beta}{\prod_1^\alpha (1 - G_1)^\beta + \prod_2^\alpha (1 - G_2)^\beta} \right] G_h^B(x) \dots\dots\dots (3)$$

where,
 h= income that separate the income distribution into two different income groups
 if h= m, the median income Equation (3) becomes

$$P^{LU}(X; \alpha, \beta) = \left(\frac{1}{2} \right)^\alpha \left[\frac{(1 - G_1)^\beta + (1 - G_2)^\beta}{(1 - G_1)^\beta + (1 - G_2)^\beta} \right] G_m^B(x) \dots\dots\dots (4)$$

- where,
- x = x₁, ..., x_n = income levels
- x_i = the income of the ith household
- m = median income
- ∏_i^α = percentage of the population of group i
- ∏_i^α = the identification term
- = 1 or 1.6 = importance of group identification
- β ≥ 0 = the degree of sensitivity towards group cohesion
- ∏_i^α (1 - G_i)^β = Identification term of group i
- i = 1, 2
- G^B = Between groups Gini-coefficient

Moreso, bipolarization was linked with poverty using Rodriguez (2006) approach. Accordingly, if poverty line, z, is the income level that divides the income distribution in two groups, the bipolarization between poor people and others is explicitly based on a poverty index and LU bipolarization index is a function of the normalized poverty deficit index of Foster-Greer-Thorbecke (FGT) as stated here-under.

$$P^{LU}(X; \alpha, \beta) = \left[\frac{\prod_1^\alpha (1 - G_1)^\beta + \prod_2^\alpha (1 - G_2)^\beta}{\prod_1^\alpha (1 - G_1)^\beta + \prod_2^\alpha (1 - G_2)^\beta} \right] \left[\frac{T_Z^{FGT}(x; 1) + \frac{\prod_1 \mu_i (\mu - Z)}{\mu}}{\mu} \right]$$

$$T_Z^{FGT}(x; \gamma) = \text{product of headcount and income gap ratio} \dots\dots\dots (5)$$

$$T_M^{FGT} = T_Z^{FGT}(x; \gamma) = \frac{1}{N} \sum_{i=1}^n \Gamma(x_i)^\gamma \dots\dots\dots (6)$$

$$\Gamma(x_i) = \max \left[\frac{Z - x_i}{Z}; 0 \right] \dots\dots\dots (7)$$

where, FGT = Foster-Greer-Thorbecke family of poverty measure

- γ = FGT parameter = 1
- x_i = income of the ith household
- x = the household distribution, x₁, x₂, ..., x_n
- n = number of households below the poverty line, Z
- N = the total sample population
- Z = poverty line (2-3rd of mean income)
- μ = mean income of the total population distribution.
- μ₁ = mean income of the poor in x-distribution below Z

This family of poverty measures is the normalized poverty deficit index or the product of the headcount and income gap ratios, D_Z(x)/Z = I_Z(x), when γ = 1, I₁ = q/n and I_Z(x) is the income gap ratio. The model, equation 5, is sensitive to incidence of poverty and its intensity because γ = 1. Rodriguez (2006) mentioned that it might be more suitable to use the poverty line to measure income bipolarization instead of using the median or mean incomes to divide the income distribution into two groups. By this, bipolarization and poverty measures are closely related, capturing normalized poverty deficit index as bipolarization is between the poor and the non-poor in the income distribution.

Finally, using 2004 data point, households' poverty status and bipolarization were considered using tobit regression with covariance analysis approach because most of the regressors are dummy variables. We generated FW bipolarization estimates for all the Thirty Six States of the Country. The estimate per state was then adopted for all households in that State as their bipolarization indices. This is because bipolarization estimate cannot be directly measured for each household and the household bipolarization estimate of the entire rural households was used as dependent variable against their poverty status as poor and non-poor households based on the two-third

poverty line and other socio-economic variables as shown below. The lowest and highest bipolarization estimates were used as the lower and upper limits for the tobit application using Stata 10.1. The tobit equation is as follows:

$$Y_i^* = \beta X_i + \varepsilon_i \quad \dots\dots\dots (8)$$

For , $Y_i = Y^*$ if $Y^* > T$
 Y^* if $Y^* \leq T$

Assuming $T = 0$

Thus $Y_i = Y^*$ if $Y^* > 0$ or
 0 if $Y^* \leq 0$

If $Y_i^* = Y$, then

$$Y = f(X_i, d_i) \quad \dots\dots\dots (9)$$

Where, $i = 1, 2, \dots, n$

Y = Bipolarization, Continuous variable

X = Socioeconomic Variable

d = Dummy socioeconomic variable (some will be additive while some will be multiplicative).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 d_1 + \beta_6 d_2 + \beta_7 d_3 + \beta_8 d_4 + \beta_9 d_5 + \beta_{10} d_6 + \beta_{11} d_7 + \beta_{12} d_8 + \beta_{13} d_9 + \beta_{14} d_{10} + \beta_{15} d_1 d_2 + \beta_{16} d_1 d_3 + \beta_{17} d_1 d_4 + \beta_{18} d_1 d_5 + \beta_{19} d_1 d_6 + \beta_{20} d_1 d_7 + \beta_{21} d_1 d_8 + \beta_{22} d_1 d_9 + \beta_{23} d_1 d_{10} + \beta_{24} d_1 X_1 + \beta_{25} d_1 X_2 + \beta_{26} d_1 X_3 + \mu \quad \dots\dots\dots (10)$$

Where,

Y_1 = Income Bipolarization of household $i = 1$

X_1 = Age (in years)

X_2 = Household Size (number of individual in each household)

X_3 = Fathers' Education (Years)

X_4 = Mothers' Education (Years)

d_1 = Household poverty Status (Poverty Dummy: 1 = poor, 0 = Non Poor)

d_2 = Gender (Female Dummy: 1 = female, 0 = male)

d_3 = Marital Status (Married Dummy: 1 = Married, 0 = otherwise)

d_4 = Religion Status (1 = Christian/Muslim, 0 = otherwise)

d_5 = Occupational Group (Farming Dummy: 1 = Farming, 0 = Non Farming)

d_6 = Membership of Socio Group (Membership Dummy: 1 = Membership, 0 = Non Membership)

d_7 = Retired Age (1 = Minimum of 60 years-Retired, 0 = below 60 years- Active age)

d_8 = Wage employment (Wage Dummy: 1 = Wage employment, 0 = Non Wage employment)

d_9 = Geographical location (South Dummy: 1 = South, 0 = North)

d_{10} = Credit status (Credit Access Dummy: 1 = Access to Credit, 0 = No Access to credit)

Interactive Dummies = $d_1 d_2, d_1 d_3, d_1 d_4, d_1 d_5, d_1 d_6, d_1 d_7, d_1 d_8, d_1 d_9, d_1 d_{10}, d_1 X_1, d_1 X_2, d_1 X_3,$

All coefficients of d_1, d_2, \dots, d_{10} (that is $\beta_5, \dots, \beta_{10}$) are differential intercepts coefficients because they tell us by how much the mean value of bipolarization indices of the dummy category that receives the value

of 1 differs from the intercept coefficients of the benchmark category, the category that receives the value of 0.

$\beta_5, \dots, \beta_{10}$ = Differential effects of the respective dummy variable (or Differential Intercepts Coefficients)

$\beta_{11}, \dots, \beta_{19}$ = Differential effects of the interaction dummies in multiplicative form (or Differential Slope Coefficients)

$\beta_{20}, \dots, \beta_{22}$ = Differential Slope Coefficients or Slope Drifter.

β_1, \dots, β_4 = Slope Coefficients of X_i
 ε_i = Error term

3. Results and Discussion

Pattern of income bipolarization by FW and LU: Foster-Wolfson (FW) and Lasso de la Vega and Urrutia (LU) bipolarization indices show similar pattern. Bipolarization decreased between 1980 and 1985, increased up to 1992 and reduces through 1996 to 2004 as shown in Table 1. Bipolarization estimates through FW index were 0.6125, 0.4067, 0.4775, 0.4108 and 0.3529 in the years 1980, 1985, 1992, 1996 and 2004 respectively. This means that the size of the middle class in the rural area increased in 1985, reduced in 1992, then increased in 1996 and further in 2004. This calls for the sustenance of existing macro-economic policies and rural economy development programmes in encouraging the trend to continue. Compare with Awoyemi (2009) bipolarization estimates of 0.49 and 0.37 in 1996 and 2004 respectively, the estimates are close with similar trend. Aigbokhan (2000) also obtained Wolfson bipolarization of 0.72, 0.65 and 0.51 for the rural Nigeria in 1985, 1992 and 1996; these estimates are comparable with our figures. Similar pattern is provided by LU Index. The LU index with $\beta = 1.6$ and $\alpha = 1.0$ gave the lowest estimates of 0.1676, 0.1430, 0.1610, 0.1460 and 0.1586 in 1980, 1985, 1992, 1996 and 2004 respectively as shown in table 1. So the discussion forthwith will be based on the estimates obtained with degree of alienation parameter $\beta = 1.6$ and degree of identification parameter $\alpha = 1.0$; the extreme case of bipolarization parameters and the choice of these parameters is at the discretion of the researcher. As shown in Table 1 the estimates of FW are higher than the LU estimates but the two shows similar pattern within the years under consideration. It should be noted that in the period of Structural Adjustment Programme, 1985 through 1992, bipolarization were enhanced while in post SAP era 1996 to 2004 bipolarization reduced. The probing instinct is that why did bipolarization decreased between 1980 and 1985 and then increased from 1985 through 1986 to 1992.

Table 1. Extent and Pattern of Income Bi-polarization

		Bi-Polarization Indices			
		Lasso de la Vega and Urrutia			
Year	Foster-Wolfson	= 1.6; = 1.0	= 1.6; = 0.5	= 1.0; = 1.0	= 1.0; = 0.5
1980	0.6125	0.1676	0.2024	0.2540	0.3068
1985	0.4067	0.1430	0.1667	0.2168	0.2526
1992	0.4775	0.1610	0.1951	0.2440	0.1899
1996	0.4108	0.1460	0.1703	0.2213	0.2582
2004	0.3529	0.1383	0.1586	0.2096	0.2404

One would recollect that the Federal Government of Nigeria said that economy policy of SAP was a failure in Nigeria instead of improving the income of the rural households, it made it worst. But in subsequent years, the economic frameworks and programme like National Economic Empowerment and Development Strategy, National Poverty Eradication Programme and Fadama Programme appear to be helping in increasing the middle class size in the rural areas. This perhaps is in tandem with the findings of NBS (2007) which showed that there was an upward movement from the core poor to the upper middle class and specifically there was a movement from 12 per cent income of the lowest class to an increase of more than 7 per cent of the upper middle class in 2004. Thus the pattern of bipolarization reflects the policy environment and political economy of the country.

As shown in Table 2, when poverty gap increases, bipolarization increases and when it decreases, bipolarization decreases. In 1980, poverty gap was 0.4481 and bipolarization was 0.2502. In 1985, 1992, 1996 and 2004, the former was 0.2955, 0.3603, 0.2665 and 0.1927 while the later was 0.1939, 0.2110, 0.1816 and 0.1419 respectively. Poverty incidence was 80.44, 66.95, 71.16, 62.76 and 50.39 per cents for the respective years. Thus, as poverty increases/decreases, bipolarization increases/decreases as well. In rural Nigeria therefore, there are those that are poorer among the rural poor population as it has been reported that about 70 per cent of Nigeria population is poor and majority lives in the rural areas (NBS, 2004). Income is bipolarized in rural Nigeria according to the findings and there are poorer people among the rural population indicating income heterogeneity. As households become poorer they move away from the middle income level where majority should be for equality, to the tail end of the income continuum while fewer and fewer households are left in the middle and of course the upper end of the income continuum is usually of very few households as well.

Relationship between bipolarization, household poverty status and socio-economic features:

As shown below table 3, the diagnostic features of the FW bipolarization tobit regression indicate that left and right censoring were zero as all the 42,525 observations in the data set were used in the analysis. The Pseudo R-square was -0.0379; it was pseudo R-square because there are no direct equivalents of R-square (from OLS regression) in non-linear model. The log likelihood ratio chi-square of 5818.92 (df=26) with a p-value of 0.0000 indicates that the model as a whole fits significantly better than a model with no predictors. In the table 3, one would see the coefficients, their standard errors, the t-statistic, associated p-values and the 95% confidence interval of the coefficients as well as the marginal effect of 100% change in the regressor's value on the regressand. Since bipolarization has been observed to move in the same direction with poverty, the expected signs of the coefficients of the regressors, as shown in table 5, follow those of poverty analyzed by Hahm (2010), Mok *et al* (2007), Omonona (2001), Imai *et al* (2009) and Gaiha *et al* (2007).

Age, Poverty Status, Female Gender and Christian/Muslim Religion Status, South Location and Credit access have positive effects on income bipolarization. Household size, Father's and Mother's years of education, Married Status, Farming Occupational Group, Membership of social group, Retired age and Wage employment have negative effects on income polarization. All except household size and credit access follow the apriori expectation. Religion, membership of socio-group, retired age and credit access are not significant even at 10 per cent level of significance; Retired age is significant at 14 per cent while others are significant at higher levels.

Using the marginal effect estimates being superior to the Beta coefficients, If age of household head increases by 1 year, bipolarization will increase by 0.00014 and if household size increases by 1 unit, bipolarization will decrease by 0.00037. If father's or mother's years of education increase by one,

bipolarization will reduce by 0.00027 or 0.00013 respectively. Increasing poverty, female and Christian/Muslim status household head by 100 percent, bipolarization will rise by 0.02520, 0.00119 and 0.00008 respectively. If one increase the Married household heads, farming households, membership of socio-group, retired age households heads and wage employment households by 100 percent bipolarization

will decline by 0.00636, 0.00697, 0.00051, 0.00163 and 0.00105 respectively. If households located in South and Credit access are increased by 100 per cent, bipolarization will rise by 0.01150 and 0.00032 respectively.

Table 2. Poverty and Income Bipolarization

Year	Poverty Index	Poverty Index	LU
	(= 0)	(= 1)	Bipolarization (= 1.6; = 1.0)
1980	0.8044	0.4481	0.2502
1985	0.6695	0.2955	0.1939
1992	0.7116	0.3603	0.2110
1996	0.6276	0.2665	0.1816
2004	0.5039	0.1927	0.1419

Poverty line: 2-3rd of mean per capita consumption expenditure as proxy for income

The implication of this is that age, poverty and female gender tend to feature or induce higher income bipolarization. Christian/Muslim religion status tends to induce higher bipolarization but is not significant. Education, married status, farming, membership of socio-group, retired age and wage employment reduces income bipolarization while South location and Credit access enhances income bipolarization among households, though religion status, socio-group membership, retired age and credit access are not significant. The coefficient of education shows that the higher the education years of household heads, the less is income bipolarization. The more educated households are, the more opportunities the households have of earning more income. This interpretation means that irrespective of the gender and poverty status of household head, bipolarization is positively related to, for instance, age which may not hold and this informed the use of intercept coefficients.

For the differential intercept coefficients relating to the dummy variables in their additive forms the average income FW bipolarization indices of poor households are higher by 0.0252, those of female headed households are higher by 0.00119, those that are Christian/Muslim, South located and credit access are higher by 0.00008, 0.0115 and 0.00032 respectively. Households that are married, farming, member of socio-group, retired age, and wage employment have average income polarization lower by 0.00636, 0.00697, 0.00051, 0.00163 and 0.00105 respectively (refer to table 3) compared with their base categories. Interactively, however, some of the signs and level of significance change for some of the covariates, as shown in same table 3.

According to Table 3, the average income bipolarization index for poor-female headed households is higher by 0.00492 and that of poor-married household is lowered by 0.01652. Similarly, for poor- conventional religion, it is higher by 0.00465 whereas, poor-farming, poor- membership of socio group, poor and 60 years of age minimum, poor- wage employment, poor-south located and poor- access to credit are lower by 0.01048, 0.00105, 0.00252, 0.00060, 0.00569 and 0.00128 respectively when compare with their base categories. Poor households with respect to age have mean income bipolarization that is higher by 0.00041, but with respect to household size and father's education their average income bipolarization is lower by 0.00102 and 0.00058 respectively compared with their base category non-poor.

Table 4 reveals that the sum bipolarization interactive effect of poor-female of 0.03131 is higher relative to poor male or non poor-female and this value is higher than 0.0252 of poverty difference alone and 0.00119 gender difference alone. This probably signals that gender issue will remain one important source of input in income distribution policy as this study shows that income distribution is more polarized among females than male.

Poor - married sum interactive effect of 0.00232 is higher than their base category but the value is lower than the 0.0252 poverty difference alone and higher than marital difference alone (-0.00636). This should not be a surprise finding because most of the household heads are married and their lower mean bipolarization effect only has downward pressure on the sum interactive effect

Table 3: Tobit Regression of Foster-Wolfson Bipolarization

Foster-Wolfson Polarization	Coef	Std. Err	t	P>/t/	Marginal Effect
Age	0.00017	0.00003	6.34	0.000*	0.00014
Household Size	-0.00045	0.00008	-5.51	0.000*	-0.00037
Fathers Education	-0.00034	0.00004	-8.49	0.000*	-0.00027
Mothers Education	-0.00016	0.00003	-5.83	0.000*	-0.00013
Poverty Status – Poor	0.03073	0.00303	10.13	0.000*	0.02520
Gender – Female	0.00146	0.00050	2.93	0.003*	0.00119
Marital Status – Married	-0.00775	0.00076	-10.18	0.000*	-0.00636
Religion Status – Christian/Muslim	0.00010	0.00131	0.07	0.943	0.00008
Occupational Group- Farming	-0.00839	0.00074	-11.28	0.000*	-0.00697
Membership Group- Membership	-0.00062	0.00065	-0.96	0.329	-0.00051
Retired Age Status- Minimum of 60yrs years	-0.00202	0.00110	-1.84	0.066	-0.00163
Employment - Wage employment	-0.00131	0.00057	-2.31	0.021*	-0.00105
Geographical Location- South	0.01403	0.00053	26.74	0.000*	0.01150
Credit Status- Credit access	0.00039	0.00057	0.68	0.494	0.00032
Poor-Female	0.00599	0.00078	7.70	0.000*	0.00492
Poor-Married	-0.02118	0.00120	-17.65	0.000*	-0.01652
Poor- Christian/Muslim	0.00572	0.00213	2.69	0.007*	0.00465
Poor- Farming	-0.01311	0.00124	-10.55	0.000*	-0.01048
Poor- Membership of Socio-Group	-0.00130	0.00099	-1.31	0.191	-0.00105
Poor- Minimum 60 years old	-0.00314	0.00178	-1.77	0.077	-0.00252
Poor- Wage employment	-0.00075	0.00085	-0.84	0.382	-0.00060
Poor-South located	-0.00719	0.00087	-8.30	0.000*	-0.00569
Poor- Access to credit	-0.00158	0.00088	-1.81	0.071	-0.00128
Poor-Age	0.00051	0.00004	11.90	0.000*	0.00041
Poor-Household Size	-0.00126	0.00012	-10.62	0.000*	-0.00102
Poor-Fathers' Education	-0.00072	0.00005	-14.63	0.000*	-0.00058
Constant	0.17493	0.00191	161.17	0.000*	-----
/Sigma	0.0352	0.00012			

Summary: 0 left censored observations 0 right censored observations 42525 Uncensored observations

Number of obs = 42525 LR CHI2(26) = 5818.92 Prob > chi2 = 0.0000 Log likelihood = 79722.16 Pseudo R2 = -0.0379

t_{tab}: 1% = 0.005; 5% = 0.025; 10% = 0.05 where * indicates P values less than 5% (significant at 5%) ** Significant at 10 %

Poor – religion: The sum interactive effect shows that the household heads that are poor with religion affiliation have average income polarization of 0.02993 more than those that are non-poor with religious affiliation. This value is more than the poverty level difference (0.0252) and religion difference (0.00008) if considered separately. Though not significant, religion affiliation tends to contribute more to income bipolarization. This is contrary to the idea that being a member of a religious group could afford a household

of additional income through interpersonal gifts in terms of money and material items. Religious organization can also give such items to their members thus belonging to a religious organization should have income equalizing effect. It is also common in Nigeria context that religious groups identifies their members' areas of professions and affords them with income rewarding jobs in the religious system.

Table 4. Interactive Effect of the Coefficients:

Interactive or Multiplicative Dummy	Sum of Differential Intercepts and Slope coefficients & Multiplicative Coefficients	Total Interactive Effect
Poor-Female Household	$0.02520 + 0.00119 + 0.00492$	0.03131
Poor- Married Household	$0.02520 - 0.00636 - 0.01652$	0.00232
Poor- Christian/Muslim Household	$0.02520 + 0.00008 + 0.00465$	0.02993
Poor- Farming Household	$0.02520 - 0.00697 - 0.01048$	0.00775
Poor- Member of Socio-Group	$0.02520 - 0.00051 - 0.00105$	0.02364
Poor- 60 years old Minimum	$0.02520 - 0.00163 - 0.00252$	0.02105
Poor- Wage employment	$0.02520 - 0.00105 - 0.00060$	0.02355
Poor- South Located	$0.02520 + 0.01150 - 0.00569$	0.02066
Poor- Access to credit	$0.02520 + 0.00032 - 0.00128$	0.02424
Poor- Age of Household Head	$0.02520 + 0.00014 + 0.00041$	0.02575
Poor- Household Size	$0.02520 - 0.00037 - 0.00102$	0.02381
Poor- Father's Education	$0.02520 - 0.00027 - 0.00058$	0.02435

Poor and farming household have sum interactive effect of 0.00775 higher when compared with their base category. The value is lower than poverty intercept but higher than farming intercept and their slope coefficients of 0.0252, -0.00697 and -0.01048 respectively. This means that poor and non-farming households have less average income bipolarization indices.

Poor and membership of socio-group with total interactive coefficient of 0.02364, the households that fall into this category have income bipolarization that is higher by 0.02364 than their base category, non poor – membership of socio group or poor non-membership of socio-group. This value is lower than poverty difference alone (0.0252) and higher than membership of socio-group difference (-0.00051) when taken into consideration alone. The household heads that are poor and minimum of 60 years old have sum mean bipolarization indices of 0.02105 lower than the poor households intercept difference or higher than the households that are 60 years old minimum (-0.00163) compared with the poor below 60 years of age or non poor-60 years old minimum and it is between 0.0252 (poverty status alone) and -0.00163 (active age difference alone). This shows that among the rural households there probably exists lower income bipolarization among those that are 60 years old and above than those below. As age increases, productivity increases, *ceteris paribus*, get to peak and start declining to the point of negative. It is only aged people that have probably remittances, savings and socio-economic insurance, for instance, standing perennial cash crops that may not become poorer, that is, that may not fall into victim of being at the tail end of income distribution continuum.

Bipolarization is therefore lower among the aged.

Poor and wage employment household heads have sum interactive income polarization indices of 0.02355 less than poverty difference, 0.0252 but more than those on wage employment difference, -0.00105 compare with their base category, poor-non wage employment or non-poor wage employment. This perhaps implies that with wage employment, polarization of income tends to decline. In the rural area, there exists little or no wage employment opportunities except probably on-farm hired labour which may be one of the reasons for high income bipolarization.

Poor-South located households have sum interactive income bipolarization indices of 0.02066 lower than poverty difference alone (0.0252) but higher than south-located alone (0.0115) compared with their base category, poor -North located or non-poor south located. This implies that income bipolarization indices are higher in the South than in the Northern Nigeria on the average.

Poor- access to credit: The Household heads that fall into this category have sum interactive average income polarization index of 0.02424 higher than their base category, non-poor credit access household heads. This index is lower than 0.0252 (poverty difference alone) and higher than 0.00032 (access to credit difference alone). All these covariates of poverty indicate that poverty has large significant positive effect on bipolarization.

From table 3, the differential slope coefficient of income polarization of the poor households with respect to age, 0.00041 is significantly higher than the non-poor just like its intercept coefficient of 0.0252 is significant both with *p* values of less than 1

percent. The slope coefficient of the polarization function with respect to age significantly differs for poor households and non poor households just like their intercept coefficient significantly differs as well. One may reject the hypothesis that polarization indices for the poor and non poor households with respect to their age are the same.

The differential slope coefficient of the bipolarization of the poor households with respect to household size is 0.00102 less than those of the non poor and it is significant just like the intercept coefficient of the poor households is higher by 0.0252 than that of the non poor households and is also significant. Therefore there is significant difference between the polarization of the poor households and non poor households with respect to the number of individuals per house.

The differential slope coefficient of the bipolarization function of the poor households with respect to father's education is 0.00058 less than that of the non-poor households just like the intercept coefficient is higher by 0.0252 than that of the non poor households. The two coefficients are significant at 1 per cent level and indicate that the income polarization function in respect to fathers' education differs between the poor and non poor households. Polarization has significant relationship with the socio-economic characteristics of households.

4. Conclusion

In this paper, we have applied Foster-Wolfson (1994) and Lasso de la Vega bipolarization (2006) indices to estimate bipolarization in the Nigeria rural sector from 1980 to 2004. Bipolarization reduced from 1992 to 2004 indicating that income distribution is improving in the sector. We linked bipolarization with poverty and it was established that they both moved in the same direction. If the income distribution have more poor households, the more it becomes bipolarized; a feature that should be expected in Africa where poverty level is high. The consequence social conflict and tension from bipolarization should be avoided through income redistribution policy that will balloon the middle class in the rural area where income distribution is heterogeneous with majority of Nigeria population. We equally showed that it is possible to apply regression analysis in bipolarization analysis by relating bipolarization with households' socio-economic variables. Income bipolarization was higher among households that are poor, female-headed, lower among married, farming based and members of social group household heads compared with their base categories. Bipolarization was higher among South located households than those in the North. Poverty has the highest positive significant

effect on bipolarization. Focus would therefore have to be more in the South on income equalizing and redistribution policy to reduce bipolarization. We suggest that in the rural area, membership of social group should be promoted, education made accessible, wage employment encourage and efforts at reducing poverty should be stepped up to reduce bipolarization and prevent the revolt that could result from it. However, we are not unmindful of the short-coming of our data sets that were of very little documentation with the exception of 2004 data point. This we played down by verbal discussion and explanation with the staff of the Statistical Department of Nigeria.

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Application Of Distance Education in Agriculture

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Abstract: Nowadays, using computers has changed man's life at all aspects. Done researches in relation to development programs of all countries, represent central role of information technology and communication at these programs. information technology and communication can be used as a powerful tool for improving quality and efficiency of education so that change traditional practices of education and no more physical presence at classrooms. If so far, education benefited just from teachers and trainers, books were considered as major informational sources for education, nowadays education has faced with new communicational tools and environments. Recent progress at computer industry and local information networks, regional and international information (especially Internet), multimedia, communicational technologies, have placed new tools and practices against planners, programmers, managers and executers of educational programs. Influence of new informational technologies on educational centers (schools to universities) and even houses, have changed simple relationship between students and teachers completely.

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Introduction

In this order, traditional learning samples have changed and users is faced with large extent of information and knowledge. Now, most countries which are leading at the field of telecommunications are establishing and operating virtual universities and class or developing their traditional systems. Establishing and managing these organizations would have some problems and challenges in addition to its benefits. But what is obvious is that virtual universities are suitable place for emergence of talents and innovations. At farming, we deal with learners who have unique features. Learners who are mostly adults and all responsible of their family life. Adults, who have been far from educational studies for a while, would need to review required skills ranges by studying again. They need to increase their required skills for their life and work by spending least time during learning. One suitable solution can be Distance education (Ismaili, 2010).

Definition of Distance education:

Distance education refers to those systems which relation between learner and teacher is through communicational systems. So in this system there isn't any time and place restriction for learner. At the other hand, in these way educational materials is available for learner through multimedia so that they benefit from this education without attending class, effectively. Generally, Distance education begins with corresponding method and these kind of

education also progressed in accordance with science and communication technology progress. So that after corresponding method, using Radio, TV and Video taped were common and after diffusion and development of personal computers and fast growth on multimedia equipments and especially emergence of internet (through various electronics tools (internet, intranet, satellite networks, video and audio tapes and CD-ROMs) was distributed and being operated by different methods (courses, modules, low learning activities) and its operation is without any geographical and time constraints (asynchronous and simultaneous learning) that great change emerged on Distance education (Grimes, 2003).

History:

Distance education organizations, are established base on their special educational needs in each country. In Australia, broadness of country and decentralization of population were most important factor for emerging and prevalence of Distance education. In china and India, base factor of tendency to Distance educational system are: population density and lack of dynamism and budget of educational organizations (Rasouli, 2010).

In USA, England, France, Germany and Japan, adult education issue and its continuity and also familiarizing with new sciences and skills are among most important factor for establishing Distance education organizations. In African countries,

economic problems caused that Distance education being common as a cheap system and partly replaced by traditional education system. In Iran , also due to broadness , decentralized population , great number of villages and existence of nomadic population and also young population (that even are bigger than whole population of some countries) has made it necessary to apply Distance education(Anonymous, 2010).

Tools such as slides and animation entered to classrooms as an educational assistance tools and emergence of TV industry made milestone at evolutionary process of education, at the other hand it caused that education theorists and experts release from traditional corresponding education environment and simultaneously use TV for education. At recent decades, range of activity at the field of education and learning like other scientific, cultural, economical and social activities has changed and affected by fast development of technology and emergence of phenomenon such as satellite, computer, internet ant etc (Information society - information technology, 2010).

History of electronic education in Iran refers to time of using audio and visual educational assistance tools such as slide showing and educational films at classrooms. After that, TV was considered as an educational media and Iran national TV del with public education across the country formally. After entering computer industry to Iran and growth and influence of personal computers among different social-cultural groups, activity at the field of computer-base education began. And now it is more than 10 years which this activity continues and these issues were begun by producing educational CDs.

First corresponding schools were founded about 1892 at Europe that they paid to teaching foreign language and stenography through Post. License of first collegiate educational Radio issued at 1921 that was considered as a first base for forming electronic education. At 1960 Distance education technology was changed, by evolution and development of media, and universities enroll students by combinatory application of multimedia tools and official structures for supporting education. Personal computers and internet, caused recreation of education appearance and they have provided learning for students from Distance. At 1980, TV broadcasting was changed be satellite emergence and caused revolution at electronic education industry ((Ismaili, 2010).

By emergence of internet, first course of undergraduate was provided by technology institute of New Jersey at 1984 through online system. Within this, electronic education in Iran was considered by science, research and technology ministry. At 2001,

virtual education site of Tehran University began by providing 9 lessons for students, daily. At 2003, first educational organization dependant to Shiraz university was established and at 1386 this organization changed to college according to developing educational activities and increasing number of students. Now, most of well known university of country, has established their electronic education units as a virtual education center. First unit which was pioneer for establishing and applying Distance education at Iran, is PAYAM NOOR university. Universities and organizations of country , began their activities at the field of learning electronic within 1998 to 1999 averagely . generally , after second half of year, approach to this item was more serious and operational activities at the field of internet education and using telecommunication width band was began for providing educational courses across the countries(Jeffres, 2005).

Benefits of Distance education :

1- religious and cultural differences ;

learning from Distance considers religious, cultural, racial and ethnical differences. Nowadays, these differences exists at most part of world and are among factors which causes problems at schools and educational centers. Distance education can consider these issues and teach according to learner. Also Distance education can develop time chances for education.

2- education for everyone and everywhere;

in this education , learner's access to course content isn't depend on time and place. Internet can be logical solution for organizations and provide their access to educational goals. Through computer networks, access to electronic education can be forever and there isn't any limitation for clerks , students and also other people. Just base need for using computer-base education and Online education is having one computer. At electronic education , people are able to learn their needed information in all time of day and week(Rasouli, 2009).

3. Update education;

For production education organization and companies, important subject is training forces according to progress of technology in order to make them ready to enter competitive market and for earning more revenue. In electronic education , educational managers can change their educational page and content according to needs of society and marketplace moment by moment while in traditional education, level of reviewing and changing content last even months(Chizari and linder, 2002) .

4- population increase

One of main challenge of less developed countries is social, economical and cultural imbalanced growth

of different parts. Distance education has affective role as a one of strategy for establishing balance by offering various trainings.

5. chance for deprived areas

Distance education provides more educational chances for residents of deprived area especially at different field of girl's education .

6. affection on public culture

since that Distance education provides especial options for Provinces so each province can deal with programming for its subsidiaries parts according to geographical conditions and status. And by establishing educational centers at different parts ,increase education cover level at secondary and high school especially those areas which face with limitation for access to education. Therefore this kind of education is field for reinforcing public culture at one hand and existing subculture at the other hand in this area(Labani, 2009).

7. flexibility at time and place

main advantage of electronic education is that allow participants to set their programs. Flexibility allows them to decide wherever and when to study and how long spend for learning. In this method, education flow isn't against with work plan , social and cultural condition and even with family responsibility of participant. Having no limitation for boarder and time, being provide possibility of learning everywhere and for everyone are among its unique features(Barron, 2002).

8. girls and women's access to education :

at village usually there is some limitation for girls and women's education ; because often there isn't possibility for learning higher than primary school at this villages . so they have to go to bigger villages and next cities. Now if it is possible to provide electronic education facility at houses or at least at their villages , so they would able to learning and also it is possible to teach them other life skills such as housekeeping, farming, ranching and etc .

9- developing justice and equality

Electronic education , typically creates justice and equality among different groups at different parts by establishing equal terms for all learners. Developing or less developed countries can decline their gaps with industrial and developed countries, By using this kind of educational method . also electronic education at village can decline gap between city and village and creates new hopes at rural society in order to dynamism at the field of production and efficiency and also cause economic growth(Badragheh, 2006).

10. prevent migration:

Now, major part of villagers especially youths migrate to cities due to various reasons such as education, job and etc that this issue has caused some problems both at cities and villages. While, there is possibility for job and education at villages through applying ICT , not only it prevents migration but even some of them return to their previous location.

11. immediate access to high volume data :

Ease of access to high volume data and existing knowledge at the world and immediate and timely access to information are among its benefits.

12. using limited numbers of available educators:

Distance education , uses limited available educators optimally especially while we faced with educational personnel shortage or those who learned related education with need. At this educational system, educators focused on geographical direction and student are able to communicate with their teachers at education center directly or through telephone or Post(Parrott, 2005).

13. reducing costs

Distance education has high costs at first. But over time it would decrease by equipping educational centers and producing educational content such as tutorial book, educational assistance books , work and practice, VCD, VHS, and multimedia CDs and would lead to saving costs(Bates, 2000).

14. help workers and disabled persons :

Distance education is good channel for educating workers and persons who less enjoy physical abilities.

15. emergence of learning :

Need to basic lessons can be planned as concentrate form and can be applied for removing emergences and facilitating learning through different methods(Carter, 2001).

16. without fear learning :

Students who register at one online course, have entered to risk free environment that can test them at new cases and make mistakes without impose themselves against other's judge. This ability is valuable for student experience skills such as decision making and guiding. Risk free environment , would increase student's self confidence and productivity(Rintala, 2002).

17. Update education :

For organizations and production-education companies , main issue is training forces according to the technology progress in order to make them ready for entering competitive markets and earning more revenue. In electronic

education, educational managers can change their pages and educational contents according to society and marketplace moment by moment while in traditional education reviewing levels and changing contents, lasts months.

18. simulating educational environments :

Electronic education is able to create all various educational environments according to different softwares and offers to users. At this kind of education, users are able to enter to places which really is hard to access and they are able to use educational assistance base on their needs (Romiszowski, 2000).

19. overcome on Physical gap

They overcome on physical gap By Distance learning. Learners living at faraway regions who aren't able to attend physically at schools and also learners and educators who are far from each other, can learn needed educations by using benefits of this system (Bolton, 2002).

20. costs saving

At electronic education, travel costs and costs related to professors and advisors would reduced and prevent time waste. At this education, educational courses can divided to short sessions and offers at more days and weeks instead. At electronic education, organizations will not lose their staffs and employer's efficiency would increased (Labani, 2009).

21. forever learning

Distance education prepares field for all students and those who interested by providing them various educational facilities in order to actively deal with education constantly and also with additional efforts and always increase their knowledge level or coordinate their knowledge with global knowledge and indeed reach to forever and constant learning.

22. continuing education of women and mothers

Since that usually there are some especial conditions for mothers and women which prevent them to learn (housekeeping, cultural problems of child care and ...) so this method is new way for them (2010).

Disadvantage of Distance education :

1. low level of personal computers (PC) per capita in country : unfortunately, there isn't formal and exact statistic about number of PC in country yet. However it seems that there is increasing number for PC but yet due to different reasons, PC wasn't considered as basic home appliances. For example It can be mentioned that : high relative cost for

buying PC, lack of knowledge about its potential capabilities, regrettable low level of computer literacy even among educated persons and professors which consider PC as a decorative device or toy at house or office. Or some negative and cynical attitudes toward entering PC and internet to home environment that maybe be due to low computer literacy and lack of knowledge about its useful capabilities (Pierre, 2004).

2. low rate of access to internet global network at country :

access rate to internet at Iran is very low even compared to same developing countries. However there isn't any exact statistics for that but base on most optimistic surveys, just 2,000,000 persons access to internet however it is predicated that this number reaches to 15,000,000 until third five year plan.

3. relatively high primary cost :

among abovementioned essentials, preparing hardware and communicational necessity is very costly which sometimes is hard to prepare. This issue is more significant at developing countries.

4. continuing communication and supporting costs :

cost of using Internet isn't one time forever and its cost, continue over time. Cost of telecommunication subscription and supporting computer can be problematic for persons and organizations and cause that they face with high costs.

5. need to computer literacy:

in order to enter to electronic education, first step is dominating on computer, at the other hand, in order to access to electronic education we need to computer as a main education tools and everybody learn to use it. Because at this sense, electronic education would manifested. Now, In our country, providing electronic services is developing daily but it isn't inclusive yet due to lack of people's aware of these services. at most part of world starting point of internet is new and most persons aren't familiar with this environment and facilities. so, computer aversion make affairs more difficult and makes them far than ever (Badragheh, 2006).

6. education by non-native language :

most information and articles, exist at English language on internet, which we should have language proficiency in order to understand them. Moreover, many ethnic groups living at different rural area of country, that even using some subjects and Persian educations are difficult for them, and maybe some subjects being unfamiliar for them.

7. resisting against change :

because , technology contains big changes at designing method and applying education , so it has created large resistance among persons and organizations. Reasons of resistance against change is different such as : fear of unknowns , need to effort at learning new subjects , losing power and prestige due to role changes and disagree with new beliefs.

8. affects on village life and context

certainly, presence of ICT at villages has affected rural context and maybe affects on family's form. Presence of this technology create critical condition due to capability of accepting is lower at villages. Also maybe while villager's knowledge level increase so he desists farming and deal with non-productive affairs which this problem has more possibility among youths.

9. lack of suitable infrastructure at country :

all governmental and private efforts would result usefully in relation to electronic education if primary infrastructure and facilities being available across the country. In order to access and search in world wide web, we need to hardware , software and communicational facilities undoubtedly which preparing them can be cheap or expensive base on conditions . this fact is acceptable for all that we can use electronic education well , when learners and teacher have easy and orderly access to computer and connection to web. This problem isn't exist at cities of developed countries but exist at rural and urban area. When we consider whole advantage and disadvantage of Distance education , we would find that disadvantage are more than disadvantages. But this dose not mean that forget disadvantages(Rasouli, 2010).

Necessity of using Distance education by Internet at agriculture:

This is a question that how we can decline digital gap between villagers and burghers that needs high thinking. But simple answer is that electronic education and creating infrastructure and fields , and making it applicable at villages can be prevent creating barrier between urban and rural , and would provide motivation for staying at village and help for economic of country at the national and international fields. Recently, Agriculture magazine (Corp) assessed more than 350 farmers in relation to using internet orderly(Strain, 2004).

About 75% of these farmers have more than 500 hectares. Next, 44% started using internet and also enjoy credit cards. This analysis shows that farmers more using internet for more easement of buying inputs and selling productions and even receiving various data by increasing busy of work and even

under cultivation field. Technology at production process , and value of goods efficiency can increase . so , time technology can be affective if user use it for tangible interests. If electronic education contains applicable data and global knowledge , so farmer not only can increase his/her productions but also is able to improve his/her life level from different aspects. For example, if farmer can gain proper data about seed of his region, most suitable time and planting principles , number and cycle of watering , suitable time for fertilization through electronic education and use them properly so undoubtedly he would able to improve his life condition through increasing productions and also can prepare better condition for his family. We can return dynamism to rural life by taking new technology to village and nativization these technologies and base on that , educating villager for affective using of these technologies and so decline deep technologic gap between rural and urban that everyday get deeper , then we would be able to prepare following rural development(Rasouli, 2009):

- completing knowledge and improving character of rural society members
- growth public knowledge of villagers about saying beliefs around their fates and society
- growth of useful ideas about self-help and cooperation of rural societies
- Growth of productivity on rural society members and try to discover potential resources
- Villager's maturity for identifying and solving problems about their societies and themselves
- Growth of villager's technologic data for systematic choosing and using and premier production methods

Using electronic education at agriculture of Iran

From sense of growth at IT fields ,Iran are among those 50% which retarded from rapid informational revolution caravan . Iran population at 2004 has been 66991500 which about 23 million live at rural area. About 5 million internet users exist at urban area of Iran but limited numbers connect to internet at villages. Until a few years ago , most peoples were not familiar with IT concept and some people defined it as computer and internet. Informatics officials of country were not excluded from this principle and applied many plans to show their activities at this field that maybe just few numbers was included as IT definition. But fortunately , at recent years , newspapers and news agencies by establishing IT services , officials by different plans and organization , individual and legal persons by performing

innovative plans and establishing informative web ; had participated on introducing IT to people and using it optimally in order to improve efficiency. at the global information society summit that was held at 2003 and Iran was signer member of this law and it was prescribed that signers countries connect Universities up to 2005, hospitals up to 2010 and all villages up to 2015 to internet. Villages are retarded traditionally and it isn't good from social sense that we give all facilities to cities. At 2000 , first internet village "SHAHKOOH" which is one of big village of Golestan province was entered to virtual world. This action that was due to 2years project , has deep affection on rural life at the economical , social and cultural fields. Farming improved and people found that it is possible to enter to market without dealer , then analysis its logic and buy everything and sell too. More than 500 persons at the village which accommodates 300 families have passed computer and internet course and large number could pass get license from technical-professional organization. Second internet village is GHARNABAD at Golestan. At 2004 , first inclusive IT user services was opened there. Residents are same residents from SHAHKOOH that spend their summer at SHAHKOOH and their winter at GHARNABAD. ICT ministry decided to equip 10,000 villages of country to rural ICT offices at the national plan. These offices provide Post bank , telephone, and other governmental services further connection of those village with Internet .

Necessity of communication at Distance education:

since that we have less face to face communication at Distance education , so some principles should be considered at this kind of education. Holmberg (1989) knows that this education as directed dialogue and considered it 7 assumptions:

- bilateral relation should be created between learning and teaching
- advanced materials for organized self learning being existed
- learning task should be fun
- law and language atmosphere should amplify friendship dialogues
- message which is received by learner should be as dialogue form and be understandable and maintainable at memory
- Distance education should be as dialogue form always
- Programming and leading is necessary for organized studying

We can easily see that Holmberg has humanism sense.

Results and suggestions:

Government and other related organizations should make decision principally and by planning at the field of internet emergence at rural area. Unfortunately, most planned programs at our country is short term and sectional. We should see this issue by broader vision and at least have twenty-years approach about rural ICT. If we decided to modify or develop infrastructure of communication network so village should be considered too and also connecting them to communication network of country. For first step we can start with those villages which have phone lines. Every villagers who have phone line also should have Internet base in order that farmers can use it. Developing ICT and drawing it to village need to invest. Government should exactly specify budget and capital for equipping villages of country with this technology. Fortunately, NGOs have act well at the field of ICT. Government can have affective role at developing ICT by supporting this part and encouraging investors to participate at national and regional plans at the field of ICT at village and also problems which NGOs have faced .

In order to gain experience and better result , it is necessary to test electronic education at small levels at one or more villages and results being analyzed. We should act by planning and forecasting About electronic education and entering ICT to villages.

Generally , it can be said that developing policy of education at world has developed. We should consider that there are very unknown point in this education that we must realize them and use them for education villagers.

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Prevalence of Depression among Elderly and Evaluation of Interventional Counseling Session in Zagazig District -Egypt

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Abstract: Depression is one of the most prevalent disabling and costly health problem among elderly. This work aimed to study the problem of depression among the elderly through determining the magnitude of depression among them, classifying the diseased according to the severity of depression, exploring some personal risk factors related to depression and evaluation an applied interventional counseling session for the diseased. This study is composed of two stages; the first one was a cross sectional design in which multistage random sample was applied to Zagazig District where 290 subjects were included in this study. The applied questionnaire included questions about sociodemographic status, some associated risk factors for developing depression and also Geriatric Depression Scale was applied to detect depressed patients and classify them according to the severity of the disease. The second stage was an interventional one applied to depressed elderly who were subjected to a counseling session educating them about the importance of counselling, follow up and recalling knowledge about treatment. Obtaining results revealed that the percentage of depression was 46.6 % and those with mild or moderate condition constitute 75.6%. Depression significantly increased with age, female (OR 2.56), not married (OR 4.47) and those having previous death event among the surrounding (OR 7.68). The severity increases among age group over 75 years and more (OR 4.52) and those of low socioeconomic condition (OR 8.8). The applied counseling session had a significant impact on recalling knowledge about the prescribed drugs (60.7%), how to manage the missed doses (71.4%), using drug correctly (75.0%) and recalling medication name (75.0 %) ($p < 0.05$). In conclusion depression is an undiagnosed public health problem. It significantly increases with age, female sex, not married subjects, and those having history of death event in their relatives. Moreover the severity of depression increases with age and low socioeconomic condition. The applied intervention counseling session had a good effect on improving drug knowledge and probably the attitudes of the depressed patients. So increasing the role of geriatric medicine in primary health care system and introduction of counseling session at outpatient clinics to increase compliance to treatment are good recommendations from that work.

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Key words: depression, risk factors, geriatric medicine, counseling.

1. Introduction:

Depression is the most common mood disorder in later life. It may be associated with serious consequences, including; disability, functional decline, diminished quality of life, increased mortality and increased service utilization. Moreover it is undiagnosed in about 50% of cases (Charney et al ,2003) .World health organization (WHO) considered that the age of 65 is the beginning of aging, but in Egypt, the age of 60 is still considered the beginning of aging according to the retirement age for most of people (Sheriff ,2000).

World Health Organization is predicting that by the year 2020, depression will become the second leading cause of disability, so it is considered as a major public health problem (Finley et al, 2002&Ustun et al, 2004)

It is estimated that the prevalence of psychiatric disorders including depression in community-residing older adults is 25% or more

(Jeste et al, 1999). Rates of psychiatric disorders are much higher among elderly patients seen in primary care or hospitalized for medical conditions it is estimated to be 30%-50 % (Borson and Unutzer, 2000)

Specific sociodemographic characteristics are differentially associated with the prevalence and risk of depression onset in the community. Among the most striking is female gender and this can be explained by the presence of biological and psychosocial factors related to female gender (Kessler et al, 2003)

A number of measures and scales have been constructed and used to assess and diagnose depression in a wide variety of populations. The most widely used self-one is the Geriatric Depression Scale (GDS); it was developed to assess the cognitive, emotional and behavioral symptoms of depression among the elderly population (Montorio and Izal ,1996). But it has limited value in the

assessment of depression in Alzheimer's patients (Rubin et al, 2001).

Although antidepressants are effective in patients with depression, effectiveness is reduced by non-compliance (Nabeel et al, 2008). Compliance to antidepressant therapy is essential for positive patient outcomes. Some studies had shown that up to 70% of patients diagnosed with depression take their medication inappropriately (Boudreau et al, 2002). While therapy duration for treating depressive disorders should continue for periods of at least 9 months or even years (American psychiatric association, 2002). Various studies had shown that 30–68% of patients discontinue therapy only after 1 month of treatment (Wooley and Simon, 2000). In addition to medications a variety of interventions comprising of patient education, such as physician counseling, had been reported to improve compliance with antidepressants (Hoffman et al, 2002).

Depression nowadays is a major health problem particularly among elderly and engaging them in the medical process by providing them counseling sessions which has a significant positive effect on their compliance to medications, so the current study was aimed to study that problem through the following objectives: to determine the magnitude of depression among elderly and to classify the diseased among them according to the severity of depression by using the Geriatric Depression Scale, to explore some personal risk factors related to depression and to apply intervention counseling session and evaluate it.

2. Subjects And Methods

This study was carried out through two phases:

Phase I:

1-Technical Design:

- Study design and sampling technique:

A cross-sectional study that was carried out on a suitable sample of elderly people who were above 60 years of age, the sample was collected using multistage random sampling technique. Zagazig District was divided by Moes Sea (one of the derivatives of Nile River) into two sectors; west and east. The west sector was chosen randomly (1st stage) then the west was divided into urban and rural areas. Two urban regions and two villages were selected randomly (2nd stage). Each selected village and urban region were divided into four sectors and one sector was selected randomly from each one (3rd stage)

Then each house in the selected areas was given a code and recorded. The sample included all

houses within each of the two selected areas (rural and urban)

- Sample size:

The sample size was calculated by assuming that the estimated prevalence of depression in elderly is 20% (Yount and Sibi, 2009), confidence level was 95% and the total number of elderly in Zagazig District according to Central and General Package Statistics System in 2006 was 60035 central and general package statistics system 2006, the calculated sample size was 245 subjects, accounting for non-response rate 20% the study sample size will be 290 subject

Time of the first phase:

This phase was carried out during the period from January 2009 to March 2009.

-Tools used:

Data collection tools:

Data for this study were collected by a pre-constructed and pre-tested questionnaire that was designed to include the following:

- 1- Socio-demographic data: age, sex, marital status, education level, occupation, income, and with whom he/she lives.
- 2- Some Risk factors for depression: losing a close person, leaving family home, living alone.
- 3- Geriatric Depression Scale (GDS): This scale was developed as a basic screening measure for depression in older adults. It is composed of 30 questions. Each question may be answered yes or no. One point is assigned to each answer and corresponds to a scoring grid. Total Score: 0-9 = normal; 10-19 = mild depression; 20-30 = severe depression (Sheikh et al, 1991). This scale was translated into Arabic and tested for its validity.

2- Operational design

It included two stages, namely pilot study, and field work stage.

-Pilot study:

A pilot study was conducted to assess the feasibility of the translated GDS and the time needed to fill out the questionnaire. It was conducted on 30 elderly subjects. They were excluded from the main study sample. Data obtained from the pilot study were analyzed, and accordingly necessary modifications in the questionnaire were done.

- Work Field:

All study members were interviewed by the researcher in front of their houses. A verbal consent was obtained from the study subjects after explaining the purpose of the study and reassuring them about the strict confidentiality of any obtained information and that the study results would be used only for the purpose of research, then the designed questionnaire sheet was filled by the study subjects and by the researcher for illiterate subjects

Phase II:

Design, sample size, study population and time:

An intervention (non randomized controlled trial) was conducted and applied on depressed elderly who were diagnosed according to the used Geriatric Depression Scale. Sample size was calculated in this stage by assuming that the response to counseling session about is 30%, the calculated sample to this stage was 28 subjects who will take counseling session and 28 subjects as a comparative control group. The researcher contacted subjects either by phone or personally and asked them to participate in the second part of the study. Those who agreed to participate were divided randomly into 2 equal groups (control and intervention) and they all take an appointment at Zagazig University Hospital Psychiatry Outpatient Clinic after being promised to take medications free from charge from researchers. All the contacted and diagnosed patients were asked if they previously asked for medical care or not and their points of views for the need for additional information about their medications was also collected based on agree and disagree scoring. This phase of the study was carried out during the period from April 2009 to July 2009.

Work Field

1- The first visit

The intervention group subjects were given antidepressant drugs from the specialist physician and subjected to a counseling session that took between 20 and 25 minutes in length. The counseling sessions was intended to help patients to understand the nature of depressive illness and to reinforce that taking medications in the way as prescribed. Advice was also provided on the side effects of medications. Emphasis was also placed on the need to continue taking medication unless otherwise advised by doctor. Advice was taken to patient so as not to take personal decision to modify their therapy, insist to know the medicine name, reason for medication, using medication correctly, dosage and how to manage missed doses. The control group subjects were given antidepressant drugs only. Both groups were asked to come to Psychiatry Outpatient Clinic

outpatient clinic again in a second visit 6-8 week after the first visit.

2- Second visit:

Patients of both groups interview was done to investigate the effect of counseling session by asking each patient to recall specific knowledge regarding the prescribed medicine: medication name, reason for its prescription, dosage, how to manage missed doses

Data management:

Data were computed and analyzed using the statistical package for social science (SPSS) for windows version 10.

3. Results

More than one half of our sample was females (51.4 %) and the majorities were between 60-70 years. Most of them were married 69.0 % and the majority of middle or high level of education (33.1 %, 36.9%). About 90.0 % of them were not working and living with someone in their house and more than one half of our sample were of moderate socioeconomic level (52.1%). Moreover 76.2% of them had history of deaths among their surroundings. (Table 1)

According to Geriatric Depression Scale, this study showed that 46.6 % of the study sample had depression and 75.6% of them had mild to moderate degree of depression (Figure 1&2)

Depression was found to be significantly higher among those above 70 and 75 age groups (OR 2.67, 5.08 respectively), females (OR 2.56), non married (OR 4.47) and those who have deaths among the surroundings (OR 7.68) (Table 2)

Severe depression was significantly about four times more among age group above 70 and 75 years (OR 4.50, 4.52) and those of low socioeconomic level (OR 8,8) (Table 3)

Logistic regression analysis of significant risk factors indicated that depression was more predicted among those above 70 years, not married and female. (Table 4)

Most of our sample 83.0 % preferred to get explanation about the prescribed drug. More than half of them (57.0%) had previously asked for medical care but the majority of them did not get any information about the prescribed drug (48.1%). Information was obtained mostly from medication label (25.9 %) and from physicians (20.8 %). (Table 5&6).

After applying intervention in the form of counseling session, 60.7 % of intervention group recalled their specific knowledge about the prescribed

drug and also 57.1 % of them recalled the reason for prescribed drug, moreover 78.6 % of intervention group recalled doses compared to 67.8% of the control group (Table 7).

There is a great significant difference between both groups regarding getting knowledge

about the prescribed drug, managing the missed doses, also the percentage of those using medication correctly and recalled the medication name was higher among the intervention group compared to control group ($p < 0.005$).

Table (1): Frequency Distribution of the Studied Group according to Sociodemographic Characteristics.

Variables	Frequency	%
Age		
60-	97	33.5
65-	104	35.9
70-	41	14.1
≥75	48	16.5
Sex:		
Female	149	51.4
Male	141	48.6
Marital status		
Not married	90	31.0
Married	200	69.0
Education		
Illiterate	24	8.3
Read& write	63	21.7
Middle education	96	33.1
High education	107	36.9
Living Condition		
Alone	39	13.4
With someone	251	86.6
Working status		
Not working	260	89.7
Working	30	10.3
Socioeconomic status		
Low	18	6.2
Moderate	151	52.1
High	121	41.7
Relative deaths	221	76.2
Total	290	100.00

Figure (1) shows the prevalence of depression among the studied group

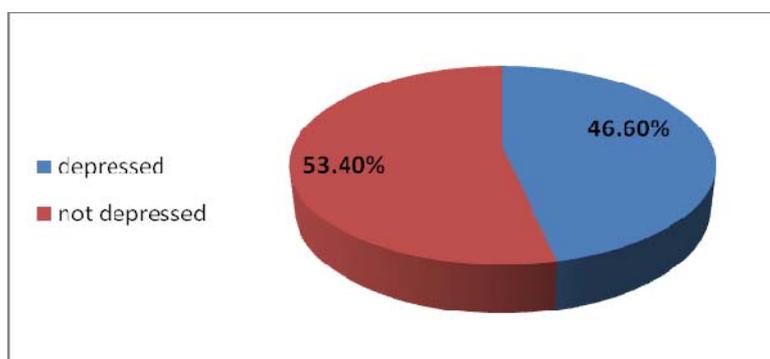
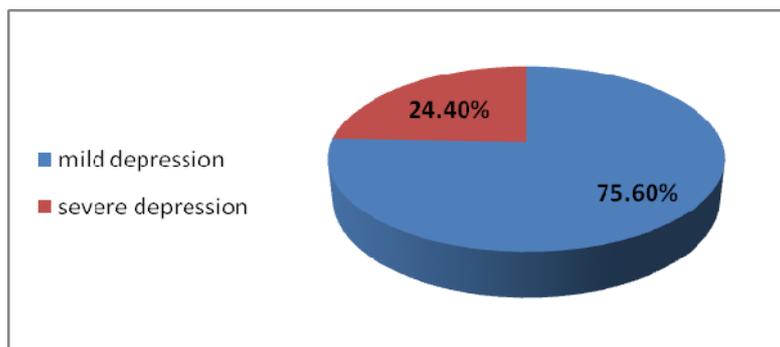


Figure (2) shows classification of depression among the studied group

**Table (2): Association between some characteristics of the study sample and occurrence of depression.**

Variable	Not depressed (155)		Depressed (135)		OR 95%CI
	Freq.	%	Freq.	%	
Age					
No					1
60- (97)	61	62.9	36	37.1	0.98(0.4-1.5)
65- (104)	66	63.5	38	36.5	2.65(1.14-6.02)
70- (41)	16	39.0	25	61.0	5.08(2.21-11.89)
≥75 (48)	12	25.0	36	75.0	
Sex					
Female (149)	63	42.3	86	57.7	2.56 (1.55-4.24)
Male (141)	92	65.2	49	34.8	
Marital status					
Not married (90)	26	28.9	64	71.1	4.47 (2.52-7.97)
Married (200)	129	64.5	71	35.5	
Education					
Illiterate (24)	17	70.8	7	29.2	1.0
Read & Write(63)	32	51.0	31	49.0	1.79(0.60-5.47)
Middle edu. (96)	55	57.3	41	42.7	1.81(0.63-5.35)
High edu. (107)	51	47.7	56	52.3	2.67(0.94-7.75)
Living condition					
Alone (39)	15	38.5	24	61.5	2.02 (0.96-4.26)
With someone(251)	140	55.8	111	44.2	
Working status					
Not working (260)	134	51.5	126	48.5	2.19 (0.91-5.39)
Working (30)	21	70.0	9	30.0	
Socio-economic status					
Low (18)	6	33.3	12	66.7	2.75(0.88-8.88)
Moderate (151)	79	52.3	72	47.7	1.25(0.75-2.09)
High (121)	70	57.8	51	42.2	1.0
Death events					
Yes (221)	96	43.4	125	56.6	7.68 (3.57-16.93)
No (69)	59	85.5	10	14.5	

Table (3): Association between some characteristics of the study sample and severity of depression.

Variable	Mild-Moderate depression		Severe depression		OR (95%CI)
	Freq.	%	Freq.	%	
Age					
No					1.0
60- (36)	32	88.9	4	11.1	1.8(0.4- 8.29)
65- (38)	31	81.6	7	18.4	4.5(1.03-20.9)
70- (25)	16	64.0	9	36.0	4.52(1.16-19.0)
≥75 (36)	23	63.9	13	36.1	
Sex:					-
Female (86)	62	72.1	24	27.9	1.72(0.67-4.47)
Male (49)	40	81.6	9	18.4	
Marital status					
Not married (64)	49	76.6	15	23.4	1.11(0.47-2.62)
Married (71)	53	74.6	18	25.4	
Education					
Illiterate (7)	5	71.4	2	28.6	1.47(0.17-10.42)
Read & write(31)	22	70.9	9	29.1	1.50(0.49-4.58)
Middle edu.(41)	31	75.6	10	24.4	1.18(0.41-3.41)
High edu. (56)	44	78.6	12	21.4	1
Living conditions					
Alone (24)	14	58.3	10	41.7	2.73(0.97-7.64)
With someone(111)	88	79.3	23	20.7	
Working Status					
Working (9)	5	55.6	4	44.4	2.68 (0.56-12.55)
Not working(126)	97	77.0	29	23.0	
Socioeconomic status					
Low (12)	5	41.7	7	58.3	8.80(1.8-45.8)
Moderate (72)	53	73.6	19	26.4	2.25(0.80-6.55)
High (51)	44	86.3	7	13.7	1
Death events					
Yes (125)	94	75.2	31	24.8	1.32(0.24-9.53)
No (10)	8	80.0	2	20.0	

Table (4) logistic regression analysis of factors associated with depression among the studied group

Variables	B	Wald	OR	P
Age (above 70 y)	3.65	6.68	38.5	0.009
Marital status(not married)	1.51	5.43	4.5	0.019
Sex (female)	4.56	6.58	96.4	0.01

Table (5): Preferences to get explanation about prescribed medication among depressed:

	Frequency(135)	Percentage
Agree	112	83.0
Disagree	11	8.1
Not Sure	12	8.9

Table (6): Previous Seeking Medical Care and Sources Of Information Among Depressed Group.

Variable	Frequency(135)	%
Previous asking medical care about depression	77	57.0%
Patient source of information about the prescribed medication(77):		
Nothing	37	48.1

Medicine label	20	25.9
Physician	16	20.8
Pharmacist	2	2.6
Friends, relative and media	2	2.6

Table (7): Difference between intervention and control group after applying intervention session

	Intervention group (28)		Control (28)		X ²	P
	No	%	No	%		
Patient recall specific knowledge regarding the prescribed medicine	17	60.7	9	32.1	4.59	0.03
Recall of reason for medication	16	57.1	10	35.7	2.58	0.10
Recall of dosage	22	78.6	19	67.8	0.8	0.36
Recall how to manage missed doses	20	71.4	12	42.9	4.7	0.03
Using medication correctly	21	75.0	11	39.3	7.29	0.006
Recall the medication name	21	75.0	10	35.7	8.7	0.003

4. Discussion

Depression is a common and serious mental health problem faced by many elderly persons worldwide .This problem is undiagnosed in about 50% of cases.

Although effective treatment is available, case finding among elderly persons and adequate treatment is generally poor so the present study was carried out to determine the prevalence of depression in elderly and the possible risk factors associated with the disease and to assess the impact of intervention counseling session on patients.

The current study revealed that the prevalence of depression among elderly in Zagazig District was 46.6%. This finding is similar to that reported among Tunisian elderly (Yount and Sibi, 2009).however it is higher than that reported by many studies among Asian (5-30%), North American (10-15%), Saudi Arabian (38.9%) and Jordan elderly (24.3%) (Yount and Sibi ,2009&Boey and Chi ,1998 &Parker et al ,2001).The difference in the reported depression rates may be attributed to many factors including; Variations in socio-cultural and economic factors, variation in the study design and sampling technique and variation in the scales that used for assessing depression.

Mild to moderate depression was observed in 75.6% of the depressed group, while 24.4% of them had severe depression , this agrees with (Shin et al., 2008) who reported that the percentage of mild to moderate depression among their study subjects was 76.3% and about 23.7% of them had severe depression.

In consistence with other studies, we found that elderly persons belonging to age group more than 70 had a significant risk more than two times of developing depression and this risk increases more

with increasing age more than 75 to reach more than five times. A significant differences regarding to the severity of the disease was observed only with later age groups. This result may be attributed to feeling of worthlessness and lower income in comparison to high cost of health care needs in this age. We also found that, those exposed to death events among their relatives showed a significant risk of about eight times of developing depression higher than those not exposed to such situation, but there was no noted significant difference regarding the severity of the disease. This finding is due to the presence of many factors that may occur as a consequence to death of one of the relatives including; bereavement and grief, loss of independence, declining health, retirement and lack of social support (Clayton ,2000)&Schoevers et al ,2000& Cole and Dendukuri ,2003&Hur and Yoo, 2002& Lee and Lee ,2002)

Previous studies on depression in elderly populations have shown that socio-demographics are often significant in this respect. Female gender, marital status, education level, financial status, and social support are the commonly identified correlates of depression (Gottfries & Karlsson ,2008) ,so in the current study we explored these risk factors

Regarding gender effect on depression, our study showed that females had significantly higher depression percentage (57.7%) than males (34.8%); moreover they had more than two times risk for developing depression in comparison with males. This finding is in agreement with (Gottfries & Karlsson, 2008 and Lai & Tong, 2009), this can be attributed to long life expectancy in females so they are exposed more to stressful life events and health problems.

Moreover elderly subjects who are not married showed about 4 times risk for developing

depression more than married. This finding is consistent with many studies which stated that non married subjects are more liable to develop depression and this is attributed to the perceived loneliness sensation and loss of social support (Lai, 2004) & Bae et al, (2005). However, there was no significant difference between marital status, gender and the severity of the condition. This is consistent with (Kessler et al, 2003, Shin et al, 2000, Cole and Dendukuri, 2003 and Hur and Yoo, 2002)

The current study showed that the risk of depression increases with increasing educational level but without significant difference. This finding is contrast to a number of studies findings (Bae et al, 2005 & Fleisher et al, 2007) that showed low educational attainment have been reported to manifest the symptoms of depression but without statistically significant.

Although, elderly subjects with low socioeconomic status showed a higher percentage (66.7%) of depression but no significant difference was found, however low socioeconomic level subjects had been associated with significant eight times risk for developing severe depression. This result is in accordance with other researches which concluded that there is a strong association between low socioeconomic status and depression occurrence and this related to bad living conditions resulting in worsening of general health status, in addition economic independence is considered as an important factor contributing to maintenance of mental health (Bae et al, 2005 & Fleisher et al, 2007).

Elderly individuals who were exposed to death events among their relatives had more than seven times risk for acquiring depression than those not exposed to the same events. This is consistent with (Lavretsky & Kumar, 2002) findings; however the risk of developing severe depression was not significantly associated with death events.

In the current study we applied a counseling session for depressed elderly who were diagnosed by the Geriatric Depression Scale and by the help of the psychiatrist. Patients looked at the counseling session in a very positive way, while literature overview showed that the effect of educational intervention offered by clinicians on clinical follow up is controversial, other studies showed that patients have good response to the received educational intervention (Van et al, 2005 & Capoccia et al, 2004)

Evidence from examining data showed that drug counseling intervention was highly effective in conveying elementary drug information to the patient. The counseling sessions were intended to help patients to understand the nature of depressive illness and to reinforce taking medications in the way that they were prescribed would be of benefit to

them. Advice was also provided on the side effects and their management. Emphasis was also placed on the need to continue taking medication unless otherwise advised by doctor. Also, advice was given to the patients so as not to take personal decision to modify their therapy, in addition the session stressed on the value of knowing the medicine name, reason for medication, doses of drugs, using medication correctly and how to manage missed doses.

In the next visit that was carried out after 6-8 weeks of intervention session (during follow up), the patient interview was done to investigate the effect of counseling session where we found a significant increase in the response among the intervention group compared to control group regarding to recall specific knowledge about prescribed drug (60.7%), know how to manage missed doses (71.4%), using medication correctly (75.0%) and recalling the medication name (75.0%).

Although, recalling reasons for medications and dosage of drugs were high among intervention group compared to control group (57.1%, 35.7%), (78.6% 67.8%) respectively but the differences were statistically insignificant.

As regard to patient preference to get information about the prescribed drug we found that the highest percentage of them (83.0%) preferred to get information while 8.9 of them were not sure from this point as they did not have previous experience in this situation. This result is in agreement with another study conducted in Kuwait where the researchers found that the percentage of those who preferred to get explanation about prescribed drug was about 90.4% (Nabeel et al, 2008)

Among 77 depressed patients who previously had asked medical advice about antidepressant drugs, 48.1% of them did not have any information about the prescribed drug, 25.9% of them had information from medication label followed by the physician advice (20.8%). This finding is in contrast with (Nabeel et al, 2008) who found that most of their patients receive information from physician 77%. This difference may be attributed to the difference in the health system between different countries.

In conclusion, depression is an undiagnosed public health problem as it was high among the studied group. It was significantly predicted with increasing age (above 70), not married subjects, and female. Moreover the severity of depression increases with age, low socioeconomic condition. In addition ;lack of getting information about prescribed drug was found among the majority who previously received medical advise and among those who having information, the main sources of it was the

medication labels which reflect the defect in the role of physician during taking medical advice..

Also, Physician can play an important role in patient treatment cycle by providing high quality and easy to understood information during counseling. It is an effective way to improve drug knowledge and probably the attitudes of depressed patients.

Recommendations

Increasing the role of geriatric medicine in primary health care system or at least extending training the physician on diagnosis of psychiatric health problem mainly depression due to its high prevalence nowadays.

Introduction of counseling session at outpatient clinic concise to diagnostic process to increase the compliance to treatment

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Perceived reproductive morbidity and treatment seeking behavior among ever married women in Siwa Oasis, Egypt.

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Abstract: Information about reproductive morbidity in developing countries is scanty and mainly based on information obtained from clinics or hospitals which are not usually reflecting the true magnitude of the disease burden. A cross-sectional study were conducted to assess the self-reported reproductive morbidity and the factors affecting it and to investigate the health seeking behavior among a sample of women in Siwa (Oasis), Egypt. A total of 340 ever-married women in the reproductive age group of 15 to 49 years were interviewed using a pre-designed questionnaire. About three quarters of women reported having any obstetric (72.6%) or any gynecological morbidity (75.6%). The most commonly reported obstetric problem was symptoms of severe anemia (43.8%), while symptoms of lower RTIs (51.2%) and UTIs (35%) were the commonest gynecological problems. Overall, 58.5% of participants had sought treatment for any morbidity with the majority had sought services of the public sector facility (80%). Regression analysis showed that education, age at first pregnancy and duration of marriage were the factors associated with women reports of any reproductive morbidity. The present results reveal a high prevalence of reported reproductive morbidity in Siwa, Egypt. Factors such as education, duration of marriage and women age at first pregnancy were associated with reported morbidity among the sampled women. This high reported rate in peripheral and remote areas needs to be explored further.

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1. Introduction

Reproductive morbidity (RM) is "any morbidity of the reproductive tract, or any morbidity which is a consequence of reproductive behavior including pregnancy, abortion, child birth or sexual behavior and may include those of psychological nature (WHO, 1990). RM encompasses obstetric morbidity, gynecological morbidity and contraceptive morbidity (Sadana, 2000).

Addressing reproductive health issues of women is on the global social agenda for the forthcoming century. Maternal mortality has long been the only indicator for women's health even though RM occurs far more frequently and seriously affects women's lives (Kambo *et al.*, 2003). The pattern of disability adjusted life years (DALYs) lost from reproductive ill health either due to premature mortality or morbidity associated with reproductive conditions is substantially different from that for deaths alone. This is because of the large component of years lived with disability (YLDs) resulting from many of these conditions (Abou Zahr, 1998; Murry & Lopez, 1998).

RM is high among women of developing countries resulting in devastating consequences on health and social well being of women. Usually many

reproductive disorders go unnoticed, either because of being asymptomatic, or because of producing vague and non specific symptoms. Low level of female literacy, low level of awareness, as well as socio-cultural norms, values and taboos withhold women from seeking health care for reproductive tract infections (Rathore *et al.*, 2003).

Information about RM in developing countries is scanty and mainly based on information obtained from clinics or hospitals. However, large proportion of women doesn't visit such facilities; results are not usually reflecting the true magnitude of the disease burden. This type of information is better obtained through community-based self reporting surveys (Rahman *et al.*, 2004).

The procedure of relying on symptoms reported by women has been widely used in health surveys in developing countries such as Demographic and Health Survey and the Pan Arabic Project for Child and Development (Zurayk *et al.*, 1993). Research has shown that self reporting corresponds closely to clinical diagnosis when diagnostic criterion is clear (Zurayk *et al.*, 1995). Thus, such surveys could prove to be an inexpensive way for generating continuous information on reproductive health (RH) issues (Rahman *et al.*, 2004).

Since the International Conference on Population and Development (ICPD), Egypt has given much attention to RH situation by applying policies and programmes to provide adequate services, but reorienting policies and programs have been more challenging. Closing the gap between urban and rural or remote areas' access to and use of RH care is a major challenge for North Africa and Middle East region including Egypt (Fahimi, 2003). Though the region has experienced major improvements in health over the past few decades, significant inequities in access to health care services and overall health status persist for the region's women, especially in the area of reproductive health (Fahimi, 2006).

The present study aimed to assess the self-reported reproductive morbidity and the factors affecting it among a sample of ever-married women in Siwa (an isolated oasis in a frontier governorate-Matrouh), Egypt. It also aimed to understand the treatment seeking behavior of the sampled women for these morbidities.

2. Materials and Methods

A community-based, cross sectional study was conducted. A systematic random sampling technique was adopted, voluntarily taking ever-married women in every fifth house for interviewing, in Siwa town, located in the southern part of Siwa Oasis (Siwa Oasis, information from anserws.com, 2011). Siwa Oasis is one of Egypt's isolated settlements, with 23,000 total populations. Siwa women have traditionally been kept behind closed doors that made them difficult to be examined by strangers (Women's freedom comes slowly to a sleepy Oasis, 2011). RH services are delivered only through one governmental hospital for the whole town. The number of health units that provided RH services in Matrouh governorate equals 82 (compared to 197 in Cairo and 167 in Alexandria). The majority of people living in the Oasis lacks the basic infrastructure, sanitation and proper water supply.

A total of 340 ever-married women in the reproductive age group of 15 to 49 years were interviewed. Women were asked about the symptoms of obstetric morbidity they experienced during their most recent pregnancy, delivery and post-partum period. Also, symptoms of gynecological morbidity that women experienced during the past 12 months were inquired about. The study considered self reported RM status to measure the prevalence of RM, as laboratory verified estimates are eight times more expensive than self reported status (Zurayk *et al.*, 1993). Also, health facilities at the community level in Siwa are generally poorly equipped and service

providers are not well acquainted to detect the morbidity or to provide counseling.

After reviewing the available literature, a pre-tested, structured interview questionnaire was used. The questionnaire drew on a number of existing instruments used to gather data on RM experiences (Zurayk *et al.*, 1993; Swimini *et al.*, 2004; NIPORT, 2003).

In addition to investigating the socio-demographic characteristics, the questionnaire included detailed questions about obstetric history; the complications experienced during pregnancy, delivery and the postpartum period; gynecological morbidity; and patterns of treatment sought for morbidities experienced. The study investigated RM in the form of gynecological and obstetric morbidities. Contraceptive morbidity could not be included owing to the small number of participants reported currently using any contraceptive methods (30.9%). Women were interviewed at their homes by female doctor researchers. The aim of the study was explained to all participants and only volunteered responses were recorded. This study conducted after taking the approval of the research and ethical committee of the High Institute of Public Health, Alexandria University. The study was carried out from April 2010 to October 2010. Data entry and analysis were carried out using SPSS version 16. Univariate analysis was performed with χ^2 test whenever applicable. Logistic regression analyses were used to identify variables that were significantly related to women's reporting of RM. The outcome variable was ever exposure to any RM with women's age, education, age at first pregnancy and duration of marriage taken as covariates (significant variables by univariate analysis).

3. Results

Regarding the socio-demographic characteristics of the participants, about forty percent of the women were in the age group 20 to less than 30, with a mean age of 33.5 ± 8.7 years. Nearly half the participants had ever enrolled in schools (51.8%). Almost all the women were currently married (95%), with a mean duration of marriage of 14.1 ± 10.2 years. The mean age at first pregnancy was 19.1 ± 3.3 years. Four in ten participants reported ever having any pregnancy wastage. Less than one in two women (45%) reported history of institutional deliveries. Only 47.1% of the participants reported ever use of any contraceptive methods and less than one third (30.9%) of them reported current use. Slightly more than half of the women (55.3%) reported having from 1 to 3 deliveries and 12.4% had 9 deliveries with a mean number of 4.4 ± 3.5 deliveries.

Self-reported obstetric morbidity

Findings indicate that more than half (52.9%) of the participants reported suffering from any pregnancy problem during their last pregnancy. The most commonly reported complications during pregnancy were symptoms of severe anemia, reported by about four in ten women (43.8%), excessive vomiting (15.3%) and symptoms of preeclampsia (9.7%). Less commonly reported complications included threatening abortion (6.2%), high fever (8.2%), vaginal bleeding (2.1%) and fits (1.8%).

Concerning complications experienced during delivery, one in five women reported experiencing any complication during the last delivery. As for the individual complications experienced during delivery, 9.7% of participants reported experiencing premature rupture of membranes, 7.9% suffered from prolonged labor

(>12 hours) and 4.4% reported having abnormal presentation of the fetus (other than the head).

In addition to morbidities experienced during pregnancy and delivery, the study also explored the morbidities that women experienced during the post-partum period, with one in four women reported experiencing any post partum complication. The most commonly reported complications after delivery were symptoms of sepsis and heavy bleeding (9.7% & 8.8%, respectively). Breast engorgement and postpartum depression were less frequently reported by all women (3.8 % & 1.8%, respectively).

Table 1 finally presents the percentage of women who reported experiencing any obstetric complication during the last pregnancy with about three quarters of women reported having any obstetric problem (72.6%).

Reproductive morbidities were assessed using the following clinical presentations;

Dysmenorrhea	Painful menstruation.
Menorrhagia	Prolonged duration of more than five days with excessive bleeding
Oligomenorrhea	Duration of bleeding less than three days with scanty period or spotting.
Lower reproductive tract infections (RTIs)	Vaginal discharge with associated itching or irritation, white colored discharge with or without foul odor
Dyspareunia	Painful sexual intercourse.
Lower Urinary Tract infections (UTIs)	Dysuria (pain or burning sensation while passing urine) and frequent urination.
Prolapse	A feeling of heaviness or something coming out (protruding) from vaginal opening
Chronic pelvic pain	Pain in the pelvis that lasts for at least 6 months.
Premature rupture of membranes	Clear fluid leaking from the vagina prior to the beginning of labor contractions.
Preeclampsia after 20 weeks gestation	Includes both blurred vision and severe headache or high blood pressure.
Severe anemia	Includes pale eyes, pallid face, pale palms, breathlessness following light work and breathlessness when lying on one's back.
Post-partum heavy bleeding	Bleeding during the postpartum period that required the woman to change the cloth used to contain the blood every hour or more often
Post-partum sepsis	Includes experience of high fever with foul-smelling discharge within 72 hours following delivery.

Self-reported gynecological morbidity

Surprisingly, high proportion of participants reported having at least one gynecological problem (75.6%). The most commonly reported gynecological problems were symptoms of lower RTIs, reported by nearly half of the sampled women (51.2%), symptoms of UTIs (35%), menorrhagia (32.1%) and symptoms of chronic pelvic pain (31.5%). Less commonly reported complications included severe menstrual pain (25.8%), dyspareunia (24.1%), hypomenorrhea (5.2%) and

uterine prolapse (4.1%). Nine in every ten women reported having any RM.

Treatment seeking for RM

Out of the 247 women who experienced any obstetric morbidity only 83 (33.6%) sought treatment for these health problems. Similarly, out of 257 women who reported having any gynecological morbidity, nearly half of them (47.8%) sought treatment for their morbidities. Overall, 58.5% of participants reported that they had sought treatment for any RM.

Among women who had sought treatment for any RM, the majority had sought the services of the public sector facility (80.1%), one in four women (26.8%) sought the services of private sector, and 18.1% reported receiving treatment at home.

Among women who had sought treatment for morbidities, the majority had sought the services of a doctor from a public sector facility (74.2%) or a private sector facility (26.8%). Almost one-fifth (19.8%) reported that they had sought treatment from an unqualified provider or relied on over-the-counter medications or home remedies and 11.1% reported having sought treatment from a nurse or auxiliary nurse-midwife.

Factors affecting RM

Using univariate analysis selected demographic and reproductive characteristics that associated with the women reports of any RM were elicited (data not shown). The highest prevalence of RM was reported by women in the age group of 20 to 29 years (96.4%), compared to 82.1% among women aged 40 years with significant differences between age groups of women ($p < 0.05$). Illiterate or women who can just read and write reported significantly higher proportion of RM than women with secondary education or above (96.3% & 81%, respectively, $p < 0.01$). Women who got pregnant at first time at age of 20 to 24 reported the least percentage of RM than those who had their first pregnancy at older ages (93%) or younger, with significant differences between these groups. Women with shorter duration of marriage (9 yrs.) reported significantly lower RM compared to women who married for 9 or more yrs. (85.9% vs. 98.7%, $p < 0.01$). Though women who had history of any pregnancy wastage reported more RM than those without such a history, the differences were not statistically significant. Minor insignificant differences were also encountered in the reported morbidity between ever users of contraceptive methods than never users (92% vs. 88.8%). Concerning the place of delivery, women who had their last delivery at an institution reported significantly higher percentage of RM than those who had their last birth delivered at home (95.4% vs. 88.7%, $p < 0.05$). Women who had 9 deliveries reported significantly higher proportion of RM than those with 1-3 deliveries (100% vs. 93%, $p < 0.01$).

Results of the stepwise logistic regression analysis for factors affecting RM among sampled women were shown in Table 4. Illiterate or just read and write women and those with primary and preparatory education were five-times (AOR= 5.51, 95% CI=2.1- 8.4) more likely to report any RM than women with secondary or higher education. Women who got pregnant for the first time at ages older than 25 years were more likely to report any RM than those

who had their first pregnancy at age 20-24 years (AOR=1.73, 95% CI=1.23-2.17). Long duration of marriage was positively associated with the reported RM, with women married for 20 years were more likely to report any RM than women with less than 9 years of marriage (AOR= 4.34, 95% CI=2.08-5.48). All data are available from the authors upon request of any interesting reader.

4. Discussion

In Egypt, the health status of women has improved over the past fifteen years (after the ICPD), but their needs have changed over that same period of time. Their overall health and reproductive indicators are slowly improving; however, this improvement was not eventually distributed among all Egyptian women with noticeable variations by women's education, wealth and place of residence (El Zanty & Way, 2008).

Community based studies have emphasized on elicitation of symptom complexes of RM for correct diagnosis (Bhatia & Cleland, 1995; Hawkes *et al.*, 2000). Till the time, at least peripheral laboratory tests could routinely be incorporated at peripheral health facilities, the diagnosis and treatment of conditions such as RTIs has to rely upon the symptomatology (Nanda & Tripathy, 2005).

The present study revealed a high reported reproductive morbidity rate; all, except nine percent of the sampled women reported having any RM. Findings indicate a high prevalence of most problems, especially symptoms of RTIs, UTIs, chronic pelvic pain and symptoms of anemia. This high prevalence reported by the current study could be explained as most of Siwi women lack access to many RH services (in terms of availability, affordability and even quality of services). Data from 2008 Egypt Demographic & Health Survey (EDHS) revealed that 64.7% of women in the frontier governorates reported receiving regular antenatal care compared to 85.1% of women in urban governorates (El Zanty & Way, 2008). Besides, this high frequency could be attributed to different socio-demographic characteristics of the sampled women than women in other parts of Egypt (in terms of living standard and education). The morbidity rate reported by the study is comparable to that described by the Giza study, a cornerstone study of reproductive morbidity in Egypt, as only 5 percent of women in the Giza study had no RM (Zurayk *et al.*, 1993). A high prevalence of RM has also been reported in studies from other developing countries (Al Riyami, *et al.*, 2005; Bhandari & Kannan, 2010; Rahman *et al.*, 2004).

Symptoms of severe anaemia, as expected, were the most commonly reported symptoms during the last pregnancy by the participants (43.8%), which can be attributed to the high parity of the sampled women (mean number of deliveries of 4.4). It is also interesting to mention that Zurayk *et al.*, (1993)

reported higher prevalence of anaemia in a previous decade (63%). It should be noted that in 2008 EDHS, the percentage of women who received iron during last pregnancy was much lower in the frontier governorates than those in urban governorates (42.3% & 62.9%, respectively), (El Zanty & Way 2008). About one third of women in the current study reported suffering from symptoms indicating UTIs. This high prevalence might be attributed to that the main source of drinking water in Siwa town is artesian and non artesian wells that handled directly from the source after minor treatment (carries a risk of contamination). Al Riyami *et al.* (2005) stated in their study that a urinary culture should supplement self-reports of UTI to enhance specificity, although the presence of a positive culture in the absence of symptoms is of no clinical significance in non-pregnant women or women without renal disease.

Much has been documented to demonstrate the prevalence of RTIs. It is unlikely that symptoms indicating lower RTIs have been reported by more than half of women in our study. Reporting abnormal discharge provides some insight into the extent to which women are aware of abnormal reproductive tract symptoms. It is worth to mention that Zurayk *et al.* (1993) reported in their study a high percentage of vaginal discharge (77%). Their findings revealed that women's reports of vaginal discharge agreed moderately well with the physician's observations, but are not good predictors of the occurrence of reproductive tract infections (Zurayk *et al.*, 1995). Different frequencies of RTIs have been reported in Bangladesh (64.5%), India (52%) and Nepal (30.1%) (Dangal, 2008; Sharma & Gupta, 2009; Rahman *et al.*, 2004).

Furthermore, chronic pelvic pain has been mentioned by almost one third of our sample. This was largely in agreement with Muhammad (2010) who reported a similar prevalence of chronic pelvic pain (27%) in her study in Alexandria, Egypt.

The extent of a woman's use of health services during pregnancy, at the time of delivery and at the post-partum period, is an essential factor in avoiding most of the obstetric morbidities and in treating them quickly when they occur. Women use of services for gynecological morbidities is equally important in controlling reproductive morbidity, and will depend on her perception of need, as well as on availability, accessibility and, especially, on quality of these services (Zurayk, 1995). The situation revealed by our study highlights that less than half of participants had never sought treatment for any form of RM (only 33.6% & 47.8% sought treatment for obstetric and gynecological complications, respectively). The majority of them sought treatment from a public sector facility, in spite of high parity and

high rate of morbidity. Women of these remote areas (Siwa Oasis) tend to internalize their health problems because of their status in the family. They may not be allowed to seek health care, or they may feel shy about reporting reproductive problems causing them to be stigmatized by the community. It should be noted that women's low social status plays an important part in keeping women's suffering from being recognized and addressed. Besides, many women in developing countries have been taught to accept their symptoms as part of being a woman.

Data from 2008 EDHS demonstrated that women in frontier governorates (63.9%) were more likely to be concerned about the unavailability of female providers than women in urban governorates (30%) indicating more cultural obstacles in frontier areas (El Zanty & Way, 2008). El-Mouelhy *et al.* (1994) described even that those women who experience symptoms might not make any linkage with a specific morbidity conditions due to lack of awareness about morbidity conditions, therefore, refrain from seeking medical assistance. Comparatively, Nanda & Tripathy (2005) reported that more than 80% of women included in their study had sought some kind of treatment.

The effect of selected socio-demographic characteristics on reported morbidity was addressed in the present study. Women's age, their educational status, age at marriage, duration of marriage, place of delivery and number of deliveries were the factors that associated with women reporting of any RM by univariate analysis. After using logistic regression analysis for controlling for confounders, only women's education, age at first pregnancy, marital duration were the significant correlates for women's reports of any RM. The effect of socio-demographic factors on RM has been previously reported in other studies (Iyoke *et al.*, 2010; Zurayk *et al.*, 1995).

The experience of our research process revealed that women who never attended schools were 5-times more likely to report any morbidity than women with secondary education or higher. This finding might indicate that illiterate women suffer from heavier morbidity burden or they were more to report due to lack of information generally or awareness about morbidity in particular.

Concerning the duration of marriage, our results revealed that longer duration of marriage was associated with more reporting of RM. Long marital duration is associated with high parity and in turn higher obstetric and gynecological morbidities linked to Iyoke *et al.*, 2010. This finding was in accordance with that of Garg *et al.* (2002) who emphasized a positive association between the duration of marriage and the reporting of RM.

Table 1: Self-reported obstetric & gynecological morbidities among the sampled women.

Characteristic	No.	Percentage
Any Pregnancy complication	180	52.9
Excessive vomiting	52	15.3
Threatening abortion	21	6.2
Severe Fever	28	8.2
Fits	6	1.8
Symptoms of pre-eclampsia after 20 weeks of gestation	33	9.7
Vaginal bleeding after 20 weeks of gestation	7	2.1
Symptoms of severe anemia	149	43.8
Any delivery complication	68	20.0
Premature rupture of membranes	33	9.7
Abnormal presentation of the fetus	15	4.4
Prolonged labor (>12 hours)	27	7.9
Any post-partum complication	75	22.1
Heavy bleeding	30	8.8
Symptoms of sepsis	33	9.7
Breast engorgement	13	3.8
Postpartum depression	6	1.8
Any obstetric morbidity	247	72.6
Total	340	100.0

Table 2: Self-reported morbidity among the sampled women.

Characteristic	No.	Percentage
Any gynecological morbidity*	257	75.6
Severe menstrual pain	85	25.8
Menorrhagia*	106	32.1
Hypomenorrhea	17	5.2
Dysparuenia	74	24.1
Symptoms of lower reproductive tract infection	174	51.2
Symptoms of chronic pelvic pain	107	31.5
Prolapse	14	4.1
Symptoms of UTI	119	35.0
Any reproductive morbidity **	311	100

* Missing data

** Calculated for those reported any obstetric or gynecological morbidity

Table 3: Percentage sought treatment for reproductive morbidity among the sampled women.

Characteristic	Percentage Sought Treatment
Percent sought treatment for any obstetric morbidity*	33.6
Percent sought treatment for any gynecological morbidity**	47.8
Percent sought treatment for any reproductive morbidity	58.5
Type of facility from where treatment was sought#	
Public sector facility	80.1
Private sector facility	26.8
Treatment provided at home	18.1
Type of provider from whom treatment was sought !	
Doctor in a public sector facility	74.2
Doctor in a private sector facility	26.8
Nurse/auxiliary nurse-midwife	11.1
Unqualified provider/pharmacist/ home remedies	19.8

* Percent calculated from women who had any obstetric morbidity.

** Percent calculated from women who had any gynecological morbidity.

! Totals did not sum up to 100% because of multiple responses.

Table 4: Relative risk ratios from stepwise logistic regression for factors affecting RM among the sampled women.

Characteristic	Adjusted Odds Ratio	95% Confidence Interval
Education **		
Illiterate or just read & write	5.51**	2.13- 8.45
Primary & preparatory	1.95*	1.56-3.23
Secondary education or higher ®		
Age at First Pregnancy (years)		
19	1.51*	1.15-1.95
20-24®		
25	1.73*	1.23-2.17
Duration of Marriage (years)**		
<9 yrs ®		
10-19	1.12	0.90-1.49
20	4.34*	2.08-5.48

®: Reference category.

*Significant at $p < 0.05$, ** Significant at $p < 0.01$.

In this study, women who got pregnant for the first time at ages older than 25 years or at age lesser than 20 years were more likely to report any RM than those who had their first pregnancy at age 20-24 years (this age group had the least reported morbidity in the present results). Increased morbidity associated with adolescent pregnancy has been long reported (WHO, 2004).

5. Conclusions:

The present results reveal a high prevalence of reported RM among women of reproductive age in Siwa, Egypt. Socio-demographic factors such as education, duration of marriage and women age at first pregnancy were the factors that associated with reported morbidity among the sampled women. This high reported rate in peripheral and remote areas needs to be explored further. In the absence of cost effective tests, health workers have to be trained to carefully elicit symptoms, and use standardized criteria for clinical diagnosis.

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Moisture desorption isotherms of *Lavandula officinalis* L. flowers at three temperatures

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Abstract

Lavender has been used as a medicinal plant and to treat several diseases. Knowledge of moisture desorption isotherms is useful in food dehydration and drying. The equilibrium moisture content for *Lavandula officinalis* L. flowers were measured by using the gravimetric static method with water activity ranging from 11% to 85% and three temperatures of 30, 40 and 50°C. Five mathematical models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfost and GAB equations) were used to fit the experimental data of desorption. The modified Halsey model was found to be the best model for describing desorption isotherms curves.

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Keywords: *Lavandula officinalis*; Equilibrium moisture content; Desorption

1. Introduction

Lavender is an important medicinal plant of the Labiatae family. Linalool and linalyl acetate are the main component of lavender oils. The relationship between Equilibrium Relative Humidity (ERH) and Equilibrium Moisture Content (EMC) is normally defined by Moisture sorption isotherms (Soysal and Öztekin, 1999). Moisture desorption isotherms help us to determine the maximum moisture that the plant can be allowed to lose during drying. Since all the agricultural products are generally hygroscopic, it is important to determine their equilibrium moisture content for drying, storing, mixing and packaging operations. Having different physical and chemical structures, agricultural crops demonstrate different EMCs under similar conditions (Ahmadi Chenarbon et al., 2010). Medicinal and aromatic plants are used extensively in food, cosmetic, and pharmaceutical industries for the production of spice, essential oils and drugs (Soysal and Öztekin, 2001). Due to their high moisture content and vulnerability to microorganisms, it is very important to provide optimum drying and storage conditions in order to prevent quality spoilage. EMC is defined as the moisture content of hygroscopic material in equilibrium with a particular environment in terms of temperature and relative humidity (Soysal and Öztekin, 1999). In practice, the result of moisture exchange between the product and the surrounding air yields a relative humidity which is known as the Equilibrium Relative Humidity (ERH) (Silakul and Jindal, 2002). The common technique for measuring sorption properties is the static method. This method benefits from the ability to maintain constant conditions (Arnosti et al., 1999; Barrozo et al., 1994). Temperature and relative humidity of the environment

in which samples are placed, are adjusted. When sample mass attains a constant level, sample moisture content is measured and adopted as the Equilibrium Moisture Content (EMC) value. Several empirical and semi-empirical equations have been reported to provide a correlation for the sorption isotherm values of agricultural and food products, including aromatic and medicinal plants (Belghit et al., 2000; Park et al., 2002). However, no single equation is comprehensive enough to predict the relationship between the EMC of agricultural and food products and the relative humidity over a wide range of temperature (Lahsasni et al., 2004; Park et al., 2002). The objective of this study was to determine the desorption isotherms of *Lavandula officinalis* L. flowers at relative humidity and temperature levels ranging from 11 to 85% and from 30 to 50°C, respectively. Five popular models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfost and GAB equations) in the literature were fitted to the experimental data in order to verify their adequacy to describe the EMC of the *Lavandula officinalis* L. flowers (Chung and Pfost, 1967; Halsey, 1985; Oswin, 1946).

2. Materials and Methods

2.1. Experimental procedure: The *Lavandula officinalis* L. fresh flowers used in desorption experiments have been grown in the Institute of Medicinal Plant of Iran in 2010. After harvesting, the flowers were cut from stems immediately. 1g (± 0.0001) samples of fresh flowers for desorption experiments were weighed and placed into the glass jars. The equilibrium moisture content of *Lavandula officinalis* L. flowers were determined by using the static gravimetric method at 30, 40 and 50°C. These temperatures are

often used for drying of medicinal plants. In this method, seven saturated salt solutions (LiCl, CH₃COOK, Mg Cl₂, K₂ CO₃, NaNO₂, NaCl and KCl) with relative humidities ranging from 11 to 85% were used

to maintain relative humidities in the jars (Greenspan, 1976). Table1 gives the equivalent relative humidities for the selected salt solutions at three temperatures.

Nomenclature			
C ₁ , C ₂ , C ₃ , C ₄	equation coefficients	RSS	Residual Sum of Square
C ₅ , C ₆ and C ₇		SEE	Standard Error Estimation
T	Temperature, ° C	MRD	Mean Relative Deviation
Ta	absolute temperature. K	df	degrees of freedom
R	universal gas constant, kJ/kmol k	EMC	Equilibrium Moisture Content
R ²	determination coefficient	d.b	dry basis
ERH	Equilibrium Relative Humidity (decimal)	m	Number of samples
i	sample number		

Table1. Saturated Salt solutions and Equilibrium Relative Humidities at different temperatures

Salt type	Equilibrium Relative Humidity (ERH)		
	T=30°C	T=40°C	T=50°C
LiCl	0.113	0.112	0.111
CH ₃ COOK	0.216	0.204	0.192
MgCl ₂	0.324	0.316	0.305
K ₂ CO ₃	0.432	0.432	0.433
NaNO ₂	0.643	0.616	0.597
NaCl	0.751	0.747	0.744
KCl	0.836	0.823	0.812

Samples were weighted every three days until constant weight was reached. Crystalline thymol was used in the jars to prevent microbial spoilage. Constant weight was reached after about 3 weeks in different levels of temperature and relative humidities. The moisture content of each sample was determined in a drying oven at 105°C for 24h (Anon1996; AOAC, 1990).

2.2. Data analysis: Five models, namely, modified Henderson, Oswin, Halsey, Chung – Pfof and GAB equations were used for correlating and defining the relationship between the equilibrium moisture content data and relative humidity at three temperatures (Table 2).

Table 2. Mathematical relationships applied for desorption modeling of *Lavandula officinalis* L.

Model name	Model expression	References
Modified Henderson	$EMC = \left(-\frac{1}{c_2(T+c_2)} \ln(1 - ERH) \right)^{1/c_3}$	(Thompson <i>et al.</i> 1968)
Modified Halsey	$EMC = \left(\frac{-\exp(C_1+C_2T)}{\ln(ERH)} \right)^{1/C_3}$	(Iglesias and Chirife 1976)
Modified Oswin	$EMC = (C_1 + C_2T) \left(\frac{ERH}{1-ERH} \right)^{1/C_3}$	(Brooker <i>et al.</i> 1974)
Modified Chung-Pfof	$EMC = \frac{1}{c_2} \ln \left(\ln(ERH) \frac{(C_2-T)}{c_3} \right)$	(Chung and Pfof 1967)
GAB equation	$EMC = \frac{C_2 C_3 (ERH)}{[1-C_2(ERH)][1-C_2(ERH)+C_2 C_3(ERH)]}$	(Van den Berg and Bruin 1981)

C₂ and C₃ in the GAB equation were determined by using the following equations (Arabhosseini *et al.*, 2005).

$$C_2 = C_4 \exp\left(\frac{C_6}{RTa}\right) \tag{1}$$

$$C_3 = C_5 \exp\left(\frac{C_7}{RTa}\right) \tag{2}$$

Nonlinear regression analysis was used to estimate the constants of models in desorption experiment (Chen, 2002; Peleg, 1993). Mean relative deviation (MRD), determination coefficient (R²), residual sum of squares (RSS), and standard error estimation (SEE) were used to evaluate the fitting quality of models.

$$SEE = \sqrt{\frac{\sum_{i=1}^m (EMC - \overline{EMC})^2}{df}} \tag{3}$$

$$MRD = \frac{1}{m} \sum_{i=1}^m \frac{|EMC - \overline{EMC}|}{EMC} \tag{4}$$

$$RSS = \sum_{i=1}^m (EMC - \overline{EMC})^2$$

3. Results and discussion

3.1.Experimental Results: Fig.1, 2 and 3 illustrates desorption isotherms of *Lavandula officinalis* L. flowers obtained at various water activities for three temperature levels of 30, 40 and 50°C. As shown, S- shaped curves were found for all three temperatures similar to the most biological products (Ait Mohamed et al., 2005; Kouhila et al., 2002; Lahsasni et al., 2003). On the other hand the full range of water activities and temperatures had a significant effect on EMC and with decreasing temperature in a constant relative humidity, the EMC was increased (Fig.1-3). Such behavior may be explained by considering the excitation state of molecules. At high temperatures, molecules are in an increased state of excitation, leading to weaker attractive forces. This in turn, results in a decrease in the degree of water sorption at a given relative humidity with increasing temperature (Kouhila et al., 2002).

3.2.Fitting of the desorption models to equilibrium moisture data: Desorption curves of *Lavandula officinalis* L. were fitted to five isotherm models. The results of non- linear regression analysis at the three temperatures are listed in Tables 3 and 4. As inferred from the tables, parameters were found to be temperature dependent for all the models. The modified Halsey equation provided the best fit to experimental data of desorption isotherms with the maximum R² = 0.99 and the lowest MRD = 0.101and SEE=0.081, respectively.

Table3. Model parameters, determination coefficients and mean relative errors in fitting of desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters			
	Henderson	Halsey	Oswin	Chung – ppost
C ₁	0.243 ± 0.013	- 2.202 ±0.052	1.422 ± 0.083	6.652± 0.384
C ₂	279.18 ± 21.00	-3.82 ± 0.38 × 10 ⁻⁴	-5.82 ± 3.14 × 10 ⁻³	20.02 ± 11.33
C ₃	2.011±0.061	2.18 ± 0.14	6.182 ± 0.032	83.53± 62.00
RSS	0.0431	0.0301	0.044	0.0320
MRD	0.375	0.101	0.221	0.187
SEE	0.120	0.081	0.107	0.094
Residual	Systematic	Random	Systematic	Systematic

Table4. Coefficients and error parameters of the GAB equation fitted to desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters
	GAB
C ₁	4.352 ± 0.062
C ₄	3.305 ± 0.087
C ₅	3.23 ± 2.201 × 10 ⁻⁴
C ₆	654 ± 31
C ₇	493
RSS	0.045
MRD	0.237
SEE	0.108
Residual	Systematic

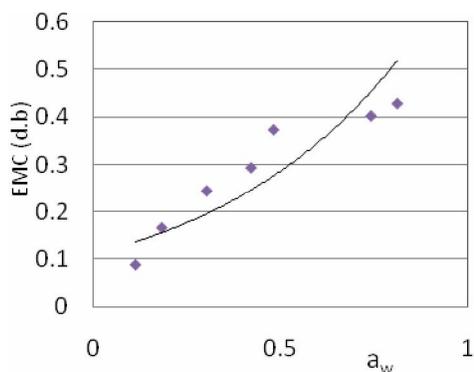


Figure 1. Desorption isotherms data of *Lavandula officinalis* L. flowers at 30°C and fitted curve of the Halsey model

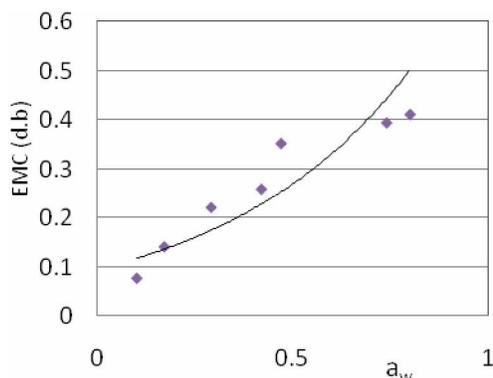


Figure 2. Desorption isotherms data of *Lavandula officinalis* L. flowers at 40°C and fitted curve of the Halsey model

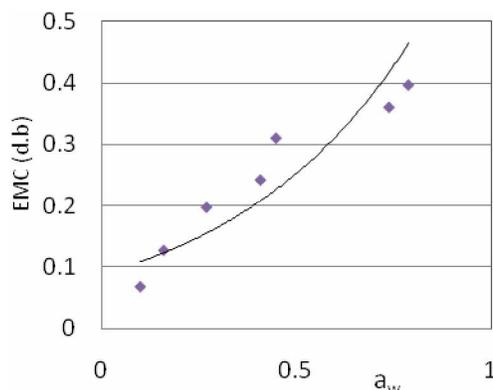


Figure 3. Desorption isotherms data of *Lavandula officinalis* L. flowers at 50°C and fitted curve of the Halsey model

4. Conclusions

Moisture desorption curves of *Lavandula officinalis* L. flowers were obtained at three temperatures (30, 40, 50°C) and relative humidity levels ranging from 11 to 85%. Statistical analysis was used to determine the best equation for predicting the desorption curves of *Lavandula officinalis* L. flowers. Halsey equation was the best fit with lowest error.

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2. Materials and Methods

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K ₂ CO ₃	0.432	0.432	0.433
NaNO ₂	0.643	0.616	0.597
NaCl	0.751	0.747	0.744
KCl	0.836	0.823	0.812

Samples were weighted every three days until constant weight was reached. Crystalline thymol was used in the jars to prevent microbial spoilage. Constant weight was reached after about 3 weeks in different levels of temperature and relative humidities. The moisture content of each sample was determined in a drying oven at 105°C for 24h (Anon1996; AOAC, 1990).

2.2. Data analysis: Five models, namely, modified Henderson, Oswin, Halsey, Chung – Pfof and GAB equations were used for correlating and defining the relationship between the equilibrium moisture content data and relative humidity at three temperatures (Table 2).

Table 2. Mathematical relationships applied for desorption modeling of *Lavandula officinalis* L.

Model name	Model expression	References
Modified Henderson	$EMC = \left(-\frac{1}{c_2(T+c_2)} \ln(1 - ERH) \right)^{1/c_3}$	(Thompson <i>et al.</i> 1968)
Modified Halsey	$EMC = \left(\frac{-\exp(C_1+C_2T)}{\ln(ERH)} \right)^{1/C_3}$	(Iglesias and Chirife 1976)
Modified Oswin	$EMC = (C_1 + C_2T) \left(\frac{ERH}{1-ERH} \right)^{1/C_3}$	(Brooker <i>et al.</i> 1974)
Modified Chung-Pfof	$EMC = \frac{1}{c_2} \ln \left(\ln(ERH) \frac{(C_2-T)}{c_3} \right)$	(Chung and Pfof 1967)
GAB equation	$EMC = \frac{C_2 C_3 (ERH)}{[1-C_2(ERH)][1-C_2(ERH)+C_2 C_3(ERH)]}$	(Van den Berg and Bruin 1981)

C₂ and C₃ in the GAB equation were determined by using the following equations (Arabhosseini *et al.*, 2005).

$$C_2 = C_4 \exp\left(\frac{C_6}{RTa}\right) \tag{1}$$

$$C_3 = C_5 \exp\left(\frac{C_7}{RTa}\right) \tag{2}$$

Nonlinear regression analysis was used to estimate the constants of models in desorption experiment (Chen, 2002; Peleg, 1993). Mean relative deviation (MRD), determination coefficient (R^2), residual sum of squares (RSS), and standard error estimation (SEE) were used to evaluate the fitting quality of models.

$$SEE = \sqrt{\frac{\sum_{i=1}^m (EMC - \overline{EMC})^2}{df}} \tag{3}$$

$$MRD = \frac{1}{m} \sum_{i=1}^m \frac{|EMC - \overline{EMC}|}{EMC} \tag{4}$$

$$RSS = \sum_{i=1}^m (EMC - \overline{EMC})^2$$

3. Results and discussion

3.1.Experimental Results: Fig.1, 2 and 3 illustrates desorption isotherms of *Lavandula officinalis* L. flowers obtained at various water activities for three temperature levels of 30, 40 and 50°C. As shown, S- shaped curves were found for all three temperatures similar to the most biological products (Ait Mohamed et al., 2005; Kouhila et al., 2002; Lahsasni et al., 2003). On the other hand the full range of water activities and temperatures had a significant effect on EMC and with decreasing temperature in a constant relative humidity, the EMC was increased (Fig.1-3). Such behavior may be explained by considering the excitation state of molecules. At high temperatures, molecules are in an increased state of excitation, leading to weaker attractive forces. This in turn, results in a decrease in the degree of water sorption at a given relative humidity with increasing temperature (Kouhila et al., 2002).

3.2.Fitting of the desorption models to equilibrium moisture data: Desorption curves of *Lavandula officinalis* L. were fitted to five isotherm models. The results of non- linear regression analysis at the three temperatures are listed in Tables 3 and 4. As inferred from the tables, parameters were found to be temperature dependent for all the models. The modified Halsey equation provided the best fit to experimental data of desorption isotherms with the maximum $R^2 = 0.99$ and the lowest MRD = 0.101and SEE=0.081, respectively.

Table3. Model parameters, determination coefficients and mean relative errors in fitting of desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters			
	Henderson	Halsey	Oswin	Chung – ppost
C ₁	0.243 ± 0.013	- 2.202 ±0.052	1.422 ± 0.083	6.652± 0.384
C ₂	279.18 ± 21.00	-3.82 ± 0.38 × 10 ⁻⁴	-5.82 ± 3.14 × 10 ⁻³	20.02 ± 11.33
C ₃	2.011±0.061	2.18 ± 0.14	6.182 ± 0.032	83.53± 62.00
RSS	0.0431	0.0301	0.044	0.0320
MRD	0.375	0.101	0.221	0.187
SEE	0.120	0.081	0.107	0.094
Residual	Systematic	Random	Systematic	Systematic

Table4. Coefficients and error parameters of the GAB equation fitted to desorption isotherms at three temperatures

parameters	Estimated values and the variance of the equations and statistical parameters
	GAB
C ₁	4.352 ± 0.062
C ₄	3.305 ± 0.087
C ₅	3.23 ± 2.201 × 10 ⁻⁴
C ₆	654 ± 31
C ₇	493
RSS	0.045
MRD	0.237
SEE	0.108
Residual	Systematic

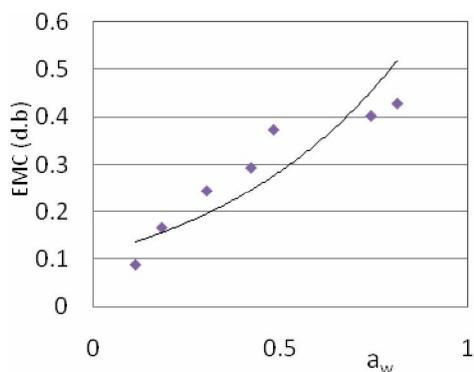


Figure 1. Desorption isotherms data of *Lavandula officinalis* L. flowers at 30°C and fitted curve of the Halsey model

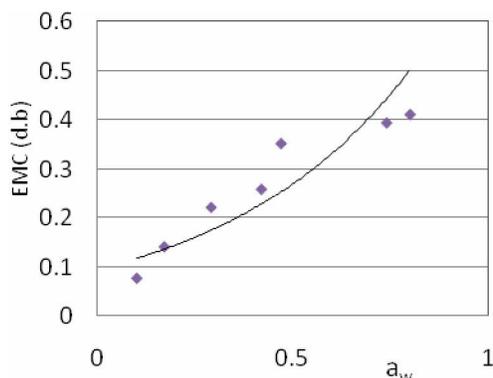


Figure 2. Desorption isotherms data of *Lavandula officinalis* L. flowers at 40°C and fitted curve of the Halsey model

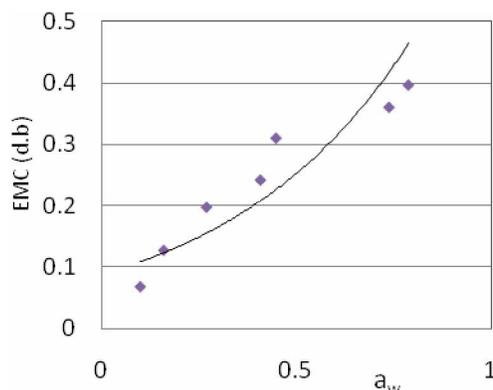


Figure 3. Desorption isotherms data of *Lavandula officinalis* L. flowers at 50°C and fitted curve of the Halsey model

4. Conclusions

Moisture desorption curves of *Lavandula officinalis* L. flowers were obtained at three temperatures (30, 40, 50°C) and relative humidity levels ranging from 11 to 85%. Statistical analysis was used to determine the best equation for predicting the desorption curves of *Lavandula officinalis* L. flowers. Halsey equation was the best fit with lowest error.

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Information Sharing in Designing a Supply Chain Model Considering Demand Forecasting Using Markov Process

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Abstract: In this paper, we incorporate information flow in a supply chain model. Also for decreasing the risk of the supply chain system, we first predict the customers' demands and then this forecasting is used as an input to the supply chain model. In this paper a markov chain model will be used to forecast the customers' demands. A simulated annealing (SA) algorithm is developed for solving the supply chain problem. The results indicate that the SA method and proposed markov chain model are efficient for a wide variety of problem sizes.

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1. Introduction

The performance of a supply chain depends critically on how its members coordinate their decisions. Information sharing between supply chain partners is a prerequisite for coordinated supply chain management. Over the last few years, considerable research has been devoted to understanding the role of information in achieving supply chain coordination. The research of information sharing in supply chain grew largely out of two-stage inventory models. The following papers mainly examine what kind of benefit can be gained through demand-oriented information sharing: Gavirneni et al. (1999), Lee et al. (2000). Further studies that analyze the benefit of information sharing with multiple retailers are as follows: Cachon and Fisher (2000), Gavirneni (2001), Aviv and Federgruen (1998). Some other researchers investigated forecasting information sharing. Cachon and Lariviere (2001) studied forecast sharing in a single product, two-level supply chain. Aviv (2001) compared three settings under a two-level supply chain. Zhao et al. (2002) presented the impact of different forecasting models on the value of information sharing in a supply chain.

In this paper, we will establish a supply chain model that includes sources, make and deliver processes to examine the effect of supply information sharing. Also we predict the customers' demands in the supply chain system. The forecast of future demand forms the basis for all strategic and planning decisions in a supply chain. In the literature several techniques have addressed time series prediction (pourahmadi, 2001). Time series can be modeled by using Markov chains. In many occasions, one has to consider multiple Markov chains (categorical sequences) together at the same time, i.e., to study the

chains in a holistic manner rather than individually. The reason is that the chains (data sequences) can be "correlated" and therefore the information of other chains can contribute to explain the captured chain (data sequence). Thus by exploring these relationships, one can develop better models.

When we predict the customers' demand, then it is used an input to the proposed supply chain model. For solving the supply chain model, a simulated annealing algorithm is used. The reminder of this paper is organized as follows. Section 2, discusses the proposed markov chain model. In section 3, the mathematical formulation of the supply chain model is presented. Section 4, discusses the solution approach for solving the problem. Section 5, discusses some computational results. Finally, section 6 contains some conclusions and future research development.

2. The Markov Chain Model for forecasting customers' demands

In this section, we propose our new multivariate markov chain model for forecasting customers' demands. The following multivariate Markov chain model has been proposed in Fung et al. (2003). The model assumes that there are S categorical sequences and each has m possible states in

$$M = \{1, 2, \dots, m\}$$

Here we adopt the following notations. Let $X_n^{(k)}$ be the state vector of the k th sequence at time n . If the k th sequence is in State j at time n then we write

$$X_n^{(k)} = e_j = \left(0, \dots, 0, \underset{jth}{1}, \underset{entry}{0}, \dots, 0 \right)^T.$$

The following relationships among the sequences are assumed:

$$X_{n+1}^{(j)} = \lambda_{jj} p^{(jj)} X_n^{(j)} + \sum_{k=1, k \neq j}^s \lambda_{jk} p^{(jk)} X_n^{(k)}$$

for $j = 1, \dots, s,$ (1)

Where

$$\lambda_{jk} \geq 0, 1 \leq j, k \leq s \quad \text{and} \quad \sum_{k=1}^s \lambda_{jk} = 1$$

for $j = 1, \dots, s,$ (2)

Equation (1) simply means that the state probability distribution of the j th chain (sequence) at time $(n + 1)$ depends only on the weighted average of $p^{(jj)} X_n^{(j)}$ and $p^{(jk)} X_n^{(k)}$. Here $p^{(jj)}$ is the one-step transition probability matrix of the states from the j th sequence to the states of the i th sequence. In matrix form, one may write

$$X_{n+1} \equiv \begin{pmatrix} X_{n+1}^{(1)} \\ X_{n+1}^{(2)} \\ \vdots \\ X_{n+1}^{(s)} \end{pmatrix} = \begin{pmatrix} \lambda_{11} p^{(11)} & \lambda_{12} p^{(12)} & \dots & \lambda_{1s} p^{(1s)} \\ \lambda_{21} p^{(21)} & \lambda_{22} p^{(22)} & \dots & \lambda_{2s} p^{(2s)} \\ \vdots & \vdots & \ddots & \vdots \\ \lambda_{s1} p^{(s1)} & \lambda_{s2} p^{(s2)} & \dots & \lambda_{sk} p^{(sk)} \end{pmatrix} \begin{pmatrix} X_n^{(1)} \\ X_n^{(2)} \\ \vdots \\ X_n^{(s)} \end{pmatrix} \equiv QX_n$$
 (3)

When we forecast the customers' demands then this forecasting is used as an input to the supply chain model.

3. The Supply Chain Model

We assume that there are several capacitated suppliers, one manufacturer, and several retailers. The retailers are confronted with time-varying customer demands, which were predicted in the previous section. In the proposed supply chain model, each supplier can supply one material. The manufacturer produces several products, which consume several materials respectively.

Then the production planning in the manufacturer is a multi-product multi-resource constraints lot sizing problem. The sequence of events in every period is as follows. First, the

manufacturer decides on his production quantity for the period, and the materials he needs are transported from suppliers under the resources constraints. Next, the manufacturer consigns his products to several retailers. If the manufacturer cannot satisfy the full order of the retailer, we assume that the retailer acquires the shortage part of the order elsewhere. All happen with no lead time. Then customer demands occur. At last inventory holding or shortage penalty costs are charged.

Now we introduce some indices and parameters, which will be used in the following formulas and models.

Index sets

- l : Product index, $l = 1, \dots, L$;
- n : Supplier index, $n = 1, \dots, N$;
- m : Retailer index, $m = 1, \dots, M$;
- t : Index of planning period, $t = 1, \dots, T$;

Parameters

- a_{nlt} : Capacity needed on material n for one unit product l in period t ;
- R_{nt} : The supplier capacity of available material n in period t ;
- b_n : Unit transportation cost for material n to the manufacturer;
- c_{lt} : Unit production cost for product l in period t ;
- h_{lt} : Unit inventory holding cost for product l in the manufacturer in period t ;
- g_{lm} : Unit transportation cost for product l to the retailer m ;
- h_{lmt} : Unit inventory holding cost for product l in the retailer m in period t ;
- β : The penalty coefficient for the shortage of the manufacturer to the retailer;
- D_{lmt} : The predicted customer demand for product l in retailer m in the period t ;

Decision Variables

- I_{lt} : The inventory of product l in the manufacturer at the end of period t ;
- I_{lmt} : The inventory of product l in the retailer m at the end of period t ;
- O_{lmt} : The shortage of product l for the retailer m from the manufacturer in the period t ;
- X_{lt} : The amount of product l produced in period t ;

f_{lm} : The quantities of product l distributed to the retailer m in period t .

So the problem can be formulated as follows:

$$\begin{aligned} \text{MIN} \quad & \sum_{n=1}^N \sum_{l=1}^L \sum_{t=1}^T b_n a_{nlt} X_{lt} \\ & + \sum_{l=1}^L \sum_{t=1}^T (c_{lt} X_{lt} + h_{lt} I_{lt}) \\ & + \sum_{m=1}^M \sum_{l=1}^L \sum_{t=1}^T (g_{lm} f_{lm} + h_{lm} I_{lm} + \beta O_{lm}) \end{aligned} \quad (4)$$

Subject to:

$$\sum_{l=1}^L a_{nlt} X_{lt} \leq R_{nt} \quad \text{for all } n, t \quad (5)$$

$$I_{l,t-1} + X_{lt} - I_{lt} = \sum_{m=1}^M f_{lm} \quad \text{for all } l, t \quad (6)$$

$$I_{l,t-1,m} + f_{lm} - I_{ltm} + O_{ltm} \geq D_{ltm} \quad \text{for all } l, t, m \quad (7)$$

$$X_{lt} \geq 0 \quad \text{for all } l, t \quad (8)$$

$$f_{lm} \geq 0 \quad \text{for all } l, t, m \quad (9)$$

$$I_{lt} \geq 0 \quad \text{for all } l, t \quad (10)$$

$$I_{ltm} \geq 0 \quad \text{for all } l, t, m \quad (11)$$

$$O_{ltm} \geq 0 \quad \text{for all } l, t, m \quad (12)$$

Constraint (5) is the total capacity for a material n needed to produce all the scheduled products in period t . Constraint (6) defines the quantities of product l on consignment by the manufacturer for the retailers in period t . Constraint (7) is to satisfy the customer demands. Constraints (8)-(12) enforce the non-negativity restrictions on the corresponding variables.

4. Solution approach

A simulated annealing algorithm is used for solving the problem. The SA methodology draws its analogy from the annealing process of solids. In the annealing process, a solid is heated to a high temperature and gradually cooled to a low temperature to be crystallized. As the heating process allows the atoms to move randomly, if the cooling is done too rapidly, it gives the atoms enough time to align themselves in order to reach a minimum energy state that named stability or equipment. This analogy can be used in combinatorial optimization in which the state of solid corresponds to the feasible solution, the energy at each state corresponds to the

improvement in the objective function and the minimum energy state will be the optimal solution.

The SA parameters are as follows:

T_0 : Initial temperature,

C : Rate of the current temperature decreases (cooling schedule),

ST : Freezing temperature (the temperature at which the desired energy level is reached),

L : Number of accepted solution at each temperature,

S : Counter for the number of accepted solution at each temperature,

X : A feasible solution

$C(X)$: The value of objective function for X ,

In the section 4.1, 4.2, we describe the initial solution construction and generating the candidate move which we use for SA algorithm.

4.1. Representation and Initialization

The procedure for obtaining the initial solution is randomly. The decision variables in our problem are X_{lt} and f_{lm} , they are positive variables of real numbers. We encode variables X_{lt} and f_{lm} as follows:

$$(X, f) = (X_{11}, X_{12}, \dots, X_{1T}, X_{21}, X_{22}, \dots, X_{2T}, \dots, X_{LT}, f_{111}, f_{112}, \dots, f_{11M}, \dots, f_{2T1}, \dots, f_{2TM}, \dots, f_{LT1}, \dots, f_{LTM})$$

For a capacitated lot-sizing problem, the decision variables X_{lt} are dependent on the available resources capacities R_{nt} . In this situation, we can first check it whether the total capacity for a resource needed to produce all the scheduled products in this period exceeds the total available capacity for this resource at this period. If exceeds, we will generate another solution to replace.

4.2. Obtaining the candidate move

For obtaining the candidate move, we randomly select one X_{lt} in X part of the solution and regenerate its value. Then adjust the correlative value of f of the solution according to the replacement and check the feasibility of it.

Table 1. Comparison of optimal solution and SA solution

NO.	# Retailers	# Suppliers	Optimal solution		SA solution		
			Cost	CPU time	Cost	CPU time	Gap (%)
1	4	2	19125.6	12	19125.6	1	0.00
2	6	3	25892.1	28	25892.1	3	0.00
3	8	3	32978.4	54	32978.4	9	0.00
4	9	3	35026.4	132	35026.4	13	0.00
5	20	6	79226.1	487	79226.1	29	0.00
6	30	8	109213.4	695	110054.2	39	0.77
7	40	10	144786.7	847	146157.4	51	0.95
8	50	13	181912.5	1475	183792.7	67	1.03
9	60	16	211326.9	3524	213375.1	80	0.97
10	70	17	254975.9	6748	258138.6	94	1.24
11	80	18	292381.7	10511	296364.2	110	1.36
12	90	20	346759.7	3 hours limit	337882.6	127	-2.56
13	100	22	383674.1	3 hours limit	369734.2	146	-3.63
14	120	24	469526.4	3 hours limit	435186.4	181	-7.31

Gap(%)= 100*(Heuristic solution value – LINGO best solution value) / LINGO best solution value.

5. Computational results

The computational experiments described in this section were design to evaluate the performance of our overall solution procedure with respect to a series of test problems. The SA algorithm was coded in visual basic 6 and run on a Pentium 4 with 3 GB processor. For simplicity we assume that the number of periods is three and the number of products is two in all of the instances, and also we use the following parameter values.

a_{nl} Is uniformly drawn from [5, 8]

b_n Is uniformly drawn from [8, 15]

c_{lt} Is uniformly drawn from [8, 15]

h_{lt} Is uniformly drawn from [7, 12]

g_{lm} Is uniformly drawn from [7, 12]

h_{lm} Is uniformly drawn from [7, 12]

$\beta=10$

And R_{nt} with regard to the size of the problem is generated randomly.

5.1. Comparison of optimal solution and SA solution

For evaluating the SA algorithm, fourteen problems are solved by LINGO software (Table 1). For each problem, the tuning of the parameters is done by carrying out random experiments.

It can be seen that the SA solutions are optimal (or near optimal) in different problem instances (Table 1). The average CPU time are less than or equal to 181 seconds for the SA method (CPU

times are in the seconds). However, the maximal average CPU time for obtaining the optimal solutions is equal to 10511 seconds, and for problem instances 12 to 14 by a reasonable amount of time limit, LINGO can not find the optimal solution, and the SA solutions in these problem instances are better than the best solutions that are obtained by LINGO.

5.2. Validating the markov chain model

For validating the proposed markov chain model, we comprise it with the Auto Regressive Moving Average (ARMA) model. The order of the ARMA model which we use is (1, 1) (i.e., ARMA (1,1)). After running we see that the absolute error for the markov chain predictor model is less than the absolute error of the ARMA model, the absolute error for the proposed markov chain model is 0.24 and the absolute error for the ARMA model is 0.46.

6. Conclusions

In traditional supply chain inventory management, orders are the only information firms exchange, but information technology now allows firms to share demand and inventory data quickly and inexpensively. In order to have an integrated plan, a manufacturer needs to know not only demand information from its customers but also supply information from its suppliers. In this paper, we incorporated information flow in a supply chain model. Also for decreasing the risk of the supply chain system, we first predicted the customers' demands and then this forecasting was used as an input to the supply chain model. A markov chain model was proposed to forecast the customers' demands.

A simulated annealing (SA) algorithm was used for solving the distribution network problem. The results of extensive computational tests indicated that the SA method and proposed markov chain model is both effective and efficient for a wide variety of problem sizes.

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Status Inconsistency of Women: A Study in Hamadan, Iran

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Abstract: This research investigates the status inconsistency among women in Hamadan province, Iran. The study was carried out in eight cities and 32 villages. Questionnaire was applied to collect data from 767 women from urban areas and 786 women from rural area. Data analysis was done by using SPSS software and multi-variable regressions. The results show considerable status inconsistency among women in Hamadan. In addition, with decreasing social status of women here, the status inconsistency increases and the rate of status inconsistency in the rural area was higher than the urban area.

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Keywords: Status inconsistency, Socio-economic Status, Self-image, Expectations, Prediction, Women

1 Introduction

Status inconsistency is a concept that is linked with modern society and its subsequent offshoots such as individualism, democracy, separation, distinction and social mobility (Chelbi, 1996; Slomczynski, 1989; Tamin, 1994). In the case of status inconsistency, people and groups suffer from stress and pressures that lead them to abnormal reactions through different attitudes and behavioral forms (Brown, Cretser, & Lasswell, 1988). Imbalance between various aspects of backgrounds, including wealth, power, prestige and knowledge, when followed by growth and development such as urbanism and education, brings along situations such as higher expectations and demands that could not be fulfilled in many societies. Furthermore, denying those claims would affect the societies and individuals in undesirable ways. This lack of conformity and agreement might be a source of negative attitudes for people and leads to social problems such as depression, anxiety and disappointment.

Studies carried out in Iran on status inconsistency determined that this social problem dramatically affects the people of Iran, especially youngsters. Moghaddas (1994) revealed that although job mobility is usually the result of education and passing of different courses and makes it possible to have social mobility, it may not be accompanied by economic achievements. It has been specified that despite educational or even job mobility, people still cannot attain a sound economic position, and the result is imbalance between their desires and their

socio-economic status (Chelbi & Azadeh, 2000; Moghaddas, 1994).

1.1 Status Inconsistency

Status inconsistency has its roots in Max Weber's theory of multi fundamentals in social inequality (Berger, Norman, Balkwell, & Smith, 1992). Lenski (1954) employed the concept of status inconsistency for the first time. Whitt (1983) defined status inconsistency, as the simultaneous occupancy by the individual of unequal ranks in two or more status hierarchies. Goffman (1957) argued that there has been a relationship between status inconsistency and intention to change in power distribution. Rush (1967) found the same relationship between status inconsistency and political views. Treiman (1966) expressed that there was no relationship between this concept and prejudgment with control of social status of respondents. On the other hand, Geschwender (1967) obtained some results that indicate a link between status inconsistency and some of the attitudes and prejudgments (Brown, et al., 1988).

In primary studies on these phenomena, the undesirable psychological results were more emphasized (Caston, 1989; Haus, 1983). Slomczynski (1989) found a decrease in social inequalities and increase in flexible and tolerating attitudes in situations of status inconsistency. Krueger (1989) defines increase in new jobs, independent staff, innovation and creativity of entrepreneurial managers with status inconsistency, and De-Graaf (1991) found status inconsistency to be present when high consumption of cultural products is

accompanied by lower consumption of physical goods to the Under-rewarded people, i.e., people with high education and low income.

In recent studies about status inconsistency, dimensions such as physical capital, job prestige and education find more importance. In addition to materialistic and prestige values, new theories have stressed cultural capital and organizational power, which are among important dimensions in establishing social positions and are being used in determining individuals' background along with other dimensions and aspects (Bourdieu, 1984; Chelbi & Azadeh, 2000; Coleman, 1988).

Some researchers such as Hornung (1980) studied status inconsistency with respect to the mediate variables such as conflicts in expectations and also confusion. His study implies that by using regression analysis models and controlling social status, the status inconsistency manifests many psychological pressures.

Kim (2000) employed status inconsistency in some studies on assigned status, typically when members of minority groups gain some advantages over members of a dominant group. Study on another type of status inconsistency revealed lower migration rates for couples in which the wife's education is higher than the husband's education than for couples in which the wife's education is equal to or lower than the husband's education (Lee, Toney, & Berry, 2009). Another research has shown that individuals with status incongruence, such as a mismatch between educational and occupational attainment, experience overall poorer health (House, 2001; Smith & Frank, 2005).

1.2 Socio-economic Status

Socio-economic status has some dimensions that show the amount of access to the valuable four resources: organizational capital, physical capital, cultural capital and social prestige (Chelbi, 1996; Chelbi & Azadeh, 2000).

From this point of view, physical capital is the name given to physical wealth, accessible financial resources and income of a certain position. Organizational capital relies on the organizational power of the person, control of power, supervision and decision making for others. Prestige shows social obligations and degree of influence on the minds of society members, and cultural capital shows the amount of access to knowledge resources, particularly education.

1.3 Self-image, Expectations and Predictions

Self-image is people's perception of their socio-economic status, which is not necessarily the same as their real socio-economic status (Chelbi,

1996; Chelbi & Azadeh, 2000). Expectation is considered as what people anticipate to gain access in life, in other words, the socio-economic status that they wanted to achieve (Chelbi, 1996; Chelbi & Azadeh, 2000). Prediction refers to the socio-economic status that people think they can achieve, or will achieve in the future. The difference between Expectation and Prediction is narrow but very important. While Expectation is the socio-economic status that people think is sufficient and merited by them, Prediction is about socio-economic status that they think they will achieve at some time in the future.

2 Research Hypotheses

For delivering a complete understanding of research results, we categorized research hypotheses into two main groups.

Hypotheses 1: aims to determine relationships between self-image, expectation, prediction and socio-economic status among women of Hamadan province.

Hypothesis 1a: There is a relationship between self-image of women of Hamadan province and their socio-economic status.

Hypothesis 1b: There is a relationship between expectation of women of Hamadan province and their socio-economic status.

Hypothesis 1c: There is a relationship between prediction of women of Hamadan Province and their socio economic status.

Hypothesis 2: aims to determine relationships between socio-economic status, self-image, expectation and prediction of women of Hamadan provenance and their status inconsistency.

Hypothesis 2a: There is a relationship between socio-economic status of women of Hamadan provenance and their status inconsistency.

Hypothesis 2b: There is a relationship between self-image of women of Hamadan provenance and their status inconsistency.

Hypothesis 2c: There is a relationship between expectation of women of Hamadan provenance and their status inconsistency.

Hypothesis 2d: There is a relationship between prediction of women of Hamadan provenance and their status inconsistency.

3 Methodology

The methodology adopted for the research is survey and data collection through questionnaires and interviews. The population subject of the research consisted of women between 20 to 55 years old from Hamadan province. Based on the last overall census

in Iran, the female population in Hamadan province is 828,734 and 317,854 women out of this number are in the 20-55 age bracket. With respect to the dispersion of this population in the cities, villages and in the different provinces, the Cochran's formula was used and the size of samples determined to be 1553.

To cover the entire province, we used the multi-stage cluster sampling, and ultimately we took eight cities in the province as the sample for urban regions. To select villages, with respect to the share of each city, we selected the sample populations from four villages by using the systematic random method. This research was conducted in 2008, and we analyzed the data by SPSS software and multi-variable regressions.

4 Results

Table 1 contains the descriptive statistics for the variables in the model. These simple descriptive statistics revealed some important findings. The table shows that 55 percent of urban women are in a very low level of socio-economic status; 33.4 percent are in low level, 5.3 percent are in high level, and 4.4 percent are in average level and only 1.8 percent of them are at top level.

In rural districts, 77.1 percent of women (highest frequency) are in very low socio-economic status, 21.2 percent of them are in low level, 1.4 percent are in average level, 0.1 percent in high level and only 0.1 percent in top socio-economic status.

In general, Table 1 shows low level of socio-economic status for women both in rural and urban districts of Hamadan province. Only 1.65 percent of urban women are in higher level in socio-economic status than rural women.

Based on results depicted in Table 1, 39.9 percent of urban women in Hamadan province assess their self-image of socio-economic status as average, 35.7 percent assess their status as low and 4.3 percent as very low. On the other hand, only 19.2 percent assess their status as high and 0.9 percent as very high. This situation was more pronounced among rural women; 48.2 percent (highest frequency) assess their socio-economic status as low. Among them, 11.3 percent assess their socio-economic status as very low level. In addition, 29.9 percent of these women assess their self-image of socio-economic status as average, 10.2 percent as high and only 0.4 percent assess their status as very high. In general, 42 percent of urban and rural women assess their socio-economic status as low, 34.8 percent as average and 14.6 percent as high level. Also 7.9 percent think they are in very low position and 0.6 percent assessed their status as very high.

Moreover, Table 1 showed 56.7 percent of urban women of Hamadan province had high expectation of their potential socio-economic status and 22.6 percent expected to be in average level. The results become significant when it becomes clear that only 1.6 percent of the women population expected to be in low level and about 0.1 percent expected to be in very low socio-economic status level. On the other hand, 19 percent of these women expected to be in very high level of socio-economic status. In the rural areas, 58 percent of women have high expectation about their socio-economic status. In addition, 15.5 percent expect to be in very high socio-economic status. Results also show that 25.4 percent expect to have average socio-economic status, 0.9 percent fell in the low category and 0.1 percent in the very low category.

Result of prediction show that 60 percent of urban women predicted their socio-economic status in future as high and 18.8 percent as very high level. Also 9.8 percent of these women predicted their socio-economic status as average, 10.4 percent as low and only 1 (one) percent as very low level. In rural areas, 51.9 percent of women predicted their socio-economic status to be high and 21.2 predicted they would have a very high economic status in the future. Results also show that 15.9 percent predicted their socio-economic status as average, 9.4 percent as low and 1.5 as very low in the future.

In this research, we used the "criteria variance" and "deviation of different capitals" to assess status inconsistency. The value zero to fifty-hundredth shows low status inconsistency, fifty one-hundredth to ninety nine-hundredth denotes average status inconsistency and one and above is considered as high status inconsistency.

With respect to the relative distribution of status inconsistency, it is clear that almost seventy percent of the sample population had high status inconsistency and only about twenty percent were in a position of low status inconsistency. In addition, the average rate of status inconsistency among the women of Hamadan Province was 2.50, showing relatively high status inconsistencies; this number was 2.64 in urban areas and 2.36 in rural areas, showing higher status inconsistency in urban women.

We tested the first group of hypotheses to determine the relationship between the factors of Self-image, Expectation, Prediction and Socio-economic status. In order to achieve this, we employed the Pearson r correlation coefficient between the variables. The Pearson correlation proved the existence of relationship between Self-image ($M=2.58$, $SD=.8555$), Expectation ($M=3.90$, $SD=.681$) and Prediction ($M=3.83$, $SD=0.9026$) with Socio-economic status ($M=1.45$, $SD=0.7642$).

As depicted in Table 3, relationships between Self-image ($r = 0.540$, $N=1553$, $p < 0.01$), Expectation ($r = 0.646$, $N=1553$, $p < 0.01$) and Prediction ($r = -0.467$, $N=1553$, $p < 0.01$) with Socio-economic status do exist. Findings showed that there was a significant relationship between three dimensions and socio-economic status and correlation analysis showed that expectation has the strongest relationship with socio-economic status.

In addition, Pearson Correlation shows that there is a significant relationship between three dimensions (Self-image, Expectation, Prediction) and Socio-economic status ($R^2 = 0.559$, $F(3, 1549) = 653.6$, $P = .000$). An R-squared value of .558 implied that the three aforementioned predictors explain around 56% of variance/variation in the socio-economic status.

The ANOVA model summary in Table 5 provides an analysis of variance for regression. The significant F value, [$F(3, 1549) = 168.79$, $P < 0.001$] indicates that a significant relationship exists between the weighted liner composite of the independent variables and the dependent variable.

For the first independent variable (Self-image), the test was statistically significant ($t = 23.32$, $Beta = 0.692$; $p = 0.001$). This suggested Self-image was the significant predictor of socio-economic status. For the second independent variable (Expectation), the test was statistically significant ($t = 7.47$, $Beta = 0.352$; $p = .000$) and Expectation is the significant predictor of socio-economic status. For the third independent variable (Prediction), the test was statistically significant ($t = -8.89$, $Beta = -0.242$; $p = .000$). This suggested Prediction was the significant predictor of socio-economic status. This Prediction variable had a negative significant relationship with the dependent variable.

As depicted in Table 6, the largest beta coefficient belonged to the Self-image dimension ($\beta = 0.692$). This means that this variable makes the strongest unique contribution to explaining the socio-economic status. The Beta value for "Expectation" is the second highest (0.352), and the lowest Beta value is for "Prediction" (-0.242). The results showed that the hypotheses 1a, 1b, 1c were supported and the estimated equation for analysis presented as:

$$Y (\text{Socio-economic status}) = -0.466 + 0.692 (\text{Self-image}) X_1 + 0.352 (\text{Expectation}) X_2 - 0.242 (\text{Prediction})$$

We tested hypotheses 2a, 2b, 2c, and 2d with Pearson r correlation coefficient for the variables. As depicted in Table 7, relationships exist between self-image ($r = 0.287$, $N=1553$, $p < 0.01$), Expectation ($r = 0.329$, $N=1553$, $p < 0.01$), Prediction ($r = 0.283$, $N=1553$, $p < 0.01$) and Socio-economic status ($r = 0.123$, $N=1553$, $p < 0.01$) with status inconsistency. Correlation analysis showed that the

Expectation has the strongest linear relationship among variables.

The regression analysis indicated a significant relationship between four dimensions (Self-image, Expectation, Prediction, Socio-economic Status) and Status Inconsistency ($R^2 = 0.129$, $F(4, 1548) = 57.507$, $P = .000$). R^2 value of .127 implies that the four aforementioned predictors explain around 13% of variance/variation in the socio-economic status.

The ANOVA table [$F(4, 1548) = 32.99$, $P < .001$] indicates that a significant relationship exists between the weighted liner composite of the independent variables and the dependent variable.

Based on data presented in Table 10, Beta of Self-image was statistically significant ($t = 3.883$, $Beta = 0.188$; $p = 0.001$) with status inconsistency. For the second independent variable (Expectation), the test also was statistically significant ($t = 6.113$, $Beta = 0.295$; $p = .000$) and this suggested Expectation was the significant predictor of status inconsistency. However, the third independent variable was not a significant predictor ($t = 0.326$, $Beta = 0.013$; $p = 0.745$) of status inconsistency. For the fourth independent variable (Socio-economic status), the test was statistically significant ($t = -5.772$, $Beta = -0.206$; $p = .000$) and Socio-economic status was the predictor (with negative effect) of status inconsistency.

By analyzing the result of the research, we proved that the hypotheses 2a, 2b, and 2d were supported but 2c was not supported and estimated equation for analysis is:

$$Y (\text{Inconsistency}) = 0.945 + 0.188 (\text{Self-image}) X_1 + 0.295 (\text{Expectation}) X_2 + 0.013 (\text{Prediction}) - 0.219 (\text{Socio-economic status})$$

Discussion and Recommendation

Regarding the two obtained equation and significant relationships, we can present the final linear regression model for status inconsistency of women in Hamadan province as follows;

As the Figure 1 makes clear, Expectation had the highest influence on status inconsistency while Self-image had the strongest relationship with Socio-economic status. Another important finding is the significant relationship between Prediction, Expectation and Self-image. An interesting point is Prediction and Self-image had a negative relationship with each other. Finally, it is important to note that Socio-economic status has the lowest relationship with status inconsistency. Absence of adaption between different dimensions of the Socio-economic status such as wealth, power, dignity and knowledge caused status inconsistency and conflict between the Self-image and Prediction and Expectation of socio-economic status of people. The results of this research support other findings of other studies about roots and dimensions of status inconsistency (Brown,

et al., 1988; Chelbi & Azadeh, 2000; Moghaddas, 1994; Tamin, 1994; Treiman, 1966).

Results of the research also showed that we should consider status inconsistency as a real threat and crisis among women in Hamadan province. The percentage of the people with high status inconsistency is more than 70 percent, which shows the severity of this social problem. We believe adopting mechanisms for balancing between psychological factors of status; most importantly Expectation, and Socio-economic status, could be a helpful way to overcome this social problem. The simplest way to achieve this is to provide a situation of fair and equal chances for everyone to pursue their desire and expectations.

Fair distribution of wealth, countering the discrimination against women, and increasing the level of the power and dignity of women are considered as the most important solutions for this social problem. This effort should be doubled when in the case of women in rural areas, because the severity of the problem in these areas is much higher than the cities.

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Table 1, Descriptive Statistics of Variables

Community Items	Urban		Rural		Total	
	Fi ¹	%	Fi	%	Fi	%
Socio-Economic Status						
Very low	422	55.0	606	77.1	1028	66.2
Low	256	33.4	167	21.2	423	27.2
Average	34	4.4	11	1.4	45	2.9
High	41	5.3	1	.1	42	2.7
Very high	14	1.8	1	.1	15	1.0
Self-image						
Very low	33	4.3	89	11.3	122	7.9
Low	274	35.7	379	48.2	653	42.0
Average	306	39.9	235	29.9	541	34.8
High	147	19.2	80	10.2	227	14.6
Very high	7	.9	3	.4	10	.6
Expectation						
Very low	1	.1	1	.1	2	.1
Low	12	1.6	7	.9	19	1.2
Average	173	22.6	200	25.4	373	24.0
High	435	56.7	456	58.0	891	57.4
Very high	146	19.0	122	15.5	268	17.3
Prediction						
Very low	8	1.0	12	1.5	20	1.3
Low	80	10.4	74	9.4	154	9.9
Average	75	9.8	125	15.9	200	12.9
High	460	60.0	408	51.9	868	55.9
Very high	144	18.8	167	21.2	311	20.0

¹ frequency

Table 2, Inconsistency Status

Inconsistency Status	Amplitude Variation	Frequency	Percent
Low	0 - .50	316	20.4
Average	.99 - .51	141	9.1
High	+1	1095	70.6

Table 3, Pearson Correlation between Dimensions and Socio-economic Status

	Socio-economic status	Self-image	Expectation	Prediction
Socio-economic status	1			
Self-image	.730 ***	1		
Expectation	.630***	.816***	1	
Prediction	-.436***	-.696***	.776***	1

*** $p \leq 0.01$ level (1-tailed)

Table 4, Standard Regression Model Summary

R	R ²	Adjusted R ²	Std. Error of the Estimate	R ² Change	Change Statistics			
					F Change	df1	df2	Sig. F Change
.747 ^a	.559	.558	.50816	.016	653.67	3	154 9	.000

a. Predictors: (Constant), Prediction, Self-image, Expectation

b. Dependent Variable: Socio-economic status

Table 5, ANOVA: Regression Significance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	505.389	3	168.79	653.67	.000 ^a
Residual	399.993	1549	.258		
Total	906.38	1552			

a. Predictors: (Constant), Prediction, Self-image, Expectation

b. Dependent Variable: Socio-economic status

Table 6, Estimates of the Coefficients for the Model

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.466	.084		-5.562	.000
Self-image	.618	.027	.692	23.32	.000
Expectation	.483	.038	.352	7.47	.000
Prediction	-.204	.023	-.242	-8.89	.000

a. Dependent Variable: Socio-economic status

Table 7, Pearson Correlation between Dimensions and Inconsistency

	Inconsistency	Self-image	Expectation	Prediction	Socio-economic status
Inconsistency	1				
Self-image	.287***	1			
Expectation	.329***	.816***	1		
Prediction	.283***	.696***	.776***	1	
Socio-economic status	.123***	.730***	.630***	.776***	1

*** $p \leq 0.01$ level (1-tailed)

Table 8, Standard Regression Model Summary

R	R ²	Adjusted R ²	Std. Error of the Estimate	R ² Change	Change Statistics			
					F Change	df1	df2	Sig. F Change
.360a	.129	.127	.75750	.129	57.507	4	1548	.000

a. Predictors: (Constant), Prediction, Self-image, Expectation, Socio-economic status

b. Dependent Variable: Inconsistency

Table 9, ANOVA: Regression Significance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	131.992	4	32.998	57.507	.000 ^a
Residual	888.250	1548	.574		
Total	1020.242	1552			

a. Predictors: (Constant), Prediction, self-image, Expectation, Socio-economic status

b. Dependent Variable: Inconsistency

Table 10, Estimates of the Coefficients for the Model

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.945	.126		7.498	.000
Self-image	.178	.046	.188	3.883	.000
Expectation	.351	.057	.295	6.113	.000
Prediction	.011	.035	.013	.326	.745
Socio-economic status	-.219	.038	-.206	-5.772	.000

a. Dependent Variable: Socio-economic status

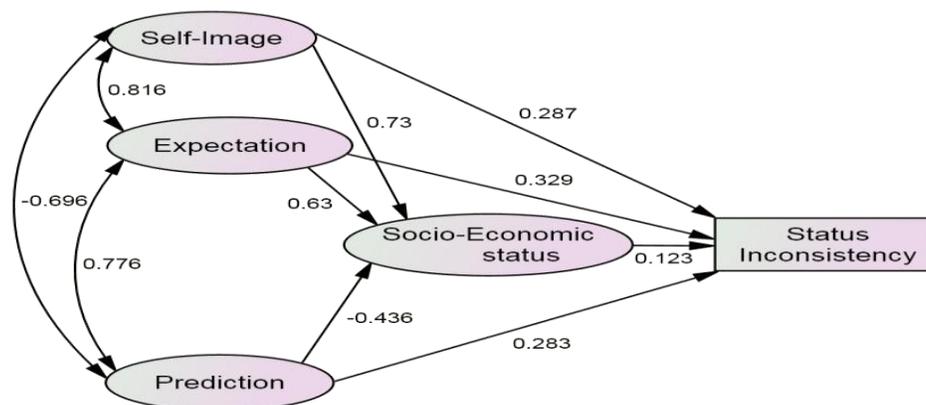


Figure 1, Relationship between Self-image, Expectation, Prediction, Socio-economic and Status Inconsistency

5 Reference

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Sweet ent-kaurene diterpene glycosides of *Stevia rebaudiana* Leaves Bertoni and Biological Evaluation**^{1*}El-Gengaihi, Souad,²Ibrahim Nabaweya,¹ Riad. Sahar,³ El-Regal, S.N. and Sherief Naglaa**¹ Medicinal and Aromatic Plants Dept., ² Pharmacognosy Dept., ³ Medicinal Chemistry Dept., National Research Centre Dokki 12311 Cairo Egypt⁴ Biochem. Dept. Fact. of Science Ain Shams Univ. Cairo Egypt*souadelgengaihi@yahoo.com , *souadgengaihi@hotmail.co.uk

Abstract: *Stevia rebaudiana*, Bertoni, a sweet, non-caloric natural source, perennial herb native to Paraguay and Brazil. A rapid better resolved HPLC separation of sweet glycosides of *Stevia rebaudiana* leaves and different biological activities were determined. Eight sweet ent-kaurene diterpene glycosides (SEDG) were quantitatively and qualitatively fractionated by HPLC from the butanol soluble fraction. Two major sweet glycosides were chromatographically isolated. Acid hydrolysis and chemical degradation of the glycosides were performed; their aglycones were also isolated and identified. Hypoglycemic effect of the glycosides on diabetic rats was estimated. Kidney function was revealed; by creatinine and serum urea. Significant decrease in the levels of serum fasting glucose, glycohemoglobin (HbA_{1c}), urea, creatinine, total cholesterol, total lipids, alanine and aspartate aminotransferases enzyme (AST&ALT). In addition, remarkable improvement in vitamins C, and E levels and antioxidant enzymes, glutathione, glutathione oxidase, glutathione reductase and lipid peroxides levels were observed in the liver tissues compared to diabetic controls. Histopathological investigations of the control diabetic rats were characterized. The kidney of diabetic rats treated with sweet glycoside showed mild protective effects as compared to the diabetic control rats.

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Key words: *Stevia rebaudiana*, glycosides, hypoglycemic, HbA_{1c}, liver, kidney function antioxidant status.

1. Introduction:

Stevia rebaudiana Bertoni, belonging to the Asteraceae, is a perennial herb native to Brazil and Paraguay, is a sweet non-caloric natural source alternative to artificially produced sugar substitutes(1). *Stevia*, sweeteners extracts from the leaves of this herb, are commercially available in Japan, Korea, China, South-East Asia and South America and have been used for some decades to sweeten a variety of foods including beverages, confectionery and pickled vegetables. *Stevia* extracts have been extensively used as the dietary supplements in USA (2). Steviosid is the predominant sweetening approximately 3-8% of the dry leaves weight. Many researchers have demonstrated that *Stevia* has several therapeutic effects, such as hypoglycemic activity (3), as hypotensive (4) and as anti-inflammatory (5). In addition, it has been used for patients suffering from obesity and heart disease

In the present study, we report a more rapid, better resolved HPLC separation of sweet glycosides and also different biological studies were carried out for the cultivated *Stevia rebaudiana* leaves.

2. Material and Methods**Plant Materials**

Stevia rebaudiana seeds were kindly secured by Prof. Dr Jose Walter Pedroza Carneiro, Maringa

University, Brazil, to whom we appreciate very much. As *Stevia* seeds were poorly germinated and also establishment of the seedlings was slow, so tissue culture technique was conducted in order to obtain the plants which consequently give up the cuttings used for cultivation of appropriate area to provide the leaves material (6). The leaves were collected, air dried and powdered.

Spectral analysis

EI/MS, Finnigan mat SSQ 7000 (Thermo Inst., system Inc., USA), and mass mode, EI: 70 Ev. ¹H-NMR spectra were recorded in (CDCl₃) or (CD₃OD) at 300 MHz on a Varian Mercury (HPLC) of (SEDG) Shimadzu system Controller Scl-10AVP with UV detector, UV-Visible detector, and Shimadzu liquid chromatography pump. Conditions: Column: zorbax NH₂ Du pont (4.6m x 25 cm). Eluting solvent: 84-70% v/v acetonitrile- water (pH: 5) changed over a period of 15 min. Flow rate: 2ml/min. UV detector: 210 nm.

Preparation of Sweet glycosides:

The sweet glycoside was isolated from butanol soluble fraction. The dried butanol extract was dissolved in hot methanol (5 ml). The total crude (sweet ent-kaurene diterpene glycosides, SEDG) was precipitated by adding ether (500 ml) and the

precipitate was collected and purified by repeated precipitation with acetone. The precipitate was collected, dried, weighed and kept in a desiccator over anhydrous calcium chloride; portions of isolated crude (SEDG) were dissolved in methanol and then subjected to fractionation on TLC, GF₂₅₄ using solvent system, chloroform: methanol: water (6:3:1, v/v/v) plates were visualized by sulfuric acid (60%) kept at 110°C for 10 min and examined in daylight. Eight compounds were revealed from which two major compounds were isolated, each isolated compound was identified by spectral analyses, MS ¹H-NMR, IR and by HPLC.

HPLC of sweet glycoside:

100 mg of sweet glycoside and 2 mg of each isolated compound was dissolved in 1 ml methanol, HPLC grade from which 25 µl were injected to HPLC using previously mentioned condition (7), (Table 1).

Acid hydrolysis:

Sweet glycoside and the isolated major compounds (0.5g each) were hydrolyzed using 20% sulfuric acid for 5 hrs. The residue was applied on silica column chromatography using chloroform as eluting solvent and TLC using solvent system CHCl₃–MeOH (9:1) then sprayed with p-anisaldehyde, isosteviol was revealed, crystallized with methanol and identified by spectral analyses.

Chemical degradation:

Sweet glycoside and the isolated major compounds (0.5g each) were stirred with sodium periodate (1g). The residue obtained after workup of the reaction mixture was chromatographed over a silica gel column for purification (particle size, 200-63 µm; Merk 63 µm) eluting with CHCl₃–MeOH (49:1) and crystallization from MeOH gave pure steviol which confirmed by spectral analyses (8). The sugar moiety in each case was identified as glucose by paper chromatography and confirmed by GLC after silylation.

Determination of biological effects of Sweet glycoside:

The biochemical effects of sweet glycoside on diabetic rats were carried out. Induction of diabetes was performed by IP administration of alloxan monohydrate (150 mg/kg b.w) to adult male albino rats weighing from 100-140g used for one week (9). Rats were divided into three groups (6 rats each). Group I: Normal control rats. Group II: Control non-treated diabetic rats. Group III: Diabetic rats treated with sweet glycoside of *Stevia rebaudiana* leaves (2.5 g/kg b. w orally) over a period of 21 successive days. The blood samples were withdrawn from the retro-

orbital venous plexus at zero, 10 and 21 days. The following biochemical parameters were determined including, HbA_{1c} (10), serum fasting glucose (11) urea (12) creatinine (13) sodium, (14) potassium (15). Cholesterol (16), Total lipids (17) and the ALT, AST (18).

Ethics

Anesthetic Procedures and handling with animals were compiled with the ethical guidelines of medical Ethical Committee of the National Research Centre in Egypt and performed for being sure at any stage of the experiment.

Tissue samples:

The animals of the different groups were sacrificed at the end of the experiment, histopathological studies for kidney and liver tissues were investigated. (19). the following antioxidant parameters including vitamin C (20) vitamin E (21). Lipid peroxides (22) glutathione (23) glutathione peroxidase (24) and glutathione reductase (25) were estimated.

3. Results and Discussion

Sweet ent-kaurene diterpene glycosides reached 5.58% of dry weight which were detected and fractionated by TLC and HPLC, eight compounds were revealed (Table 1). Two major compounds were isolated; their structures were established by chemical and spectral analyses as follows:

Rebaudioside A:

Colorless needles were obtained from the methanol extract. It showed molecular ion peak at m/z 966 in EI/MS corresponding to molecular formula C₄₄H₇₀O₂₃.3H₂O. ¹H-NMR spectrum showed signals for the anomeric protons at δ 5.52 for β-glucosyl ester and δ 4.86, 5.20 and 5.4 for β-glucosidic linkage, these result were confirmed by Koha *et al.* (26).

Stevioside:

Colorless needles were obtained from methanol. EI/MS showed a molecular ion peak at m/z 804 corresponding to the molecular formula C₃₈H₆₀O₁₈, this result coincided with the results of Crosby *et al.* (27).

Isosteviol:

Acid hydrolysis of sweet glycoside, rebaudioside A and stevioside yielded isosteviol which was identified by TLC and spectral analyses that coincided with the reports of Starratt (28). Isosteviol has been isolated for the first time in free state from *Ceriops decandra*, (29). ¹H-NMR spectrum showed proton signals of three methyl group at δ 0.79, 0.98 and 1.25 ppm.

Mass spectrum of the substance showed a molecular ion peak at m/z 318 M^+ (80%) corresponding to the molecular formula $C_{20}H_{30}O_3$, another main ions were at m/z 300(40%), 273(42%), 259(25%), 203(22%), 165(25%), 152(22%), 109(30%) and 81(25%).

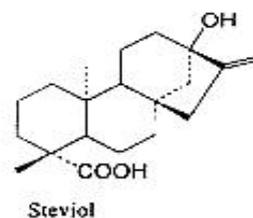
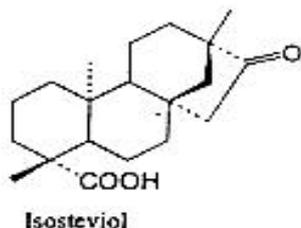
Table (1): HPLC of the SEDG in *Stevia rebaudiana* leaves.

Peak No	R_f (min)	Conc %	Identified compounds
1	1.31	1.78	Unidentified
2	1.69	2.10	Unidentified
3	2.60	0.83	Unidentified
4	3.42	1.55	Steviolbioside
5	3.89	0.76	Unidentified
6	4.19	1.21	Unidentified
7	4.57	2.46	Unidentified
8	5.45	2.86	Dulcoside A
9	6.13	4.27	RebaudiosideB
10	6.94	29.02	Stevioside
11	7.75	9.96	RebaudiosideC
12	8.96	31.21	RebaudiosideA
13	10.93	7.23	Rebaudioside E
14	12.28	4.26	Rebaudioside D
15	14.53	0.51	Unidentified

Steviol:

Chemical degradation of sweet glycoside, rebaudioside A and stevioside yielded steviol which was identified by TLC and spectral analyses, these analysis agreed with Ogawa(30). Steviol was isolated in free state from the root bark of marine mangrove .

Many analytical methods have been applied for the separation and quantification of sweet entkaurene diterpene glycosides from the leaves of *Stevia rebaudiana*(31) Quantified only stevioside levels enzymatically (32) quantified total glycosides content by gas chromatography after acid hydrolysis(33). TLC was applied to identify four more abundant glycosides, stevioside, rebaudioside A, C and dulcoside A. Makapugay (34) quantified the diterpene glycosides by HPLC using soxhlet extraction. Mauri *et al* (35) Employed a capillary electrophoresis method to analyze *Stevia rebaudiana* glycosides where they obtained rebaudioside A and steviolbioside using a semi preparative HPLC.



Biochemical studies:

In the present study, the hypoglycemic effect of the sweet glycoside of *Stevia rebaudiana* leaves was evaluated on diabetic rats. The continuous treatment with crude stevioside (2.5g/kg b.w) for a period of 21 days caused a significant decrease in the blood glucose levels of diabetic rats (-32.98%) (Table 2) as compared with diabetic control rats. Jeppesen *et al.* (36) stated that, stevioside and steviol possess hypoglycemic effects by stimulation of insulin secretion from mouse islets, while Huber *et al.* (37) showed that stevioside has a stimulatory action on glycogen deposition in the rat liver.

The present work revealed an increase in HbA₁ percentage (19.66%) in diabetic control rats reflected as an increase in mean serum fasting glucose levels (160 mg/dl), group III treated with sweet glycoside restored normal level of HbA₁ percentages (7.05%) as compared to diabetic control rats (Table 3).

Concerning the kidney function tests, it was found that diabetic rats treated with sweet glycoside showed a slightly decrease in serum urea levels. (Table 4). Serum creatinine levels are frequently used as screening test for renal dysfunction (38). The level of serum creatinine was significantly decreased by (-26.88%) in comparison to diabetic control and reached normal values (0.68 mg/dl) after 21 days (Table 2).

The present results indicate that sweet glycoside had a significant decrease in serum sodium (139 mEq/L) and potassium levels (3.39mEq/L) after 21 days. This result may be due to increase the excretion of sodium and potassium in urine (Table 4).

Melis (39) showed that intravenous infusion of crude extract of *Stevia* leaves increase both sodium and potassium excretion however, insignificant difference was detected in mean arterial pressure in male Wister rats under antidiuresis or water diuresis. The author suggested that the extract may have a direct effect on salt and water transport in renal tubules.

Table (2) Effect of SEDG of *Stevia rebaudiana* leaves on serum creatinine levels in diabetic rats in comparison to normal and diabetic controls.

Groups Time	blood glucose level (mg/dl)			Serum creatinine (mg/dl)		
	GI	GII	GIII	GI	GII	GIII
Zero						
Mean±S.E	86.66±2.47 ^{Aa}	160±3.89 ^{Ba}	159.00±2.00 ^{Ba}	0.65±0.05 ^{Aa}	0.86±0.06 ^{Ba}	0.89±0.05 ^{Ba}
Range	74-89	150-177	150-165	0.47-0.70	0.6-1.04	0.88-1.03
10 th day						
Mean±S.E	88.33±3.32 ^{Aa}	156.50±2.18 ^{Ba}	112.00±2.14 ^{Cb}	0.68±0.08 ^{Aa}	0.83±0.04 ^{Aa}	0.72±0.04 ^{Aab}
Range	78-100	148-164	104-119	0.44-0.95	0.64-1.0	0.56-0.88
% Change			-28.43			-13.25
21 st day						
Mean±S.E	89.00±3.32 ^{Aa}	143.00±3.49 ^{Bb}	95.83±2.72 ^{Ac}	0.61±0.04 ^{Aa}	0.93±0.05 ^{Ba}	0.68±0.06 ^{Ab}
Range	78-93	133-152	90-108	0.45-0.80	0.77-1.09	0.42-0.80
% Change			-32.98			-26.88

Number of rats / group = 6 Means with different capital letters superscripts A, B... for rows and small letters a, b... for columns with a significant difference (P value) at ≤ 0.05. Percentage of change compared to diabetic rats. GI: normal control rats. **GII**: diabetic control rats. **GIII**: diabetic rats treated with SEDG.

Table (3) Effect of SEDG of *Stevia rebaudiana* leaves on Blood glycohemoglobin, Serum total lipids and Serum total cholesterol levels in diabetic rats in comparison to normal and diabetic controls.

Groups Time	Blood glycohemoglobin (HbA _{1c} %)			Serum total lipids (mg/dl)			Serum total cholesterol (mg/dl)		
	GI	GII	GIII	GI	GII	GIII	GI	GII	GIII
Zero									
Mean±S.E	6.63±0.10	11.00±0.6	10.21±0.9 ^B	229.33±7.64 ^A	250.5±4.28 ^B	257.66±2.92 ^B	45.33±1.33 ^A	54.66±1.77 ^B	57.66±0.92 ^B
Range	6.30-7.0	10-12	9.5-11	200-246	240-268	245-260	39-47	47-58	55-60
21 th day									
Mean±S.E	6.50±0.25 ^A	19.66±0.60 ^B	7.05±0.43 ^A	234.83±8.78 ^A	393±9.13 ^B	200.66±5.52 ^C	48.33±1.77 ^{AC}	87.50±2.67 ^B	45.33±1.77 ^C
Range	5.4-7.2	17.7-22	5.6-8.4	200-257	351-418	188-218	44-56	76-94	38-50
% Change			-64.14			-48.94			-48.19

Number of rats / group = 6 Means with different capital letters superscripts A, B. for rows and small letters a, b... for columns with a significant difference (P value) at ≤ 0.05. Percentage of change compared to diabetic rats. GI: normal control rats. **GII**: diabetic control rats. **GIII**: diabetic rats treated with S.

Table (4): Effect of SEDG of *Stevia rebaudiana* leaves on serum sodium, serum potassium and serum urea levels in diabetic rats in comparison to normal and diabetic controls.

Groups Time	Serum sodium levels (mEq/L)			Serum potassium levels (mEq/L)			Serum urea levels (mg/dl)		
	GI	GII	GIII	GI	GII	GIII	GI	GII	GIII
Zero									
Mean±S.E	152.66±4.43 ^{Aa}	157.83±2.45 ^{Aa}	159.66±4.82 ^{Aa}	5.06±0.13 ^{Aa}	5.73±0.31 ^{Aa}	5.58±0.44 ^{Aa}	19.68±2.42 ^{Aa}	27.66±0.06 ^{Ba}	28.78±2.68 ^{Ba}
range	143-165	146-163	143-177	4.7-5.5	4.4-5.9	4.5-7.0	11-20	22-30	22-39
10 th day									
Mean±S.E	145.33±1.66 ^{Aa}	172.16±5.20 ^{Bb}	144.00±3.89 ^{Ab}	4.93±0.25 ^{Bb}	3.98±0.23 ^{Bb}	4.03±0.33 ^B	21.4±1.51 ^{Aa}	28.66±0.91 ^{Ba}	22.13±2.00 ^{Ab}
range	140-150	156-190	130-155-16.35	4-5.8	2.9-4.6	3.4-5.6	16-26	27-33	16-29
% change						1.25			-22.78
21 st days									
Mean±S.E	148.85±4.59 ^{Aa}	176.00±5.10 ^{Bb}	139.00±1.46 ^{Ab}	4.71±0.21 ^{Bb}	3.43±0.18 ^{Bb}	3.39±0.26 ^{Bb}	21.71±1.48 ^{Aa}	30±1.46 ^{Ba}	24.25±1.15 ^{ADab}
range	136-164	163-190	135-145	3.7-5.2	2.8-4	3.2-4.8	15-26	25-35	20-28
% change			-21.02			-1.16			-19.16

Number of rats / group = 6 Means with different capital letters superscripts A, B... for rows and small letters a, b... for columns with a significant difference (P value) at ≤ 0.05. Percentage of change compared to diabetic rats. GI: normal control rats. **GII**: diabetic control rats. **GIII**: diabetic rats treated with SEDG.

From these results it is concluded that sweet glycoside have natriuresis and kaliuresis effect, and acts as a vasodilator. The fact that water and sodium excretion increased following sweet glycoside infusion in spite of an unchanged glomerular filtration rate. This may be explained by decreased water and sodium reabsorption in the proximal tubules. The greater enhancement of renal blood flow caused more marked changes in the startling forces around the proximal convolution, resulting in a substantial decrease of the proximal tubular reabsorption and an increase in urinary flow and sodium excretion(39). Treatment of diabetic rats with sweet glycoside not only caused blood glucose homeostasis but also reversed changes in lipid metabolism

In the alloxan-induced control diabetic rats, the rise in blood glucose is accompanied by an increase in serum total cholesterol (87.5mg/dl) and total lipids (393 mg/dl) levels after 21 days as compared to the normal control. The treatment with sweet glycoside caused decrease in total cholesterol and total lipids level (45.3 mg/dl and 200.7 mg/dl, $P \leq 0.05$ respectively) as compared to diabetic control rats (Table 3). It has been suggested that the increase in the total cholesterol and triglycerides levels in diabetes mellitus was the result of resistance to insulin dependent glucose uptake, which consequently increase the serum glucose levels, leading to an increase in hepatic total cholesterol and triglycerides synthesis and secretion.

The aminotransferases constitute a group of enzymes that catalyze the interconversion of amino acids and α -oxo-acids by transfer of amino groups. In liver diseases, serum ALT and AST levels are elevated, where ALT level is characteristically higher than AST level. Elevated serum AST activity with no ALT elevation indicates muscle necrosis or myocardial infarction.

In diabetic control rats, serum ALT and AST levels (30.5 U/ml and 66 U/ml, $P \leq 0.05$, respectively) were significantly higher than normal rats (19.33 U/ml and 16.16 U/ml, respectively) but treatment with sweet glycoside caused significant decrease in both enzymes (-1.63 and -41.42% $P \leq 0.05$, respectively) as compared to diabetic control rats (Table 5).

Free radicals formation and oxidative stress may act as a common pathway to diabetes itself as well as, to its later complications (40). Hyperglycaemia is thought to be associated with increased oxidative stress via glucose autooxidation which produces superoxide radicals and free radicals generated from glycosylated proteins (41).

In the present study it was found that lipid peroxidation level was increased ($0.34 \mu\text{mole/g tissue}$) in diabetic rats compared to normal ones (0.28

$\mu\text{mole/g tissue}$). On the other hand, diabetic rats treated with sweet glycoside (Table 6) showed significantly decreased levels of lipid peroxidation (-11.7% $P \leq 0.05$).

Peroxidation reactions and oxidative stress occurring in disease states can be controlled by supplementing the diet with antioxidants such as vitamin C, E, flavonoids, caffeic acid, chlorogenic acid, anthocyanins. Vitamin C is a strong reducing agent, it is a naturally occurring suppressor of free radicals also it enhances vitamin E efficiency in reducing lipid peroxidation. Vitamin E is the major chain breaking antioxidants in plasma, red cells and tissues. It represents first line of defense against peroxidation of polyunsaturated fatty acids in cellular and subcellular membrane phospholipids (42).

In this study, it could be concluded that *Stevia* sweet glycoside were used to control diabetes and scavenging agents for control free radicals associated with diabetes. So, the effect of administered *Stevia* to diabetic rats was also undertaken as antioxidant agent.

The present results showed that diabetic rats treated with sweet glycoside led to a significant increase in vitamin C, E (80.99 and 75.68% $P \leq 0.05$, respectively) as compared to diabetic control rats (Table 6).

In this study, a significant increase in glutathione level was found in both diabetic rats treated with sweet glycoside (19.11 %), in addition to glutathione peroxidase and reductase activities which were significantly increased (28.84 and 38.49% $P \leq 0.05$, respectively) in comparison to diabetic control rats (Table 6), it could be also concluded that sweet glycoside may have potential use as antidiabetic agents, and could be used as antioxidant agents, controlling free radicals in diabetes.

Histopathological studies

The present study showed that the kidney tissues of diabetic control rats were characterized by vacuolar degeneration, fatty changes in tubular epithelial cells and glomerular degeneration. The kidney of diabetic rats treated with sweet glycoside showed mild protective effects as compared to the diabetic control rats. These changes appeared in the form of marked diminution of fats. In the present work, the pathological changes observed in liver and kidney of diabetic rats may be attributed to lipid peroxidation and free radical causing damage to cells, these side effects may be neutralized by treatment of diabetic rats with sweet glycoside Figs (1 and 2).

It is realized that the treatment of diabetic rats with sweet glycoside alleviated the deleterious effect of alloxan on liver and kidney tissues.

Stevia rebaudiana leaves might be recommended as natural alternative to chemical sugar substitutes; in

addition, the sweet glycosides have many biological effects.

Table (5): Effect of SEDG of *Stevia rebaudiana* leaves on serum AST and ALT levels in diabetic rats in comparison to normal and diabetic controls.

Groups	GI	GII	GIII	GI	GII	GIII
Time	AST (u/ml)			ALT (u/ml)		
Zero	15.50±1.60 ^{Aa}	34.00±3.67 ^{Ba}	34.50±0.88 ^{Ba}	21.33±2.17 ^{A a}	20.83±2.30 ^{Aa}	22.16±0.70 ^{Aa}
Mean±S.E	11-21	27-47	31-37	15-22	15-28	20-25
Range						
10 th day	15.83±1.30 ^{Aa}	69.66±6.50 ^{Cb} 41-	37.33±2.67 ^{Ba}	15.66±3.29 ^{Aa} 10-	23.33±2.26 ^{Ba} 13-	22.0±1.12 ^{Ba}
Mean±S.E	11-19	88	30-47	20	28	19-26
Range						
% Change			-46.4			-5.7
21 st day	16.16±2.79 ^{Aa}	66.00±6.00 ^{Bb}	38.66±3.07 ^{Ca} 30-	19.33±2.37 ^{Aa} 11-	30.5±1.82 ^{Bb}	30.00±1.23 ^{Bb} 26-
Mean±S.E	11-27	52-85	49	29	22-35	34
Range						
% Change			-41.42			-1.63

Number of rats / group = 6 Means with different capital letters superscripts A, B... for rows and small letters a, b... for columns with a significant difference (P value) at ≤ 0.05. Percentage of change compared to diabetic rats.

GI: normal control rats. GII: diabetic control rats. GIII: diabetic rats treated with SEDG.

Table (6): Effect of (SEDG) of *Stevia rebaudiana* leaves on liver, glutathione, glutathione peroxidase, glutathione reductase Vitamin C, vitamin E and lipid peroxides levels in diabetic rats in comparison to normal and diabetic controls.

Parameters	Glutathione mg/g tissue	Glutathione peroxidase μmole/g tissue	Glutathione reductase μmole/g tissue	Vitamin C mg/g tissue	Vitamin E mg/g tissue	Lipid peroxides μmole/g tissue
Group I	31.69±0.022 ^A	2.98±0.07 ^A	14.05±0.64 ^A	6.31±0.06 ^A	7.27±0.08 ^A	0.28±0.02 ^A
Mean±S.E						
Group II	20.62±0.39 ^B	2.03±0.04 ^B	9.43±0.29 ^B	4.63±0.04 ^B	4.77±0.04 ^B	0.34±0.01 ^B
Mean±S.E						
Group III	24.56±0.33 ^D	2.96±0.04 ^A	13.06±0.17 ^A	8.38±0.07 ^D	8.38±0.08 ^D	0.30±0.01 ^A
Mean±S.E						
% of change	19.11	45.81	38.49	80.99	75.68	-11.7

Number of rats / group = 6 Means with different capital letters superscripts A, B... for rows and small letters a, b... for columns with a significant difference (P value) at ≤ 0.05. Percentage of change compared to diabetic rats.

GI: normal control rats. GII: diabetic control rats. GIII: diabetic rats treated with SEDG.

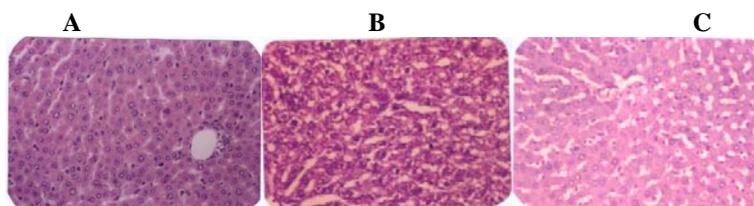


Fig (1):

- A. Liver tissue of control rat.
 B. Liver tissue of diabetic rat.
 C. Liver tissue of diabetic rat treated with crude stevioside

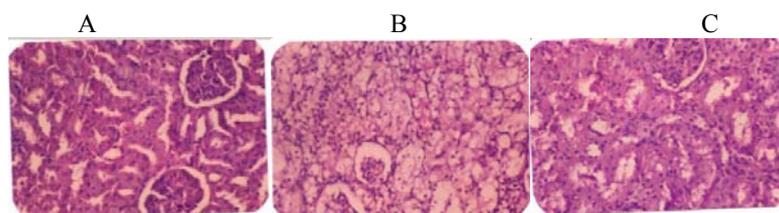


Fig (2):

- A. Kidney of control rat.
 B. kidney of diabetic rat
 C. kidney of diabetic rat treated with crude stevioside

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Maternal and Neonatal Toxicities induced by three Antirheumatic Drugs in Albino Rats

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Abstract: Because of their analgesic and anti-inflammatory properties especially for patients with rheumatoid arthritis, nonsteroidal anti-inflammatory drugs (NSAIDs) are one of the most often ingested drugs during pregnancy. The aim of the present work was to evaluate and compare some of the maternal and neonatal toxicity induced by three presently marketing antirheumatic drugs namely meloxicam, celecoxib and leflunomide. The study revealed an ascendent retardation in the body weight gain of experimental dams during gestation compared to control in a drug dependent manner for meloxicam, celecoxib and leflunomide, respectively. Moreover, maternal atrophy of femur cartilage thickness associated with lacking of the integrity was observed in the treated dams. Significant retardation in weight, size and length of the maternally treated newborns was also detected compared to control. A number of congenital malformations associated with a significant decrease in ossified lengths of certain axial and appendicular bones and evident missing of ossification centers were observed in the maternal treated litters. The mentioned maternal and neonatal toxicity showed direct dependency on the applied drug. The results indicate that the tested drugs should be avoided during pregnancy and if necessary, this should be done with caution.

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1. Introduction

The use of nonsteroidal anti-inflammatory drugs NSAIDs is increasing because they remain first-line during therapy for a wide range of rheumatic conditions and they are the drugs of choice for the treatment of inflammatory arthritis. It is well known that NSAIDs provide analgesia and suppress inflammation by inhibiting the enzyme cyclooxygenase, resulting in decreased prostaglandin synthesis (Urban, 2000). Many rheumatic diseases affect women of childbearing age, and the medications used to treat these diseases may affect both maternal and fetal organs (Janssen and Genta, 2000). The deleterious side effects that accompany the chronic use of NSAIDs on human health are of concern, particularly their impact on reproduction (Fort, 1999). NSAIDs readily cross the placenta and contribute alongside maternal and placental toxicity in blocking prostaglandin synthesis in a variety of foetal tissues (Burdan *et al.*, 2009 b). The risk of NSAIDs during pregnancy is best searched for aspirin including a number of complications such as diaphragmatic hernia, midline (gastro-sichisis/umbilical hernia) and cardiac septal defects (Kauffman, 1989, Cook *et al.*, 2003 and Kozer *et al.*, 2002 & 2003, Burdan *et al.*, 2006 a & b, Ofori *et al.*, 2006). Examples of other NSAIDs that have been searched for are indomethacin, sulindac, naproxen, ibuprofen, ketoprofen, and diclofenac (Ostensen, 2001) mostly because of their ability to suppress

premature labour.

Animal studies may provide some guidance in the usage of drugs during pregnancy though they cannot be easily extrapolated to the human situation. A few reports have demonstrated that NSAIDs exerted embryotoxicity and teratogenicity among experimental animals including isopropylantipyrine (Burdan, 2000), Diclofenac (Chan *et al.*, 2001), acetylsalicylic acid (Espiridiao *et al.*, 2002), ibuprofen and tolmetin (Burdan, 2004) and piroxicam (Burdan, 2005a). The latter study showed that piroxicam caused maternal toxicity, intrauterine growth retardation, and increase of external and skeletal variations in rats, while the decrease of fetal length was the only signs of developmental toxicity observed in pups. More recently, a number of histopathological side effects have been reported for both celecoxib and leflunomide on liver and kidney of both neonatal and pregnant albino rats (El-Sayyad *et al.*, 2010).

As immunosuppressant drug, leflunomide has been found to be teratogenic in a wide range of experimental animals. In rabbits, fused and incomplete ossification of the sternebra are seen when treatment began during fetal organogenesis (Sanofi-Aventis, 2003). In mice, leflunomide causes multiple malformations over the entire body of the fetus when administered to pregnant mice during gestation day 6-15 (Fukushima *et al.*, 2007). The latter study showed that the characteristic

malformations induced by leflunomide are exencephaly, cleft palate, tail deformity anomalies of the axial skeleton, and cardiovascular malformations. A more recent studies (Fukuschima *et al.*, 2009 & 2010) demonstrated that leflunomide induced limb malformations in mice fetuses via inhibition of dihydroorotate dehydrogenase, a key enzyme in the *de novo* synthesis of pyrimidine found in lymphocytes and other cells with subsequent inhibition of RNA and DNA synthesis. The same study demonstrated that the coadministration of uridine inhibited most of the teratogenicity caused by leflunomide.

In human, it has been reported that NSAIDs can cross the placenta and therefore have been detected in foetal tissues (Siu *et al.*, 2000). A few reports confirmed the animal findings and indicated that the use of prescribed NSAIDs was found to be highly associated with miscarriage beside certain teratological effects and an increased risk for defects of oral facial clefts (Ericson and Kallen, 2001). Santis *et al.* (2005) reported higher incidence of congenital malformations in neonatal outcome among women subjected to leflunomide-treatment during pregnancy. Leflunomide was also found to cause dose-related teratogenicity and fetotoxicity including malformations of the skeleton and central nervous system and prenatal exposure resulted in decreased birth weight and increased mortality in the offspring (Brent 2001 and Casanova *et al.*, 2005). It is well known that cyclooxygenase inhibitors caused intrauterine growth retardation and increased the number of skeletal developmental variations (Gross *et al.*, 1998, Reese *et al.*, 2000 and Burdan *et al.*, 2003). Such observations were partially confirmed in manufacturer studies with celecoxib (PDR, 2003). However, those results were never fully published in available journals.

The present experimental study was therefore aimed to evaluate and compare some of the possible morphological and skeletal maternal and neonatal teratogenic effects of certain marketing NSAID, namely, meloxicam and selective COX-2 inhibitor i.e. celecoxib as well as leflunomide as immunosuppressant drugs.

2. Material and Methods

2.1. Animals and Housing

Forty eight sexually mature healthy Wister albino rats (*Rattus norvegicus*), 12-15 weeks of age and weighing 125 ± 5 g were purchased from the breeding center of experimental animals at Helwan University, Helwan, Egypt and used for experimentation. The rats were acclimated for at least 2 weeks, housed and maintained in an animal care facility. The experiments were approved by the

Animal Research Ethics Committee at Menoufiya University and were conducted in accordance with the guidelines for animal experiments at Menoufiya University. Free access of standard diet composed of 50 % grinding barley, 20% grinding yellow Maize, 20% milk and 10% vegetables was supplied and tap water was allowed *ad-libitum*. Rats were housed in individual cages and maintained in a room at 23 °C. They were kept under good ventilation with a 12 hour light/dark photocycle. Feed and water consumption were monitored daily after the acclimatization period. Females were made pregnant by keeping them with healthy fertile male rats overnight (at a ratio of 1 male: 3 females). On the next morning, vaginal plugs were examined. Vaginal smears were carried out to give a precise determination of the onset of gestation i.e. the designation of gestation day 0. The pregnant rats were arranged into four groups nine female each including one control group and three experimental groups.

2.2. Applied drug-treatment

Three anti-rheumatic drugs were used in this study, namely, celecoxib and meloxicam as non-steroidal cyclooxygenase inhibitor drugs and leflunomide (*Avara*) as a disease-modifying antirheumatic drug. The three drugs were bought from a local pharmacy and manufactured by Amoun pharmaceutical Company, El-Obour city, Cairo, Egypt. The drug tablets were ground separately with Tween-80 (Sigma Chemical Co., St. Louis, Mo, USA). Using distilled water, the suspension was freshly prepared and orally administered by the use of gastric tube to experimental pregnant rats every other day beginning on gestational day 6 and ending on the day 20 few hours before spontaneous delivery which occurred on day 21, while the control group had no treatment. The drug administration period was therefore prolonged to the end of pregnancy, according to the FDA guidelines (Christian, 2001). Care was taken just before the anticipated day of parturition to prevent dams from eating any malformed offspring. The applied therapeutic dose for celecoxib (Pulbutr and Sookvanichsilp, 2002) and leflunomide (Menor and Dunham, 1999) was 0.2 mg/kg body weight whereas it was 0.4 mg / kg body weight for meloxicam (Salhab *et al.*, 2001).

2.3. Maternal investigation

Dam body weight was monitored every other day before drug administration from day 6 until the end of pregnancy. All animals were observed at least once daily before treatment and two times a day during treatment. The total numbers of delivered newborns were recorded for both control and experimental groups. At parturition, the pregnant rats of both control and experimental groups were sacrificed and ten femur bones were incised and

fixed by immersion in 10% neutral formalin for 24 hours and decalcified in 5% nitric acid for 24 hours, after then washed carefully in water and returned to 10% neutral formalin. Consequently, the femur bones were dehydrated in ascending grades of ethyl alcohol, cleared in xylol and mounted in molten paraplast 58-62°C. 5 μ m histological sections were cut, stained with Harris hematoxylin, counter stained with eosin and investigated under bright field Leitz microscope. The obtained sections were subjected to morphometric analysis. Some sections were photographed with "Leitz-Laborlux-S" binocular photomicroscope.

2.4. Delivered newborns investigation

When fetuses were spontaneously delivered on gestational day 21, they were routinely examined. External variations and different morphological abnormalities were examined. The size (cm³), weight (g.) and crown-rump length (cm) of delivered newborns of both control and experimental groups were therefore determined and recorded. The size of the newborns was determined using measuring cylinder containing 10 cm³ fixative solution (10 % neutral formalin). The final size after putting the newborn was subtracted from the constant volume of the fixative i.e. 10 cm³ to find out the exact size of the specimen which represents the displacement volume.

After analyzing the morphological teratogenic effects, both experimental and control delivered newborns were further investigated for the possible adverse effects on bone elements. This has been done by eviscerating and fixing the whole specimens in 10% neutral buffered formalin followed by treatment with 2% potassium hydroxide for 5 days till ossified areas were clearly visible through the soft tissue. The whole specimens were stained following transparency technique for demonstration of bones by Alizarin red "S" method (Mahony, 1973).

The axial and appendicular bones were examined for the occurrence or absence of ossification centers. Lack of alizarin staining was interpreted as bone missing. The incidence of missing bones and length reduction of axial and appendicular bones were determined. Length measurements of mandibular bone (axial region) as well as of ischium, ilium and fore- (humerus, radius and ulna) and hind (femur, tibia and fibula) limbs were carried out in 10 specimens per each group using an ocular micrometer to assess the degree of length reduction displayed by experimental groups comparing with the control.

2.5. Statistical Analysis

The data are presented as the means \pm standard error of the mean (SEM) of different groups. Statistical analysis was carried out using normal

deviates (z-scores) and Student's t test to compare the experimental groups with the control using Minitab 12 computer program (Minitab Inc. State College, PA). A difference was regarded as statistically significant at a value $P < 0.05$.

The following four integrated teratogenic parameters were therefore investigated for both control and experimental groups:

- 1- *Body weight gain of dams during gestation as well as the total number of delivered newborns.*
- 2- *Histological alterations of maternal femur.*
- 3- *Body weight (g.), size (cm³) and crown-rump length (cm) of delivered newborns.*
- 4- *Morphological and skeletal abnormalities of the delivered newborns including morphometric assessments of both axial and appendicular skeletal bones.*

3. Results

3.1. Maternal toxicity examination

Within treated groups, food consumption exhibited retardation compared with control in an ascending order for celecoxib, meloxicam and leflunomide respectively.

3.1.1. Body weight gain of dams during pregnancy

Fig.1 demonstrates the significant decrease in the accumulated body weight gain of experimental groups during gestation compared to control. Statistical analysis showed that the reduction magnitude in weight gain was 19.67, 28.96 and 31.97% of that of the control for celecoxib, meloxicam and leflunomide, respectively.

3.1.2. Histological examination of femur

The femur of the control dams exhibited normal epiphyseal cartilage with regular arrangement of cartilage column. The epiphyseal cartilage differentiates into resting layer, cartilage column, hypertrophied zone and calcified zone and bone trabeculae (Fig. 2 A). However, femur of dams treated with celecoxib (Fig. 2 A1) and meloxicam (Fig.2 A2) showed a marked disruption of cartilage cells including reduction of cartilage column, lacking their integrity, deranged epiphyseal line and lacked most of their building cartilage cells. The cartilage stromata became widened with widely separated cartilage cells. The bone trabeculae attained a considerable reduction. Leflunomide treated dams exhibited disruption of cartilage column cells including reduction of the epiphyseal cartilage associated with irregularity of cartilage column cells and reduction of trabeculae bone (Fig. 2 A3).

3.1.3. Morphometric assessments of femur

Fig. 3 illustrates the depths of epiphyseal cartilage (μ m) of femur bone of control and experimental dams. The antirheumatic drug-treatment induced a significant atrophy of epiphyseal cartilage in an ascending manner i.e. celecoxib, meloxicam,

and leflunomide groups.

3.2. Developmental toxicity

3.2.1. Morphological abnormalities of delivered newborns

Table 1 shows three of the investigated parameters of developmental toxicity. Fetal weight was significantly reduced and followed the same trend of the experimental dams. It therefore has an ascending order for celecoxib, meloxicam then leflunomide respectively. The table also shows the evident reduction of body size (cm³) and crown-rump length (cm) of delivered newborn rats maternally treated with the tested anti-rheumatic drugs.

Examining the gross morphology of maternally treated newborns shows the presence of some pattern of congenital malformations including kyphotic body, uni- & bilateral malformation of both fore -& hind limb, kinky tail and presence of superficial spotty regions of skin hemorrhage in head, neck and trunk regions (superficial haematomas). These abnormalities are observed at higher rates in delivered newborns maternally treated with either celecoxib or leflunomide. Table 2 summarizes all the external malformations and Figs. 4 A1 & A2 demonstrates two malformed examples compared to control (Fig. 4 A).

3.2.2. Effects of the tested drugs on ossification of delivered newborn skeleton

Contrarily to the control group (Fig. 4 B) delivered newborns maternally-treated with the tested antirheumatic drugs show a significant decrease in the length of the primary ossification centers in both axial and appendicular bones. Fig. 4 B1 & B2 demonstrate examples of skeletal preparations. As can be noted from the figures, the decrease in the length of the primary ossification centers were restricted mainly in nasal , parietal, interparietal ,zygomatic arch of squamosal , hyoid

arch , squamosal, tympanicum , exoccipital , supraoccipital , sternum , ischium , pubis and distal phalanges. As shown in table 3, delivered newborn rats of the three experimental groups exhibit significant reduction in the ossified length of mandibular, scapula, ilium, humerus, radius, ulna, femur, tibia and fibula. It is also evident from the table that the highest reduction of ossified length is detected post- leflunomide and celecoxib-treatment.

Assaying the incidence of missing ossified bones in newborns of different experimental groups revealed that the most affected bones are distal phalanges of both fore- & hind limbs, tympanic region, hyoid arch, exoccipital, and pubis. Developmental skeletal variations are seen in the treated litters (Table 4).

4. Discussion

The majority of rheumatologic disorders have been increased frequently in women (Temprano *et al.*, 2005). Rheumatic diseases in women of childbearing years may necessitate drug treatment during pregnancy to control maternal disease activity and to ensure a successful pregnancy outcome. The illness may be severe enough that it requires therapy even during pregnancy and lactation. Health care providers need to be aware of the potential adverse effects of these antirheumatic drugs during conception and pregnancy and should carefully weigh the risks and the benefits of these medications for both mother and child. It is worth mentioning that observations concerned prenatal toxicity are out of the scope of this study since the present data are limited only to the maternal and neonatal toxicity. The latter is attracting special interest particularly in view of the present FDA initiative to encourage clinical trials in children (FDA, 1998).

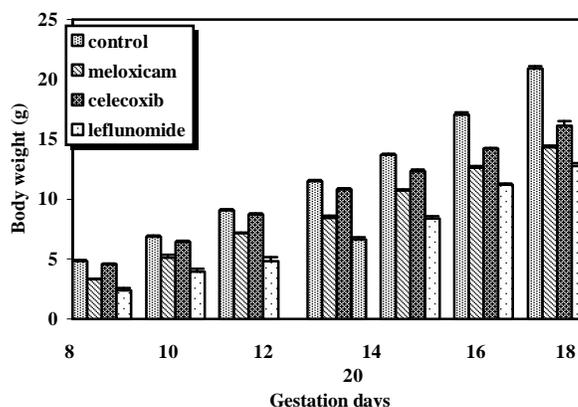


Fig. (1): Maternal increase in body weight gain of control and experimental dams.

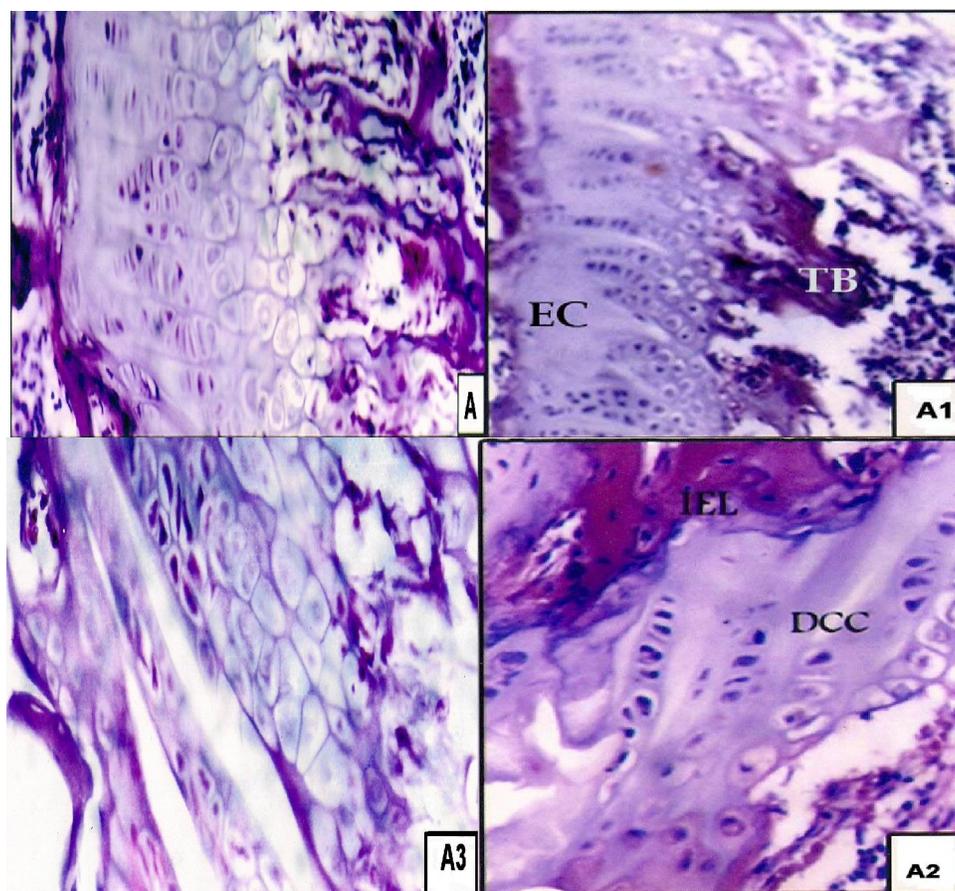


Fig. (2): A: Photomicrograph of histological longitudinal section of femoral head epiphyseal cartilage of control dam showing normal arrangement of epiphyseal cartilage column. (H&E. X100). A1 & A2: Photomicrographs of histological longitudinal sections of femoral head epiphyseal cartilage (EC) of celecoxib and meloxicam-treated dams showing marked atrophy of cartilage thickness, irregular epiphyseal line (IEL) and degenerated cartilage cells (DCC). The arrangement of cartilage column is disturbed and the trabeculae bone (TB) is reduced. (H&E. X200).

A3: Photomicrograph of histological longitudinal section of femoral head epiphyseal cartilage of leflunomide-treated dam showing reduction of epiphyseal cartilage thickness associated with irregularity of cartilage column cells and reduction of trabeculae bone. (H&E. X100).

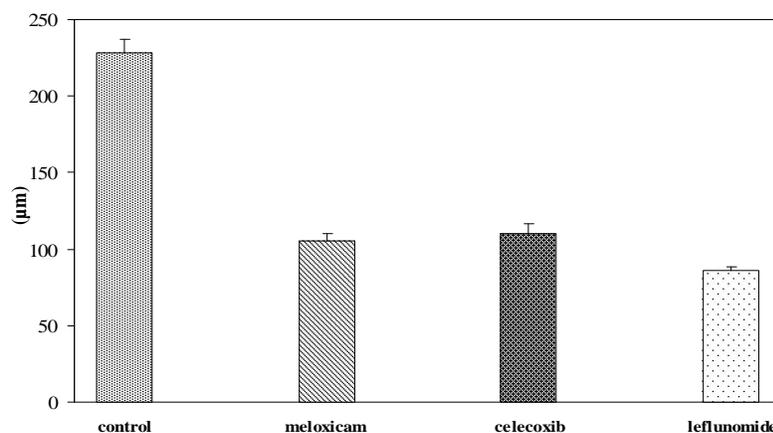


Fig. (3): The depths of epiphyseal cartilage (μm) of 10 femur bones of both control and experimental dams.

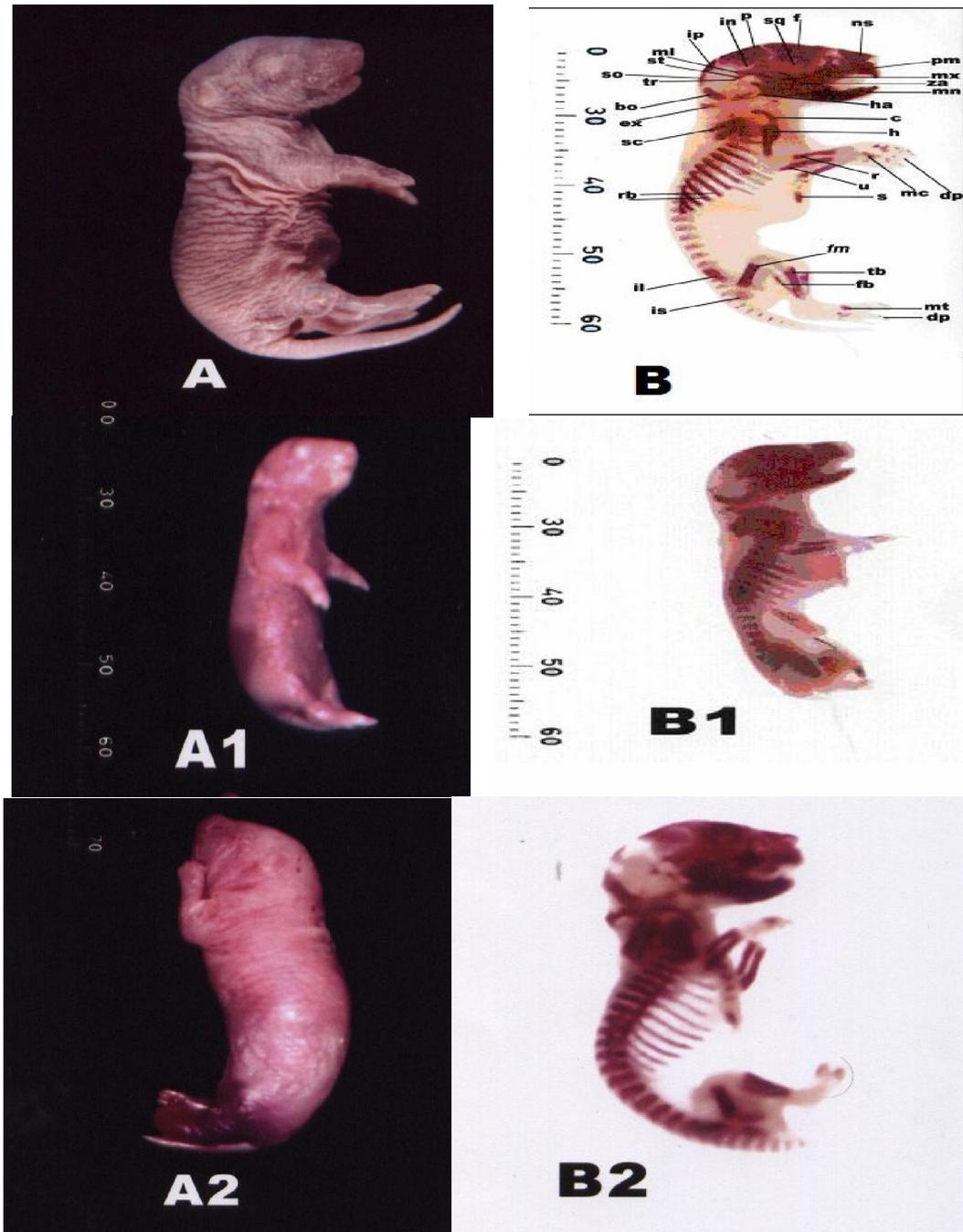


Fig. (4): A: Lateral view photograph showing the gross morphology of control delivered newborn rat. A1: Lateral view photograph showing the gross morphology of delivered newborn maternally treated with leflunomide. A2: Lateral view photograph showing the gross morphology of delivered newborn maternally treated with celecoxib. B: Lateral view photograph of alizarin red preparation of control delivered newborn rat showing normal skeletal elements. nasal (ns), frontal (f), parietal (p), interparietal (ip), premaxilla (pm), maxilla (mx), zygomatic arch (za), hyoid arch (ha), mandibular (mn), squamosal (sq), incus (in), ml: malleus (ml), stapes (st), tympanic ring (tr), basioccipital (bo), exoccipital (ex), supraoccipital (so), scapula (sc), clavicle (c), sternum (s), ribs (rb), ischium (is), ilium (il), humerus (h), radius (r), ulna (u), distal phalanx (dp), metacarpal (mc), femur (fm), tibia (tb), fibula (fb), metatarsal (mt). B1 & B2: Lateral view photographs of alizarin red preparation of delivered newborn maternally-treated with meloxicam and leflunomide showing reduction in the lengths of the ossification centers.

Table (1): Morphological assessments of control and experimental delivered newborn rats.

Parameter	Control	Meloxicam	Celecoxib	Leflunomide
Body weight (g)	0.04±5.67	0.19±4.82	0.09±5.29	0.17±3.69
Body size (cm ³)	0.12±6.8	0.19±4.8	0.15±4.65	0.23±3.69
Crown- rump length (cm)	0.47±41	0.54±37.4	0.75±40.6	1.07±38.4

Values are means ± Standard error of the mean.

Table (2): Morphological abnormalities of control and experimental delivered newborn rats.

	Control	Meloxicam	Celecoxib	Leflunomide
Total number	20	20	20	20
Superficial haematomas	0	4	8	3
Reduced neck region	0	5	3	0
Kinky tail	0	10	10	1
Mild-kyphotic body	0	2	0	0
Abnormal fore limb				
-Unilateral	0	10	13	7
-Bilateral	0	1	1	1
Abnormal hind limb				
-Unilateral	0	8	5	3
-Bilateral	0	2	3	0
Oedematous skin	0	1	0	0
Abnormal skin appearance.	0	2	0	0

Table (3): Morphometric assessments of control and experimental delivered newborn rats.

Skull	Control	Meloxicam	Celecoxib	Leflunomide
Ossified length (mm) of mandibular bones	0.02±8.09	0.46±4.64	0.21±4.16	0.14±2.57
Ossified length (mm) of scapula bones	0.04±4.30	0.07±1.79	0.07±1.31	0.12±1.18
Ossified length (mm) of ilium bones	0.07±2.84	0.23±1.43	0.08±0.72	0.05±0.82
Ossified length (mm) of humerus	0.03±5.45	0.11±2.08	0.07±1.79	0.08±1.45
Ossified length (mm) of radius	0.06±5.07	0.07±1.79	0.10±0.74	0.09±1.14
Ossified length (mm) of ulna	0.04±4.85	0.10±2.14	0.05±0.84	0.09±1.59
Ossified length (mm) of femur	0.01±4.08	0.11 ±1.61	0.06±1.13	0.07±1.09
Ossified length (mm) of tibia	0.05±4.48	1.07±1.79	0.12±0.50	0.16±1.32
Ossified length (mm) of fibula	0.03±3.82	1.10±1.67	0.06±1.30	0.11±1.05

Values are means ± Standard error of the mean.

Table (4): Incidence of missing ossified bones of both control and experimental delivered newborn rats.

Missed bones	Control	Meloxicam	Celecoxib	Leflunomide
Total number	20	20	15	20
Nasal	0	2	2	3
Interparietal	0	4	1	0
Pre maxilla	0	2	1	0
Hyoid arch	0	5	3	2
Zygomatic arch	0	2	3	0
Squamosal	0	4	4	0
Ossicles(incus, malleus & stapes)	0	4	4	2
Tympanic ring	0	4	4	11
Basioccipital	0	0	2	7
Exoccipital	0	4	3	1
Supraoccipital	0	4	4	0
Incomplete ossification of sternum	0	4	4	0
Ischium	0	4	2	0
Pubis	0	4	4	4
Tibia & Fibula	0	2	2	0
Distal phalanx	0	10	12	12

The present study showed that the investigated drugs caused morphological as well as skeletal changes in both dams and their newborn albino rats. Thus, a reduction in the weight gain of pregnant dams compared with control was largely noticed with leflunomide, meloxicam and celecoxib respectively and therefore, the decrease in the rate of body weight gain varied with the drug type. It is well known that maternal toxicity reflects adversely on the offspring (Chahoud *et al.*, 1999 and Burdan *et al.*, 2009 b) and consequently, similar findings were also noticed among the newborn rats, where the body parameters and bone ossification were adversely affected. These adverse effects would be exemplified by the magnitude of weight gain reduction, which is a symbol of the overall drastic change of these drugs. Thus, it could be stated that the drastic effect on health as reduction in weight gain of the studied animals exhibited significant dependency upon the applied drug. Hewiston *et al.*, (2000) showed that among its adverse side effects, leflunomide caused weight loss. Other animal data indicated that exposure to leflunomide at normal therapeutic levels during pregnancy has teratogenic and foetotoxic effects including reduced foetal weight (Hazes *et al.*, 2004). The observed developmental effects as expressed by delayed ossification are related to the fetal growth retardation (Burdan, 2005a).

The morphological abnormalities were evident in delivered newborn rats maternally treated with the tested drugs. According to the present data, the incidences of abnormalities are found to appear markedly higher in newborn maternally treated with either leflunomide or celecoxib more than meloxicam. The observed morphological abnormalities were kyphotic body, malformed fore- & hind limb, reduced neck region, superficial haematomas and kinky tail. These abnormalities were associated with reduction in body weight, size and crown-rump length. According to Manson and Kang (1994) the body weight, the crown length of the fetuses were considered sensitive indicators of animal's response to xenobiotics. However, superficial haematomas can be interpreted as a side effect of inhibition of cyclooxygenase enzyme (Burdan, 2000). In accordance with the present data, decreased foetal length was reported post piroxicam treatment by Burdan *et al.* (2005a) and similar pattern of congenital abnormalities were observed post diclofenac-treatment (Chan *et al.*, 2001).

Number of animal and human studies showed that cyclooxygenase inhibitors may disturb bone physiology and decrease synthesis of cartilage matrix (Seidenberg and An, 2004 and Burdan 2005b). Studies stem from variety of animal models indicating that NSAIDs have adverse effects on the

skeletal system. According to Allen *et al.*, 1980; Tornkvist and Lindholm, 1980; Keller *et al.*, 1987 Ho *et al.*, 1995, the NSAIDs induced cytotoxicity of cartilage cells, the element components of epiphyseal cartilage of the femur. The defects of epiphyseal cartilage may be attributed to the inhibition of glycosaminoglican and collagen synthesis (McKenzie *et al.*, 1976; Palmoski and Brandt, 1979; Herman *et al.*, 1984). Meanwhile, the disruption of cartilage column and degeneration of cartilage cells manifesting the apoptic cell death as a result of drug toxicity. These may be attributed to the slow physiological death leading to apoptosis (Kuhn *et al.*, 2004).

The direct effects of NSAIDs on cartilage have frequently been reported to be adverse (Smith *et al.*, 1995) but generally ignored owing to the fact that they are not visible during clinical evaluation and are shadowed by the effects on inflammation. Despite that, there is a significant amount of evidence that cartilage is sensitive to certain NSAIDs which inhibit the synthesis of cartilage proteoglycans (Dingle, 1999). Decrease in alizarin staining, as a qualitative sign of mineralization reduction, was observed in bones whose development occurred slowly and / or late in fetal life e.g. cranial, phalanges, metacarpal and metatarsal (Zoetis *et al.*, 2003). Lack of the alizarin staining in well formed cartilage structures, indicating a delay of ossification as a result of intrauterine growth retardation. Poorly ossified metacarpal, metatarsal and caudal vertebrae were also observed in the present work after drug treatment with highest average in leflunomide-treatment. The results obtained from this study indicated that ossification centers of different parts of axial and appendicular regions were retarded especially in tympanic region, sternbrae, clavicle, ischium, distal phalanges of fore- & hind limbs as well as caudal vertebrae which represented by higher incidence of missing ossified bones or delayed formation. Length measurements of ossified bones in mandibular, humerus, radius, ulna, femur, tibia, fibula, scapula and ilium appeared markedly reduced in maternally treated newborns. These findings are in agreement with the report of Brent (2001) in that leflunomide given to pregnant rats and rabbits in doses equivalent to human doses induced skeletal malformations in the offspring. Other studies have shown similar pattern of retarded ossifications including coccygeal, sarcococcygeal vertebrae missing, reduced ossification of skull bones, wavy ribs and decreased ossification of appendicular bones in newborn maternally treated with the highest dose of cox-2 inhibitors NSAIDs including tolmetin, ibuprofen and piroxicam (Burdan *et al.*, 2005 & 2009a). Similar results have been reported by Fukuschima *et al.*

(2009 & 2010) on mice fetuses. *In vitro* experiments revealed that NSAIDs including celecoxib suppress proliferation, delay the endochondral ossification and induce cell death of cultured osteoblasts of fetal rats (Chang, *et al.*, 2006). However, according to available data (Fritz, 1975, Khera, 1981, Beck, 1990 and Solecki *et al.*, 2003) growth restriction and most of the skeletal variations, including treatment-related decrease of bone ossification, could be normalized during postnatal life and thereafter. However, more recent studies indicated that delayed fetal mineralization may be the cause of complications in adulthood (Burr, 2002).

Taken together, the spectrum and frequency of bone malformation presented here are similar to those observed in fetuses exposed prenatally to paracetamol and caffeine (Burdan and Wyskiel, 1999; Burdan, 2001). The maternal toxicity is manifested by decreased body weight gain and both hepato- and nephrotoxicity lead to fetotoxicity (El-Sayyad *et al.*, 2010). Most of the observed developmental defects, e.g., morphological and skeletal malformations are possibly related to the foetal growth retardation (Burdan, 2003).

Based on the present data, it could be concluded that celecoxib, meloxicam and leflunomide induced maternal and neonatal toxicity and consequently, it is highly recommended to delay the treatment with these drugs until the termination of pregnancy.

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Curcumin Improves Insulin Sensitivity and Ameliorates Serum Pro-inflammatory Cytokines Levels in Diabetes Rat model Irrespective of type of Diabetes

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Abstract: Objectives: To evaluate the impact of type of diabetes on serum levels of pro-inflammatory cytokines and the effect of chronic administration of curcumin on their levels in experimentally-induced diabetes in albino rats. The study included 60 (20 as control group) male albino rats; diabetes mellitus (DM) was induced using intraperitoneal injection of a single dose of 50 mg/kg of streptozotocin (STZ) after animals were maintained on high-fat diet for 2-weeks (20 rats) for induction of non-insulin dependent DM (NIDDM) or without dieting regimen for induction of IDDM (20 rats). One-week later, rats received oral curcumin (200 mg/kg). Homeostasis Model Assessment of Insulin Resistance (HOMA-IR) and rapid insulin sensitivity test (RIST) were used for clinical assessment. Two fasting venous blood samples were obtained after induction of diabetes and prior to initiation of therapy and at 6-wks after treatment for calorimetric estimation of fasting blood glucose (FBG) and ELISA estimation of fasting plasma insulin (FPI), serum interleukin (IL)-1 and -6 and tumor necrosis factor- (TNF-). Results: Curcumin induced significant reduction of FBG levels, irrespective of type of diabetes and in NIDDM animals, post-treatment FPI levels were significantly lower compared to their pre-treatment levels. Diabetes, irrespective of its type, induced significantly higher pre-treatment serum levels of pro-inflammatory cytokines in both study groups compared to control group. However, curcumin significantly lowered serum levels of estimated cytokines at 6-weeks after treatment compared to pre-treatment levels. In group II, post-treatment RIST index was non-significantly higher compared to control index. In group III, pre-treatment HOMA-IR index was significantly higher compared to control index, while post-treatment HOMA-IR index was significantly lower compared to pre-treatment levels, despite still being significantly higher compared to control group. It is concluded that chronic administration of curcumin improves insulin sensitivity and thus imposing an anti-diabetic effect manifested as decreased FBG levels with concomitant decreased FPI and ameliorated the increased serum levels of pro-inflammatory cytokines and such effects are manifested in both types of diabetes.

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Keywords: Diabetes mellitus, Curcumin, pro-inflammatory cytokines.

1. Introduction

Diabetes and inflammation form a vicious circle, where diabetes is usually associated with inflammation and inflammation contributes to the development of diabetes. Glucose is proinflammatory and even a 75-g glucose load given orally to normal subject results in profound oxidative stress and inflammatory changes at the cellular and molecular level. This occurs even without an increase in plasma glucose concentrations into the pathological range and in spite of endogenous insulin secretion. Therefore, if high plasma glucose concentrations are maintained, they can be expected to be profoundly pro-inflammatory; this is indeed the case, especially if endogenous insulin secretion is inhibited^(1, 2, 3).

Insulin resistance is typically defined as decreased sensitivity or responsiveness to metabolic actions of insulin, such as insulin-mediated glucose disposal in skeletal muscle and adipose tissue and inhibition of hepatic glucose production⁽⁴⁾. Cross-talk between inflammatory signaling pathways and

insulin signaling pathways causes metabolic insulin resistance and endothelial dysfunction⁽⁵⁾.

Insulin resistance plays a major pathophysiological role in type 2 diabetes and is tightly associated with major public health problems, including obesity, hypertension, coronary artery disease, dyslipidemias, and a cluster of metabolic and cardiovascular abnormalities that define the metabolic syndrome⁽⁶⁾. The metabolic syndrome is considered to be a pro-inflammatory state because it is associated with elevated levels of high-sensitivity C-reactive protein, IL-6, fibrinogen, and plasminogen activator inhibitor-1, all of which promote the development of atherosclerotic cardiovascular disease⁽⁷⁾.

Improvement of insulin sensitivity has been suggested in many reports to be feasible by certain herbs and drugs. For instance, it was reported that curcumin improve blood glucose and insulin sensitivity in rat models of diabetes. Curcumin, a polyphenolic compound, is the major yellow-colored

pigment found in the spice, turmeric. It has been used in traditional Indian medicine for centuries, and has numerous pharmacological activities, including potent anti-inflammatory, antioxidant, chemopreventive and chemotherapeutic actions^(8, 9, 10).

The present study aimed to evaluate the impact of type of diabetes on serum levels of pro-inflammatory cytokines and the effect of chronic administration of curcumin on their levels in experimentally-induced diabetes in albino rats.

2. Materials and Methods

Animals

The present study comprised 60 male albino rats with weight range of 250-300 grams. Rats were grouped and kept in separate animal cages, under the prevailing atmospheric conditions and maintained on a balanced diet (bread, barely, carrots, lettuce, milk) and fresh-water supply.

Induction of diabetes

- A) Type 1 diabetes mellitus (IDDM group) was induced by injecting rats intraperitoneally with a single dose of streptozotocin (STZ) (Sigma) in a dose of 50 mg/kg body weight dissolved in 0.2 ml of citrate buffer (pH 4.5)⁽¹¹⁾ without dieting regimen.
- B) Type 2 diabetes mellitus (NIDDM group) was induced by feeding rats with high-fat diet (HFD) consisting of 22% fat, 48% carbohydrate and 20% protein. After two weeks, rats were injected intraperitoneally with a single dose of streptozotocin (STZ) (Sigma) in a dose of 50 mg/kg body weight dissolved in 0.2 ml of citrate buffer (pH 4.5)⁽¹¹⁾.

Diagnosis of diabetes

On the third day of injection, the animals were checked for the presence of glucose in the urine using enzymatic test strips as STZ induces diabetes within 3 days by destroying the beta cells, (*Karunanayake et al., 1975*). Confirmation was done by measuring fasting blood glucose levels by taking a drop of blood from the rat-tail using a glucose-measuring device (Glucocheck). Rats had blood glucose levels of 200 mg/dl were considered diabetic⁽¹¹⁾.

Grouping & Dosing:

- Group I (Control group): 20 animals were considered as a control group for estimated parameters and were divided into 2 subgroups:
 - a) Group I-A: included 10 rats received no medications and kept under the same conditions as prior to start of the study.

- b) Group I-B: included 10 rats were injected intraperitoneally with one injection of citrate buffer and received 1ml/rat of 1% gum acacia orally for 6 weeks.
- Group II: included 20 rats had induced IDDM and were administered 200 mg/kg body weight of curcumin in 1% gum acacia, orally/day for a period of 6 weeks
- Group III: included 20 rats had induced NIDDM and were administered 200 mg/kg body weight of curcumin in 1% gum acacia, orally/day for a period of 6 weeks.

Biochemical Evaluation

Two fasting venous blood samples, withdrawn from the tail vein, were obtained, the 1st after induction of diabetes and prior to initiation of therapy and the 2nd at the end of the 6-wks treatment period. Blood samples were divided into 2 parts:

- A) The first was put in a tube containing sodium fluoride (2 mg sodium fluoride/ ml blood) to prevent glycolysis. Plasma was separated by centrifugation and used for calorimetric estimation of glucose by glucose oxidase method⁽¹²⁾.
- B) The second part was allowed to clot then serum was separated by centrifugation at 3000 rpm for 10 min. Serum was removed, divided into 2 parts:
 1. The first part was used for RIA determination of serum level of insulin⁽¹³⁾.
 2. The second part was placed in pyrogen-free Eppendorf tubes and stored at -80°C until ELISA assayed (within one month) for estimation of serum levels of IL-1⁽¹⁴⁾, IL-6⁽¹⁵⁾ and TNF-⁽¹⁶⁾ using Quantikine ELISA kits from R & D Systems, Inc., (Minneapolis, MN).

Insulin sensitivity Evaluation

Insulin sensitivity of control animals was evaluated by both tests, for comparison with IDDM using RIST and NIDDM using HOMA-IR test

- a. Homeostasis Model Assessment of Insulin Resistance (HOMA-IR)⁽¹⁷⁾ on the basis of fasting insulin and glucose levels and according to the formula $HOMA-IR = I \times G / 22.5$, where I is fasting plasma insulin level (μ U/ml) and G is fasting blood glucose in mg/dl divided by 18, considering an abnormal HOMA-index >3.8 ⁽¹⁸⁾.
- b. Rapid insulin sensitivity test (RIST): The RIST starts with the administration of an insulin bolus (50mU/kg i.v.), over 5 min. At 1 min after initiating the insulin infusion, arterial blood glucose was measured and glucose infusion (D-Glucose/saline, 100 mg/ml, i.v.) was started at a

rate of 5mg/kg/min. According to arterial glucose concentrations measured at 2 min intervals, the infusion rate of the glucose was readjusted to maintain euglycemia. When no further glucose infusion was required, usually within 35 min, the test was concluded. The amount of glucose necessary to maintain euglycemia along the test quantifies insulin sensitivity and is referred to as the RIST index (mg glucose/kg)⁽¹⁹⁾.

Statistical analysis

Data are presented as mean±SD and compared using Wilcoxon ranked test for unrelated data (Z test) using SPSS program (Version 10, 2002). P value at <0.05 was considered significant.

3. Results:

Estimated variables showed a non-significant ($p>0.05$) difference between both subgroups of control rats, (Table 1), so all statistical analyses of study groups were compared versus the total number of control rats and arbitrary named control group.

Fasting blood glucose (FBG) levels estimated either prior to or at end of therapy, were significantly ($p<0.05$) higher in all studied animals compared to control group. Administration of curcumin induced significant ($p<0.05$) reduction of FBG despite still being significantly ($p<0.05$) higher compared to control group. Curcumin induced reduction of FBG, irrespective of type of diabetes, as judged by the non-significant ($p>0.05$) difference of

post-treatment FBG levels in both groups. The impact of type of diabetes was evident on fasting plasma insulin (FPI) levels which were significantly ($p<0.05$) lower in Group II compared to both control group and group III at pre- and post-treatment estimates. On contrary to FBG, curcumin has no impact on FPI in group II, while significantly reduced FPI levels in group III at 6-weeks after initiation of administration compared to prior to administration, despite being still significantly ($p<0.05$) higher compared to control levels, (Table 2).

Induced diabetes, irrespective of its type, significantly induced release of pro-inflammatory cytokines as evidenced by significantly ($p<0.05$) higher pre-treatment serum levels of pro-inflammatory cytokines in both study groups compared to control group. However, the ameliorative effect of curcumin was also evident as manifested by the significantly ($p<0.05$) lower serum levels of estimated cytokines at 6-weeks after treatment compared to pre-treatment levels, despite still being significantly ($p<0.05$) higher compared to control levels

In group II, post-treatment RIST index (34.5 ± 3.9) was non-significantly higher ($p>0.05$) compared to control index (30.6 ± 7.8). In group III, HOMA-IR index calculated prior to initiation of therapy (2.3 ± 0.08) was significantly ($p<0.05$) higher compared to control index (0.17 ± 0.03), while post-treatment HOMA-IR index (0.81 ± 0.19) was significantly ($p<0.05$) decreased compared to pre-treatment levels, despite still being significantly ($p<0.05$) higher compared to control group.

Table (1): Mean values of estimated parameters in both control subgroups

Variable	Group I-A	Group I-B
Fasting blood glucose (mg/dl)	77.4±9.1	81±9.3
Fasting insulin (µIU/ml)	0.9±0.2	0.82±0.21
HOMA-IR index	0.17±0.03	0.16±0.05
IL-1 (pg/ml)	1.28±0.23	1.19±0.31
IL-6 (pg/ml)	12.2±3.3	11.9±4.2
TNF- (pg/ml)	1.82±0.6	1.86±0.52

Data are presented as mean±SD

Table (2): Mean (±SD) of FBG and FPI levels estimated in studied animals pre- and post-treatment compared to control levels

	Fasting blood glucose (mg/dl)		Fasting plasma insulin (µIU/ml)	
	Pre-ttt	Post-ttt	Pre-ttt	Post-ttt
Control	77.4±9.1		0.9±0.2	
Group II (IDDM)	173.4±28*	127.7±6.5*†	0.28±0.1*	0.29±0.1*
Group III (NIDDM)	176.3±24.9*	124.5±6.4*†	5.3±1.2*‡	2.55±0.54*‡

Data are presented as mean±SD Pre: prior to initiation of therapy

Post: at end of 6-wks therapy

*: significant difference versus control group

†: significant difference versus pre levels

‡: significant difference versus Group II

Table (3): Mean (\pm SD) of serum levels of IL-1 , IL-6 and TNF- estimated in studied animals pre- and post-treatment compared to control levels

		Control	Group II (IDDM)	Group III (NIDDM)
IL-1 (pg/ml)	Pre	1.28 \pm 0.23	2.57 \pm 0.36*	2.22 \pm 0.46*‡
	Post		1.75 \pm 0.4*†	1.4 \pm 0.32†‡
IL-6 (pg/ml)	Pre	12.2 \pm 3.3	50.2 \pm 7.5*	43.2 \pm 9.3*
	Post		23.5 \pm 1.7*†#	21.9 \pm 2.3*†#
TNF- (pg/ml)	Pre	1.82 \pm 0.6	6.54 \pm 1.7*	6.7 \pm 2*
	Post		3.1 \pm 0.5*†#	3.4 \pm 0.6*†

Data are presented as mean \pm SD Pre: prior to initiation of therapy Post: at end of 6-wks therapy
 *: significant difference versus control group †: significant difference versus pre levels
 ‡: significant difference versus Group II

4. Discussion

Curcumin induced significant reduction of FBG levels in both diabetic groups, irrespective of type of diabetes. Moreover, in NIDDM animals, FPI levels estimated at end of therapy despite being still significantly higher compared to control levels, but were significantly lower compared to their pre-treatment levels. These findings indicated that the effect of curcumin was mediated through increasing the sensitivity of insulin receptor to the available secreted amount of insulin and consequently increased glucose metabolism with lowering FBG without any impact on insulin secretion.

The obtained results coincided with and supported that previously reported by Pari & Murugan(2005) ⁽²⁰⁾ who investigated the effect of tetrahydrocurcumin (THC), one of the active metabolites in curcumin, on the key hepatic metabolic enzymes involved in carbohydrate metabolism in STZ-induced diabetic rats and found that in untreated diabetic control rats, the activities of the gluconeogenic enzymes were significantly increased, whereas hexokinase and G6PD activity and glycogen levels were significantly decreased, while both THC and curcumin were able to restore the altered enzyme activities to near normal levels and normalize blood glucose in diabetic rats. Thereafter, Murugan & Pari ⁽²¹⁾ investigated the effect of THC on lipid profile and lipid peroxidation in type-2 diabetic rats and reported a significant reduction in blood glucose, which proved its antidiabetic effect and caused a significant reduction in lipid peroxidation and lipids in serum and tissues, suggesting its role in protection against lipid peroxidation and its antihyperlipidemic effect.

Murugan & Pari ⁽²²⁾ and Suryanarayana et al. ⁽²³⁾ examined the effect of THC and curcumin on erythrocyte membrane bound enzymes and antioxidants activity in type-2 diabetic model and reported that administration of THC and curcumin induced increased levels erythrocyte antioxidants and the activities of membrane bound enzymes and concluded that these biochemical observations

indicate that the THC and curcumin possess a significant beneficial effect on erythrocyte membrane bound enzymes and antioxidants defense in addition to its antidiabetic effect. In support of the reported data, post-treatment HOMA-IR and RIST indices were significantly improved in the studied animals compared to pre-treatment levels.

Furthermore, post-treatment serum levels of studied cytokines were significantly lower compared to pre-treatment levels, such ameliorative effect of curcumin on pro-inflammatory cytokines could be a possible mechanism for the reported effects on insulin sensitivity that proved to be improved irrespective of type of diabetes.

The reported beneficial effects of curcumin especially on IDDM could be attributed to its anti-oxidant and anti-inflammatory effects and go in hand with Tikoo et al. ⁽²⁴⁾ who reported that treatment of type-1 diabetic rats with curcumin significantly decreased blood urea nitrogen and creatinine and increased albumin; variables associated with the development of diabetic nephropathy and prevented the increased levels of HSP-27 and MAP kinase (p38) in diabetic kidney and at nuclear level curcumin prevented the decrease in dephosphorylation and increases acetylation of histone H3. Moreover, Kanitkar et al. ⁽²⁵⁾ demonstrated that curcumin in vitro protects pancreatic islets against cytokine-induced death and dysfunction by scavenging reactive oxygen species (ROS) and normalized cytokine-induced NF-kappaB translocation by inhibiting phosphorylation of inhibitor of kappa B alpha and in vivo curcumin prevents STZ-induced diabetes.

Kang & Chen ⁽²⁶⁾ found curcumin dose-dependently eliminates insulin-induced hepatic stellate cells (HSC) activation by suppressing expression of type I collagen gene, interrupts insulin signaling in HSC by reducing the phosphorylation level of insulin receptor and suppressing its gene expression. Furthermore, curcumin attenuates insulin-induced oxidative stress in HSC by inducing gene expression of glutamate-cysteine ligase leading

to de novo synthesis of glutathione. Also, Lin et al.⁽²⁷⁾ found curcumin suppresses gene expression of lectin-like oxidized LDL receptor-1, leading to the blockade of the transport of extracellular oxidized LDL into cells through interruption of Wnt signaling and the activation of peroxisome proliferator-activated receptor-gamma

Recently, El-Moselhy et al.⁽²⁸⁾ found curcumin showed an anti-hyperglycemic effect and improved insulin sensitivity, and this action may be attributed at least in part to its anti-inflammatory properties as evident by attenuating TNF- levels in high fat diet (HFD) fed rats, and its anti-lipolytic effect as evident by attenuating plasma free fatty acids and concluded that curcumin could be a beneficial adjuvant therapy in patients with T2DM. El-Azab et al.⁽²⁹⁾, (2011), reported that treatment with curcumin significantly reversed STZ-induced hyperglycemia/glucose intolerance, hypoinsulinemia, and damage of pancreatic islets. Moreover, El-Azab et al.,⁽²⁹⁾ found curcumin blunted the pancreatic lipid-peroxidation, up-regulated activities of the antioxidant enzymes, and suppressed serum levels of TNF- and IL-1. Lin & Chen⁽³⁰⁾, (2011), observed that high levels of glucose induced cell proliferation, type I collagen production and expression of genes relevant to HSC activation, and elevated intracellular glucose levels in cultured HSC, but curcumin eliminated such stimulatory impacts, abrogated the membrane translocation of GLUT2 by interrupting the p38 MAPK signaling pathway, suppressed Glut2 expression by stimulating the activity of peroxisome proliferator-activated receptor-gamma and de novo synthesis of glutathione.

The obtained results and data extracted from literature allow concluding that chronic administration of curcumin improves insulin sensitivity and thus imposing an anti-diabetic effect manifested as decreased FBG levels with concomitant decreased FPI and ameliorated the increased serum levels of pro-inflammatory cytokines and such effects are manifested in both types of diabetes.

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Biochemical Determination of Tissue Ossification Markers in Experimentally-induced Myringosclerosis**Ahmed Al-Shal¹, Nahla E. El-Azab², Mohamed Khaled Mohamed Mahfouz³**

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Abstract: Objectives: To explore myringosclerotic tissue levels of two bone modeling markers: osteopontin (OPN) and osteoprotegerin (OPG) in experimentally-induced, histologically-confirmed myringosclerosis (MS). **Materials & Methods:** The right middle ear of 24 normal healthy growing male Wister rats was inoculated, via transtympanic access, by *Streptococcus pneumoniae* type 3, after a period of 8 weeks the tympanic membrane (TM) was examined Otomicroscopically for transparency and graded as normal TM, mild or marked opacification. Then, tympanic bullae were removed and a part of myringosclerotic plaque was excised for ELISA estimation of tissue extract levels of OPN and OPG and the remainder of the TM was stained with hematoxylin-eosin for light microscopic grading of TM inflammation according to extent of calcification into 5 grades. **Results:** 20 ears developed otoscopically defined myringosclerotic changes, 14 ears showed mild and 6 had marked opacification that was localized in 4 ears and diffuse in 2 ears. Histological examination reported inflammation of grade III in 7, grade IV in 13 and grade V in 4 specimens. Mean estimated tissue extract level of OPN and OPG in studied animals were significantly higher compared to control animals with a positive significant correlation between histological grading and tissue-extract levels of both OPG and OPN and a positive significant correlation between otoscopic grading and tissue-extract levels of OPG, but the correlation was non-significant with OPN **Conclusion:** Increased myringosclerotic tissue extract levels of both bone modeling markers indicated their possible role in initiation and/or progression of sclerotic changes in TM after chronic suppurative otitis media.

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1. Introduction

Tympanosclerosis involves the hyalinization and calcification of the collagen layer in certain areas of the tympanic membrane. The process is most often seen in the TM but may also involve other sites in the middle ear. The incidence of tympanosclerosis was found to be 35.6% of patients with chronic suppurative otitis media, but 77.8% of these patients had dry ear and the majority of them had hearing loss of the conductive type, ⁽¹⁾.

The pathogenesis of TS is still unclear and various studies tried to explore the etiopathogenesis of MS especially that occurred in conjunction with or secondary to middle ear aeration using ventilation tube. The relationship between oxygen-derived free radicals and occurrence of MS has been proven in experimental models, and it was also shown that the formation of MS after experimental myringotomy could be reduced by application of various free radical scavengers, ⁽²⁾. Kazikdas et al., ⁽³⁾ reported that the formation of MS after experimental myringotomy can be diminished by intramuscular alpha-tocopherol injections and Uneri et al., ⁽⁴⁾ reported similar results after topical application of vitamin E in human subjects.

Osteopontin (OPN) is a phosphorylated glycoprotein that is initially identified in osteoblasts as a mineralization-modulatory matrix protein and is constitutively expressed in mineralized tissues and in epithelial surfaces, ⁽⁵⁾. In calcified tissues OPN plays an important regulatory role in bone mineralization and tissue remodeling, through the control of bone cell adhesion, osteoclast activation and matrix mineralization, ⁽⁶⁾. OPN has been studied as a multifunctional protein that is upregulated in a variety of acute and chronic inflammatory conditions, such as wound healing, fibrosis, autoimmune disease, and atherosclerosis, ⁽⁷⁾.

Osteopontin plays an important role in the inflammatory response, in which it stimulates macrophage and T-lymphocyte migration and activation, ⁽⁸⁾. In the latter cells, OPN polarizes the early Th1 cytokine response and inhibits Th2 cytokine expression, ⁽⁹⁾. During inflammation, OPN is also expressed by cells of both innate and adaptive immunity, such as activated T lymphocytes, macrophages and resident fibroblasts, ⁽¹⁰⁾. Moreover, OPN has been found to play an important role in neoplastic disorders and in the control of blood vessel neof ormation (angiogenesis) via the stimulation of endothelial cells proliferation and progression, ⁽¹¹⁾.

Osteoprotegerin (OPG) is an extracellular regulator of osteoclast differentiation and activation,⁽¹²⁾ OPG is synthesized as a propeptide (401 amino acids for the human, mouse, and rat forms), of which the signal peptide (21 amino acids) is cleaved, thus generating the 380 amino acids mature peptide,⁽¹³⁾ In contrast to all other TNFR superfamily members, OPG lacks transmembrane and cytoplasmic domains and is secreted as a soluble protein. Moreover, OPG mRNA has wide tissue distribution not restricted to bone or immune tissues and high levels of OPG mRNA have been detected in lung, heart, kidney, liver, stomach, intestine, skin, brain, spinal cord, thyroid gland, and bone,⁽¹⁴⁾ In addition, high OPG mRNA levels have also been detected in endothelial cells, aortic smooth muscle cells, fibroblastic cells, ovarian and breast cancer cell lines, and monocytic dendritic and B lymphocytic cell lines,⁽¹⁵⁾

As the calcification process and the sclerotic plaques of the drum mimics features of bone tissue, this study was designed to explore myringosclerotic tissue levels of two bone modeling markers: osteopontin (OPN) and osteoprotegerin (OPG) in experimentally-induced, histologically- confirmed myringosclerosis.

2. Materials and Methods

After approval of the study protocol from the Local Ethical Committee with regards to rules for dealing with experimental animals; the study comprised 30 normal healthy growing male Wister rats, weighing 200-400 gm. Rats were kept under standard conditions, temperature 20°C, humidity 60% and 12-hs day/night cycle, and maintained on standard diet and free water supply till the start of study regimens. The animals were divided into 2 groups, each in a separate cage: Control group included 6 rats and Study group included 24 rats.

The rats were anesthetized with chloral hydrate at 10% by intra-peritoneal injections after which they were placed over the surgical bench, left lateral position, so that the examiner could explore the right ear. Under otomicroscopy, using surgical microscope brand D.F. Vasconcelos, model MC-M31, the middle ear of each animal was inoculated, via transtympanic access, by 0.1ml of solution containing 10^7 colony-forming units (CFU) of *Streptococcus pneumoniae* type 3, after which the animals were sent back to their respective cages. All animals were injected in right ear only. After elapse of a period of 8 weeks control and study rats were sacrificed with a lethal dose of chloral hydrate and the TM was examined Otomicroscopically for transparency and graded as normal TM (TM appeared thin and transparent), mild opacification (diffuse or isolated mild loss of transparency) and

marked opacification (diffuse or isolated marked TM thickness with total loss of transparency),⁽¹⁶⁾ Then, tympanic bullae were removed and after decalcification of specimens in nitric acid at 7.5%, a part of myringosclerotic plaque was excised for biochemical assay and the remainder of the TM together with the external auditory canal was fixed in formaldehyde at 10%. In the post-fixation process, bullae were placed in a hot oven for 40 minutes in alcohol and 20 minutes in alcohol-xylol and later they were placed in xylol outside the hot oven, and then they were dehydrated, mounted in paraffin bloc (50 minutes). The material was sectioned at axial sections of 4mm thickness, with intervals of 50mm, encompassing the whole TM, and stained with hematoxylin-eosin and then examined under light microscopy,⁽¹⁷⁾

Microscopically, TM inflammation was graded into 5 grades: Grade 1: exudation, characterized by marked polymorphonuclear infiltrate; Grade 2: granulation, characterized by marked neovascularization and presence of elements of the macrophage mononuclear system (fibroblasts, lymphocytes, macrophages); Grade 3: fibrosis, characterized by major proliferation of fibroblasts and formation of collagen fibers, reduction of vascularization; Grade 4: hyalinization, characterized by reduction in number of fibroblasts, which are replaced by collagen fibers, which fuse forming plaques and Grade 5: calcification, characterized by calcium and phosphorus deposits, giving the collagen matrix an aspect similar to that of cartilage or bone tissue,⁽¹⁸⁾

Immediately after removal of the sclerotic plaque; specimens were homogenized in 10 mg/ml ice-cold phosphate-buffered saline to get a concentration of 10% (W/V). Homogenization was performed for 1 minute with the aid of a motor driven homogenizer at 5000 rpm on an ice background,⁽¹⁹⁾ The homogenate was then centrifuged to get the supernatant for Enzyme-Linked Immunosorbent Assay (ELISA) estimation of tissue extract levels of Osteoprotegerin using the RayBio® Human Osteoprotegerin ELISA,⁽¹³⁾ and Osteopontin using the R&D Systems, Inc.,⁽²⁰⁾

Statistical analysis

Obtained data were presented as mean±SD and ranges. Results were analyzed using Wilcoxon Z-test. Possible relationships were investigated using Pearson linear regression. Statistical analysis was conducted using the SPSS (Version 10, 2002) for Windows statistical package. P value <0.05 was considered statistically significant.

3. Results:

At the end of the study period, 20 of the study animals developed otoscopically defined myringosclerotic changes. The TM of 4 ears (16.7%) appeared normal, while 14 ears (58.3%) showed mild opacification. The remaining 6 ears (25%) developed marked opacification that was localized in 4 ears (Fig. 1) and diffuse in 2 ears, (Fig. 2).

Seven (29.1%) specimens showed grade-3 changes with hyalinization, reduced number of fibroblasts and appearance of collagen fibers, (Fig. 3). Thirteen (54.2%) specimens showed grade 4 changes with fibrosis, proliferation of fibroblasts and formation of collagen fibers associated with reduction of vascularization, (Fig. 4). Four specimens (16.7%) showed grade-5 changes with calcification giving the collagen matrix an aspect similar to that of cartilage or bone tissue, (Fig. 5). All studied samples showed microscopic evidence of sclerosis varied between fibroblastic proliferation and evident calcification. On contrary, clinical evaluation failed

to detect sclerotic changes in 4 ears with sensitivity of 83.3%.

Mean estimated tissue extract level of OPG in studied animals (127 ± 12.5 ; range: 103.9-165.4 ng/ml) was significantly ($p < 0.05$) higher compared to that estimated in control animals, (71.9 ± 7.6 ; range: 62.3-81.4 ng/ml). Also, mean estimated tissue extract level of OPN in studied animals (204.3 ± 45.5 ; range: 135-265 ng/ml) was significantly ($p < 0.05$) higher compared to levels estimated in control animals, (342.5 ± 110.9 ; range: 194-654 ng/ml), (Fig. 6).

Moreover, there was a positive significant correlation between tissue-extract levels of OPG and otomicroscopic grading, ($r = 0.430$, $p = 0.036$) and histological findings, ($r = 0.581$, $p = 0.003$), (Fig. 8). Also, there was a positive significant correlation between tissue-extract levels of OPN and histological grading, ($r = 0.445$, $p = 0.029$), while the correlation was non-significant with otomicroscopic grading, ($r = 0.314$, $p > 0.05$), (Fig. 9).

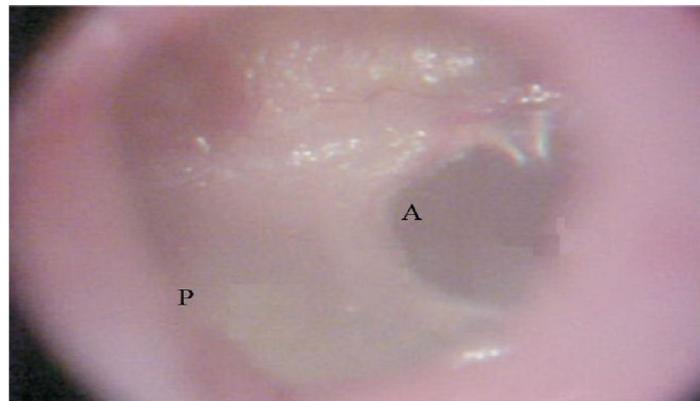


Figure 1: Otomicroscopic examination of one affected ear showing marked opacification of the posterior portion (P) of TM with normal transparency of the anterior portion (A) of TM

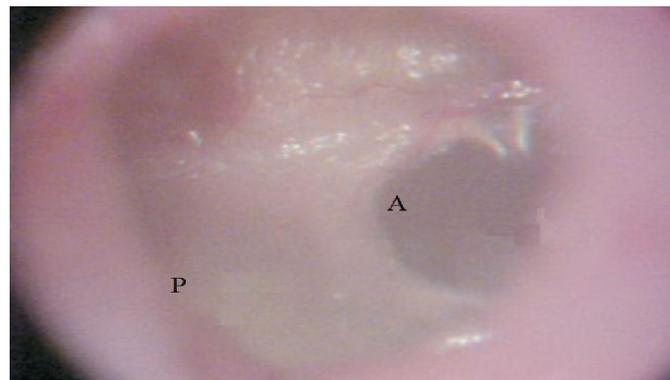


Figure 2: Otomicroscopic examination of one affected ear showing marked diffuse opacification of the TM (O)

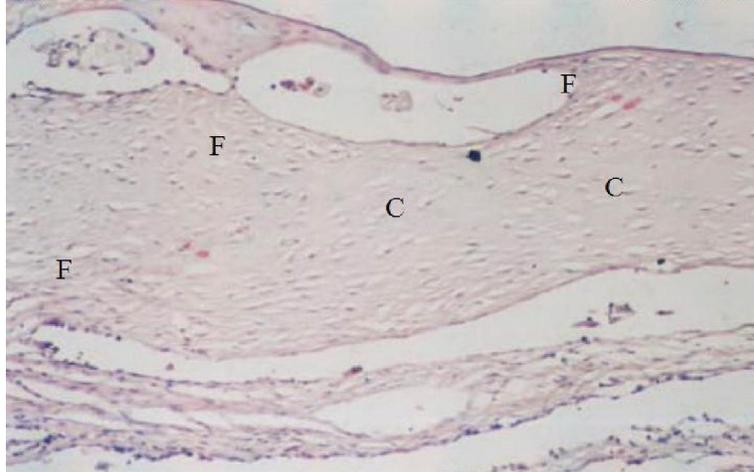


Figure 3: TM showed scattered fibroblasts (F) with areas of hyalinized collagen (HC), (Hx &E, x100).

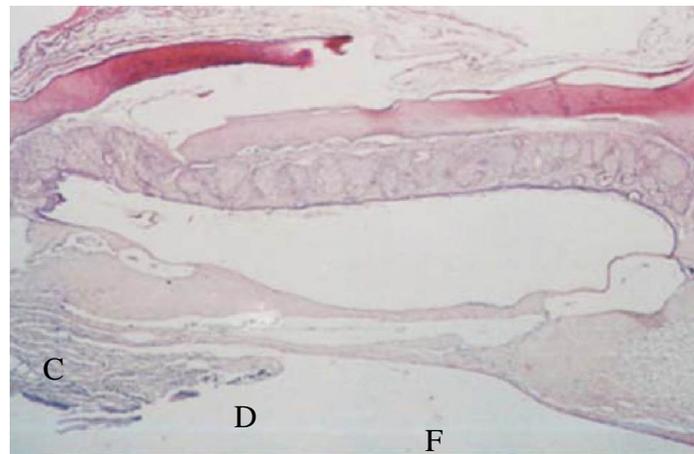


Figure 4: TM showed collagen (C) deposition with fibrosis (F) and areas of hyalinized degeneration (D), (Hx &E, x10).

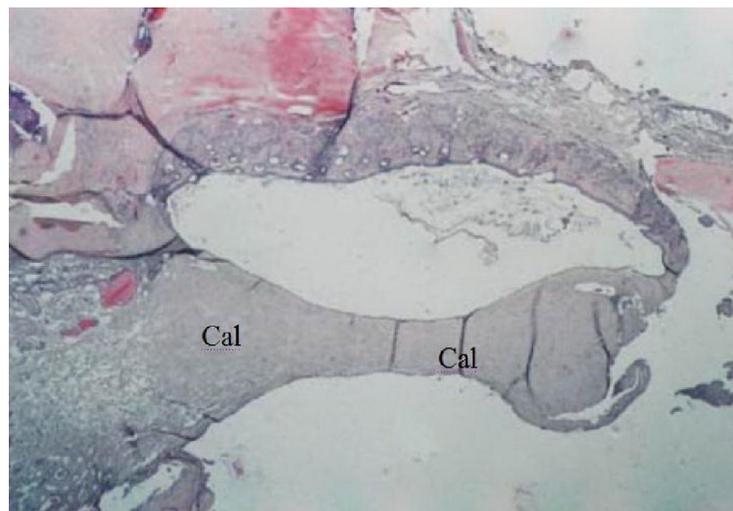


Figure 5: TM showed calcification (Cal), (Hx &E, x10).

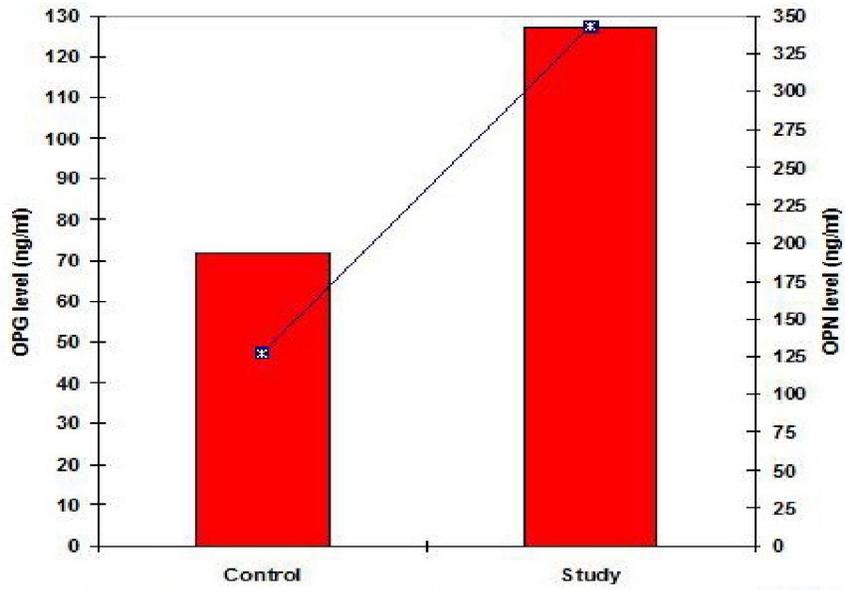


Figure 6: Mean tissue extract level of OPG and OPN estimated in studied versus control animals

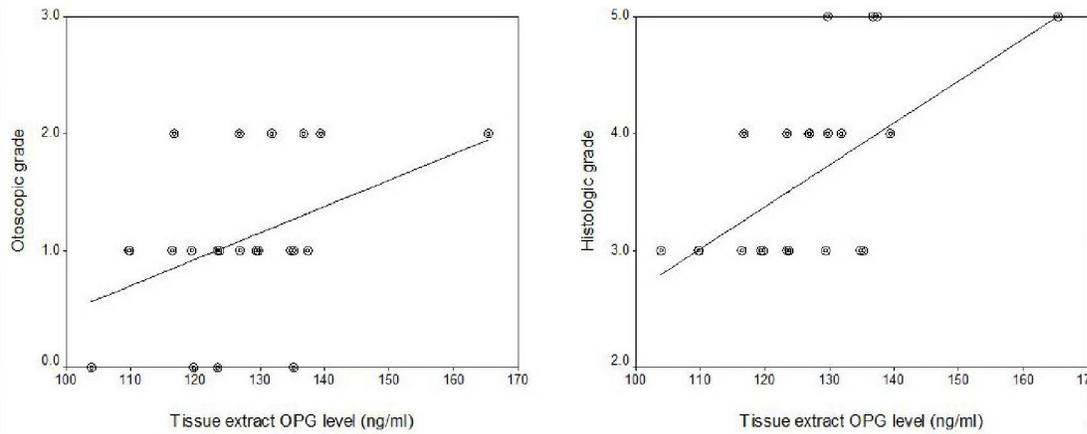


Figure 7: Correlation between otoscopic and histological grading and tissue extract levels of OPG

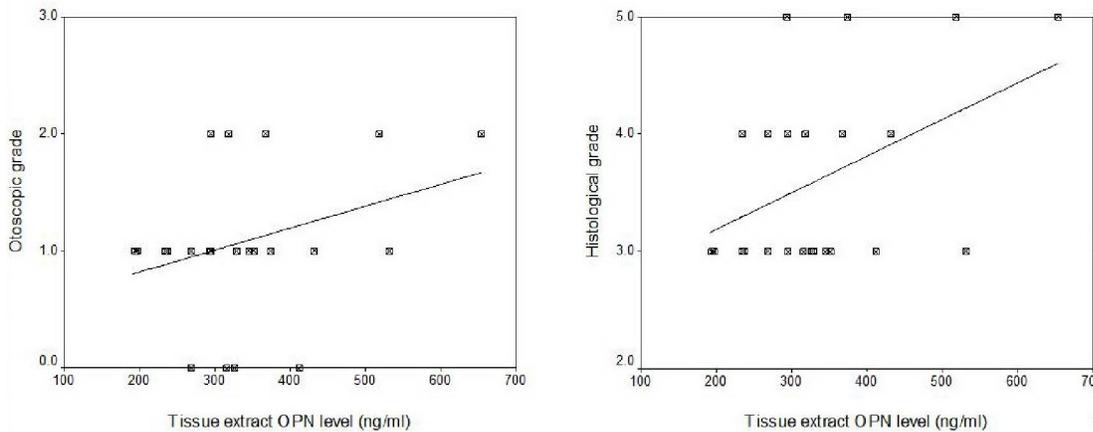


Figure 8: Correlation between otoscopic and histological grading and tissue extract levels of OPN

4. Discussion

Myringosclerosis was induced inoculation of the middle ear of studied animals, via transtympanic access, by 0.1ml of solution containing 10^7 CFU of *Streptococcus pneumoniae* type 3 and animals were sacrificed 8 weeks after inoculation. Such induction protocol goes in line with de Carvalho et al.,⁽²¹⁾ who induced myringosclerosis in rats and obtained plaques after 7 weeks of inoculation with *Streptococcus pneumoniae* and the choice of type of bacterial species was dependent on the previous data of Raustyte et al.,⁽²²⁾ who found *Streptococcus pneumoniae* type 3 provokes a severe clinical course of acute otitis media that healed with scarring and myringosclerosis formation in the tympanic membrane and clinically visible myringosclerosis develops after middle ear infection caused by *Streptococcus pneumoniae* type 3, but not in cases caused by non-typeable *Haemophilus influenzae*.

Otosopic examination missed 4 ears appeared to have normal TM but histological examination of excised drum specimens determined the presence of sclerotic changes of grade 3 in these four drums with sensitivity of 83.3%; a figure consistent with Santos et al.,⁽²³⁾ who reported that from the comparison of the otomicroscopic data in relation to the histological findings, otomicroscopy showed sensitivity of 80% and specificity of 75% for diagnosis of myringosclerosis especially in mild cases

The reported histological findings coincided with that previously reported in studies concerned with tissue changes in myringosclerosis; Kazikdas et al.,⁽³⁾ reported that under light microscopy, extensive sclerotic lesions were found in the tympanic membranes; these sclerotic deposits were located in the lamina propria and myringosclerosis occurred predominantly adjacent to the handle of the malleus, but also near the annular region. Also, Stenfeldt et al.,⁽²⁴⁾ found that during infection, the collagen layer was thickened and stained strongly for type II collagen and collagen types I and III were found in the edematous connective tissue around the main collagen layer and around dilated blood vessels and 3-months after perforation or infection, all 3 collagens were present in the lamina propria of the tympanic membrane with extensive amounts were present in the scar tissue.

Mean estimated tissue extract levels of OPG and OPN in studied animals were significantly higher compared to that estimated in control animals with a positive significant correlation with both otoscopic and histological findings. These findings agreed with Makiishi-Shimobayashi et al., who immunohistochemically evaluated tissue expression of OPN in experimental tympanosclerosis,⁽²⁵⁾ and at

the calcification sites of cholesteatoma in humans,⁽²⁶⁾ and reported that in hyalinized tissues with macroscopic calcification and fibrous tissues with microscopic calcification, OPN was found in the calcification sites and in inflammatory tissues with microscopic calcification, OPN was also found in the calcifying foci, and many OPN mRNA-expressing cells, determined by in situ hybridization, located around their foci and concluded that these results suggest that OPN secreted by exudate macrophages might be an important regulator in the calcification of tympanosclerosis and the pathological calcification that occurs in association with cholesteatoma. Also, Grases et al.⁽²⁷⁾ found all rats subjected to calcosinosis induction showed OPN 8 days post-induction, and was clearly associated with calcified areas.

Raustyte et al.,⁽²⁸⁾ using a rat model of acute otitis media (AOM) determined the expression of OPN and OPG by immunohistochemistry and detected calcium depositions accumulated in the cytoplasm of macrophages and dispersed in the connective tissue layers of the pars flaccida and tensa, but late accumulation occurred in the lamina propria of pars tensa, OPN and OPG expression was found early in inflammatory cells including especially macrophages and late in pars tensa fibrocytes, but OPG expression was also located late to the inner basal membrane of pars flaccida.

These findings spotlight on the role played by inflammatory cells in pathogenesis of TM either through precipitation in tissues and subsequent release of fibrosis-inducing cytokines or through the release of bone-remodeling cytokines and supported that previously reported by Lui et al.⁽²⁹⁾ who found all the examined sclerotic plaques were surrounded with macrophages and bone morphogenetic protein 2 positive cells and were synchronously expressing CD68 positive and BMP2 positive.

It could be concluded that increased myringosclerotic tissue extract levels of both bone modeling markers indicated their possible role in initiation and progression of histologically documented sclerotic changes in tympanic membrane after chronic suppurative otitis media.

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Micro Vascular Density MVD-CD34 and VEGF Expression in the Liver of Patients with Chronic Hepatitis, Cirrhosis and Hepatocellular Carcinoma

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Abstract: *Purpose:* The aim of this work is to study angiogenesis of the liver of patients with chronic hepatitis, liver cirrhosis and hepatocellular carcinoma by assessment of microvessel density MVD-CD34 and VEGF in liver tissue. *Method:* Sixty patients with chronic liver disease and 30 patients with hepatocellular carcinoma (HCC) were subjected to clinical examination, laboratory investigations for hepatitis C, liver function tests and ultrasonography. Liver biopsy was performed for histopathological examination. They were 3 groups: chronic hepatitis [CH] (35), liver cirrhosis [LC] (25) and HCC (30) and ten healthy volunteers as controls with negative serological markers for hepatitis (C&B), HCC were 7 with grade I, 14 with grade II and 9 with grade III. Immunohistochemical staining for tissue vascular endothelial growth factor (VEGF) was done and MVD-CD34 was assessed by Image Analysis System. *Results:* In normal liver tissue specimen, both CD34 & VEGF were negative. MVD-CD34 was increased significantly from CH to LC to HCC and increased significantly in grade I to II to III HCC. VEGF showed a significant increase in LC compared to CH & insignificant in mean HCC compared to LC. With differentiation of HCC, MVD-CD34 increased for grade I, to II to GIII ($p < 0.01$). VEGF showed a higher expression in grade I and decreased in grade II & III. *Conclusion:* MVD-CD34 is more responsible of angiogenesis than VEGF with progression of chronic liver disease to HCC. Further research for other factors mediating and cells contributing to angiogenesis is needed, which may have therapeutic implications in the control of chronic liver disease and HCC. [Olfat Ali Hammam^{*1}, Nawal El Badrawy², Maged El Ghanam², Moataz Hassan², Wael Safwat², Amgad Anas². Micro Vascular Density MVD-CD34 and VEGF Expression in the Liver in Patients with Chronic Hepatitis, Cirrhosis and Hepatocellular Carcinoma. Journal of American Science 2011;7(6):808-815].(ISSN: 1545-1003). <http://www.americanscience.org>.

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1. Introduction:

Chronic viral Hepatitis infections including the hepatitis B virus (HBV) and hepatitis C Virus (HCV) are major risk factors contributing to HCC development [1].

Whatever the etiologic cause of chronic liver disease, liver injury usually results in a form of excess scarring termed liver cirrhosis where the liver synthetic and metabolic function one compromised and there is also an increased risk of developing liver cancer [2]. With progression of the scarring process, the endothelial lining of the sinusoids undergoes conversion to a non fenestrated cell leading to an appearance which has been termed "capillarization" of sinusoids [3]. In liver, resting endothelial cells rarely proliferate under physiologic conditions. When they undergo a process called "sinusoidal capillarization", these endothelial cells form tight junctions along with deposition of extracellular matrix followed by a new vessel formation [4].

According to Tosh and Strain [5], there are two reasonably well defined types of stem cells in the bone marrow. The hematopoietic stem cells (HSC) and the mesenchymal stem cells. The HSC is the precursor for the lymphoid and the myeloid cells of

the blood and they are quite well characterized and have been isolated from humans as cells with a CD34 +ve phenotype. According to Fausto [6] oval cells can be induced to proliferate under different pathological conditions. Herrera et al. [7] isolated and characterized a population of human liver stem cells (HLSCs) which in culture supplements with VEGF, expressed the endothelial marker CD34 and Lee et al. [8] stated oval cells express some of the antigens of hematopoietic cells such as CD34.

Poon et al. [9] used CD34 as an endothelial cell marker and Amarapurkar et al. [10] used it in normal liver, cirrhosis and HCC. CD34 has been widely used for the assessment of sinusoidal like neo-angiogenesis in HCC. Amongst, viral infection, HCV has been demonstrated to show more angiogenesis and has been suggested to represent a risk factor for HCC in patients with chronic HCV [11]. Furthermore high expression of CD34 positive sinusoidal endothelial cells is a risk factor for HCC in patients with HCV associated chronic liver disease [12].

VEGF is a known marker of angiogenesis [13]. It is thought to be a selective mitogen for endothelial cells. It acts as a link between angiogenesis, immune system and tissue re-modeling

[14]. It was found that VEGF secreted by replicating hepatocytes induces sinusoidal endothelial cell proliferation during regeneration after partial hepatectomy in rats [15]. Greene et al. [16] in their studies on hepatic regenerative process suggested that the regulation of angiogenesis controls the regenerative process. According to Amarapurkar et al. [17] understanding the process of angiogenesis is of great help in developing new therapeutic approach for the chronic liver disease patients; and interfering with angiogenesis may be a potential target to avoid progression of liver disease.

This paper aims to study angiogenesis of the liver assessed by MVD-CD34 and VEGF expression in liver biopsy in patients with chronic hepatitis, liver cirrhosis and hepatocellular carcinoma.

Materials and Methods

Patients

Ninety patients (66 males and 24 females); were the subject of this study. Patients were admitted to the Department of Gastroenterology and Hepatology, Theodor Bilharz Research Institute (TBRI), Cairo, Egypt. They included 35 cases of chronic hepatitis C virus infection (CH), 25 cases with cirrhosis and 30 cases of HCC, all with HCV infection. Of the HCC patients seven patients were grade I, 14 were grade II and nine were grade III. The presence of HCV-RNA in patient's sera was detected by real-time polymerase chain reaction. All patients were subjected to thorough clinical examination, urine and stool analysis, liver function tests, ultrasonography and liver biopsy for histopathologic and immuno-histochemical studies. The study protocol was approved by the Ethics Committee of TBRI according to the Institutional Committee for the Protection of Human Subjects and adopted by the 18th World Medical Assembly, Helsinki, Finland.

Ten control liver biopsies were taken from individuals subjected to laparoscopic cholecystectomy after their consent. They were 4 males and 6 females with a mean age of 48.3 ± 2.3 years. Their liver function tests were normal and had no serologic evidence of hepatitis B or C viruses.

Liver biopsies were fixed in 10% buffered formalin for 24 hours, and then processed in ascending grades of ethyl alcohol; xylene, wax and paraffin blocks were prepared. Sections (4 μ m) were cut on albuminized glass slides and stained with Hematoxylin & Eosin and Masson trichrome stains. All sections were subjected to light microscopic examination for evaluating the histopathological and basic classification of cases. Five histological features have been observed to be relatively characteristic of (although not pathognomonic for)

chronic hepatitis: (1) lymphoid aggregates in portal tracts, (2) degenerative injury type changes of bile ducts, (3) large droplet steatosis, (4) Mallory body-like material within injured hepatocytes, and (5) Lymphocytic aggregates within the lobules [18-19]. They were evaluated on a five point scale, using 20 random fields at x100 and x400 magnification per slide. Architectural changes, fibrosis and cirrhosis were evaluated on a seven point scale according to Knodell score system [19]. HCC cases were classified into 3 grades (I, II, III) well, moderately, and poorly differentiated tumors [20]. Other liver sections (4 μ m) were cut on slides, which were treated with TESPA (3-aminopropyl-triethoxysilane, Sigma) for immunohistochemistry (IHC).

Immunohistochemistry for Detection of tissue CD34 and VEGF antigens

Immuno-histochemical reaction was performed using an avidin biotin complex (ABC) immunoperoxidase technique according to Hsu and Raine [21] using anti human CD34, and VEGF antibodies on paraffin sections, which were dewaxed in xylene and hydrated in descending grades of ethanol. Endogenous peroxidase activity was quenched by incubation in 3% hydrogen peroxide in 100% methanol for 20 min. Antigen retrieval was performed by microwaving the sections in citrate buffer (PH 6.0) for 15 min at 700 W. Sections were incubated overnight at 4°C with the anti-human primary antibodies against CD34, (purchased from R&D, USA), and VEGF (purchased from Santa Cruz Biotechnology Inc.; Santa Cruz, USA) monoclonal antibody, diluted at 1:50,150 respectively in BPS. Next day, after thorough washing in PBS, the sections were incubated with alkaline phosphatase for both VEGF and tissue CD34. Staining is completed by 5-10 minutes incubation with alkaline phosphatase + substrate - chromogen which results in a pink-red colored precipitate at the antigen site for VEGF and tissue CD34 (cytoplasmic stain). Slides were washed in PBS for 5 minutes. Slides were placed in 70%, 95% and then 100% alcohol each for 5 minutes. The cell nuclei were counterstained with Mayer's hematoxylin. The cover slips were mounted using Dpx.

Positive and negative control slides for each marker were included within each session. As a negative control, liver tissue section was processed in the above mentioned sequences but the omission of the primary antibody and PBS was replaced.

Determination of microvascular density (MVD)

MVD in tissue sections was evaluated according to Gasparini's criteria [22] by independent observer who was blinded to the patients'

clinicopathologic data. At low power field (x 40), the tissue sections were screened and five areas with the most intense neovascularization (hot spots) were selected.

Microvessel counts of these areas were performed at high power field (x 200). To reduce observer-related variation, counting of the microvessels was performed with a Computer Image Analyzer (Kontrone Image Analysis System, Germany). This essentially consists of a computer controlled microscope (Zeiss axioskope), video camera, two monitors, video printer, computer unit (P.C., IBM compatible ,486Dx100) and a desk jet colored printer 560C. Image analysis was performed using the soft ware program; KS 400. The image analyzer is an integrated system of Windows-based software specially designed for immunohistochemical analysis. Any brown stained endothelial cell or endothelial cell cluster that was clearly separated from adjacent microvessels, tumor cells, and connective tissue elements was counted as one microvessel, irrespective of the presence of a vessel lumen. The image analyzer allowed the operator to select stained microvessels and make a subtraction of the background; an automated microvessel count per field was computed in each hot spot. The mean microvessel count of the five most vascular areas was taken as the MVD, which was expressed as the

absolute number of microvessels per 0.74 mm² (x 200 field). Zero% was given to unstained sections.

Immunohistochemical scoring of VEGF

VEGF was expressed as cytoplasmic pink red color of hepatocytes and endothelial cells lining blood vessels and counting the number of positive cells in 5 microscopic fields, with power of magnification (x 400) according to Shimizu et al. and Takahashi [15, 23].

Statistical analysis

The Statistical Package for Social Sciences (SPSS) for Windows (version 10) computer program was used for statistical analysis. For comparison of more than 3 group's means, one-way ANOVA test, Post Hoc test was used. Comparison between percent positive cases was calculated by Chi-square test. A P value < 0.05 was considered statistically significant.

Results

Patients were 66 males (73.3 %) and 24 females (26.7 %), their age ranged (23-72 years) with a mean of 46.6±4.5 years, as well as 10 patients without liver disease as control group. They were (4) males and (6) females, their age ranged (30-45 years) with a mean of 39.4±3.7years. Clinical and biochemical data of the studied groups are shown in Table 1.

Table 1 Clinical and biochemical data of studied groups

Variables	CH (n=35) No. of positive cases %	LC (n=25) No. of positive cases %	HCC(n=30) No. of positive cases%	Control (n=10) No. of positive cases %
Jaundice	10 29.9	15 60	10 33.3	0 00
Lower limb edema	5 14.3	16 64	5 16.6	0 00
Hepatomegaly	12 34.2	0 00	5 16.6	0 00
Splenomegaly	6 17.1	11 44	0 00	0 00
ALT (0-41) U/L Mean ± SD	53.95 ± 29.16 ^{a,b}	45.8 ± 31.91 ^a	36.87 ± 21.5	19.8 ± 5.59
AST (0-38) U/L Mean ± SD	38.3 ± 17.33 ^b	69.8 ± 16.15 ^{a,c}	72.9 ± 34.75 ^a	20.2 ± 5.87
S. albumin (3.5-5) gm/dl Mean ± SD	4.46 ± 0.4 ^b	3.62 ± 0.22 ^{a,b,c}	3.28 ± 0.54 ^a	4.22 ± 0.18

CH: Chronic hepatitis

LC: Liver cirrhosis

HCC: Hepatocellular carcinoma

^a: p value <0.05 relative to the control group

^{a'}: p value <0.001 relative to the control group

^b: p value <0.05 relative to the HCC group

^{b'}: p value <0.01 relative to the HCC group

^c: p value <0.01 relative to the CH group

In cases of CH & LC CD 34 staining were confined to large vessels in the portal tracts. In cases of HCC on top of cirrhosis the density of microvessels was higher in the peripheral tumor tissue close to the margin than in the central areas.

By estimating MVD-CD34 by image analysis system (Table 2) positivity was not found in normal control specimens. Twenty percent of CH, 40% of LC and 100% of HCC were positive, with grades I,II,III. In CH, the mean MVD-CD34 was $(15.66 \pm 3.44 / 0.74 \text{ mm}^2)$, LC $(33.63 \pm 7.60 / 0.74 \text{ mm}^2)$. Specific staining of capillary-like vessels by anti-CD34 antibody was observed in all tumor specimens and between cancer cells $(166.77 / 0.74 \text{ mm}^2)$. MVD-CD34 in HCC cases was higher than CH and LC groups ($P < 0.01$). There was significant difference in MVD-CD34 between LC and CH liver ($P < 0.05$) (Table 2, Fig. 1A- B).

There is statistically significant difference between MVD-CD34 expression levels in HCC grades III (mean MVD-CD34, $114.7 \pm 46.83 / 0.74 \text{ mm}^2$) and HCC grade I (mean MVD-CD34, $64.62 \pm 24.86 / 0.74 \text{ mm}^2$) and II (mean MVD-CD34,

$91.71 \pm 18.29 / 0.74 \text{ mm}^2$) (at a $p < 0.01$) and no significant difference in HCC grade III relative to HCC grade II at $p = 0.129$, There was a positive correlation between mean MVD-CD34 and grades of HCC ($r=0.325$, ($p < 0.01$)) (Table 2, Fig. 2A- B).

The results of VEGF expression are shown in table 2, all control were negative, 42.8% of CH cases were positive, 80% of LC cases were positive, 100% of HCC were positive. VEGF was mainly seen in the cytoplasm of hepatocytes as intracytoplasmic granules in all tumor cells or periportal hepatocytes, VEGF showed a significant increase ($p < 0.05$) in CH group relative to control, a significant increase ($p < 0.01$) in LC & HCC groups related to control and ($p < 0.01$) compared to CH (Table 3, Fig. 3 A-B).

There is statistically significant difference in VEGF expression levels in HCC grade I (65 ± 14.4) compared to grade II (25.2 ± 10.5) and grade III (35 ± 3.9) at a $p < 0.01$, being lower in grade II & III than grade I HCC. (Table 3, Fig. 4A- B).

There was an inverse correlation between mean VEGF and grades of HCC ($r=0.295$, ($p < 0.01$)).

Table 2 MVD-CD34 expression levels in studied groups and in different grades of HCC.

Variable	CD34	
	Number of Positive cases for CD34	MVD μ^2 / five microscopic fields Mean \pm SD
Control (n=10)	0/10	0.0 \pm 0.0
CH (n=35)	7/35	15.66 \pm 3.44 ^a
LC (n=25)	10/25	33.63 \pm 7.60 ^{a,c}
HCC (n=30)	30/30	166.77 \pm 77.29 ^{b,c,d}
Grade I (n=7)	7/7	64.62 \pm 24.86
Grade II (n=14)	14/14	91.71 \pm 18.29 ^e
Grade III (n=9)	9/9	114.7 \pm 46.83 ^{e,f}

CH: Chronic hepatitis LC: Liver cirrhosis HCC: Hepatocellular carcinoma

^a: p value < 0.05 , ^b: p value < 0.001 relative to the control group respectively.

^c: p value < 0.05 , ^d: p value < 0.01 relative to the CH group. ^d: p value < 0.01 relative to the LC group.

^e: p value < 0.01 relative to grade I

^f: p value < 0.01 relative to grade II

Table 3 VEGF expression levels in studied groups and in different grades of HCC.

Variable	VEGF	
	Number of Positive cases for VEGF	Percentage of positive area/ five microscopic fields Mean \pm SD
Control (n=10)	0/10	0.0 \pm 0.0
CH (n=35)	15/35	16.3 \pm 1.21 ^a
LC (n=25)	20/25	40.3 \pm 7.02 ^{b,c}
HCC (n=30)	30/30	47.5 \pm 13.2 ^{b,c}
Grade I (n=7)	4/7	65 \pm 14.4
Grade II (n=14)	14/14	25.2 \pm 10.5 ^e
Grade III (n=9)	9/9	35 \pm 3.9 ^{e,f}

CH: Chronic hepatitis LC: Liver cirrhosis HCC: Hepatocellular carcinoma

^a: p value < 0.05 , ^b: p value < 0.001 relative to the control group respectively.

^c: p value < 0.01 relative to the CH group. ^d: p value < 0.01 relative to the LC group.

^e: p value < 0.01 relative to grade I

^f: p value < 0.01 relative to grade II

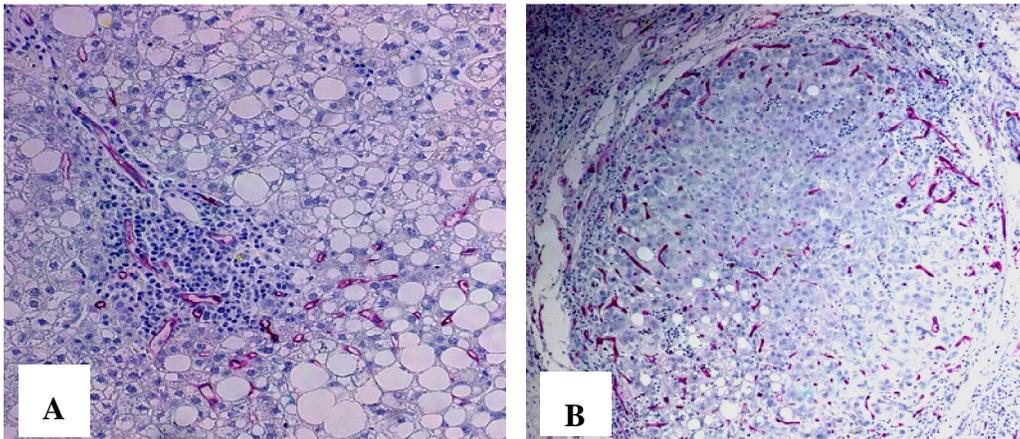


Fig. 1 A) A case of chronic HCV, showing few blood vessels stained with CD34 antibody. B) A case of HCV with cirrhosis (cirrhotic nodule) showing moderate number of blood vessels stained with CD34 (IHC for CD34, alkaline phosphatase, X200, X100 respectively).

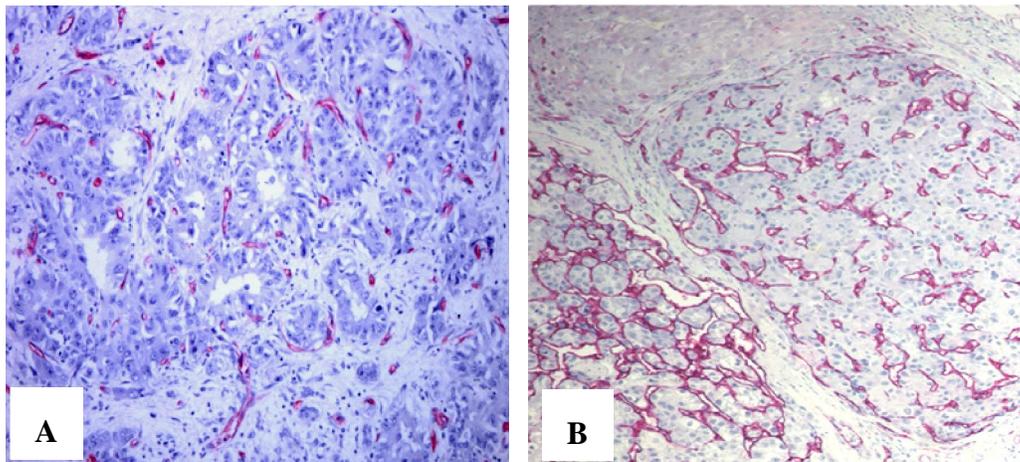


Fig. 2 A) A case of well differentiated HCC showing moderate number of blood vessels expressing CD34 antibody. B) A case of poorly differentiated HCC showing increased (intense) expression for CD34 antibody (IHC for CD34, alkaline phosphatase X 200).

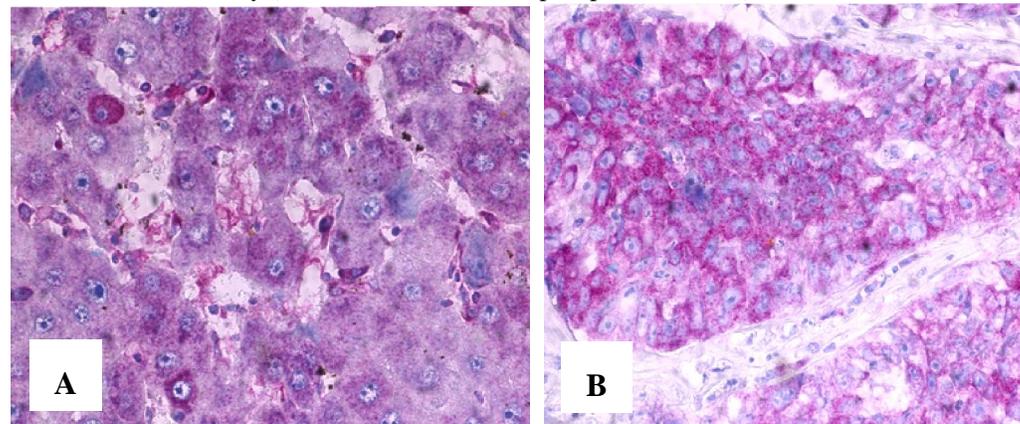


Fig. 3 A) A case of chronic HCV, showing mild VEGF expression, cytoplasmic, stain sparing the nuclei B) A case of chronic HCV with active cirrhotic changes, showing moderate VEGF expression (IHC for VEGF, alkaline phosphatase X 200).

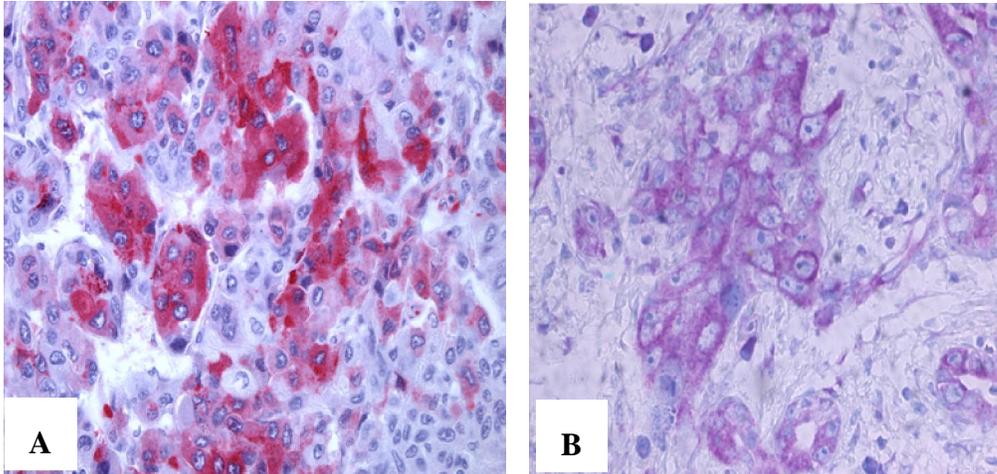


Fig. 4 A) A case of well differentiated HCC showing intense expression of VEGF. B) A case of poorly differentiated HCC showing weak, scattered hepatocytes stained for VEGF (IHC for VEGF, alkaline phosphatase, X 200)

4. Discussion

In our study MVD-CD34 staining was not detected in normal liver biopsies. It was significantly increased ($p < 0.05$) in liver cirrhosis (LC) relative to control. In HCC, a highly significant increase ($p < 0.01$) was found relative to control and to LC cases. VEGF, showed negative staining in control cases, a significant increase in CH ($p < 0.05$) relative to control, a significant increase ($p < 0.01$) in LC and HCC groups relative to control.

Park et al. [24] found that there was a gradual increase in CD34 expression from cirrhotic nodules to dysplastic nodules to HCC. Kim & Hu [14] by immunohistochemistry staining using anti CD34 and anti VEGF antibodies; found that CD34 was reactive throughout the neoplastic tissue, albeit it was confined to a few periportal sinusoids and vessels in fibrous septa of adjacent cirrhotic liver. Expression of VEGF which was localized to the cytoplasm was not correlated with all clinicopathological parameters. CD34 was closely associated with neo-vascular process in cirrhosis and hepatocellular carcinoma. Di Carlo et al. [25], studied by immunohistochemistry, the expression and distribution of CD34 in chronic liver diseases and in HCC. They found that the sinusoids of the liver showed no or focal immunoreactivity for CD34, an increased immunoreactivity was observed in the periportal sinusoids of cirrhotic nodules, whereas diffuse and strong staining was in overall HCC. They concluded that immunoreactivity for CD34 represents an effective method to evaluate angiogenesis. Ma Jee et al. [26] concluded that CD34 is a useful marker for distinguishing HCC from non cancerous liver tissue; as CD34 was not present along the sinusoidal wall in normal human liver, was weakly present in the

perinodules in few cases of cirrhosis, and HCC showed a diffuse capillarization with over expression. Cui et al. [27] found enhanced CD34 expression of sinusoidal like vascular endothelial cells in HCC.

In our study, VEGF showed higher expression in CH and LC but no significant difference in HCC group from LC groups. Yang et al. [13], by Immunohistochemical staining, found that CD34 was expressed in the vascular endothelial cells of normal liver, paracarcinomatous tissue and HCC tissue in the following proportions of specimen; 86.7%, 93.8% and 100% respectively. However, they found expression of CD34 in both normal and tumor tissue indicating that it was not a reliable marker for HCC.

According to Saaristo et al. [28] VEGF is a cell specific mitogen and is a major inducer of angiogenesis in human cancers. It was found by Shimizu et al. [15] that VEGF served by replicating hepatocytes induces sinusoidal endothelial cell proliferation and that a peak of hepatocytes production of VEGF, an endothelial mitogen, correspond to an increase of VEGF receptor expression on endothelial cells after partial hepatectomy in rats. Yoshiji et al. [29] have also shown that VEGF expression increases significantly during fibrogenesis and carcinogenesis and that the combined effect of VEGF & its receptor reflect the combined effect of both on hepatic stellate cells and endothelial cells. Also in the study by Amarapukar et al. [17] none of cases with normal histology was CD34 or VEGF positive. Angiogenesis was positive in 45.5% of cases of chronic liver diseases and was proportional to the stage of fibrosis. VEGF expression was commonly found in early stages of fibrosis and increased significantly during

fibrogenesis and carcinogenesis. They also found a significant high expression of CD34 in HCC as compared to chronic liver diseases.

In the study by Amarapukar et al. [10] by Immunohistochemical staining; CD34 positive staining was taking as any cell that stained brown with a dotted, linear, semi-circular or circular pattern and was clearly separate from an adjacent one. They found over expression of endothelial marker CD34 with gradual progression from normal liver to cirrhosis to HCC & metastasis.

Brdosky et al. [30] found that fibrotic stroma surrounding cirrhotic nodules has an increased number of vessels not only compared to the cirrhotic nodule but to the normal liver parenchyma as well. They also found that vascular density in the areas of HCC and internodular fibrotic tissue in cirrhotic liver was significantly higher than in non cirrhotic parenchyma. Additionally cirrhotic nodules were characterized by significantly lower vascularization compared with normal liver which may lead to diminished cell function.

The study by Namashima et al. [31] using CD34 staining for MVD-CD34, concluded that MVD representing tumor angiogenesis offers a new candidate prognostic factor in HCC to predict tumor recurrence and patient survival, in addition to traditional biological factors.

Cui et al. [27] have shown moderate to diffuse positivity for CD34 in the majority of well differentiated HCC. Park et al. [24] studied CD34 in HCC and found that 14 out of 21 cases of moderate to poorly differentiated HCC showed strong positivity, while it was seen in three out of 11 cases of well differentiated HCC. The importance of neovascularization in the progress of HCC has been high lightened suggesting that microvessels increase gradually from cirrhotic nodules through low grade and high grade dysplastic nodules with the greatest number recorded in HCC.

According to Yang et al. [13] much attention has been paid to the association between angiogenesis and post-operative recurrence or metastasis. Ma Jee et al. [26] found that diffuse capillarization with overexpression of CD34, collagen IV and laminin are features of HCC. Frequent breaks in and loss and decrease of the basement membrane in poorly differentiated tumors and tumors with portal vein infiltration suggest a potential metastasis of tumor cells and may play a role in metastasis of HCC. They found a significant difference ($p < 0.05$) in the expression of CD34 between the well differentiated and moderately differentiated HCC. Amarapukar et al. [10] suggested that angiogenesis as assessed by CD34 expression play an important role in carcinogenesis.

Kim & Hu [14] found that microvascular density in HCC is not directly correlated with VEGF expression, suggested that other angiogenic factors may be involved in neovascularization of HCC.

Piao et al. [32] found that MVD in HCC with metastasis, lower differentiation or without intact capsule was significantly higher than that in HCC with intact capsule, higher differentiation or without metastasis.

Brdosky et al. [30] found that in the early stages of fibrosis, the production of VEGF and the neovascularization increase, whereas in the late stages; cirrhotic nodules in hepatitis C patients are characterized by decreased density of microvasculature and that VEGF was higher in HCC and diminished in cirrhotic nodule, thus strongly correlating with the degree of vascularization.

Ivarone et al. [33] concluded that VEGF appears to be involved in the development of HCC and could be a predictor of HCC development in patients with cirrhosis. They found that angiogenic factors were equally expressed in any well differentiated & poorly differentiated tumors.

In conclusion, in the present study, MVD-CD34 increased in LC and in HCC ($p < 0.01$) and in HCC from grade I to II to III ($p < 0.05$). VEGF positivity increased in CH ($p < 0.05$) and, in LC & HCC ($p < 0.01$). In HCC higher expression was in grade I and lower in grade II & III. Therefore MVD-CD34 is more indicative of progression of CLD & HCC than VEGF is associated with angiogenesis. Further search for other cells contributing to and factors mediating angiogenesis is needed; which may have implication in providing therapeutic targets to control progress of chronic liver disease and malignancy.

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The Effect of Induction Therapy with Basiliximab on the Recurrence of Hepatitis C Virus in Living Donor Liver Transplantation (Retrospective Study)

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Abstract: Background: Hepatitis C virus (HCV) recurrence in HCV+ liver transplant recipients is almost inevitable and may be promoted by immunosuppression. Basiliximab, a high-affinity chimeric monoclonal antibody functions as an immunosuppressive agent, is effective in reducing acute rejection episodes in liver allograft recipients, but the influence on HCV recurrence might be a problem. **Objectives:** To study the effect of induction therapy with Basiliximab on HCV recurrence in adult living donor liver transplantation. **Methods:** This was a retrospective study to determine the effect of induction therapy with Basiliximab on the recurrence of HCV in the grafted liver. In this study 47 HCV patients were included who passed more than 6 month post-transplantation. All HCV recurrences were all proved histologically. All our patients received corticosteroids in addition to either tacrolimus (FK) or ciclosporine (Neoral), mycophenolate mofetil was given to all except 4 patients. **Results:** From the 47 transplanted patients 14 (29.8%) had HCV recurrence. In the group which used Basiliximab (Group I); the rate of HCV recurrence was 56.3%, while the group in which no Basiliximab was used (Group II); the rate of HCV recurrence was 16.1% (P<0.001) highly significant. In patients who had HCV recurrence 64.3% of patients received induction therapy with Basiliximab, meanwhile in the non-recurrent group only 15.2% of patients received Basiliximab (P<0.001) highly significant. To out rule the role of either FK or Neoral in recurrence of HCV, we found that the rate of HCV recurrence was as follows: in a group of patients who received Basiliximab and FK; HCV recurrence occurred in 54.50%, in patients who did not receive Basiliximab but received FK; HCV recurrence occurred in 21.7% (P<0.001) highly significant. In patients who received Basiliximab and Neoral; HCV recurrence occurred in 60% and there was no HCV recurrence in patients who did not receive Basiliximab and received Neoral (P<0.001) highly significant. We also compared two groups of patients; those who received FK and Basiliximab (54.5%) had HCV recurrence, and in those who received Neoral and Basiliximab (60 %) had HCV recurrence (P > 0.05) non significant. **Conclusion:** The rate of HCV recurrence in LDLT is more when Basiliximab was used as induction therapy in patients undergoing LDLT for chronic HCV related end stage liver disease.

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Keywords: Therapy; Basiliximab; Recurrence; Hepatitis C Virus; Living Donor; Liver Transplantation

1. Introduction:

Cirrhosis secondary to chronic hepatitis C virus (HCV) infection accounts for most liver transplants performed in transplant centers worldwide (1). Given the high prevalence of HCV infection, the number of patients in need of transplantation will increase. A number of factors may predispose to HCV recurrence (2). Acute graft rejection remains a major problem among additional sequelae in liver transplant recipients. Basiliximab, a chimeric monoclonal antibody with high affinity for the CD25 chain of the interleukin-2 receptor, has significantly reduced the incidence of acute rejection episodes in liver transplant recipients (3) (4). HCV recurrence in post living donor liver transplantation (LDLT) is of utmost importance to prolong both graft and patient survival. Earlier reports stated that LDLT might lead to an increased rates of HCV recurrence due to

regeneration of the graft, however with more experience and the increasing number of studies concerning this issue it turned to be the same or even better due to the fact of having a better chance of choosing a better graft with less fat and younger donor age. Multiple factors have been studied as predisposing factors for HCV recurrence; surgical factors as ischemia time and medical factors such as; overweight and steatosis, alcohol intake and immunosuppressive regimens are all incriminated factors. Considering the immunosuppression factor, no specific calcineurin inhibitor has been proven up till now superiority over the other in terms of decreased rates of HCV recurrence. The use of corticosteroids and the duration whether long term or rapid tapering or even steroid free protocols gave conflicting results. The use of induction therapy has

not been clearly studied concerning its effect on HCV recurrence in the graft (5).

Objectives:

To study the effect of induction therapy with basiliximab on HCV recurrence in adult living donor liver transplantation.

2. Materials and Methods:

This was a retrospective study. The clinical courses of 47 recipients who were transplanted for HCV end stage liver disease and successfully survived a least 6 months post LDLT were studied. The Immunosuppression regimens for all our patients included corticosteroids which were all tapered within the first 3 months. Calcineurin inhibitors used were either tacrolimus (FK) or ciclosporine (Neoral). Mycophenolate mofetil was given to all except four patients who had monotherapy with tacrolimus as they had hepatocellular carcinoma before transplantation. The diagnosis of Hepatitis C virus recurrence was suspected in cases of elevated liver enzymes with a high level of viraemia with HCV RNA PCR and then all subjected to a liver biopsy and proved histologically by our transplant pathologist. The studied group was divided into two groups; group I had basiliximab as induction therapy included 16 patients and group II had no induction therapy with basiliximab included 31 patients, and the incidence of recurrence was compared between the two groups. **Statistical analysis:** Statistical analyses were performed using SPSS for Windows release 11.0 (SPSS Inc, Chicago, IL, USA). Comparisons were performed between groups of patients (level of $p < 0.05$ were considered significant). Categorical data were analyzed using Pearson's chi-square test, and t-test.

3. Results:

From the 47 patients originally underwent LDLT for HCV ESLD and successfully passed the operation and passed at least 6 months post transplant, Age ranged from 38-62 years, 5 females and 42 males. HCV recurrence occurred in 14 (29.8%) patients. In group I (induction therapy with basiliximab) the incidence of HCV recurrence was 9 (56.3%) patients. In group II (no induction therapy with basiliximab) the rate of HCV recurrence was 5 (16.1%) patients ($P < 0.001$) which is a highly significant difference between the 2 groups. In the HCV recurrent group 9 (64.3%) patients had induction therapy with basiliximab meanwhile in the non recurrent group only 5 (15.2%) patients had induction therapy ($P < 0.001$) highly significant. In order to rule out the effect of the used immunosuppressive drug; either Tacrolimus or neoral

on HCV recurrence, the following analysis was done: Rate of HCV recurrence in the group of patients who received basiliximab and FK (11 patients); HCV recurrence occurred in 6 (54.50%) patients, in patients who did not receive basiliximab but received FK (23 patients); HCV recurrence occurred in 5 (21.7%) patients ($P < 0.001$) highly significant. In patients who received basiliximab and Neoral (5 patients); HCV recurrence occurred in 3 (60%) patients and there was no HCV recurrence in patients who did not receive basiliximab and received Neoral ($P < 0.001$) highly significant. We also compared two groups of patients; those who received FK and basiliximab 11 patients, 6 (54.5%) patients had HCV recurrence, and in those who received Neoral and basiliximab 5 patients, 3 (60 %) patients had HCV recurrence ($P > 0.05$) non significant. All other factors analyzed such as age, sex, biliary strictures had no statistical influence on HCV recurrence in our studied group.

4. Discussion:

Although liver transplantation is the second most common form of solid organ transplantation after renal transplantation, with an increasing rate of LDLT due to organ shortage and HCV being the most common indication for liver transplantation, surprisingly few data are available on the use of immunosuppressive antibody therapy in these patients. The rate of HCV recurrence and the rate of acute rejection episodes post LDLT when compared to cadaveric liver transplantation, is an important question that might influence management strategies. In our study recipients after LDLT, has been evaluated for the effect of induction immunotherapy using basiliximab on the recurrence of HCV. The previous hypothesis that HCV recurrence would be higher in LDLT is debated recently in many studies. However, In a retrospective study of hepatitis C virus (HCV)-infected transplant recipients in a 9 multi-center Adult to Adult Living Donor Liver Transplantation Cohort Study, graft and patient survival and the development of advanced fibrosis were compared among 181 living donor liver transplant (LDLT) recipients and 94 deceased donor liver transplant (DDLT) recipients. Overall 3-year graft and patient survival were 68% and 74% in LDLT, and 80% and 82% in DDLT, respectively and it was concluded that the 3-year graft and patient survival in HCV-infected recipients of DDLT and LDLT were not significantly different (6). The incidence of HCV recurrence in our studied group was 29.8% for patients who passed time ranging from at least 6 months to 4 years this average percentage of recurrence is not to be considered more than that reported in the literature for cadaveric liver

transplantation if not even less. In another retrospective analysis of 289 HCV-LT (20 LD splits) patients receiving transplants. Patient and organ survival, intensity of HCV recurrence, and fibrosis progression were analyzed with respect to deceased donor (DDLT) or (LDLT). In this patient sample, intensity of HCV recurrence was not increased in LDLT graft recipients compared to full-size recipients. Patient and organ survival were similar. LDLT can therefore be advocated for HCV patients (7). The rate of acute cellular rejection (ACR) and high-degree ACR are decreased in living-related liver transplant recipients than for cadaveric (8). It is also estimated that the number of rejection episodes is actually much less for HCV infected individuals (9). Factors contributing to the recurrence of HCV after LDLT are multiple and include; overweight, alcohol intake and level of immunosuppression. Concerning immunosuppression; keeping appropriate levels is considered as a key factor as low level of immunosuppression would lead to rejection episodes necessitating corticosteroid boluses or other antibodies leading to increased incidence of HCV recurrence, on the other hand high levels of immunosuppression would lead to increased side effects of the immunosuppressive drugs as well as severely depressed immune status also enhancing HCV replication leading to HCV recurrence in the new graft. This is consistent with a universal finding that has emerged over the past decade, that immunosuppression increases the serum level of HCV RNA, and this is particularly true for patients treated with monoclonal antibody preparations and corticosteroids (10-15). In our study we studied the effect of using different calcineurin inhibitors on HCV recurrence in our study and has been ruled out by a subgroup analysis of patients receiving FK & Basiliximab and another group receiving Neoral & Basiliximab, the incidence of HCV recurrence was 54.5% Vs 60% respectively ($p>0.05$ nonsignificant). Although the use of induction therapy with basiliximab seems to be safe and efficient, its effect on the recurrence of HCV in our study is hazardous. Induction therapy with basiliximab increased HCV recurrence as presented in our study; a 56.3% in the induction group Vs 16.1% in the non-induction group which is statistically a highly significant difference ($P<0.001$). We find that these findings are indirectly proven in more than one study as the effect on the incidence of recurrent hepatitis C is of major concern with any additional immunosuppressive agent used. In two trials, any favorable effect on rejection with basiliximab was smaller in HCV positive patients. The investigators stated that the rate of recurrent hepatitis C at 6 months post-transplantation was 48.4% (16). In summary, our study shows the

deleterious effects of using induction therapy with Basiliximab on the recurrence of HCV post LDLT. We demonstrated that the use of the different calcineurin inhibitors had no effect on HCV recurrence in our studied group. Therefore we recommend limiting the use of basiliximab as induction therapy in cases of HCV patients undergoing LDLT, only for cases whom starting immunosuppression need to be delayed post transplant specially those patients with renal impairment. Specially that the need for induction therapy for fear of rejection, which is generally less in cases of LDLT than that in cases of cadaveric liver transplant.

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Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections

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Abstract: The present study aimed to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections. Data were collected from cardiothoracic surgery department, intensive care unit, and outpatient clinic at Assiut University Hospital. The study was conducted on 60 adult patients with open heart surgery (30 - study group and 30 - control group) who have been selected randomly. Data were collected through: four tools; (cardiac surgery patient needs assessment sheet, cardiac teaching program based on individualized patient needs assessment, cardiac post operative observation checklist sheet, and cardiac post operative wound site infection evaluation sheet). Results of this study concluded that, more than half of the patients in study group 53.3 % were females, 70 % were married, and 40 % their ages ranged from 18 - 29 years. While the majority of the patients in the control group 63.3 % were male, 46.7 % were married, and 33.3 % from 30-39 years. Conclusion; Significant differences for improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. The study recommended that, pamphlets and simple illustration booklet should be available for patients illiterate to with simple explain how to safely live after open heart surgery. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.

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Key Words: Open heart surgery, Infection, Post operative care

1. Introduction:

Cardiac surgery is surgery on the heart and/or great vessels performed by a cardiac surgeon. Frequently, it is done to treat ischemic heart disease (for example, coronary artery bypass grafting), correct congenital heart disease, or treat valvular heart disease created by different causes including endocarditis. It also includes heart transplantation (Morton & Fontaine, (2009).

Postoperative surgical site infections (SSIs) are a major source of morbidity in the United States. Wound infections rates are; clean surgery infection rate typically 1-2 %, clean-contaminated infection rate usually < 10 %, contaminated infection rate 15-20 %, and dirty infection rate 40% (Williams & Wilkins (2006).

Nurses play a vital role in the prevention of SSIs in patients with open heart surgery. By managing disease processes, through education and assessment (Harrington *et al.*, 2005). The unique challenge for the critical care nurse is to integrate theoretical knowledge, assessment skills, and problem solving ability to provide optimal nursing care and maintain high quality outcomes (Morton & Fontaine, 2009).

Pre operative preparation for cardiac surgery includes physiological and psychological components. Physiological preparation includes history, physical examination, chest radiography, and an ECG. Effective pre operative teaching, which reduces anxiety and physiological responses to stress and after surgery, is an important aspect of psychological preparation. The surgical procedure, the Intraoperative, and postoperative experiences are explained to the patient (Morton & Fontaine, 2009).

Post operative phase patients are transported directly to the intensive care unit (ICU), where they recover from anesthesia and usually remain for 24 hours after surgery. Patients arrive in the ICU with numerous lines and tubes (e.g., endotracheal tube and hemodynamic monitoring lines). Immediate postoperative care involves cardiac monitoring and maintenance of oxygenation and hemodynamic stability (Rosborough, 2006).

Discharge instructions for heart surgery patients includes observe appetite of the patient, signs and symptoms of swelling, sleeping condition, gastro intestinal problems as constipation, diet, care of incision, instruction about medication used, activity, shower daily if he/she is strong enough to stand and

wash the incision with a mild antimicrobial soap. Using a clean towel, the patient should pat dry the incision. No lotions, creams, oils, or powders are to be used. The patient also should avoid sun exposure, sexual, driving, lifting heavy objects, work, stress management and follow exercise program given to the patient by physical therapist in the hospital (Society of Thoracic Surgeons, 2006).

Significance of the study:

Wound site infections are a major source of post operative complications, accounting for approximately a quarter of all nosocomial infections. Many international studies have defined the patients at highest risk for infection in general and in specific operative procedures (Abd El Aziz *et al.*, 2007). However, there is a scarcity of local studies dealing with this problem. It is hoped that, data generated from this study could help in educating the patient and managing care for patients with open heart surgery as well as training adequately the patients to decrease incidence of infection and complications. Complications increase morbidity, inpatient stay, hospital cost, and increase mortality of patients. So, this study will be carried out to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections.

Aim of the study:

To investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections.

Research hypothesis:

Open heart surgery patient attending educational program will exhibit a positive effect on minimizing surgical site infections post operatively.

Material and Methods:

Research design:

Quasi-experimental research design was utilized to fulfill the aim of this study.

Materials:

Setting:

Cardiothoracic surgery department, intensive care unit, and outpatient clinic for follow up at Assiut University Hospital.

Subjects:

Patients admitted in cardiothoracic surgery department (60 patients) were included in the study, (31) male and (29) female their ages ranged between 18 and 60 years. The patients classified inrolled randomly (convenience sample) into two groups (study and control group). The study group (30

patients) who were received nursing instruction (educational teaching nursing program), while the control group (30 patients) who were received routine hospital care.

Tools of the study:

Four tools were used to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections. These tools were deduced by the researcher based on reviewing of related literatures (Horan & Gaynes, 2004; Williams & Wilkins, 2006; Smeltzer *et al.*, 2008; Berman *et al.*, 2009; Morton & Fontaine, 2009; Proehi, 2009).

Tool I:

Cardiac surgery patient needs assessment sheet (Annex 1):

This tool was developed to assess open heart surgery patients needs. It contains 23 items and will be developed by the researcher and it includes 5 parts:

Part I: Assessment of the sociodemographic patients' profile: To assess the patients profile as patient's name, age, sex, marital status, diagnosis, family size, housing condition...etc).

Part II: Patients nursing needs pre cardio surgery: This part includes structured items to identify patient's pre cardiac surgery nursing needs.

1. Present, Past, and family history

Scoring system:

$$\text{For body mass index (BMI)} = \frac{\text{Weight(kg)}}{\text{Height (in meters)}^2}$$

Within standard level	20 to < 26
Over weight	26 to < 30
Obese	30 to < 40
Morbid obesity	> 40

This equation and classification of BMI were adopted from (Syed & Davis, 2000).

2. Physical examination.

3. **Psychological needs:** assess psychological state of patient such as fear, irritable, insomnia, and apprehensive.

Part III: Laboratory investigation.

Part V: Diagnostic procedure.

Part IV: This part carry out pre/ post test questionnaire and observation checklist sheet was used prior to implementation of the teaching program to measure the exact knowledge level and assessment practice for patient about open heart surgery. The same part used after implementation of the teaching program and after 2 weeks later to evaluate the gain in knowledge after the intervention. It consists of 2

main parts: Patient assessment knowledge and practice about open heart surgery.

Scoring system:

As regard patient assessment knowledge about open heart surgery which includes 18 items, each item was assessed, categorized, and scored into either yes = 1 or no = 0 on all items. Patient assessment practice about open heart surgery. Which includes 14 items, each item was observed, categorized, and scored into either yes = 1 or no = 0 on all items.

Tool II:

Cardiac teaching program based on individualized patient needs assessment (Annex2)

The educational program was designed to minimizing the incidence of post operative infections with open heart surgery patients through individualized session of educational program. It developed by the researcher based on the review of relevant literature, available resources, and the patient needs assessment. Number of session; a total 9 educational sessions will be conducted for each patient in addition to the pre assessment session. Preparing of educational training place, teaching aid and media (pictures, Arabic handout; the content of program modified in Arabic language and give it to the patient, and models) to help and facilitate the implementation of the educational program for the patient. Prepare the contents of training program, based on the assessment and the available equipment in the unit for its application

The first session; included information about the heart and its function, meaning of heart disease. The second session; provided information about open heart surgery and importance of surgery. The third session; included information about teaching skills related to preparation before surgery. The fourth session; included information about daily activity and exercises. The fifth session and sixth session; included information about wound care schedules. The seventh session; included information about specific nutrition for post cardiothoracic surgery. The eighth sessions; included information about wound infection: local and systemic signs and symptoms, and medication used. The ninth session; included information about discharge instructions for heart surgery patients. The duration of each session about 15 – 20 minutes according to patient tolerance. The end of each session makes discussion and feedback, except for the session for discharge instruction, which take 60 minutes

Tool III:

Cardiac post operative observation check list sheet (Annex 3):

An observation checklist was designed based on reviewed related literature Serna & Cathy (2006); Bonnie & Barnard (2007). The observation was performed to evaluation of effectiveness of the educational nursing program related to postoperative wound management on minimizing infection before discharge and follow up post discharge.

Scoring system:

As regard cardiac post operative observation check list sheet, each item was observed, categorized, and scored into either present or not present on all items of local wound manifestation of infection and systemic manifestation schedule of observations.

Tool V: Cardiac post operative wound site infection evaluation sheet:

Used evaluation tool sheet for wound site infection (Southampton Wound Assessment Scale) The wounds were graded before discharge and after 10 – 14 days postoperatively into one of four categories; normal healing, minor complication, wound infection , and major haematoma (Pudner, 2005).

Southampton scoring system:

Grade	Appearance
0	Normal healing
1. Normal healing with mild bruising or erythema: A B C	Some bruising Considerable bruising Mild erythemia
2. Erythema plus others signs of inflammation: A B C D	At one point Around suture Along wound Around wound
3. Clear or haemoserous discharge: A B C D	At one point only (< 2 cm) Along wound (> 2 cm) Large Volume Prolonged (> 3 days)
4. Major complication (Pus): 0 A B	Normal At one point (< 2 cm) Along wound (>2cm)
5. Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration	

Scoring system:

As regard cardiac post operative wound site infection evaluation sheet, each item was observed, categorized, and scored into either present or not present on all items of Southampton scoring system for study and control groups.

Methods:-

Techniques for data collection:

- Official approval and administration permission were obtained from the head of internal

cardiothoracic surgery department and post operative ICU to collect the necessary data.

- The consent from the patients who will be participating in the study will be taken.
1. The tools 1, 2, 3 and 4 used in this study was developed by the researcher based on reviewing the relevant literature (Bonnie & Barnard, 2007).
 2. Jury of programs tested by 5 expertise's from the field of staff thoracic surgery and nursing educators for content validity of program.
- A pilot study was conducted during September 2009. It included 5 patients, in order to test the clarity and applicability of the tools.
 - The data collection covered a period of one year starting from October 2009 till the end of October 2010.
3. Confidentiality and anonymity were assured.

Description of the nursing intervention program:

This program included three major parts;

- 1- The first was concerning the cognitive skills, i.e. knowledge about; The heart and its function, meaning of heart disease, definition and indications of open heart surgery, wound care schedules, knowledge about preoperative preparation, and postoperative instructions as regards open heart surgery, information about specific nutrition for post cardiac surgery, wound infection; local and systemic signs and symptoms, and medication used and discharge instructions for post cardiac surgery patients, and the importance of follow-up instruction of care.
- 2- The second was concerning the practical skills, i.e. deep breathing and coughing exercise, leg exercise, activities of daily living.
- 3- The third was related to carry out (implementation) the educational program practice among open heart surgery patients on minimizing the incidence of post operative infections.

Procedure:

The study was carried out in three phases: 1st, 2nd and 3rd phases:

- 1- Preparatory phase (Assessment and planning phase), involved the following: Review of relevant literature (Berman *et al.*, 2009), (nursing textbooks, journals, internet resources, etc), about nursing care for cardiac patient, jury for program by 9 expertise nurses and doctors, arrange for the training program schedule, based on the contents of the program, each patient was interviewed and counseled individually, time availability and the resources available.
- 2-The second phase (implementation phase): This phase comprised the preoperative, postoperative,

and during this phase the exercise training program was implemented.

Pre-operatively:

- Patients were equally enrolled in the study as control and study groups sequentially. The 1st patient's interview was used to explain purpose and nature of the study as well as patient agreement for voluntary participation was obtained.
- The 1st 3 sessions from educational nursing program were carry out in 2nd interview with study group and take break 10 minutes between every session.
- The 4th, 5th, and 6th sessions from educational nursing program were carry out in 3rd interview with study group and take break 10 minutes between every session.
- The last 3 sessions from educational nursing program only were carry out in 4th interview with study group and take break 5 minutes between every session.

Postoperatively:

- The 5th interview with study group was at 1st day post-operatively, and then once time daily during hospitalization for base line data was obtained from study and control groups patients to fill tool 3.
 - Before discharge the investigator emphasized the importance of follow up visit for all subjects (study and control) and arranged with study group the time and place for follow up which were 2 weeks postoperatively in out patient cardio thoracic surgery clinic at Assiut University Hospitals.
- 3-The last phase of proposed teaching program is the evaluation phase. After implementation as well as after 2 weeks the patient knowledge and practices has been evaluated by the researcher through filling the tool (1). Also local wound and systemic manifestation of infection was assessed utilizing tool 3 during hospitalization before discharge and after 2 weeks post discharge (follow up). A line of contact was established between the investigator and subjects of both groups for feed back, monitoring, and provision of needed consultation and help.

Analysis of data

Data collected by computer program SPSS" version. 17" Chicago. USA. Data expressed as "mean \pm standard deviation" "number, percentage". Using T.test to determine significant for numeric variable. Using Chi.square test to determine significant for non-parametric variable. Using person's correlation for numeric variable in the same group.

n.s $P > 0.05$ no significant. $P < 0.05$ significant.

** $P < 0.01$ moderate significant.

*** $P < 0.001$ highly significant.

Limitations of study:

- 1- Time available for follow up not enough as many patients were coming from far town and need to leave hospital early.
- 2- The patient's anxiety and feelings of vulnerability may interfere with the ability to learn information provided.
- 3- Participants suffered from transportation and financial problems.

3. Results:

Distribution of the biosociodemographic variables in study and control group subjects: the data reveals the more than half of the patients' in study group 53.3 % was female, 70 % were married, were 40 % from (18 to 29 years), 33.3 % were illiterate, 50 % were non working, family size 70 % from 4 to 8 persons and 56.7 % were moderate housing condition.. While the patients' in control group 63.3 % were male, 46.7 % were married, were 33.4 % from (30 to 39 years), 26.7 % were read & write, 43.3 % were non working, family size 66.7 % from 4 to 8 persons and 46.7 % were low housing condition. With no statistical significant difference between study and control groups as regards biosociodemographic variables.

Distribution of the sample according to vital signs means scores preoperative assessment for both study and control groups: There are highest mean scores as regard to temperature and pulse rate in control group than in study group (37.04 ± 0.37 , 36.92 ± 0.457 and 85.53 ± 15.38 , 83.43 ± 11.55 , respectively). Table show that highly statistical difference between control and study group related to respiratory rate ($P = 0.005$).

Distribution of the sample according to preoperative risk factors for study and control group: the high percentage in both study and control groups (80 % and 73.3 %, respectively) have non smoking. As regards body mass index the highest percentage (63.3 % and 40%, respectively) in study and control groups have standard level of weight. As regard percentage of chronic obstructive pulmonary disease and use of antibiotics they were equally in both groups, while highest percentage in study group have used of anticoagulant (80%) and one third of patients in control group have hypertension (33.3 %).

Distribution of the sample according to hereditary diseases & medical history for both study and control group: more than half percentage (60 %) in study group have diabetes and 40 % have hypertension and in control group were 80 % of

patients have diabetes and 76.7 % hypertension. As regard the medical history streptococcal infections it was found that 86.7 % and 96.7 % in study and control groups, respectively. There was significant difference related to hypertension between both groups.

Table (1): This table shows that the cardiovascular preoperative and health habits clinical assessment for both study and control groups. The findings indicated that 96.7 % and 100 % of the patients in the study and control groups had palpitation preoperatively, while half of the sample in both study group and control had equal percent of leg edema. Concerning of extremity pain of both study and control groups preoperative assessment; the findings indicated that there were significant differences between the study and control groups in preoperative period ($p < 0.05$).

The data reveals that cigarette smoking the majority of the patients' in study group had smoked cigarette more than control ones (83.3 %, 62.5 % respectively). The result also revealed that, there were highest mean scores of smoking index was found in study group than control ones (310 ± 65.21 , 120.23 ± 20.25 , respectively). The data reveals that the patients' in control group as performing exercise more than study ones (33.3 %, 26.7 % respectively). Difference was statistically significant ($p < 0.01$) for smoking index, and common symptom.

Table (2): This table demonstrates that significant difference was found between study and control groups as regard magnesium studies finding ($P = 0.042$).

Table (3): This table demonstrates that, significant difference was found between study and control groups as regard coagulation factories and blood glucose studies.

Table (4): The highest percentage (33.33 and 26.67 %) in study group and in control groups were has knowledge about rest and sleep. As regards percentage of knowledge about define of surgical site infection, sources and predisposing factors for surgical site infection, health teaching activities after discharge, notify the physician if patient have any abnormal, and daily activities to infection control they are equally in both groups and they have not any knowledge about this items.

Table (5): As regards pre operative nursing care practice the highest percentage (73.33 % and 66.67 %) in study and in control groups were have about foot and leg exercises, while they have not any knowledge about how to use incentive spirometry and elastic stocking. Also the table shows that assessment of level of practice about post operative nursing care among patients in study and control group, approximately an equal percentage in study and control groups (73.33 % and 70

%) were have knowledge about nursing care of urinary catheter, activities and exercises in intensive care unit. As regards discharge instructions for open heart surgery patients the highest percentage (60 % and 43.33 %) for study and control groups have had knowledge about how perform walking exercises.

Table (6): The above table shows that, there were significant differences improvements throughout the educational program phases among study group regarding total score of knowledge and practice with $P = 0.000$, 0.000 about open heart surgery.

Table (7): The above table shows that, there were statistical significant differences improvements of throughout the educational program phases among study group while non statistical significant differences were noticed throughout the educational program phases among control group regarding level of knowledge and practice.

Table (8): This table shows that, Non significant difference were existed between infection scoring system at three phases for both group in all items except normal healing in pre discharge ($P = 0.06$).

Also table enumerate that significant difference in post discharge for all items except major complication ($P = 0.015$), deep or severe wound infection ($P = 0.03^*$), and clear wound discharge ($P = 0.009$).

Table (9): This table demonstrates that, non significant difference between study and control groups as regard to hospital stay and ICU stay.

Figure (1): The table mentioned that, statistical significant differences of study groups was exited between housing condition & incidence of namely fever ($p=0.005$), delayed wound healing ($p=0.027$) and pneumonia ($p=0.027$).

Figure (2): The table shows that, statistical significant differences was exited for study group between ICU stay & incidence of fever, delayed wound healing, endocarditis, myocarditis, pericarditis and pneumonia.

Figure (3): The table mentioned that, a statistical significant difference was exited for study group between hospital stay & incidence of endocarditis, myocarditis, and pericarditis ($p < 0.01$).

Table (1): Distribution of the sample according to preoperative cardiovascular clinical assessment and health habits for study and control group.

Variable	Group				X ² Test	P-value
	Study group (n=30)		Control group (n=30)			
	No.	%	No.	%		
Common symptoms for cardiovascular:						
- Chest pain	27	90	29	96.7	1.735	0.306
- Palpitation	29	96.7	30	100	1.515	0.500
- Dyspnea	27	90	28	93.3	0.228	0.500
- Cough	21	70	21	70	0.738	0.611
- Oedema	15	50	15	50	1.02	0.602
- Extremity pain	21	70	28	93.3	8.05	0.021*
- Nocturnal Dyspnea	28	93.3	30	100	0.651	0.246
- Fatigue	25	83.3	28	93.3	0.735	0.212
Health habits:						
- Use of tea and coffee	7	23.3	14	46.7	0.041	0.082
- Use of alcohol	1	3.3	1	3.3	0.392	0.754
- Smoking	6	20	8	26.7	0.483	0.381
Type of smoking:						
- Cigarette	5	83.3	5	62.5	0.931	0.417
- Shisha	0.0	0.0	2	25		
- Both	1	16.7	1	12.5		
Degree of smoking:						
- Mild	1	16.7	6	75	0.925	0.061
- Moderate	3	50	2	25		
- Heavy	2	33.3	0.0	0.0		
Smoking Index :						
- Mean \pm SD	310 \pm 65.21		120.23 \pm 20.25		37.43	0.01*
Exercise:						
- Yes	8	26.7	10	33.3	0.397	0.389
- NO	22	73.3	20	66.7		

(*) Statistically significant $P < 0.05$.

Table (2): Comparison between pre and post operative electrolytes disturbance finding among open heart surgery patients for both study and control group

Variable	Group								X ² Test		P-value	
	Study (n=30)				Control (n=30)				Pre	Post	Pre	Post
	Pre		Post		Pre		Post					
	No	%	No	%	No.	%	No.	%				
Serum sodium (Na+):												
- Normal	28	93.3	25	83.3	28	93.3	21	70	0.083	0.521	0.694	0.180
- Abnormal	2	6.7	5	16.7	2	6.7	9	30				
Serum potassium (K +):												
- Normal	26	86.7	27	90	24	80	26	86.7	0.071	0.081	0.365	0.50
- Abnormal	4	13.3	3	10	6	20	4	13.3				
Calcium (Ca++):												
- Normal	25	83.3	21	70	24	80	16	53.3	0.028	0.904	0.50	0.144
- Abnormal	5	16.7	9	30	6	20	14	46.7				
Magnesium (Mg++):												
- Normal	26	86.7	25	83.3	25	83.3	18	60	0.34	15.93	0.50	0.042*
- Abnormal	4	13.3	5	16.7	5	16.7	12	40				

Table (3): Comparison between pre & post operative as regard coagulation factors, renal function studies & glucose among open heart surgery patients for both study and control group.

Variable	Group								X ² Test		P-value	
	Study (n=30)				Control (n=30)				Pre	Post	Pre	Post
	Pre		Post		Pre		Post					
	No.	%	No.	%	No.	%	No.	%				
Prothrombin time:												
- Normal	16	53.3	2	6.7	20	66.7	14	46.7	0.283	12.43	0.215	0.000 ***
- Abnormal	14	46.7	28	93.3	10	33.3	16	53.3				
Prothrombin concentration:												
- Normal	12	40	4	3.3	18	60	14	46.7	0.392	8.43	0.098	0.005 **
- Abnormal	18	60	26	86.7	12	40	16	53.3				
International normalized ratio:												
- Normal	17	56.7	12	40	19	63.3	16	53.3	0.415	0.253	0.396	0.219
- Abnormal	13	43.3	18	60	11	36.7	14	46.7				
Glucose:												
- Normal	20	66.7	11	36.7	26	86.7	20	66.7	0.273	7.43	0.063	0.029*
- Abnormal	10	33.3	19	63.3	4	13.3	10	33.3				
Urea:												
- Normal	28	93.3	23	76.7	30	100	26	86.7	0.415	0.053	0.246	0.253
- Abnormal	2	6.7	7	23.3	0.0	0.0	4	13.3				
Creatinine:												
- Normal	27	90	24	80	25	83.3	24	80	0.292	0.382	0.353	0.626
- Abnormal	3	10	6	20	5	16.7	6	20				

(***) statistical highly significant P < 0.001

Table (4): Pre-operative knowledge level for patients' about open heart surgery between study and control group

Variable	Group								P-value
	Study (n=30)				Control (n=30)				
	Yes		No		Yes		No		
	No.	%	No.	%	No.	%	No.	%	
Definition of the heart.	5	16.67	25	83.33	4	13.33	26	86.67	0.425
Function of the heart.	6	20	24	80	5	16.67	25	83.33	0.561
Definition and indications of open heart surgery	1	3.33	29	96.67	0.0	0.0	30	100	0.623
Complications occur after open heart surgery.	1	3.33	29	96.67	2	6.67	28	93.33	0.745
Define of surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Sources of surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Predisposing factors for surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Complications of surgical site infection.	3	10	27	90	2	6.67	28	93.33	0.582

Guidelines for good diet.	2	6.67	28	93.33	3	10	27	90	0.473
Weight control.	1	3.33	29	96.67	2	6.67	28	93.33	0.498
Health teaching activities after discharge.	0.0	0.0	30	100	1	3.33	29	96.67	0.498
Notify the physician if patient have any abnormal.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Rest and sleep.	10	33.33	20	66.67	8	26.67	22	73.33	0.391
Returning to work.	3	10	27	90	2	6.67	28	93.33	0.425
How to stop of smoking?	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Daily activities to infection control.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Guidelines for patient when taking medication.	2	6.67	28	93.33	3	10	27	90	0.493
Nursing care for common problems after open heart surgery.	3	10	27	90	2	6.67	28	93.33	0.582

Table (5): Peri-operative knowledge level regarding nursing care practice for open cardiothoracic surgery patient between both study and control group.

Variable	Group								P-value
	Study (n=30)				Control (n=30)				
	Yes		No		Yes		No		
	No.	%	No.	%	No.	%	No.	%	
Pre operative nursing care:									
- Coughing and breathing exercises.	19	63.33	11	36.67	17	56.67	13	43.33	0.431
- Foot and leg exercises.	22	73.33	8	26.67	20	66.67	10	33.33	0.627
- Performing arm and shoulder exercises.	16	53.33	14	46.67	15	50	15	50	0.465
- Used of elastic stocking.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
- Mouth care.	8	26.67	22	73.33	5	16.67	25	83.33	0.251
- Incentive spirometry.	0.0	0.0	30	100	0.0	0.0	30	0	0.0
Post operative nursing care:									
- Patient observation in intensive care unit.	18	60	12	40	17	56.67	13	43.33	0.521
- Nursing care of chest tube.	21	70	9	30	20	66.67	10	33.33	0.602
- Nursing care of urinary catheter.	22	73.33	8	26.67	21	70	9	30	0.584
- Nursing care of nosogastric tube (ryle).	19	63.33	11	36.67	18	60	12	40	0.493
- Activities and exercises in intensive care unit.	22	73.33	8	26.67	21	70	9	30	0.479
Discharge instructions for heart surgery patients:									
- Wound care of the site of operation in home.	13	43.33	17	56.67	12	40	18	60	0.315
- Walking exercises.	18	60	12	40	13	43.33	17	56.67	0.482
- Steps for measuring radial pulse.	8	26.67	22	73.33	9	30	21	70	0.291

Table (6): Comparison of knowledge and practice scores among cardiac surgical patients post implementing educational program at three phase's pre, post and follow up for study group.

Variable	Program phases						P-Value
	Pre-program		Post-program		Follow up		
	No.	%	No.	%	No.	%	
Level of knowledge:							
- Satisfaction	2	6.67	27	90	26	86.63	0.000***
- Unsatisfaction	28	93.33	3	10	4	13.33	
Level of practice:							
- Satisfaction	13	43.33	25	83.33	24	80	0.000***
- Unsatisfaction	17	56.67	5	16.67	6	20	

Table (7): Knowledge and practice scores among open heart surgery patient for both group throughout three phase's pre, post and follow up.

Variable	Program phases		
	Pre-program	Post-program	Follow up
	Mean ± SD	Mean ± SD	Mean ± SD
Knowledge (Total score = 18 degree):			
- Study group	2.055 ± 0.92	15.69 ± 1.38	15.46 ± 1.07
- Control group	1.88 ± 0.42	2.16 ± 1.01	2.16 ± 1.01
P-value	0.274 n.s	0.000***	0.000***
Practice (Total score = 14 degree):			
- Study group	6.86 ± 2.38	13.13 ± 0.641	13.00 ± 0.925
- Control group	2.26 ± 2.04	2.26 ± 2.04	2.26 ± 2.04
P-value	0.485 n.s	0.001**	0.001**

Table (8): Infection scoring system among open heart surgery patient before and after discharge (follow up) for both groups.

Variable	Group								X ² Test		P-value	
	Study (n=30)				Control (n=30)							
	Pre		Post		Pre		Post		Pre	Post	Pre	Post
	No.	%	No.	%	No.	%	No.	%				
1. Normal healing	25	83.3	30	100	16	53.3	24	80	24.35	9.25	0.02*	0.03*
2. Normal healing with mild erythema:												
0 Normal	17	56.7	30	100	16	53.3	22	37.3	0.721	7.531	0.06	0.015*
A Some bruising	13	43.3	0.0	0.0	12	40	7	23.3				
B Considerable bruising	1	3.3	0.0	0.0	10	33.3	6	20				
C Mild erythema	7	23.3	0.0	0.0	8	26.6	5	16.6				
3. Erythema with inflammation:												
0 Normal	22	73.3	30	100	22	73.3	24	80	0.348	9.25	0.403	0.03*
A At one point	8	26.67	0.0	0.0	4	13.3	4	13.3				
B Around suture	1	3.3	0.0	0.0	8	26.6	6	20				
C Along wound	1	3.3	0.0	0.0	0.0	0.0	0.0	0.0				
D Around wound	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
4. Clear discharge:												
0 Normal	28	93.3	30	100	21	70	26	86.7	0.371	27.43	0.259	0.009**
A At one point only	2	6.7	0.0	0.0	9	30	4	13.3				
B Along wound	2	6.7	0.0	0.0	1	3.3	0.0	0.0				
C Large Volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
D Prolonged	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5. Major complication (pus):												
0 Normal	30	100	30	100	26	86.7	28	93.3	0.092	0.342	0.06	0.246
A At one point	0.0	0.0	0.0	0.0	4	13.3	2	6.7				
B Along wound	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
6. Deep or severe wound infection:												
0 Normal	27	90	30	100	26	86.7	25	83.3	0.352	6.93	0.500	0.026
A wound infection	3	10	0.0	0.0	4	13.3	5	16.7				

Table (9): Comparison between duration of patient's stay among open heart surgery patient at intensive care unit (ICU) and hospital department for both groups throughout three phases of educational program.

Variable	Group		X ² Test	P-value
	Study (n=30)	Control (n=30)		
	Mean ± SD	Mean ± SD		
Hospital department stay	31.83 ± 16.88	30.60 ± 12.58	0.391	0.749
ICU stay	4.83 ± 2.10	5.43 ± 2.97	0.425	0.371

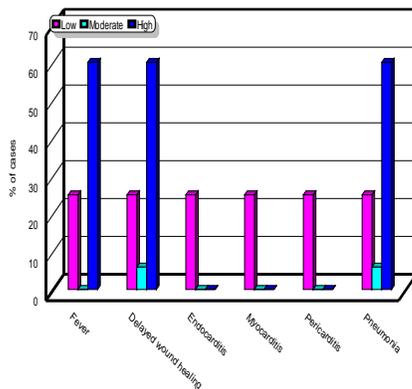


Fig. (1): Relation between housing condition & incidence of infection in study group

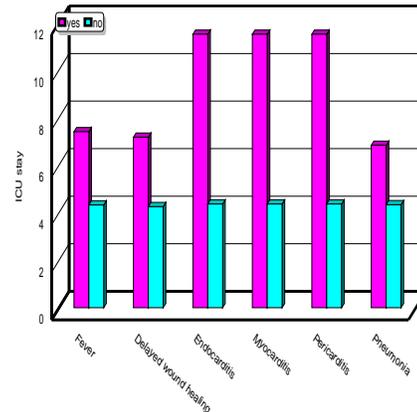


Fig. (2) Relation between ICU stay & incidence infection in study group.

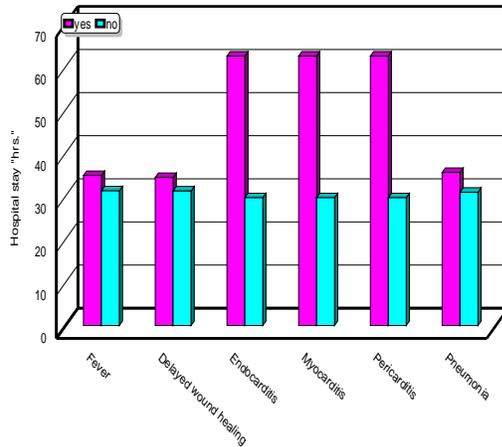


Fig (3): Relation between hospital stay & incidence of infection in study group

4. Discussion:

Patient education is an essential component of nursing practice, there has been a continuous development and emphasize on the leadership role of nurses in the arena over the last century. Kern, (2005) stated that the nurse is responsible for providing preoperative nursing care for patients which includes assessing physical and psychological needs preparing patients for operation includes the following instruction such as listing medication routinely, limitation of eating or drinking before surgery with specific time, bathing, checking vital signs, laboratory investigation and administrating preoperative medication.

Based on the results of the present study biosocio-demographic characteristics, two groups study & control were included in this study with no statistically significant differences shown between them regarding: sex, age, marital status, educational level, occupation, family size, and housing condition at the beginning of the study.

Concerning sex, the present study showed that approximately half of study and control groups were female, this result agree with Hopkins, (2005) study finding who mentioned that the majority of participated patients with open heart surgery were females. Whiles this disagrees with that of Stahle *et al.*, (1997) and Borger (1998) who reported that fewer female patients than males (female: male ratio = 1: 4.4).

The result revealed that, more than one third of the total studied patients were in the age group from 18 - 29 years old in study group and control group. On same line, this finding disagrees with Chih-Hung (2005) who reported that the number of open heart surgery is increasing in patient who are 50 years old or more.

The present study findings have shown that; one third of the study groups were illiterate and less than one third of the control group were able to read and write. As patient's education can increase the patients' awareness toward the surgery and the importance of follow up program.

The present study showed that, the mean scores vital signs in study group in preoperative phase were less than those of the control ones especially for temperature and pulse (85.53 ± 15.38 , 83.43 ± 11.55 and 37.04 ± 0.37 , 36.92 ± 0.457 respectively) with highly statistical difference between control and study group related to respiratory rate (0.005). Punder (2005) and Koplow and Hardin (2007) mentioned that pulse and blood pressure serve as useful tools to assess cardiac output in heart disease..

Based in the results in the present study preoperative cardiovascular clinical assessment, more than two third of study group and all patients who participate in control group have palpitation and nocturnal dyspnea, these findings is at one with those of Gamer *et al.* (1996), Mangram *et al.* (1999), and Spelman *et al.* (2000) who reported that, all patients with cardiac disease have complained with palpitation and nocturnal dyspnea.

The present study showed that, consumption of tea and coffee it was more prevalent among control group subjects than those in the study ones. More than two third of study and control group were non smoker. This agrees with those of Kleinbaum *et al.* (1998), Delgado *et al.* (2001), and Kern (2005) who reported that, the majority of sample in study and control group were smokers and smoking is considered one of the risk factors for sternal surgical site infection.

According to Debacker *et al.* (2003) who recommended that physical activity for cardiac patient should be positively encouraged because this may reduce blood pressure, cholesterol level, and body weight. Patients should be encouraged to exercise at least four times a week, but preferably daily for a period of 30 minutes. Exercise does not need to be complex or competitive; a daily walk is sufficient to gain health benefits. These contradicts with study more than two third of the patients were not performing exercises (walking) in both groups. The American College Sports Medicine (ACSM, 1993) guidelines and Ellis (1995) who stressed that the individual will benefit from daily bouts of aerobic exercise totaling 30 minutes.

According to Syed and Davis (2000) who mentioned that within the standard level of weight 20 to < 26, over weight 26 to < 30, obese > 40 Kg. It was found in the present study, two third of the study and more than one third in the control group were

having standard level of weight. According to Grady and Jalowiec (1995), Debacker *et al.* (2003) and Jarrick (2006) who recommended that nutritional information should be given to optimize wound healing, maintain ideal body weight and reduce cholesterol levels if elevated.

With regard associated disease, the study revealed that less than one third of subjects in study and control group were complaining from diabetes this may be due to that most of the sample were young (18 -29 years). Slaughter *et al.* (1993), Minohara *et al.* (1993), Spelman *et al.* (2000), Swanton (2003), American Heart Association (2004) consistent diabetes and obesity were independent predictors of sternal surgical site infection following coronary artery bypass grafting.

Also in the present study, it was found that half of subjects in study and control group were complaining from chronic obstructive pulmonary disease. However, Paletta *et al.* (2000), Keogh (2003), American Heart Association (2004), Adam (2005), Drain & Forren (2009) and Morton & Fontaine (2009), emphasized that patients complaining from chronic obstructive pulmonary disease lead to impaired sternal wound healing.

In this context finding that all patients who participate in study and control group were using antibiotics, this is in agreement with those of Paletta *et al.* (2000); Trick *et al.* (2000) and Abd El Aziz *et al.* (2007) who mentioned that, the use of antimicrobial prophylaxis surgical procedures is one of the measures used to prevent the development of a surgical site infections.

The present study mentioned that more than two thirds of the patients in study and more than one third in control group were using anticoagulant. This agrees with those of, Kern (2003), and Punder (2005) who recommended that patients with mechanical prosthetic valves will require warfarin anticoagulation for life to prevent thrombosis and embolism.

Based on present finding mentioned that more than half of the patients in study and two thirds in control group have normal laboratory values of prothrombin time in preoperative period, while more than two thirds in study and more than half in control group have abnormal values as regard prothrombin time in postoperative period, this may be related to anticoagulation therapy.

The present study revealed that, more than two thirds in study and control group have normal laboratory values as regard serum sodium, serum potassium, calcium, and magnesium. This is in with accordance Noronha and Matuschak (2002), Diercks (2004), Palmer (2006) and Urden *et al.* (2006), who mentioned that normal serum potassium levels are 3.5

to 4.5 mEq/L. Hyperkalemia and Hypokalemia elicits significant changes in the electrocardiogram (ECG) and impairs myocardial conduction.

Regarding glucose level two thirds of the patients in study and more than two thirds in control group have normal values as regard glucose level in preoperative period. In addition Garber *et al.* (2004) and Wynne *et al.* (2007) consistent the detection of increased blood glucose (more than 110 mg/dl) during a fasting state may indicate diabetes mellitus.

The present study showed that, the highest percentage (33.33 % and 26.67 %) in study and control groups respectively were having knowledge about rest and sleep. It also showed that most of patients had a general lack of knowledge in both groups about other items. Level of knowledge was insufficient this may be due to inavailability of training programs and lacking of continuous educations. This result was in agreement with Bedier (2005) who found that their was lack of patient's knowledge about pre and post operative care which predict poor recovery outcome

After implementing of the educational program study group patients had a highly significant improvement than those of control ones in relation to all items of knowledge. In this respect, Jennifer (2003) and Charlson *et al.* (2006) found that, applying nursing intervention postoperatively plays a major role in patients' improvement of knowledge and recovery.

As regard level of preoperative nursing care practice for open heart surgery patient, more than half of the patients in both groups had knowledge about performing foot and leg exercise. It also revealed that more than one third in study and control groups has no knowledge about how to perform coughing and breathing exercises, arm and shoulder exercise. According to American College Sports Medicine (ACSM, 1993) guidelines and Urden *et al.* (2006) recommended that exercise is important in the maintenance of the healthy heart.

Based on present finding assessment of practice level about post operative nursing care among patients in study and control groups, approximately an equally more than two thirds of patients in both groups have knowledge about nursing care of urinary catheter, activities and exercises in intensive care unit. It also showed that lacking of patient's knowledge about patient observation in intensive care unit, nursing care of nasogastric tube, and nursing care of chest tube in both study and control groups.

Regarding post operative activities, Charlson and Islam (2003) stressed that, following the cardiac surgery; the patient must be encouraged slowly to resume an active life, while minimizing the risk associated with overexertion. On the other hand Gerald and Fletcher (2007). Abdel Monem (2008)

illustrated that, active but not restrictive range of motion of extremities is also well tolerated early after cardiac surgery as long as activities do not stress or impair healing of sternal incision while patient become stable and early ambulated from bed.

As regards discharge instructions for open heart surgery patients, more than one third for study and control groups has had knowledge about how to perform walking exercise. Bedier (2005) and Punder (2005) recommended that a daily walk is sufficient to gain health benefits for patients after open heart surgery.

Before program implementation (pre-test) there was unsatisfactory level of knowledge. The implementation of educational program showed an improvement in patient' level of knowledge regarding all information related to open heart surgery. This has improved immediately after the program implementation and remained in the follow up.

The present study revealed that, before program implementation the patient did not have any background or information about level of practice in preoperative, postoperative nursing care and discharge instructions for open heart surgery. Post program implementation there were significant improvement in patient' level of nursing care practice about open heart surgery preoperative, postoperative and discharge instructions on immediate post-test and follow up test.

According to Morton *et al.* (2005); Morton and Fontaine (2009) effective preoperative teaching program for patient before open heart surgery is important to help the patient in rapid recovery and prevent postoperative complications. The surgical procedure, the intraoperative and postoperative experiences are explained.

In the present study there were statistical significant differences in improvements throughout the educational program phases among study group regarding total score of knowledge and practice about open heart surgery.

The study in the line with those of Morton *et al.* (2005); Morton and Fontaine (2009); Okkonen and Vanhanen (2006) who emphasized that after cardiac surgery the patient may experience pain resulting from the chest or leg incision. In addition Wynne *et al.* (2007) and Osborn (2010) illustrated that the goals of nursing management is a thorough assessment of the patient's pain using a pain scale, provide a calm environment, adequate period of rest and sleep, administration of analgesics based on the report of pain intensity.

In present study the scoring system used is of Southampton Wound Assessment Scale to assess surgical wound infection in patients, the wounds graded before discharge and after 2 weeks postoperatively. In the present study, more than half

of the patients in study and control group were having normal healing with mild erythema pre-discharge, while in follow up phases all patients in study group and more than two third in control group were having normal healing with mild erythema. In addition Bailey *et al.* (1992), Morris (2003) and Punder (2005) devised the Southampton Wound Assessment Scale to assess surgical wound infection in patients following surgery; the wounds were graded before discharge and 10-14 days postoperatively into one of four categories; normal healing, minor complication, wound infection, and major haematoma.

Based on the study results; it was clear that there were a significance difference as regard the relation between hospital stay and ICU stay and incidence of infection. Eagle *et al.* (2004), Morton and Fontaine (2009) supported that length of stay in ICU and hospital environment after cardiac surgery increased risk for sternal surgical site infection.

It was found that in the present study there was significance difference as regard to relation between housing condition and incidence of fever, delayed wound healing and pneumonia. This in line with Minohara *et al.* (1993) and Campbell (2000) and DVLA (2003) who found that poor housing condition increases incidence of surgical site infection.

It is the fact that study documented the statement of role of the nurse play a vital role in the prevention of SSIs in patients with open heart surgery, identification of early signs of infection are vital to the prevention and optimum treatment of SSIs. The critical care nurse must be integrating theoretical knowledge, assessment skills, and problem solving ability to provide optimal nursing care and maintain high quality outcomes for open heart patients.

Conclusion:

Based on the result of the present study, it can be concluded that; Significant differences in improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. A significant relation was existed between age, nutritional status, diabetes, hospital stay, ICU stay and incidence of delayed wound healing among study group.

Based on results of the present study, the following can be recommended:

I. For patients:

1. Patients who have had valve replacement require additional verbal and written information about protecting their prosthetic valve from infective.

2. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.
3. Tell the patients about importance of regular follow up in regular time.
4. Advice the patient regarding effective education and information are required to enhance understanding of drug therapy (anticoagulant drug).

II. For nurses:

1. An in-service education center should be established within Assiut University Hospital to improve nursing staff level of knowledge and performance.
2. To reduce the rate of infection, implementation of universal precaution and comprehensive education are required.

III. In services:

1. Follow-up care for patients with open heart surgery phone calls, home health visits and clinic visits would help to pinpoint problems and solve it.
2. Establishment of specialized cardiac clinics in all health centers to help guiding and caring for patient with open heart surgery.

IV. For research (future study):

1. Importance of doing separate studies of open heart surgery helpfully lead to more effective and preventive – based strategies for future.
2. Studies should be done for those patients who high risk for infection

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IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES OF POROSOME IN MAMMALIAN PANCREATIC ACINAR CELL

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Abstract: Pancreatic acinar cells have a particular role in the synthesis, storage and regulated secretion of the different digestive enzymes present in pancreatic juice. Recently a detailed understanding of the molecular machinery and mechanism of cell secretion has come to light. So, it is now an accepted belief, that the mechanism of cell secretion is quite different, and a highly regulated process. The secretory vesicles (zymogen granules) dock and transiently fuse at the base of specialized plasma membrane structures called porosomes or fusion pores. In the present study, TEM images and a computer-assisted morphometry approaches have been used to analyze quantitatively the shape and fine structure of porosome in pancreatic acinar cell of post-feeding rat. The electron micrographs illustrated the porosome as a distinct permanent, lipoprotein, cup-shaped structure at the cell plasma membrane of the pancreatic acinar cell, facing the lumen and varies in shape and structure according to the stage of secretion. The computer-assisted morphometry summarized the structural and morphological importance of the porosome and revealed its different shapes during the cell secretion. The coloured images have clearly shown the supramolecular tripartite lipoprotein structure of the plasma membrane and porosomes. Histogramic analysis showed the numerical values of the secreted materials and the three layers of both porosomes and plasma membrane which differed depending on the stage of cell secretion.

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Key Words: cell secretion, image processing, histogramic analysis, porosomes, secretion machinery, ultrastructure.

1. Introduction:

Since last decade, secretory process in the cells attracted great attention and concern of several investigators, and a series of elegant studies revealed a completely different molecular mechanism of secretion and membrane fusion in cell as a very important process involved in the release of hormones and digestive enzymes (Jena *et al.*, 1997, 2003; Cho *et al.*, 2002a, b, d,&e; Jeremic *et al.*, 2003; Craciun, 2004; Kelly *et al.*, 2004; Thorn *et al.*, 2004). These authors demonstrated that pancreatic acinar cells have a particular role in the synthesis, storage and regulated secretion of the digestive enzymes present in pancreatic juice. The process of pancreatic secretion involves the docking and transient fusion of membrane-bounded secretory vesicles (the zymogen granules) at a specialized plasma membrane structures called porosomes or fusion pores, to discharge vesicular contents. In 1997, Schneider *et al.* represented the first discovery of the porosome as a circular pit containing 150 nm diameter depression, presents at the apical cell plasma membrane where secretion occurs in living pancreatic acinar cells. Also, Jena who is considered as one of the most pioneer investigators in the studies of porosomes elucidated singly a lot of searches in (1997; 2002; 2003; 2004; 2005; 2007; 2008; 2009), in addition to his work with other teams. In his interesting and intense studies of the story of cell secretion, he elucidated the porosome as a permanent universal secretory machinery in a

nanometer-size lipoprotein structure at the cell plasma membrane. In addition, determination of porosome biochemical composition; its functional reconstitution into architecture lipid membrane; its structure and dynamics at nm resolution and in real time have been all explained by Jena *et al.*, 2003; Jeremic *et al.*, 2004a,b; Lee *et al.*, 2004, 2009; Cho and Jena, 2007; Cho *et al.*, 2007, 2008; Cook *et al.*, 2008; Potoff *et al.*, 2008. The monumental discovery of the porosome as a new cellular structure at the plasma membrane and its molecular mechanism of secretion were also described in the reviews of Anderson (2004; 2006) and Zhvania (2004). Similarly, Craciun (2006) and Jefinija (2006) determined in their interesting studies the structure of the porosome in resting pancreatic acinar cells and when co-isolated with the secretory vesicles in exocrine pancreas (the zymogen granules), and demonstrated the presence of porosomes at the apical plasma membrane where secretion occurs. Ultimately solving one of the most difficult, significant, and fundamental cellular process – the cell secretion.

On the other hand, image processing is a technique for processing any image, it depends on the fact that the causes of colour in many structures are in response to the structural irregularities (Fortner and Meyer, 1997; Fraser *et al.*, 2003; Gendler, 2003; Rector *et al.*, 2004) Such use of this property can be considered as the key factor for mapping the way in

which the electron beam of TEM interact with the internal structure of organelle to produce the digital image. This digital image was further used for better characterization of the differences in fine structural field. However, the digital image consists of a square array of image elements or pixels; at each pixel, the image brightness was sensed and assigned with an integer value (from 0 to 255 in the case of gray scale image) that was named as the gray-level. For better visualization of the image, the gray-level image is transformed into colour image and converted into hue, saturation and intensity (HIS) using a discoloured technique. The simplest way of obtaining a pseudo colour image from a gray-level image is to use the RGB mode. An RGB colour consists of three individual images exposed through Red, Green and Blue filters, which are eventually combined into a single composite colour image. Note that, the individual RGB images are not in colour. They will still be gray scale images until combine them into the final colour image. This is recognized by many of the popular image processing programs like Photoshop or Paint Shop Pro (Parker, 1997; Sonka *et al.*, 1998; Myler, 1999). These programs are excellent tools when you want to crop, resize and perform final adjustments to your colour images and hence. Also, it can offer both more feasible and practical performance at simple tasks and good implementation, which would be impossible by TEM or other tools alone. However, the purpose of RGB colour model is to facilitate the specification of colours in some standard, generally accepted way, and is the most commonly used model in graphics devices (MacDonald, 1999; Lynch and Livingston, 2001). This model however, allows offering colour range for the pixels from an integer value 0 to 16777215 (number of colours: 256x256x256). This can be used as an additional parameter for identifying the fine details of the differences in the ultrastructure features.

On the light of this, the present study has been carried out to visualize on the nanosize structure and analyzes numerically and histographically the porosomes ultrastructure in mammalian pancreatic acinar cell.

2. Materials and Methods:

2.1. Experimental Animals and Ultrastructural

Preparation of Pancreatic Acinar Cells:

Ten male albino rats (*Rattus norvegicus*) ranging in weights from 150-200g were acquired from Schistosoma Biological Supply Program (SBSP) Theodor Bilharz Research Institute, Cairo, Egypt. Housed in clear plastic cages (one rat/cage) with wood chips as bedding and given pellet rodent diet, in addition of milk and water *ad-libitum*. They were kept for acclimatization and observation of their eating habit for a week, under controlled environmental conditions, including a temperature of 25°C and a 12h light/ dark cycle. At the last day, after they finished eating presented meal at morning, five rats were sacrificed by

decapitation one hour post-feeding, while the others were decapitated two hours post-feeding. The pancreas were rapidly excised and were processed for ultrastructural evaluation by electron microscopy as described previously by Dykstra *et al.*(2002) as follows: Freshly excised pancreas were cut into small blocks (1 × 1mm³) fixed in cold 4F:1G (i.e. 4% formaldehyde and 1% glutaraldehyde adjusted at pH 2.2) for 24h, and postfixed in 1% osmium tetroxide in 0.1M phosphate buffer (pH 7.3), dehydrated in an ethanolic series culminating in 100% acetone, and infiltrated with epoxide resin. After polymerization overnight at 60°C, semithin section (0.5µm) were stained with 1% toluidine blue in 1% sodium borate and examined with a light microscope. Areas of exocrine acinar cells were selected and the blocks trimmed accordingly. Ultrathin sections (80-90nm) were cut, placed on 200 mesh copper grids, and stained with uranyl acetate and lead citrate. The grids were examined and photographed using JEOL.JEM-1400-EX-ELECTRON MICROSCOPE at the Central Laboratory of Faculty of Science, Ain Shams University, Cairo, Egypt. The photographs were printed on KODABROMIDE F5s GLOSSY Black and White- Schwarzweib-Kodak.

2.2. Computer-assisted Examinations:

The TEM images of porosome at the plasma membrane of pancreatic acinar cell were visualized and examined by applying Cartographic Information System software (CIS) technique (Shulei and Yufen, 2004). Combination of image processing; numerical analysis; artificial intelligent and expert system with general vision software were used to colorize; analyze and reveal the morphological and Ultrastructural changes in porosomes by using Adobe® ImageReady® CS Middle Eastern Version “8”.

3. Results and Discussion:

The electron micrograph of one hour post-feeding rat, of the apical region of the pancreatic acinar cell displays clearly the presence of porosome as a swelled flask-shaped structure at the cell plasma membrane. The mouth of the porosome opening to the outside, range in size from 130 to 150 nm in diameter. It is loaded with electron dense particles at its groove. Some of these dense particles (enzyme materials) are also seen at the acinar lumen, as shown in figure (1).

TEM micrograph of two hours post-feeding period (Fig.2) illustrates that the porosome is more or less cup-shaped with wider mouth opening (range in size from 250 – 300 nm), compared with that seen at one hour post-feeding in figure (1) and no dense particles can be detected at the groove of this porosome, i.e. the secretory material was discharged, while the acinar lumen is loaded with these dense

particles. Also, the plasma membrane appears in these electron micrographs (Figs.1&2) as a triple-layered structure consisting of two dense bands separated by a central clear zone of lipid. The structure of plasma membrane shown in these electron micrographs coincides with the well known nomenclature “the unit membrane” or the “tripartite structure” that suggested and established by Robertson (1959; 1960b) as referred in the interesting book of Heimburg (2010).

Image analysis of these electron micrographs (Figs.1&2) after being processed with CIS and histographic analysis clearly demonstrate an obvious appearance of the tripartite lipoprotein structure of the plasma membrane as; an outer and an inner protein layers which are coloured with blue colour, while the lipid bilayer that sandwiched between them is coloured in yellow, as clearly seen in figures (3A –5A) that represented one hour post- feeding period and in figures (6A- 8A) which represent two hours post- feeding period. The porosomes in these figures also appear with the same colouration of plasma membrane on their three lateral boundaries of the cup-shape which emphasize that porosome is originated from plasma membrane as a permanent supramolecular lipoprotein structure as reported by Jena (2008). In addition, it is worthy to mention that the fluid mosaic model of Singer and Nicolson (1972), is clearly seen in the coloured figures (3A-5A), as the membrane lipid is arranged predominantly in the form of a bimolecular layer which is frequently interrupted by the presence of integral embedded protein extended from the protein layers in the form of mosaic arrangement.

Also, Singer (1992) and Lundbaek *et al.* (2010) established that the lipid bilayer is essentially a fluid substance permitting lateral mobility of both the lipid and protein molecules, and hence they are capable of transitional movement within the whole bilayer. The coloured figures (6A-8A) reveal this movement by the changeable features of plasma membrane layers and porosome in comparison with the figures (3A-5A) after releasing of the enzymatic materials in to the lumen which appear loaded with these materials in the period of two hours post- feeding. That means, the plasma membrane layers and porosome are essentially involved in the process of cell secretion.

In the same coloured figures (3A-8A) the image analysis of the electron dense materials which are seen at figures 1&2 in the groove of porosome cup appear with a distinct colour of deep green, which represent the enzymatic materials, and the released enzymes from this porosome in the lumen have the same green colouration.

Regarding histographic analysis, it is well known in CIS technique as reported by Rector *et al.*, 2004; Shulei and Yufen, 2004, that the colour which is appeared, is not randomly colour, but it is related to the formation of the structure, i.e. it means that the constituents of the structure is formed of its individual elements in different colours which combine and give the specific colour of the structure.

The histographical analysis is formed of two dimensions (2D); the X and Y axes. In this study, the Y axis represented the amount or the concentration (quantitatively) of the elements or compounds, whereas X axis represented the different elements or compounds of the structure.

Histographical analysis of the coloured pictures of the lipoprotein layer of plasma membrane and porosome, in addition to the enzymatic material are represented in figures (3B-8B).

It is obviously noticed during comparison between the figures (3B-5B), which represent the features of one hour post-feeding period and the figures (6B-8B), which represent the features of two hours post-feeding period, the quite differences in arrangement and concentrations of the protein layers and lipid bilayer of the plasma membrane and porosome, as well as enzymatic material, i.e. the position of green, red, blue in the elementary map of protein and lipid layers and enzymatic material appeared totally of varying degrees of concentration and accumulation from one hour to two hours post – feeding periods. This means that the lipoprotein layer of plasma membrane and porosomes are in active and changeable condition during the process of secretion to allow the transformation of the secretory materials (the enzymes) from the inside of the pancreatic acinar cell to the outside into the lumen. This can be obviously detected by the elucidation of the histographical figures.

As seen clearly in coloured figure (3A) of one hour post- feeding period, the inner and outer protein layers which have a distinct architecture and are coloured in blue and marked in white dots have a value of 53.96 and pixelation area is 8477 pixels in the histogram (Figure 3B). The arrangement of the peaks of this histogram are green, red and blue, which may reflect that they are different types of amino acids or protein constituents of the plasma membrane. While the same layers of protein in figure (6A) which represent two hours post-feeding period, appear totally different in arrangement and it looks like that they are involved in the secretory process. Their histogram analysis in figure (6B) show a value of 101.53 and the pixelation area is 16637 pixels. The arrangement of the peaks of this histogram are also green, red and blue, but in different concentrations and a little far distance of each others.

For the lipid layer, at one hour post-feeding period, it obviously appears in figure (4A) as a distinct bimolecular layer having variant degrees of deep yellow colouration and the marked white dots have a value of 82.69 and 3718 pixels of the pixelation area as clearly seen in figure (4B) of the histogram, which displays the arrangement of the peaks as blue, green and red with observed close space between blue and green, which may represent a certain type of lipid molecules, while the red colour

which is far from the two former colours may reflect other type of molecules in the lipid bimolecular layer.

In figure (7A) which represents the period of two hours after feeding, the lipid bimolecular layer is coloured with light yellow and in this figure, the protein layers are seen to be much intermingled with lipid layer. The histogram in figure (7B) give the arrangement of the peaks as blue, green and red with a value of 165.92 and the pixelation area is 6037 pixels, and it also reflects a great changeable in the arrangement of the peaks as clearly notice in the blue colour which locates at the beginning of X axis of the histogram while the red colour locates at the end of the axis followed inwards by the green one in a close distance. These features may interpret the changeable arrangement of molecules of plasma membrane and porosome during cell secretion.

In figure(5A), the secretory materials (the enzymes) appear in the period of one hour post- feeding as a deep green colour in the base of the flask-shaped porosome, in addition, some of them are seen in the lumen of the exocrine pancreatic acinus. They are marked in white dots and have a value of 49.86 and pixelation area is 3489 pixels as obviously shown in figure (5B) of histogram. The three colours; blue, red and green in arrangement of the peaks are presented in this histogram.

After two hours post-feeding period, the secretory materials (the enzymes) are seen in light green colour at the lumen only while the porosome is empty as obviously demonstrate in figure (8A). they have value of 92.46 and 2632 pixels of the pixelation area as reveal in the histogram of figure(8B), and the arrangement of the peaks of this histogram are red, blue and green.

An interesting observation is seen in the histograms of figures (5B and 8B) of the secretory materials, that the blue colour occur as a single line in concentration. It is in arrangement before the red in the histogram of one hour post-feeding while it came after the red in the histogram of two hours post-feeding, so, it can be neglected in both cases as compared with the layers of plasma membrane and porosome.

Also, the red and green colours in these histograms are not at the same arrangement, i.e. the red peak became far away from the green peak in the histogram of released secretory materials which are observed in the lumen. These two colours might represent the types of active enzymes in the lumen.

In the present study, the changeable features that appear in the coloured electron micrograph and histogram values of two hours post-feeding period reveal obviously that the plasma membrane and porosome are in dynamics and functional reconstitution

as described in 2009, by Jena in his interesting two reviews, about the secretory portal in cells and the functional organization of the porosome complex and associated structures facilitating cellular secretion. Furthermore, Jena elucidated in these reviews that a specialized and sophisticated secretory machinery is developed even in single – cell organisms such as the secretion apparatus of *Toxoplasma gondii*, the contractile vacuoles in paramecium, or the various types of secretory structures in bacteria. Therefore, he found in not surprising that the mammalian cells such as human platelets have evolved such highly sophisticated and specialized cup-shaped supramolecular lipoprotein structures – the porosome complexes and porosome – like “canaliculi system” for the precise and regulated docking, fusion, and release of intravesicular contents from cells. So, it established that the porosome is a universal secretory machinery at the cell plasma membrane and it has various forms of specialized structures starting in nature from the single – cell organisms till the highly mammalian cells structure in the different organs of the body as clearly elucidated also by Jeremic, 2008; Cho *et al.*, 2009 and 2010; Trikha, *et al.*, 2010; Wheatley, 2010.

Beside these great and elegant efforts of these pioneer physiologist investigators in identifying porosome in different organs, the author of the present study as a cytologist utilized the computer-assisted morphometry to analyze quantitatively the shape and fine structure of plasma membrane and porosome in pancreatic acinar cell of post-feeding rat to present another method of evaluation of the dynamics, composition, and functional reconstitution of porosome and plasma membrane structures in coloured histograms and numerical values of the electron micrographs. Specially that the image processing and the numerical analysis approaches are applied in medicine and biology (Szilágyi, 2006; Sadaphal *et al.*, 2008). Beside, a plenty of image processing searches and articles have been released in a very wide scale of different science branches in 2011 from “IEEE transactions on image processing [TA]”.

Therefore, it found worthy that utilization and application of the image processing and numerical analysis techniques in the present study to evaluate and estimate the ultrastructural components of the plasma membrane and porosome of the pancreatic acinar cell, may can be also applied in cell and molecular biology branches in general.

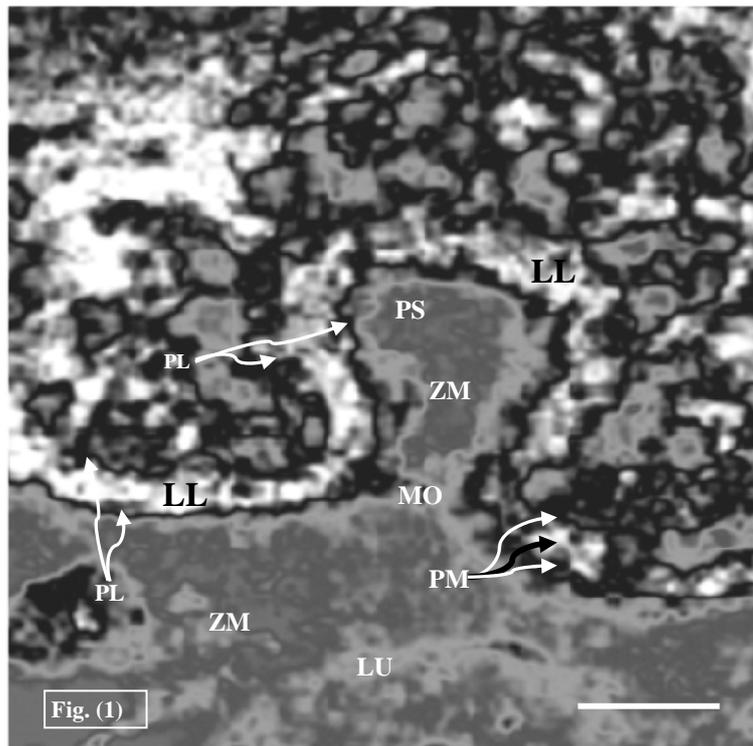


Figure (1): Electron micrograph of the apical region of a pancreatic acinar cell at one hour post-feeding period revealing the flask – shaped porosome (PS) with mouth opening (MO) range in size from 130 – 150 nm. It is loaded with electron dense particles representing enzyme materials (ZM). Some of these particles are also seen at the acinar lumen (LU), the plasma membrane (PM) showing the “tripartite structure” consisting of two dense bands representing protein layers (PL) separated by a central clear zone of lipid (LL). (Scale Bar = 300 nm)

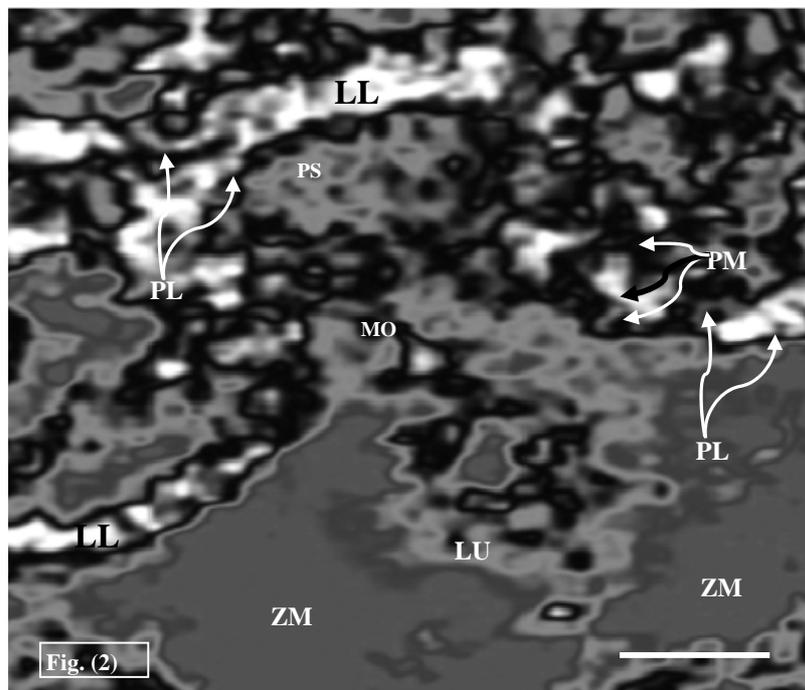
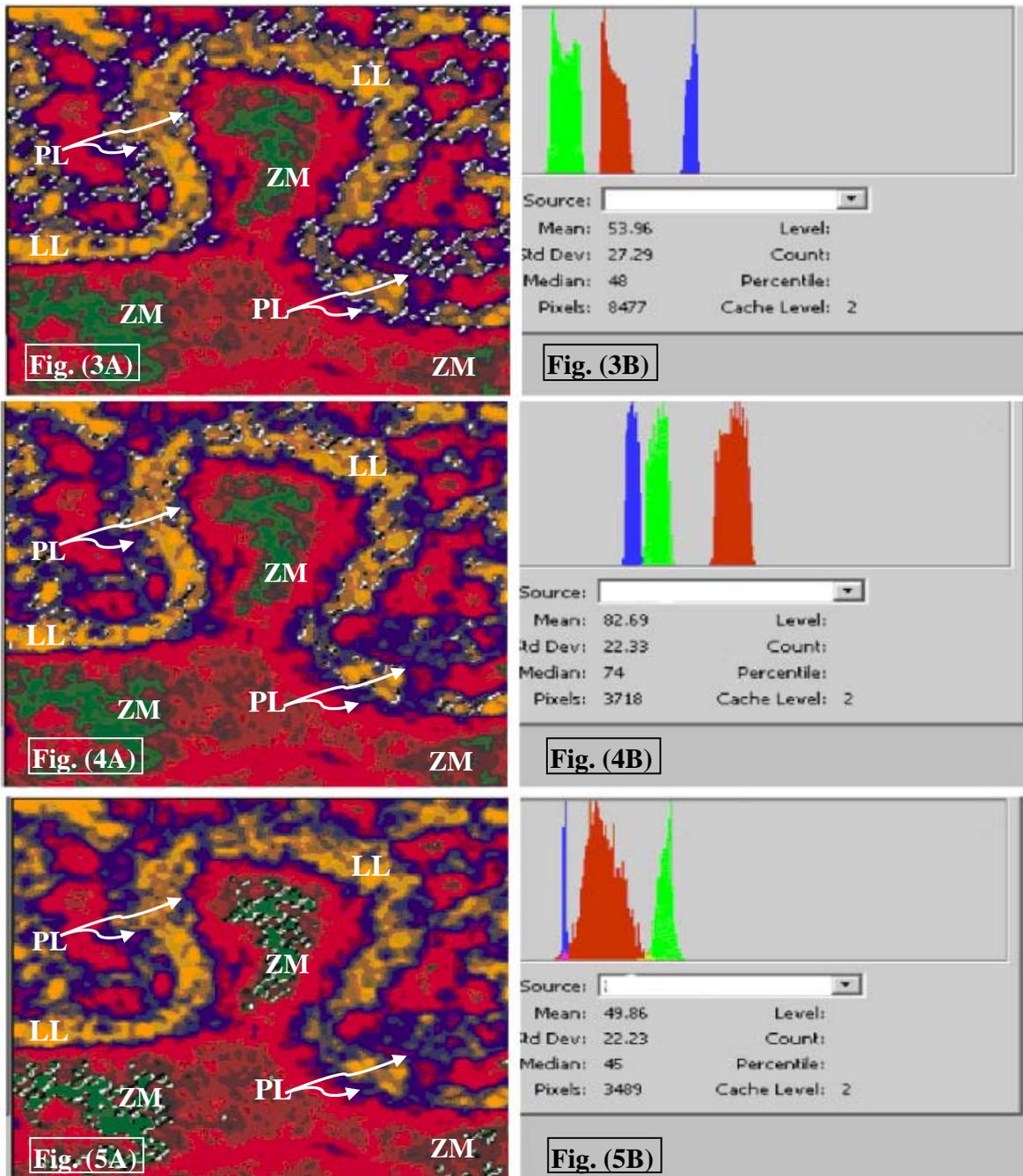


Figure (2): Electron micrograph of the apical region of a pancreatic acinar cell at two hours post-feeding period illustrating clearly cup-shaped porosome (PS) with a wide opened mouth (MO) (275– 300 nm) compared with figure (1). No dense particles can be detected at the groove of its cup, while the acinar lumen (LU) is loaded with these dense particles (enzyme materials) (ZM). (Scale Bar= 300 nm).



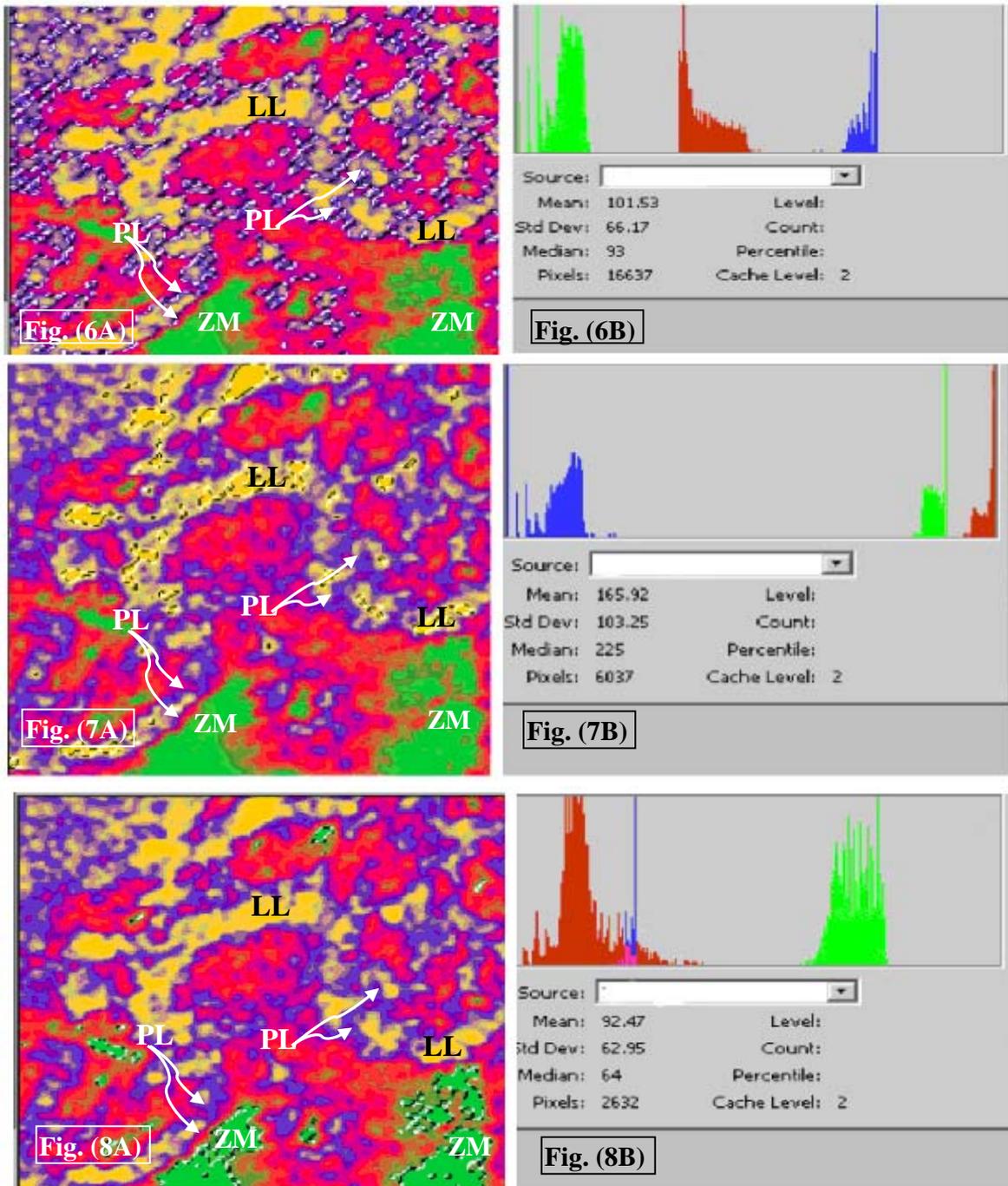
Figures (3A, 4A, 5A) : Image analysis of the micrograph of one hour post-feeding period revealing obviously the tripartite structure of the plasma membrane and the porosome; an outer and an inner protein layers (**PL**) appear with blue colour, while the lipid bilayer (**LL**) that sandwiched between them appears with a variant degree of deep yellow colour which reflecting the presence of the molecules of its bilayer. The flask-shaped porosome has the same colour of plasma membrane unit on its three lateral boundaries. The enzymatic materials (**ZM**) in porosome groove and in lumen appear with a distinct colour of deep green.

Figures (3B, 4B, 5B) : Illustrating the histograms analysis of colours and the numerical values of protein layers, lipid layer and enzymatic materials respectively at one hour post-feeding period.

Figure (3B) : The protein layers arrangement of the peaks as green, red, blue with a value of 53.96 and 8477 pixels.

Figure (4B) : The lipid layer arrangement of the peaks as blue, green, red with a value of 82.69 and 3718 pixels.

Figure (5B) : The enzymatic materials arrangement of the peaks as blue, red, green with a value 49.86. and 3489 pixels.



Figures (6A, 7A, 8A): Representing image analysis of the micrograph of two hours post-feeding period. The plasma membrane unit and the porosome appear with the same colours as in the figures of one hour post-feeding period, but they have different arrangement on their molecular structures, while the enzymatic materials which is occupying only the acinar lumen appear with light green colour.

Figures (6B, 7B, 8B): Showing the histograms and the numerical values of protein layers, lipid bilayer and enzymatic materials respectively of the two hours post-feeding period. It is obviously noticed in these figures that although the plasma membrane unit and the porosome have the same colouration arrangement of their peaks as appeared in the histograms of one hour post-feeding period, yet they have different values in number according to their position that appear on the X axis as in the following:

Figure (6B): The protein layers in value of 101.53 and 16637 pixels.

Figure (7B): The lipid bilayer in value of 165.92 and 6037 pixels.

Figure (8B): The enzymatic materials in the lumen in value of 92.47 and 2632 pixels. (The position of the blue line can be neglected)

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The effect of non-linear terms on the process of computing water hammer with regard to friction coefficients for different cast iron pipe

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Abstract: Water Hammer problems are complex and time-consuming even with very simple calculation method and usual boundary conditions. The governing equations of water Hammer are partial differential equation and are expressed based on continuity and momentum equations. One of the important procedures for solving the governing equations of unsteady flows is finite difference method. One procedure for simplifying the governing equations is neglecting the nonlinear terms such as $V \frac{\partial V}{\partial x}$, $V \frac{\partial H}{\partial x}$ without considering the amount of errors that are created with

this process. Therefore in this paper, the phenomenon of water Hammer in the tank, pipe and valve system has been investigated in two manners, one with full equations and other with neglecting the nonlinear terms. For doing this, an FDM code has been written in MATLAB and the amounts of head along the pipe in sequential times and the differences between two manners have been given in diagrams. The obtained results indicate that for iron pipe with different friction coefficient (smooth, perennial and worn) by decreasing Chezy coefficient, wave damping increases and the effect of nonlinear terms decreases.

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Keywords: Water Hammer; Non-linear and Linear Terms; wave damping; Chezy Coefficient; Tank and Pipe System

1. Introduction

Water Hammer and its destructive potential are in many cases identified by its resultant sound. Water Hammer is caused by an abrupt change of flow velocity in a pipe. When it is created, water Hammer is propagated in the form of a wave through all parts of the system connected to it, and is a function of flow geometry and pipe characteristics. Water Hammer is assumed to be an elastic phenomenon and is expressed by continuity and momentum equations (Koutitas, 1983; Zandi, 2006).

The wide-spread dimensions of water Hammer problem and numerous unknowns and problems caused by this phenomenon, as well as rapid advance in numerical computation in parallel to computer sciences provide an appropriate field for further study. Finite difference method is among techniques commonly used for solving partial differential equations and plenty of its applications exist in. The effect of nonlinear terms on process of solving partial differential equations is an issue which has not been studied much in hydraulics engineering. Therefore in the present research water Hammer phenomenon has been studied for hyperbolic differential equations with similar initial and boundary conditions and different friction coefficients, and the results obtained from finite difference method have been compared in two cases.

Governing equations and formulation

Mathematical model of this phenomenon includes the two principles of continuity and momentum, and the respective nonlinear partial differential equations are as follows:

$$\frac{\partial V}{\partial t} + V \frac{\partial H}{\partial x} + g \frac{\partial H}{\partial x} + \frac{fV|V|}{2D} = 0 \quad (1)$$

$$\frac{\partial H}{\partial t} + V \frac{\partial H}{\partial x} + \frac{C^2 \partial V}{g \partial x} = 0 \quad (2)$$

where H and V are values of pressure head and velocity as unknown parameters, respectively; g is earth's gravity constant; C is wave velocity; and f is friction coefficient which depends on pipe diameter and pipe smoothness (Daneshfaraz et al, 2009).

An appropriate approach for simplifying the above mentioned nonlinear equations is to neglect the nonlinear terms $\left(V \frac{\partial V}{\partial x}, V \frac{\partial H}{\partial x} \right)$. If water Hammer

phenomenon occurs in a short time period, frictional damping will be small and the equations (1) and (2) are summarized as follows considering small amount of flow velocity compared to wave propagation velocity:

$$\frac{\partial V}{\partial t} + g \frac{\partial H}{\partial x} + \frac{fV|V|}{2D} = 0 \quad (3)$$

$$\frac{\partial H}{\partial t} + \frac{C^2}{g} \frac{\partial V}{\partial x} = 0 \quad (4)$$

Equations (1) and (2) are nonlinear differential equations, while equations (3) and (4) are linear differential equations which become complete by defining initial and boundary conditions. The mentioned equations can be solved by numerical computation of finite differences on nodes at time and position intervals. To solve them, the pipe is assumed to be broken down into several discrete segments with defined lengths, and for each segment the values of pressure head (H) on nodes and velocity (V) in middle of the segment are calculated. Fig. 1 schematically demonstrates integration procedure in (x, t) plane (Daneshfaraz et al, 2009; Musavai-Jahromi, 2006).

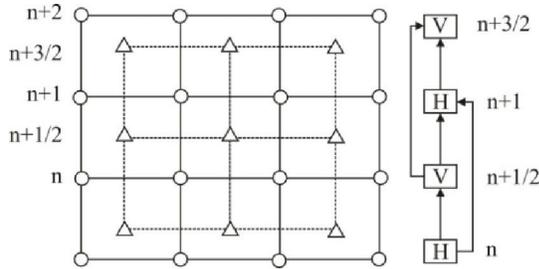


Fig 1: Integration procedure in (x, t) plane using FDM method.

Making use of the algorithm shown in Fig. 1 and finite difference approximation, the equations (1) to (4) are expanded as follows:

$$\frac{V_i^{n+3/2} - V_i^{n+1/2}}{\Delta t} + V^* \frac{V_{i+1}^{n+3/2} - V_i^{n+3/2}}{\Delta x} + g \frac{H_i^n - H_{i-1}^n}{\Delta x} + \frac{fV^*|V^*|}{2D} = 0 \quad (5)$$

$$\frac{H_i^{n+1} - H_i^n}{\Delta t} + V^* \frac{H_i^n - H_{i-1}^n}{\Delta x} + \frac{C^2}{g} \frac{V_{i+1}^{n+1/2} - V_i^{n+1/2}}{\Delta x} = 0 \quad (6)$$

$$\frac{V_i^{n+3/2} - V_i^{n+1/2}}{\Delta t} + g \frac{H_i^n - H_{i-1}^n}{\Delta x} + \frac{fV^*|V^*|}{2D} = 0 \quad (7)$$

$$\frac{H_i^{n+1} - H_i^n}{\Delta t} + \frac{C^2}{g} \frac{V_{i+1}^{n+1/2} - V_i^{n+1/2}}{\Delta x} = 0 \quad (8)$$

where indices *i* and *n* denote position and time, respectively. To expand *V** in mentioned equations, Lax formulation has been used as follows:

$$V^* = \frac{V_{i+1}^n - V_{i-1}^n}{2} \quad (9)$$

Also, for solution's stability, Courant condition has been used as integration criterion as follows:

$$\lambda = \frac{C\Delta t}{\Delta x} < 1 \quad (10)$$

2. Experimental/Applied example

A pipe is assumed to possess following properties: length, 6000 m; diameter, 50 cm; thickness, 4 mm; output head, 5 m; wave velocity, 2980 m/s; output flow velocity, 9.9 m/s. General scheme of the system is illustrated in Fig. 2. Discharge is stopped in 2 seconds by a valve at the end of the pipe.

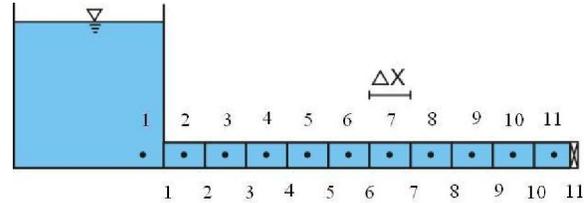


Fig 2: General scheme of tank and pipe system, and its segmentation.

Flow cross-section changes linearly by the valve. At beginning of the pipe, pressure head is equal to water depth in tank and is assumed to be constant. At the end of the pipe, boundary conditions depend on flow velocity and flow cross-section, and are calculated from the following equation. $V = \frac{A_{(t)}}{A_0} \sqrt{2gH}$ (11)

3. Analysis of results and discussion

Numerical solutions by FDM method were yielded from program written in MATLAB environment for smooth iron pipes with Chezy coefficient equal to 130, for perennial iron pipes with Chezy coefficient of 100, and for worn iron pipes with Chezy coefficient of 80 (The website of Southern Tehran Mechanic Society), and the following graphs were obtained.

Figs. 3 and 5 demonstrate changes in water head versus time at end part and middle of the pipe considering its material in two cases, i.e. with and without nonlinear terms, respectively. Furthermore, differences in water head values at the two mentioned cases for end and middle nodes are presented in Figs. 5 and 6, respectively. For instance in Figs. 3 and 5 the water head values at the two cases with and without considering nonlinear terms are provided for smooth iron pipes; the difference is not however much obvious due to high level of water head existing in the pipe. Therefore, these difference values are shown in Figs. 4 and 6 and are in the range of 10 and -6 m water depth.

Changes of water head along the pipe at times of 10 and 20 s considering the pipe material in the two mentioned cases, as well as differences between water head values along the pipe at times of 10 and 20 s are illustrated in Figs. 7 to 10, respectively.

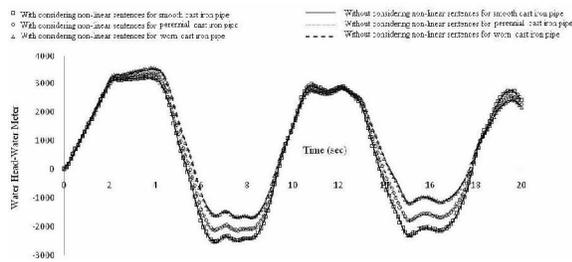


Fig 3: Changes of water head versus time at end of the pipe considering the pipe material in the two cases, i.e. with and without considering nonlinear terms.

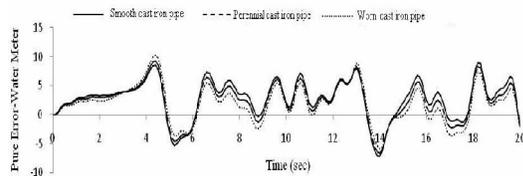


Fig 4: Differences between water head values obtained in the two mentioned cases versus time at end of the pipe considering the pipe material.

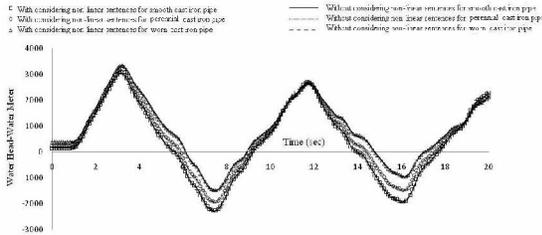


Fig 5: Changes of water head versus time in middle of the pipe considering the pipe material in the two cases, i.e. with and without considering nonlinear terms.

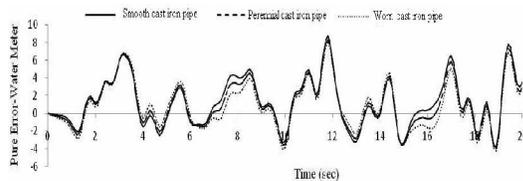


Fig 6: Differences between water head values obtained in the two mentioned cases versus time in middle of the pipe considering the pipe material

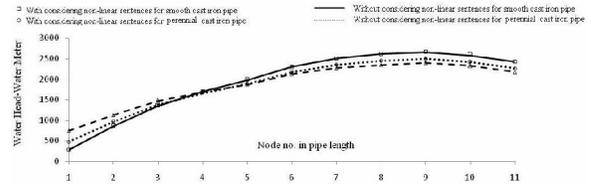


Fig 7: Changes of water head along the pipe at $t = 20$ s considering the pipe material in the two cases, i.e. with and without considering nonlinear terms.

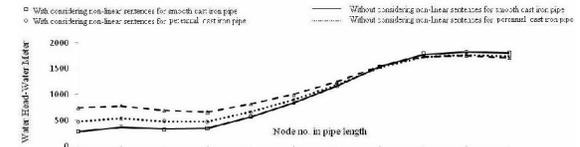


Fig 8: Changes of water head along the pipe at $t = 10$ s considering the pipe material in the two cases, i.e. with and without considering nonlinear terms.

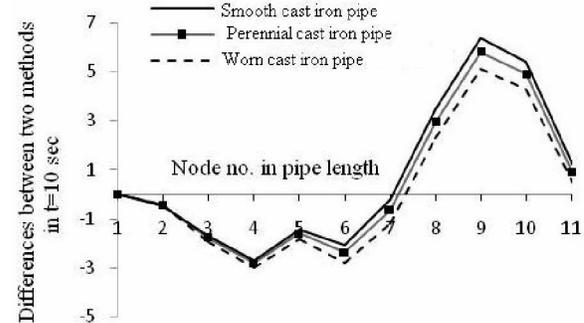


Fig 9: Changes in water head values obtained in the two mentioned cases along the pipe at $t = 10$ sec.

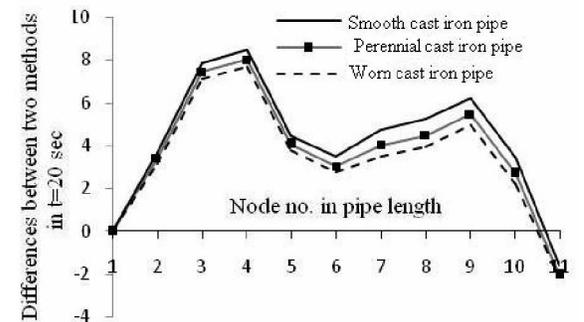


Fig 10: Changes in water head values obtained in the two mentioned cases along the pipe at $t = 20$ sec.

With numerical considering of mentioned figs, it has concluded that increasing of Chezy coefficient, it will result in increase of pure mean differences between two methods. Relations between them in pipe length and continued times respectively screened in figs 11, 12.

But the point that is mandatory is that the maximum differences resulted from removing non-linear

sentences in pipe length in continued times, were not constant and were in resonance. This pointed in Fig. 13.

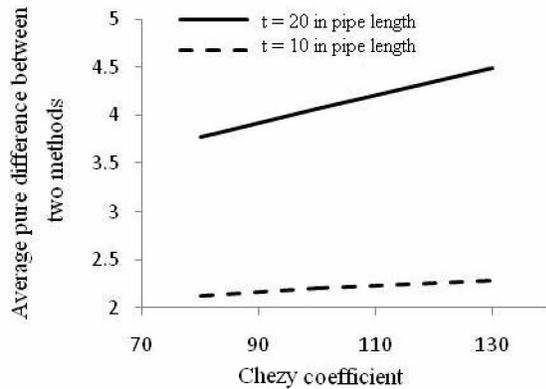


Fig 11: Mean absolute value of the difference between $t = 20$ s and $t = 10$ s versus Chezy coefficient.

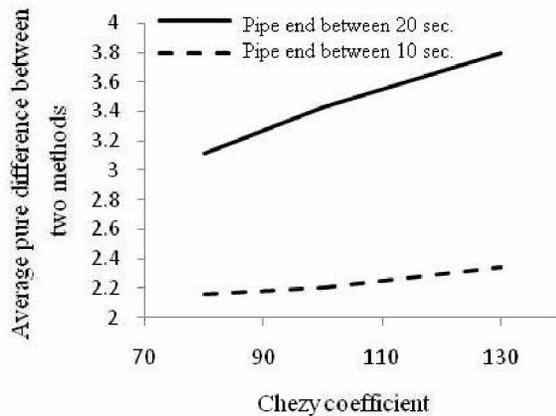


Fig 12: Mean absolute value of the difference at end part and middle of the pipe versus Chezy coefficient.

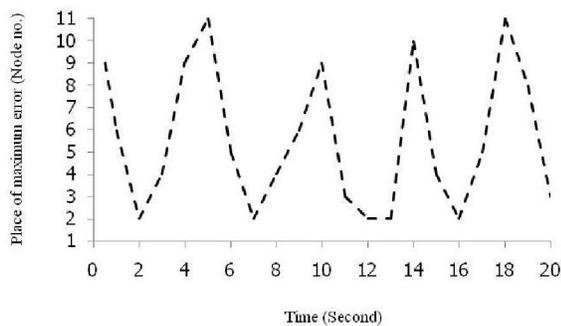


Fig 13: Position of maximum error caused by removal of nonlinear terms.

4. Conclusion

In the present paper, partial differential equations of water Hammer were solved in two cases, i.e. by considering and neglecting nonlinear terms, using FDM method for Chezy coefficients mentioned in the text, and numerous results were yielded. The most significant results are as follows:

1. Increasing Chezy coefficient has led to increase in mean absolute value of the difference between the two mentioned cases (see Figs. 11 and 12).
2. According to Figs. 3 to 6, behavior of wave is in good agreement at nonlinear and linear cases; thus by removing nonlinear terms the solution can be generalized to complete equation with an acceptable error.
3. Difference between the two mentioned cases is not constant along the pipe, and it changes according to Fig. 13.

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Psychological reflection on anguish in players

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Abstract: A great deal of the literature on the relationship between anguish and performance has come from a cognitive-behavioral perspective. This paper examines the relationship between the two constructs from a psychodynamic perspective. Included are a discussion of winning and the anguish of separation from an object relations perspective, the dread of success, self psychology, Freudian instinct theory, and the secondary gain that is found in defeat. Suggestions for future directions in treatment of anguish within the athletic context are offered as well as a postscript.

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Keywords: Psychological reflection; anguish; players; performance

1. Introduction

From a review of the literature it is clear that the most popular conceptual paradigm in sport psychology is a cognitive-behavioral one. Texts used in undergraduate and graduate courses on sport psychology are slanted heavily toward a behavioral/experimental model of intervention (Murphy, 1995; Horn, 1992). The standard sport psychology interventions include relaxation training, deep breathing, visualization, imagery, mental practice, self-talk and goal-setting. Sport psychology has its roots in academic settings which have traditionally been behavioral in orientation. However, if one works full-time in the field of sport psychology, it becomes clear that cognitive-behavioral techniques will only take you so far. These methods have a hard time with issues such as resistance in the player and more subtle effects such as shame, embarrassment and guilt when winning.

This paper will present a review in player's performance. We will not discuss the areas of resistance and narcissism, two subjects that psychoanalysis is especially suited to explore. However we will cover the various aspects of sports anguish on players. Symptoms of anguish as they relate to unconscious conflicts are psychoanalytic ideas. Both the motivation to compete in sports and conflicts about winning are largely unconscious and cognitive-behavioral interventions have little to contribute in the study of these areas. One of the very few psychoanalytic papers on the psychoanalysis of sports was written by Dan Dervin nearly fifteen years ago. He introduced psychoanalytic thinking to the world of the player, (Dervin, 1985). I will extend his introduction and focus on anguish as a psychoanalyst views it. Criteria for diagnosing Anguish during athletic performance are from the DSM IV. Under the heading of general Anguish disorder are the

symptoms of muscle soreness, trembling, restlessness, fatigue, shortness of breath, tachycardia, sweating, dizziness nausea and vomiting, being on edge, startle response, blank mind, poor sleep and irritability. The prevalence of Anguish disorders, simple phobias, obsessive compulsive disorders and post traumatic stress disorders are common in the general population and common in players as well.

These symptoms are familiar to many players. It is not at all uncommon to hear of sleeplessness, vomiting, nervousness and restlessness before games. The intensity of the anguish that is felt before and during sports is so gripping, immediate and debilitating that one feels compelled to provide fast relief for these anxious players. The need to offer a quick solution to panicking players is so pervasive that it may account for the compulsive use of behavioral techniques even when they are ill-advised or ineffective. For the psychologist that works with players full-time and over a long period of time one soon realizes that these quick fixes are often not fixes at all and at best last for very brief periods. Let us explore some psychoanalytic approaches to performance Anguish in sports.

2. Winning and the Anguish of Separation: An Object Relations Approach

A friend of mine recently qualified for the US Amateur in golf. This was a lifelong dream of his and he proceeded to finish last in a field of 160 players. These results were published in every major newspaper in the nation. Do you think he felt any embarrassment?

Shame and embarrassment are constant threats in sports because the game is usually played in front of people. Gabbard (1997) has written about performance Anguish and shame from an object-relations perspective. He suggests that shame is a

narcissistic disturbance that impacts many who perform in front of an audience. Success or winning in a player can induce a feeling of separation from the family, the opponent or the crowd and this can produce considerable Anguish and shame. This shame and Anguish can inhibit performance. Conflicts that winning brings loss and separation derive from childhood when the child is given the message to stay close to the mother and never to leave her. Separation Anguish induced by winning or the threat of winning is exceedingly common. I was working with a professional female golfer who was leading a tournament up the 71st hole. She proceeded to 4 putt #17 and triple bogey 18 to lose. When asked to free associate; to this collapse she reported that she still feels like a little kid (she is in her early 30).

Performing in front of a crowd provides enormous exhibitionistic excitement. This can bring with it a sense of shame that one is indulging in a taboo. I had a patient who was an extremely attractive female tennis player. She developed a growing sense of dread the better she became. With improvement came an increase in the number of people who watched her play. She began to experience panic attacks in front of these crowds. Analysis revealed that during childhood she was expected to exhibit herself in front of her parents and their friends by showing off her body. This experience was both exciting for her and it also instilled shame. This early and latency age experience lay dormant and repressed until she began to achieve a measure of fame on the tennis courts whereupon she began to feel the same kind of shame over being watched. The adulation was a reminder of her childhood experiences and it produced a feeling that these crowds knew of her past abuse.

3. The Dread of Success

Some players carry a dream of winning because it means that they are superior to others. Superiority, for some, means greed and selfishness. We all see this amply displayed by some professional players. The dread of success is especially felt in female players, some of whom are raised to think aggression is not nice. For many children raised religiously winning implies selfish striving which is considered sinful. Occasionally a child rose in the lower class who later becomes a star with great fame and wealth has a sense of dread that they are leaving their families behind. This explains why you so often hear professional players say their true desire is to buy their mothers a home with the money they make. Success can bring with it great guilt. The recent near disqualification of a pro golfer at a Tour event may have something to do with the dread of success. He had already won three tournaments this year. It was

reported that before the tournament he had lost two close friends to sudden death. During the event he was nearly disqualified twice, once due to almost missing a tee time and once by marking his ball on the 2nd green a failing to replace it properly. If he had signed his scorecard without the score adjustment and the two shot penalty he would have been disqualified. A fan that he later called his "guardian angel" saved him from disqualification by telling him of the infraction in time. These very unusual mishaps were neither accident as most would do not think nor divine intervention but may have had to do with the guilt over winning following the loss of his two friends. We saw similar accident proneness in Dave Jansen during his Olympic speed skating mishaps which came on the heels of his sister's death. Guilt over winning is an unconscious but powerful barrier.

4. Self Psychology and Sports

Self psychology has emerged in the last few decades as an alternative to classical psychoanalytic instinct theory. Kohut (1977) moved the focus of psychoanalytic concern away from sexual and aggressive drives and onto self concepts. A cohesive sense of self esteem which is developed in childhood is thought to enable adults to cope with pressures inherent in sports. Conversely, a disordered self will fragment under extreme pressure.

It is very common to observe players with low self image fall into rage or despair at the first sign of difficulty. I recall a player I was working with who was leading a golf tournament, missed one putt and had such Anguish and injury in him that he broke his putter over his knee, thereby guaranteeing a loss. His self-concept was so weak that the slightest sign of trouble was able to cause a collapse.

A fragmented or enfeebled self system can give way to temporary states of psychosis when under extreme pressure during competition. I recall a professional golfer leading a major a few years ago with only six holes to play. He had a fifteen foot putt on a par three and as he walked to the green he reported noticing the beauty of the trees on this course. He became obsessed with the "beauty of nature" for the last six holes as he proceeded to bogey in, thereby losing the tournament and also his reality testing for a few hours. We may have seen a similar problem in the 1999 British Open when Van de Velde appeared to lose possession of his faculties on the 72nd hole and made a triple bogey to lose the event that he could have won had he only been able to make a double bogey. I believe that the threat of self-fragmentation accounts for why so many players have one great performance and then never come close to that level again. It may be the memory of the pressure and how it threatens the integrity of the ego

is felt to be so dangerous that these players find a way to avoid it in the future by backing off leads. The experience of being "flooded" with affect as one fights for the lead in a sporting event can be explained with the concept of the self and its collapse. The collapse of ego boundaries when under pressure produces disorganization in thinking and what is referred to as choking. Many players unconsciously choose the effect of humiliation and depression over the effect of being flooded. As a result, mistakes and missed shots take on a new meaning in this light. Anything that gets them out of the pressure is a defensive maneuver used to remove the self from under pressure. Many of them say they try to "enjoy" themselves while under pressure to inhibit this overwhelming and psychosis producing emotion.

5. Freud and the Player: Instinct Theory and Sports

Sports are clearly about aggression. If you work with players you soon begin to realize just how much aggression they are capable of. The first time I met Keyshawn Johnson, wide receiver for the New York Jets, I recall that his size and power reminded me of a very large and dangerous locomotive. Boxers emanate power and grace as well thereby combining aggression and sexuality, the two basic drive states.

The inhibition of aggression occurs as a result of trauma, training in not to be aggressive or through difficulty during the oedipal phase of psychosexual development. Freud suggested that aggression is typically defended against by turning it into its opposite (passivity), turning it against oneself (self-defeat or depression) or by sublimating it through sports. Conflicts with aggression invariably lead to defeat. Tiger Woods

Horner (1981) has researched female inhibition of aggression. Women are often taught that aggression is unfeminine, not lady-like and are faced with the conflict of winning versus being seen as "unfeminine." This conflict has an impact on performance and brings us to a discussion of secondary gain over losing.

6. Secondary Gain Found In Defeat

Secondary gain is a standard psychoanalytic concept and is considered a reason that neurotic symptoms are so difficult to give up. The same unconscious dynamic holds for self-defeat in sports. Loss has the potential to produce enormous secondary gain. One need only recall Greg Norman's humiliating defeat by giving up a six stroke lead in the 1996 Masters which was witnessed by millions of television viewers. In the next few weeks he received thousands of sympathy letters as well as

supportive articles in all the major newspapers around the world. This sympathy can be quite reinforcing and gives defeat an unconscious appeal to some individuals.

7. Summary

This brief review of a psychoanalytic approach to Anguish in players should suggest that far from being an unnecessary afterthought in sports, psychoanalysis has the potential to provide a wide array of insights and interventions for the Anguish ridden player. Psychoanalysis alone provides a long-term relationship with the player which gives him or her space in which to explore the many areas of disturbance they suffer with. Post trauma due to injury or embarrassing defeat is extremely common and is remedied only in a slow and careful manner. Often the problems these players have are deeper-rooted and go untouched by standard cognitive-behavioral work. The hope for a quick fix that cognitive behavioral interventions often promise will usually lead to disappointment in all but the easiest cases. Players that suffer with narcissistic personalities, low self-image, inhibitions with aggression, guilt, shame or separation Anguish will usually require serious and delicate psychotherapy that psychoanalysis can provide. These conflicts can produce self-defeat that dynamics are largely unconscious. The therapist that plans on a full-time career in sport psychology would be advised to look into psychoanalytic training. I believe that the future of sport psychology will be found in a synthesis of cognitive-behavioral, or what I call the suppressive therapies, blending with psychoanalytic therapies which include long-term supportive treatment, modification of low self-image and ego strengthening measures, what are referred to as the expressive therapies.

8. Postscript

It also may be of interest to the reader to know that when I am asked to provide commentary to the print, radio or television media on breaking sports stories they invariably seek my psychoanalytic insights into these stories and not my cognitive-behavioral knowledge. When players "choke" or act out off the playing field the media is able to deliver common sense explanations but come seeking my knowledge of the players unconscious motives to help the public sort out these headline events. I have found that I must tap into my psychoanalytic expertise to satisfy the fans and the media questions. This provides yet another reason to include psychoanalytic thought into concerns about the sporting life.

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The Effects of two different doses of Antioxidant Vitamin C supplementation on bioenergetics index in male college student

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Abstract: In order to study the effects of consumption of 2 regimes of vitamin C (500 and 1000 mg) on bioenergetics index (aerobic and anaerobic power) in 36 physical education college male students, were selected non – randomly procedure and they were set in 3 groups .Average of age, weight, height and Fat percentage of subjects was (22.48 ± 1.84) years, (64.93 ± 7.84) kg (175.4 ± 5.66) cm and (10.94 ± 5.29) mm respectively. The period considered for consumption of vitamin C by experimental groups, was a 3 weeks period that in this period the first group consumed dose of (500 m.g) vitamin c and second group (1000 m.g) vitamin C and third group (control group) consumed placebo. The tests which have been exerted in this research consist of: assessment of anaerobic power by RAST test. 2) Assessment of aerobic power by Cooper test. Result indicated that there was not a significant ($p < 0.05$) difference between 3 group in anaerobic and anaerobic power .Therefore we concluded that daily consumption of 500 or 1000 m.g vitamin C for a period of 3 week does not have any effect on the basis of improvement of anaerobic and aerobic power in male college students.[Morteza Jourkesh,Iraj Sadri,amineh sahranavard,ali ojahi,mohammad Dehganpoori. The Effects of two different doses of Antioxidant Vitamin C supplementation on bioenergetics index in male college student. Journal of American Science 2011;7(6):852-858]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Aerobic power, anaerobic power, Antioxidant, performance

1. Introduction

Ascorbic acid or vitamin C is involved in a number of biochemical pathways that are important to exercise metabolism and the health of exercising individuals. Vitamin, mineral and/or trace element supplements are beneficial if they supply a nutrient that is deficient in the diet. That is, when dietary intake is lower than the amount needed to provide maximum benefit as judged from all biological perspectives. It is difficult to accurately define nutrient «adequacy» in competitive athletes, for several reasons. First, requirements for vitamins and minerals vary: metabolic, environmental, and/or genetic factors can influence individual nutrient requirements. Second, physical activity and physical fitness are complex, involving multiple diverse components that are difficult to accurately and reliably measure. Third, a nutrient supplement that could improve performance by as little as 2–3% could provide a competitive edge; for example, reducing a 1500 m runner's time of 3 min 45 s by 6 s. In order to detect such small changes an intervention requires randomized, placebo-controlled, double-blind studies designed to maximize statistical power (Haskell and Kiernan, 2000.). Vitamin C has many functions within the human body. It is a water soluble vitamin vital in carnitine synthesis (needed for the transport of fatty acids into the mitochondria), Collagen formation, neurotransmitter synthesis, and most importantly, as an antioxidant. It also plays a part in the process to convert cholesterol to bile acids and aids iron absorption (Guthrie and Picciano, 1995). An important

water-soluble vitamin is vitamin C, which has diverse functions including being an antioxidant, exerting positive effects on lipid and iron metabolism, and promoting improved immune function (Victor et al.,2001;Victor et al.,2002).High doses of the antioxidant vitamin C prevent the increases in skeletal muscle mitochondrial biogenesis after exercise training(Wadley and McConnell,2010).

For years, athletes have been supplementing with vitamin C with the belief that it will aid or at least help to maintain athletic performance. As an antioxidant, ascorbic acid may react with OH (hydroxyl radical), O₂⁻ (superoxide Radical), H₂O₂ (hydrogen peroxide), and HO₂ (hydroperoxyl radical). Once ascorbate reacts with these ROS, semidehydroascorbate radical (also called ascorbyl) and water are formed. Two ascorbyls react to form ascorbate and dehydroascorbate (Frei, 1991). Dehydroascorbate can react with glutathione to form ascorbate. As a reductant, vitamin C can reduce cupric (Cu²⁺) to cuprous (Cu⁺) ions, and ferric (Fe³⁺) to ferrous (Fe²⁺) ions (which aids in their absorption in the small intestine). These two products (Cu⁺, Fe²⁺) may react with free radicals and other ROS, and may cause damage to cells via the generation of more ROS (Gruff et al., 1995). Ascorbate can react in aqueous environments within the body, including blood, extracellular fluid, and cell interiors, before any oxidative damage may occur to lipids (Frei, 1991). It is well accepted, that exercise causes an increase in the production of free radicals and other reactive oxygen species (Jourkesh et al.,2007).A proliferation of these

free radicals can cause a decrease in the function of affected cells and can result in a decreased ability of muscles to maintain work (Jourkesh et al.,2007).Several investigators believe that the ingestion of antioxidants will help to stave off this proliferation of free radicals during exercise and thus provide a beneficial effect (Keith and Merrill ,1983; Viitala et al.,2004).The established functions of antioxidant vitamins predispose them for improving physical work capacity. It is a known fact that the concentration of these vitamins increases after supplements yet further migration to tissues is hindered do to the structure and the accompanying biochemical properties, for example: water-soluble (vitamin C) and lipid-soluble (vitamin E) (Schröder et al 2001; Thompson et al .,2001).

In human subjects, supplementation with 400 mg ascorbic acid-d-1 for 3 wk increased blood ascorbic acid concentrations but did not significantly reduce plasma MDA after a bench-stepping exercise (Maxwell ,1993). However, using the same supplementation schedule and exercise protocol, Jakeman and Maxwell (1993), reported the ascorbic acid group showed reduced strength loss in the triceps surface after exercise and faster recovery, suggesting vitamin C supplementation reduced muscle damage. Delayed-onset muscle soreness may be an indicator of muscle damage induced by exercise. Staton (1952) gave men 200 mg ascorbic acid-d-1 or placebo for 30 d, and then had them perform sit-up exercises to induce soreness. When they repeated the exercise 24 h later, the supplemented group was able to perform significantly more sit-ups than the placebo group. Oxidative stress is a state where the ROS production overcomes the antioxidant system's ability to handle the ROS. Exercise-induced oxidative stress is a condition where the exercise has created a condition that produces ROS that cannot be adequately 2 handled by the antioxidant defense mechanisms of the system being measured. This exercise-induced oxidative stress can be produced through both aerobic exercise of sufficient intensity and duration, as well as high intensity exercise of short duration (Goldfarb ,1999).The type of exercise, the intensity and duration of exercise, and the form of muscle contraction involved appear to be important factors for inducing oxidative stress. Concentric contractions (muscle actively shortening) during aerobic or intense short duration exercise has been reported to increase by-products of lipid breakdown, activate antioxidant defense mechanisms and decrease the amount of reduced thiols (Armstrong, 1990). In contrast, eccentric contractions (muscle actively lengthening) that can result in greater muscle damage utilizes less oxygen for the muscle contraction. In addition, there are fewer muscle motor units recruited for the same or greater

force in an eccentric action compared to a concentric muscle action (Armstrong, 1990) As a result there is a greater likelihood for muscle damage with eccentric types of contractions.

Recently, Bryer and Goldfarb (2006) reported that this same dose of vitamin C could not only attenuate the delayed soreness to eccentric exercise but could also attenuate the increase in glutathione ratio but did not alter the leakage of proteins out of muscles as indicated by blood creatine kinase. More work is needed to determine if vitamin C can give protective effects to ROS damage of cardiac muscle. Goldfarb and Patrick (1999) reported that both 500 mg and 1 gm of vitamin C given for two weeks prior to exercise could attenuate the exercise induced oxidative stress as indicated by a reduction in protein carbonyls. Based on the current literature, it can be concluded that antioxidant supplementation may partially protect against exercise induced oxidative stress. The results are inconsistent, which could be attributed to differences in subject, exercise modes, supplementation dosage and form, and the markers of oxidative stress measured. In this research the subjects were supplemented with a highly bioavailable antioxidant (vitamin C) over a period of 3 wks. The main objective of this study was to evaluate the effect of oral supplementation with vitamin C on aerobic and anaerobic power in male university students.

2. Material and Methods

Subjects

The research included 36 male students of physical education, randomly divided into 3 groups: Group 1 (n = 12) consumed 500 mg of vitamin C daily throughout the training period, and Group 2 (n = 12) consumed 1000 mg of vitamin C, whereas group 3 (n=12). Consumed visually identical placebo. All subjects were informed verbally and in writing about the nature and demands of the study, and subsequently they completed a health history questionnaire and gave their written informed consent. The study was approved by university's ethical advisory commission P?gina: 853 which conformed to the Declaration of Helsinki. Our selection of highly trained and motivated athletes for this study was based on our experience that competitive athletes are generally willing and able to withstand considerable discomfort and to exercise until the development of physiological signs of exhaustion.

. The subjects were in good health, were not using medications known to affect immune function, and had not consumed vitamin or mineral supplements more than the recommended dietary allowance within one week of the test. All participants regularly took part in a variety of activities but were unfamiliar with the tests used in the current investigation. Subjects 'descriptive data are presented in Table 1.

Table 1. Descriptive Characteristics of Experimental Subjects

Variable	Placebo (N=12)	Vitamin C (500mg) (N=12)	Vitamin C (1000mg) (N=12)
Age (years)	22.14±1.12	22.52±1.34	22.38± 1.27
Height (cm)	176.55±1.52	177.29±2.21	177.32±1.43
Weight (kg)	73.74±1.61	72.91±1.32	71.26±2.21
% Body fat	12.2 ± 4.5	13.3 ± 2.3	11.9 ± 3.6

*Results are expressed as mean ±standard deviation.

Dietary Assessment

Three days prior to the baseline testing, athletes met a nutritionist who instructed them to maintain their normal dietary pattern throughout the course of the study and to refrain from using any other supplementation. During the supplementation regimen, all athletes consumed similar standardized diet to ensure adequate macro- and micronutrient intake (daily energy intake and protein intake were similar between the groups). Compliance was monitored by analyzing 3-d food records pre- and post-supplementation. The information therein was analyzed using the software Food Processor for Windows (version 7.30, ESHA Research, Oregon, USA).

Experimental Procedures

Before the supplementation protocol began, each subject compiled a 3-day food diary to assess the status of antioxidant vitamins. The diary length was selected based upon previous research that showed that beyond this time period, the quality of record keeping declines [Jourkesh et al., 2007; Gersovitz et al., 1978; Lee and Nieman, 1979]. Subjects' diaries were assessed for RDA levels of the selected vitamins using the software Food Processor for Windows. Subjects ingested antioxidant Vitamin C capsules consisting of 500 mg of vitamin C, or 1000 mg of vitamin C, or one placebo capsule. We carried out RAST and then the Cooper test on the subjects (pre-test). After pretest and under supervision of the researcher, the first group received cellulose-based placebo pills, the second group received 500 mg of vitamin C (in the form of ascorbic acid) and the third group received 1000 mg of vitamin C (in the form of ascorbic acid). The subjects ingested the supplement for 3 weeks before lunch, between 11:00 and 13:00 every day, under the supervision of the researcher. After 3 weeks the subjects between 15:00 and 18:00 completed the RAST and Cooper test again (post-test). Subjects completed six 35 m runs at maximum pace (10 s allowed between each sprint for turnaround). Power output in watts for each sprint was calculated according to the following equation: power = weight (kg) × distance (m) × time (s) (Zacharogiannis et al.,

2004). Each subject's aerobic power was estimated by distance covered at 12 minute (cooper, 1968).

Statistical Analysis

Means and standard deviations were calculated for all variables, and for the intragroup analysis the "One-Way ANOVA" was used with the Tukey test as post hoc. The level of significance was set for all analysis at $P < 0.05$. The data were analyzed using the statistical package SPSS, PC program (version 7.5, SPSS Inc., USA).

3. Results

The analysis of the tested subject's diet is presented in table 2. The data indicates no significant difference in the caloric value of diets of these groups. The amount of vitamin C and E, were consistent with RDA and after supplementation were much higher in the group supplemented with Zellschutz product.

There were no significant differences among the improvements in aerobic and anaerobic power between groups (Figure 1, Table 3; $P < 0.05$). There were no significant differences between groups for their supplement compliance rate ($P < 0.05$). Analyses of the dietary recalls were demonstrated no significant differences in caloric intake between the groups. Furthermore, there were no differences in macronutrient daily intake, with these groups.

4. Discussion

The present study was designed to determine whether antioxidant vitamin C supplementation influences bioenergetics index in male physical education students. Aerobic work capacity depends to a large extent on the effectiveness of the cardiovascular system and may be improved by physical training and supplementation (Haymes, 1991). Work capacity is also dependent on the synthesis of structural and enzymatic proteins. The last ones act as catalysts of chemical reactions, allowing the athlete to reach the steady state. This helps to supply the working muscles in ATP (Packer, 1997).

Table 2. Daily energy, macronutrient, vitamin C, vitamin E intake and contribution (%) of macronutrients to energy intake of subjects.

NUTRIENT	Group1 (N=12)	Group2 (N=12)	Group3 (N=12)
Total Energy Intake (Kcal)	3060 ± 626	3140 ± 604	3090±615
Carbohydrate (Kcal.Kg ⁻¹)	52.7 ± 5.2	53.5 ± 4.6	51.2 ± 6.4
Protein (Kcal.Kg ⁻¹)	1.6 ± 0.5	1.7 ± 0.4	1.8 ± 0.6
Vitamin E (mg)	3.1 ± 0.6	3.5 ± 0.4	3.2 ± 0.5
Vitamin C (mg)	28 ± 3.2	29 ± 1.1	27 ± 2.4
Carbohydrates (% of calories)	55 ± 10	51 ± 15	53 ± 10
Protein (% of calories)	16.6 ± 3.1	15.2 ± 2.4	14.4±4.3
Fat (% of calories)	30.5±3.2	29.5±4.2	29.6±2.5

*Results are expressed as mean ± standard deviation.

Table 3. Performance parameters after 3 weeks of vitamin C (500 and 1000 mg) supplementation.

Performance Parameters	Group1 <i>PRE</i>	Group1 <i>POST</i>	Group2 <i>PRE</i>	Group2 <i>POST</i>	Group3 <i>PRE</i>	Group3 <i>POST</i>
Aerobic power (ml.kg ⁻¹ .m ⁻¹)	50.4±4.5	50.7±5.2	50.6±3.7	50.7±4.3	49.9±5.6	50.2±4.2
Anaerobic power (Watt)	449	450	450	450	448	448

Data are means ± SD; Group1=500mg Vitamin C supplemented; Group2=1000mg Vitamin C supplemented; Group3=Placebo Group.

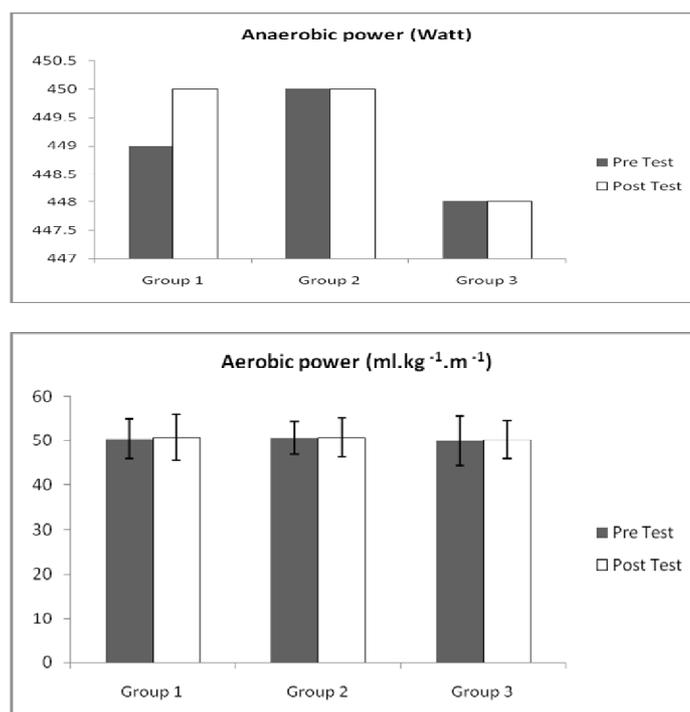


Figure 1. Work measures before and after supplementation. Data are means ± SD; Group1=500mg Vitamin C supplemented; Group2=1000mg Vitamin C supplemented; Group3=Placebo Group.

Vitamin C is an essential cofactor in number of hydroxylases such as prolyl hydroxylase and lysyl hydroxylase. Since hydroxylation adds stability to the collagen triple helix, many of the symptoms of vitamin C deficiency, such as blood vessel fragility, can be traced to lack of proper collagen strength but in addition to its role in hydroxylation, vitamin C probably functions as an antioxidant. Vitamin C acts as a free radical scavenger, neutralizing such reactive oxygen species as superoxide hydrogen peroxide and hypochlorous acid in the process being converted to dehydroascorbic acid. Dehydroascorbic acid may be recycled to ascorbic acid by various mechanisms (e.g. glutathione) (Packer, 1997). The results of this study indicate that supplementation with 500 and 1000 mg of vitamin C has not a significant effect on the aerobic capacity of male students. This study also found that using 500 and 1000 mg of vitamin C has not a significant effect on anaerobic capacity of male students during a 3-week period of ingestion. Jourkesh et al. (2007) showed that 3 weeks of vitamin C supplementation (1000 mg/day in the form of ascorbic acid) offers a significant effect on aerobic capacity of male athletes. It seems that the significant increase in aerobic capacity of male athletes can be attributed to vitamin C, which leads to an increase of aerobic capacity in male athletes (1 ml/kg/min during the second and third week as compared with pretest results).

Some authors assume that higher doses of antioxidant vitamins may cause of greater changes in aerobic capacity (Antosiewicz, 1998). A review of scientific literature indicates the lack of influence of antioxidant vitamins on work capacity (Bendich, 1991; Van, 1991). Since ascorbate in high concentrations may reduce NADPH and therefore provide the high-energy electrons necessary for aerobic metabolism (Cathcart, 1991), we were unable to show significant increase in subjects aerobic and anaerobic power. A greater amount of vitamin C in the body enhances the flow of electricity, optimizing the ability of the cells to maintain aerobic energy production and metabolic intermediaries that facilitates cell to cell communications (Michael et al., 2005). In support of this theory, it has been documented that osteoblast cells treated with ascorbic acid had four-fold increase in respiration, a threefold increase in ATP production that provided the necessary energy for cell differentiation (Komarova et al., 2000). In support results of our study, Nieman et al. (1992) found no beneficial effects of vitamin C supplementation on markers of immune function following a 2.5 h run. Various studies have also demonstrated beneficial physiological effects of vitamin C supplementation in physically-active people. Jakeman & Maxwell (1992) reported greater recovery of maximal voluntary contraction in subjects who

consumed 400 mg vitamin C/d for 21 d. Kaminski & Boals (1992) reported less calf soreness in subjects who consumed 3 g vitamin C for 3 d before and 4 d after strenuous calf exercise. Peters et al. (1993) noted fewer cases of self-reported upper respiratory tract infection in runners who consumed 600 mg vitamin C/d for 3 weeks before a 42 km road race.

In the present research antioxidant vitamin C supplementation did not show a significant effect on performance either in 500 mg or following 1000 mg supplementation. Several studies have examined vitamin C intakes in athletes from a variety of sports [Chen et al., 1989; Guillard et al., 1989; Rokitzki et al., 1994, Short, 1993]. The results from a 24-h dietary recall suggested wide variation among sports, with some indication of seasonal variation, but no consistent trends emerged (Short, 1993) Low intakes have been observed in male gymnasts and wrestlers (Short, 1993), and also in female athletes (Chen et al., 1989). In contrast to these findings, the results from another project indicated very little difference in 1- or 7-day vitamin C intakes among athletes from different sports, including wrestlers (Short, 1993). Lower intakes in some athletes may reflect dietary interventions directed at weight control in these athletes, as it has been demonstrated that vitamin C intakes are related to total energy intakes (Fogelholm et al., 1992). Therefore, the amount of vitamin C in the diets of most athletes appears to be sufficient, based on the recommended daily allowance. Another approach to measuring vitamin C status has been to examine the response of plasma or serum ascorbic acid concentrations to supplementation with varying doses of vitamin C. Claudio et al. (2006) failed to find performance benefit in soccer players after vitamins C supplementation daily during the pre-competitive season. They also demonstrated that antioxidant vitamin C and E supplementation in soccer players may reduce lipid peroxidation and muscle damage during high intensity efforts (Claudio et al., 2006).

On the other hand, no single study has detected whole body ergogenic effect of antioxidant vitamins supplementation on performance or fatigue onset process. Lawrence et al. (1979), and Rokitzki et al. (1994), did not find changes in lactate threshold in antioxidant vitamin supplemented cyclists and swimmers respectively. Similarly, Shephard et al. (1974) didn't detect alterations on muscle strength nor maximal oxygen uptake (Thompson et al., 2001). Our results agreed with the work of Thompson et al. (2001) and indicates that vitamin C supplementation can bring modest benefit for elite soccer players even under strenuous training, since it attenuated lipid peroxidation and muscle CK leakage, but did not have a direct ergogenic effect on physical performance. The reasons why antioxidant vitamin supplementation could

prevent fatigue in isolated muscle fibers, although it cannot act as an ergogenic aid in the whole body of athletes are not yet understood, and further studies are needed to clarify this issue (Claudio et al.,2006).The reason for the conflicting results is not clear, however variations in the intensity and duration of the exercise tests, the dosage and duration of antioxidant vitamin administered, and the time delay between administration and the beginning of the test are all factors that may explain these discrepancies.Epidemiological data suggest that diets rich in antioxidants protect against diseases associated with free radical damage, including cancer, cardiovascular disease and diabetes. Although some equivocation remains in the extant literature regarding the beneficial effects of antioxidant vitamin supplementation on muscle damage, there is little evidence to support such a role. Since the potential for long-term harm does exist, the casual use of high doses of antioxidants by athletes and others should perhaps be curtailed (McGinley et al., 2009).Early observations also suggested that vitamin supplements with antioxidant properties, like vitamins C and E, could also prevent or ameliorate pre-eclampsia, but most large randomized clinical trials have failed to show any benefit. Vitamin C given orally, even at high doses, does not achieve sustained serum levels that might be required for effective antioxidant activity. This may explain the failure of the numerous clinical trials involving its use in pre-eclampsia, cancers, cardiovascular diseases, etc. Vitamin C supplementation to stave off pre-eclampsia, cancer and other diseases is a 'nutraceutical' industry-driven myth which should be abandoned. We do not dispute a role for oxidative stress in the pathophysiology of pre-eclampsia, nor the possibility of amelioration of the disease by an anti-oxidant given at the right time and in the correct dosage. We simply wish to make a case that the massive and expensive clinical trials of vitamins C and E should cease until further rigorous scientific research is undertaken (Talaulikar and Manyonda ,2011).In conclusion it can be stated that supplementation with antioxidant vitamin C has not a positive effect on physical work capacity evaluated by cooper and RAST tests. For the future, researchers may want to consider a longer supplementation period or a larger sample size to be able to detect significant differences between the trained and untrained groups using the same protocol. Additionally, a study design entailing a crossover may allow for less variability since each subject would have the opportunity to fall under both treatments.

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Removal of Cu from Aqueous Solution Using Slag

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Abstract: This study intends to establish the usage of steel slag in absorption of Cu. Within this study the two types of blast furnace and converter slag were examined in laboratory conditions and the effects of parameters of time, concentration, solutions' pH on the amount of absorption were studied. Studying the experiments showed converter slag's absorption of Cu per gr was greater in a balance time of 15 minutes with high concentrations of metallic elements of 500 and 1000 ppm, but increase in pH did not alter the absorption. And the highest absorption of Cu was that of blast furnace slag with the same conditions. The only difference was that the more the pH increased the greater the absorption was, in a way that the greater amount of absorption occurred in a pH of 7. Considering the great volume of slag and its feature of absorbing Cu, usage of this absorbent can be taken into consideration as a method of quality treatment and complimentary filtration of effluent.

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Keywords: Slag, Cu, Absorption, Effluent

INTRODUCTION and LITERATURE REVIEW

In order to design equipment for the handling, conveying, separation, drying, aeration, storing and processing of bean seeds, it is necessary to determine their physical properties. Recently scientists have made great efforts in evaluating basic physical properties of agricultural materials and have pointed out their practical utility in machine and structural design and in control engineering. Dimensions are important to design the cleaning, sizing and grading machines. Coefficient of friction is important in designing equipment for solid flow and storage structures. The coefficient of friction between seed and wall is an important parameter in the prediction of seed pressure on walls (Amin et al., 2004).

Heavy metals are among the components forming the earth's crust (Das et al., 2008). Their concentration in the environment has increased nowadays as the cities, and industries such as plating, mining, painting, intinction, electronics, rubber building have grown. In addition, due to their lack of quality experience there have been many environmental problems (Asiagwu et al., 2009). Heavy metals in industrial wastewater are highly hazardous for living creatures (Oboh et al., 2009). They get concentrated in the food chain and can result in health risks to human beings (Saravanan et al., 2009). There are many physical and chemical ways to extract heavy metals from water or effluent. To name a few: chemical deposit making, membrane processes, reverse Osmosis, evaporation, solvent extraction, ion exchange, and absorption (Kefala et al., 1999; Selatnia et al., 2004). Absorption is an effective

technique in purification and extraction, which has been used in industries especially in effluent filtration. In the past, because of its high capacity activated carbon was used to absorb heavy metals, but this usage has been limited due to the cost of providing the substance especially in developing countries (Souag et al., 2009). Today there seems to be a strong tendency towards using industrial and agricultural waste such as barks, sawdust, peanut skin, mountain pistachio, rice bran, corn woods, and volatile coal ash (Saikaew et al., 2009; Shama et al., 2010). Many factors including chemical form, temperature, pH, type of metal, type of absorbent, concentration of metal, amount of absorbent, and... are effective in the process of absorption and metal removing by the absorbent (Saikaew et al., 2009). Slag is one of the substances that can perhaps be used in the process of absorption of heavy metals. Slag is one of the non-metallic byproducts of metal melting industry that is produced during the formation process of iron, made of silica, alumina silica and calcium silica (Li, 1999; Cha et al., 2006). A great amount of produced slag has been buried in the past without any proper utilization, but it has been of much use during recent decades (Durinck et al., 2008). However, due to the large amount of produced slag finding new methods for a better use is inevitable. Within this study the abilities of blast furnace slag and converter slag as absorbents and the effects of various parameters on absorption process by them were studied.

Table 1: some properties of Blast furnace slag and convertor slag

Salt's name	Chemical Formula	Molecular Weight (g)	Metal ion	Electrical load	Atomic weight (g)
Hydrated copper chloride	CuCl ₂ ·2H ₂ O	170.5	Cu	+2	63.5

MATERIAL AND METHODES

The Types of Slag under study

After preparing the two types of slag both slag samples were passed through a two-millimeter sieve and the particles smaller than two millimeters were taken under study in absorption laboratories. All tests were carried out twice and their average was considered in calculations. Some of the physical and chemical properties of slag samples are shown in table 1.

Table 2: chemical properties of salts used in laboratories of heavy metal absorption

	CEC(Meq/100g)	pH	Specific surface(m ² /g)	Bulk density(g/cm ³)
Blast furnace slag	1.9	8.0	0.51	1.1
Convertor slag	2.5	11.2	2.2	1.7

Laboratory solutions containing heavy metals

Throughout this project absorption of element copper in laboratory solutions by the two types of slag were studied. Chemical formula and properties of the salt are shown in table 2. Stoke solutions with concentration of 1000 milligrams were provided for each of the aforementioned element. Solutions containing 100 milligrams of the elements per liter were prepared by diluting the stoke solutions for the tests regarding absorption of Cu by slag. One-gram slag was added to 100 milliliter of the solution with a certain concentration of cu, and the solution was stirred using a sweep shaker at 150rpm. Then these suspensions were passed through Whatman filter papers grade 42, and the concentration of Cu in the filtered solution was measured using atomic absorption spectroscopy.

Absorption tests

Determining the balance time

In order to determine the balance time the slag types using laboratory solutions that contain pollutants, absorption tests were conducted using the suspension method, by adding one gr of slag to 100 milliliter of the solution and stirring in 5, 15, 30, 60, and 120 minutes.

The effect of pH

To study the effect of the first solution's pH on the amount of absorption of Cu: copper solutions with pH's of 3, 4, 5, 6, and 7 were prepared. With pH's

more than 7 the solubility of Cu' ions decreased and they settled in the form of hydraksyd compounds. Therefore, the absorption tests were not conducted in alkaline pH's. pH was adjusted by adding chloridric acid, or 0.1 chlorid to the the solution on a magnetic mixer having a pH-meter electrode, Jenway, model no. 3310.

The effect of concentration

Solutions with various concentrations of 0, 10, 25, 50, 100, 250, 500, and 1000 milligrams per liter of defined Cu and pH's were prepared to study the effects of primary concentration on the amount of absorption. Absorption tests were carried out using the suspension method by adding one gr of slag to 100 milliliter of solution.

RESULTS and DISCUSSION

Absorption of Cu by slag

Within this study the inexpensive material, slag, was used to absorb Cu in laboratory filtration solutions considering the four factors of time, pH, and concentration.

Determining the balance time

According to the figure 1, the absorption process for copper was completed in 15 minutes and then the amount of absorption by both elements remained constant. But for convenience, a time was picked for other elements' absorption and studying the effects of different parameters on the amount of absorption. The slag samples at hand were much different considering the amount of absorption of copper. The amount of absorption of Cu by the convertor slag reached almost 100 percent; while the amount of absorption of copper by the furnace slag was orderly 30 and 10 percent. The main reason to the higher amount of absorption of these elements by convertor slag can be associated with its being more alkaline, so much that the final pH of the solutions containing convertor slag was more than 10. In addition, the convertor slag has a bigger CEC (cation exchange capacity) and specific surface area compared to the furnace slag, which helps the absorption sites be more on its surfaces (table1).

The effects of pH on absorption of heavy metals

According to the figure 2 and table 3 and 4, there is no significant difference between the amount of absorption by the convertor slag in different levels of pH, and the amount of absorption for Cu went beyond 95%. In fact, the strong alkaline characteristic of of convertor slag in increasing the final pH of all solutions to more than 10 and settling of dissolved the solution did. This increase was not the same for all the elements under study. For copper, the percentage of absorption slightly rose from a pH of 3 to 6 and when pH=7 it

reached to its maximum of 98%. Overall, the solution's primary pH is one of the effective parameters in absorption process of heavy metals by absorbents.

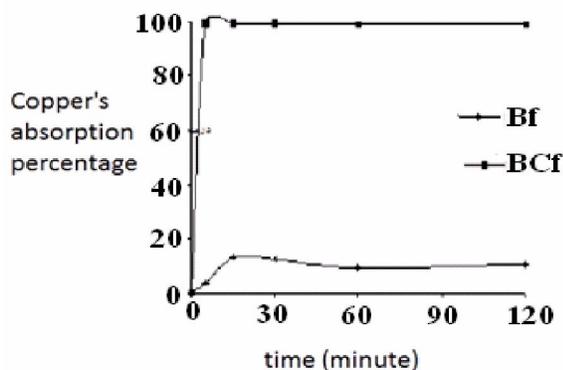


Fig 1: the effect of time of the amount of absorption of copper by slag

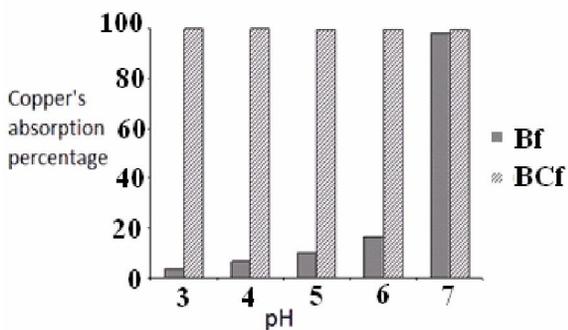


Fig 2: the effect of pH on the amount of absorption of copper by slag

Table3: the amount of absorption of Cu in different PH by Furnace slag

pH	3	4	5	6	7	8	9
Absorption(mg/g)	3.6	6.6	10	16.6	97.3	97.9	97.72

Table4: the amount of absorption of Cu in different PH by Convertor slag

pH	3	4	5	6	7	8	9
Absorption(mg/g)	99.8	99.8	99.6	99.6	99.6	99.7	99.6
	5	4	6	9	7	4	6

Effects of concentration on absorption of Cu

The effects of primary concentration of Cu in solutions when pH=5 are shown on figure 3 and table 5 and 6. The more the concentration of metal ion increased, the higher the amount of absorption (milligram/gram) of slag samples grew. However, due to the stability of the relationship between absorbent and solution (1 gr for

each various concentration) while the concentration increases, the absorption percentage, especially for furnace slag, decreases. The amount of absorption of copper was calculated orderly 77 percent.

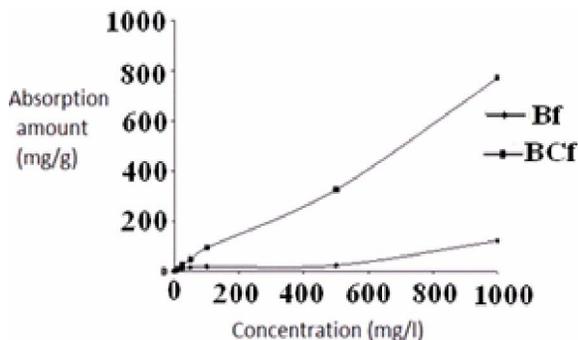


Fig 3: the effect of concentration on the amount of absorption of copper by slag

Table 5: the amount of absorption of Cu in different concentration by Furnace slag

Concentration(ppm)	10	25	50	100	500	1000
Absorption(mg/g)	5.4	11.4	15.6	19.2	23	122
Concentration(ppm)	10	25	50	100	500	1000
Absorption(mg/g)	9.83	24.53	47.2	93.96	325.5	770.1

CONCLUSIONS

According to the results, it seems that steel slag can be an appropriate absorbent for removing Cu from aqueous solutions. However, it should be heeded that due to its alkaline characteristic the amount of these elements is more when using the convertor slag compared to furnace slag; the convertor slag has played a much better role as an absorbent. As it was observed during the tests, the balance time for both types of slag was 15 minutes and it is after this time that the absorption amount remains constant. In different levels of pH for furnace slag, the more the level was, the more the amount of absorption became, while the best level of absorption happened when pH=7. But the convertor slag had a large amount of absorption at all levels of pH due to its alkaline characteristic. The amount of absorption for both types of slag increased with an increase in the concentration per gr of slag. The highest amount of absorption for both types of slag belongs to absorption in concentration of 1000ppm. As it was observed, the samples were prepared in laboratory conditions. We can take a new step into the recovery of quality and complimentary filtration effluent by using steel slag, which is an inexpensive product, as an absorbent of heavy metals in effluent filtration processes. This however requires more devotion of time to tests.

Table 6: the amount of absorption of Cu in different concentration by Converter slag

6/5/2011

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The Efficacy of Different *Bacillus Thuringiensis* Formulations for the Control of the Cotton Leafworm *Spodoptera Littoralis* (Boisd.) (Lepidoptera: Noctuidae)

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Abstract: The efficacy of three *Bacillus thuringiensis* formulations, Agerin, Dipel 2X and Dipel DF were tested against 2nd larval instar of *Spodoptera littoralis*. The three formulations were tested in the laboratory, field and semi field experiments. The 48 hour LC₅₀ for Agerin, Dipel 2X and Dipel DF were 0.18, 0.07 and 0.10 % for the three formulations, respectively. The results of the field experiment indicated that the general mean of reduction were 59.0, 55.9 and 58.6 % for the three *Bt* formulations (Agerin, Dipel 2X and Dipel DF, respectively). In addition, the general mean of mortality rate in the semi-field experiments were 60.3, 60.4 and 61.3 % for Agerin, Dipel 2X and Dipel DF, respectively. Moreover, the histopathological studies using ultrastructure microscopy were carried out on the midgut of 4th larval instar after the treatment of the second instars with LC₅₀ of the three formulations. These results therefore confirm the opinion stated that the toxicities of the different three formulations, are similar to each other. Therefore the Egyptian *Bacillus thuringiensis* strain (Agerin) can be used for control of *S. littoralis* as it is cheap and readily available.

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Keywords: Different *Bacillus*; *Thuringiensis*; ormulations

1. Introduction:

The cotton leafworm *Spodoptera littoralis* (Boisd.) (Lepidoptera: Noctuidae) is a serious polyphagous pest that damages numerous kinds of cultivated crops including corn, cotton, beet, tomato, and many others. Due to the overuse of insecticides over the past years, *S. littoralis* has developed resistance to various synthetic insecticides. Therefore alternative bioinsecticides need to be evaluated (Fahmy and Dahi 2009). *Bacillus thuringiensis* strains are high toxic to *S. littoralis* (Sneh *et al.*, 1981 and Yunovitz *et al.*, 1986). *Bacillus thuringiensis* (*Bt*) is the most widely applied biological insecticide and is used to manage insects that affect forestry and agriculture and transmit human and animal pathogens (Broderick *et al.*, 2006). It is a common gram-positive aerobic entomopathogenic endospore forming soil bacterium, which produces unique crystalline cytoplasmic inclusion bodies during the process of sporulation (Martin and Travers 1989). These crystals are predominantly comprised of one or more cry proteins, also called δ -endotoxins. These toxins are highly specific to their target insect, are harmless to humans, vertebrates and plants, and are completely biodegradable (Bravo *et al.*, 2005).

The knowledge of toxicity of different commercial formulations of *Bt* strains to the *S. littoralis* is important for their optimal use in the form of spray formulation or in the development of *Bt* transgenic cole crops. The present study, therefore,

reports toxicity of three commercial formulations of *Bt* strains, Agerin (Egyptian commercial formulation), Dipel 2X and Dipel DF, against 2nd larval instar of *S. littoralis*. Furthermore, histopathological studies using ultrastructure microscopy also will be carried out on the midgut of 4th larval instar after the treatment of the second instars with LC₅₀ of *Bt* formulations.

2. Material and Methods:-

Rearing of *Spodoptera littoralis* in laboratory:-

The colony of cotton leafworm *S. littoralis* was obtained from the division of the cotton leafworm, Plant Protection Research Institute, Doki, Egypt. Larval stages were reared on castor bean leaves at 27±2°C and 65±5% R.H. as described by El-Dafrawi *et al.*, (1964).

Bacillus thuringiensis formulations:-

Three *Bacillus thuringiensis* formulations, wettable powder, used in the present study are Agerin 6.5%, Dipel 2X 6.4%, and Dipel DF 54%, containing 32000 international units per mg. (IU/mg) of product. Agerin (*Bacillus thuringiensis aegypti*) a product of Agricultural Genetic Engineering Research Institute (AGERI). Dipel 2X and Dipel DF (*Bacillus thuringiensis*, subsp. *Kurstaki*), supplied from May trade Corporation.

Bioassays

Leaf-dip bioassay method was followed as described by Tabashnik *et al.*, (1993) using castor leaves. The leaves were first washed with distilled water and dipped in solutions of different concentrations of *Bt* formulations which prepared with distilled water. Each leaf was dipped for 5–10 Sec and allowed to air dry for a period of 1 hr. Then the leaves were placed individually into Petri dishes (15 cm dia.). Newly hatched second instar larvae were released on each dish with three replications (twenty insects /replicate) including controls. Different concentrations of Agerin, Dipel 2X and Dipel DF were prepared in distilled water. The concentrations of Dipel 2X and Agerin were 0.325%, 0.1625%, 0.08125%, 0.04063%, 0.0203% and 0.0102%. The concentrations of Dipel DF were 2.7%, 1.35%, 0.675%, 0.3375%, 0.169% and 0.0845%. Larvae were allowed to feed for 48 hrs. Larval mortality was recorded at 48 hrs. Larvae that treated with LC₅₀ of the three formulations were fed on untreated leaves after 48 hrs of treatments and followed until adult emergence to assess pupal and adult malformations.

Field experiments:

The experiments were conducted at Toukh District, Qalyobia Governorate to evaluate the field efficiency of three *Bacillus thuringiensis* formulations (Agerin 6.5 % WP, Dipel 2x 6.4%, WP and Dipel DF54 % WP) against cotton leafworm *Spodoptera littoralis*. The field area was cultivated with Giza 86 cotton variety and the normal agricultural practices were applied. The experimental area was divided into plates of 1/16 feddan (262.5 m²) one for each *Bt* formulation. The treatments were arranged in Randomized Complete Blocks Design (RCBD) with four replicates per each *Bt* formulation. Application with the three *Bt* formulations were on July 2009. A motor sprayer was used. The volume of spray solution was 100 liters / Feddan. The number of *S. littoralis* larvae were recorded before the spray and on 2, 4, 6 and 8 days after the spray on one meter lengthwise cotton plants for five times (four at corners and the last one on plot center) for each *Bt* formulation. The reduction % in the *S. littoralis* larvae population was estimated by using technique of Henderson and Tilton (1955).

Semi Field experiments:

From the same experiment area, the treated cotton leaves with the three *Bt* formulations were collected after zero time, 1, 2, 3, 4, 5, 6 and 7 days and directly transfer to the laboratory for feeding the second instar larvae of *S. littoralis* to estimate the general mean of mortality percentages for the three *Bt* formulations.

Statistical Analysis:-

The percentage of mortality was corrected according to the Abbott formula (Abbott 1925) for correction wherever required. Probit analysis was determined to calculate LC₅₀, Finney (1971), through software computer program. Statistical significant differences between individual means were determined by one way analysis of variance (ANOVA).

Histopathological studies:-

After the treatment of the 1-day old 2nd instar larvae of *S. littoralis* with LC₅₀ of three tested *Bt* formulations for 48 hrs, the histopathological and ultrastructural effects were examined in the mid-gut of the 1- day old 4th instar. For this purpose, a representative larvae of each group were fixed as soon as possible in 3% phosphate buffered glutaraldehyde (pH 7.3) for 2 hours. After two rinses in the buffer (for a period of 4 hours) the specimens are post fixed in 1% buffered osmium tetroxide for 1 hour at 4°C (Brissan *et al.*, 1996). The specimens were washed twice in a buffer for 30 minutes. The specimens are then dehydrated in the seconding grades of ethanol, 50, 70, 80, 90 and 100%. The specimens were cleared in toluene for 10 minutes and then embedded in the resin of choic Epon. Semi-thin sections are cut from these blocks (stained with toluidine blue) and examined by the light microscope (Spnrr 1969). Ultrathin sections obtained from selected blocks were mounted on copper grids stained with uranyl acetate and lead citrate and then examined with Jol 1010 transmission electron microscope (Reynolds 1963). This technique was carried out at Faculty of Science, Ain Shams University, Cairo, Egypt. 2. Materials and Methods:

This was a retrospective study. The clinical courses of 47 recipients who were transplanted for HCV end stage liver disease and successfully survived a least 6 months post LDLT. The Immunosuppression regimens for all our patients included corticosteroids which were all tapered within the first 3 month. Calcineurin inhibitors used were either tacrolimus (FK) or ciclosporine (Neoral). Mycophenolate mofetil was given to all except 4 patients who had monotherapy with tacrolimus as they had hepatocellular carcinoma before transplantation. Hepatitis C virus recurrence was suspected in cases of elevated liver enzymes with a usual high level of viraemia and then all subjected to a liver biopsy and proved histologically by our transplant pathologist. The studied group was divided into two groups; group I had basiliximab as induction therapy and group II had no basiliximab as induction therapy and the incidence of recurrence was compared between the two groups.

3. Results:

Field experiments:

The data presented in Table (1) showed that the reduction rates in *S. littoralis* larvae population in the field after the treatment with the recommended doses of the three *Bt* formulations. The reduction rates were 23.2, 51.4, 77.7 and 86.0 % after 2, 4, 6 and 8 days from treatment, respectively for the 1st

formulation (Agerin). The reduction rates for the 2nd formulations (Dipel 2X) were 24.8, 43.9, 68.0 and 86.0 % after 2, 4, 6 and 8 days from treatments, respectively. For the 3rd formulation (Dipel DF) it reaches 30.1, 49.7, 70.7 and 83.9 % after the same periods, respectively. The general mean of reduction rate were 59.0, 55.9 and 58.6 % for Agerin, Dipel 2X and Dipel DF, respectively.

Table (1): Reduction % of *S. littoralis* larval population after treated with recommended dose of three *Bt* formulations during cotton season 2009.

<i>Bt</i> commercial name	Rate of application gm / Fed.	Reduction %				General mean
		2 Days	4 days	6 days	8 days	
Agerin	250	23.2	51.4	77.7	86.0	59.6
Dipel 2x	200	24.8	43.9	68.0	86.7	55.9
Dipel DF	200	30.1	49.7	70.7	83.9	58.6

Semi Field experiments:

Data in Table (2) shows the corrected mortality percentage for *S. littoralis* 2nd instar larvae after treated the cotton plants with recommended dose of three *Bt* formulations in semi-field experiment. The corrected mortality percentage

reached to the highest rate after zero time treatment for all *Bt* formulations and it reached to the lowest one after 7 days treatment. The general mean of mortality % were 60.3, 60.4 and 61.3 % for the three *Bt* formulations (Agerin, Dipel 2X and Dipel DF, respectively).

Table (2): Corrected Mortality % of *S. littoralis* larvae in the field after the treatment with recommended dose of three *Bt* formulations during cotton season 2009.

<i>Bt</i> Commercial name	Rate of application gm / Fed.	Corrected mortality %								General mean
		Zero time	1 day	2 days	3 days	4 days	5 days	6 days	7 days	
Agerin	250	70.5	69.8	69.1	60.6	57.9	57.7	50.0	46.8	60.3
Dipel 2X	200	72.3	71.7	68.8	66.0	63.8	56.3	44.9	39.6	60.4
Dipel DF	200	72.0	68.1	67.7	64.1	62.1	58.9	52.1	45.2	61.3

Bioassays

Table (3) shows that LC₅₀ estimated values for Agerin, Dipel2X and DipelDF were 0.18, 0.07 and 0.10 % for the three formulations, respectively.

Table (3): Toxicity of commercial formulations of *Bacillus thuringiensis* to *S. littoralis* after 48 h of exposure.

<i>Bt</i> commercial formulations	LC ₅₀ %
Agerin	0.18
Dipel 2X	0.07
Dipel DF	0.10

Metamorphic and morphogenic effects:

The morphogenic abnormalities of pupae and adults which emerged from 2nd instar larvae which treated with LC₅₀ of Dipel DF, Dipel 2X and Agerin (Fig. 2,3&4, respectively) could be grouped into four categories malformed larvae, malformed

larval-pupal intermediates, malformed pupae and malformed adults as compared with normal larva, pupa and adult stages (Fig. 1). Dipel 2X induced swallowed larvae with a ring of larval cuticle around the tip of abdomen (Fig. 3-A). Malformed larval-pupal intermediates that produced by the action of Dipel DF, Dipel 2X and Agerin can be easily observed in Fig. (2-A&B), Fig. (3-B) and Fig. (4-B), respectively. Pupae with small size were observed in case of Agerin (Fig. 4-A right) with compared to control (Fig. 4-A left). Some emerged adults have various degrees of morphogenic abnormalities. Adults were unable to emerge from their pupal skins (Fig. 2-C). Adults were completely free but possessed crumpled and incomplete formation of wings (Fig. 2-D & 3-C). Collapsed appendages and evaginated elytra (4-C).

Histopathological studies:

The histopathological and ultrastructural investigations were carried out for 1- day old 4th instar larvae after feeding the 1- day old 2nd instar on castor leaves treated with LC₅₀ of Agerin, Diple2X or Diple DF for 48 hours.

Ultrathin sections of the non-infected *S. littoralis* control mid-gut showed that the apical folded plasma membrane, microvilli, (Mv) of epithelial cells are arranged in a regular array (Fig. 5-A). The coated vesicles (Cv) lie in the cytoplasm immediately adjacent to the base of the microvilli accumulates along the apical region of the cells. The endoplasmic reticulum is represented in fairly well developed rough form (RER) as long and short rod-like cisternae. Free ribosomes are found in the cytoplasm of the columnar cells (Fig. 5-A&B). The mitochondria (Mi) are distributed throughout the cytoplasm of the midgut cells. They are rounded or elongated in shapes and have various sizes (Fig. 5-B).

When the mid-gut of larvae was exposed to Diple DF, it showed increasing in the morphological changes of the epithelium Fig. (6-A). Microvilli of the epithelium were irregular and broken into the lumen in the form of blebs. Irregularities in mitochondrial structure could be observed. Disarray of cristae with more or less disintegration was also observed. In addition various sizes of round granules appear in the cytoplasm. They give rise to large vacuoles (Va) which may be liberated separately into the gut lumen through the striated border or they may first coalesce into a single large vacuole. The nuclear membrane (Nm) showed irregular shape (Fig. 6-B). The nuclear chromatins (Ch) appear distributed in large and small clumps. It was released by the rupture of nuclear envelop. The cytoplasm around the nucleus filled with *Bt* cells.

The apical part of the epithelial cell showed various degrees of damage after treatment with Agerin. Microvilli appeared activated with irregular, curled and dense shape. It filled with *Bt* cells (Fig. 7-A). Many vacuoles were observed in the apical part of the epithelial cell. Vacuoles appear to slough from microvilli into the lumen. Some of mitochondria degenerated whereas other ones maintain its morphology. Also multi vesicular bodies (MVB) appeared in the cell wall which were transported outside the cytoplasm (Fig.7-B)

Irregular microvilli filled with bacteria and broken into the lumen was observed in the midgut of larvae that treated with Diple 2X (Fig. 8-A). Vacuolated cytoplasm, irregular shape of mitochondria with loss of cristia and apical cell membrane broken in some parts was also observed in the same figure. (Fig. 8-B). The *Bt* aggregated in large vacuole in different stages. Small vacuoles

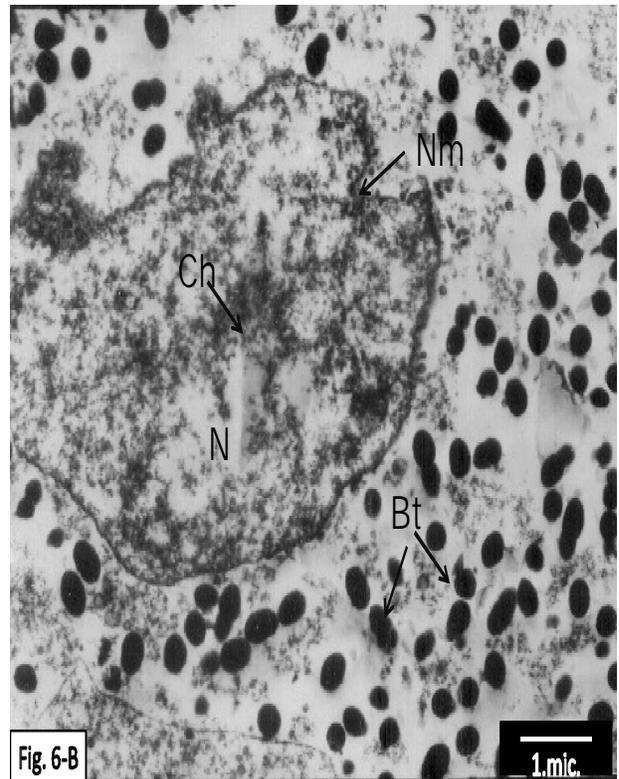
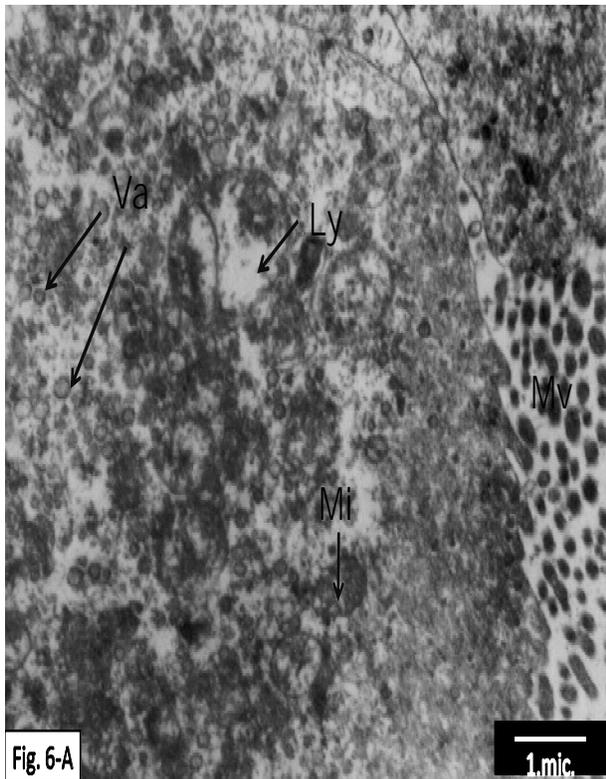
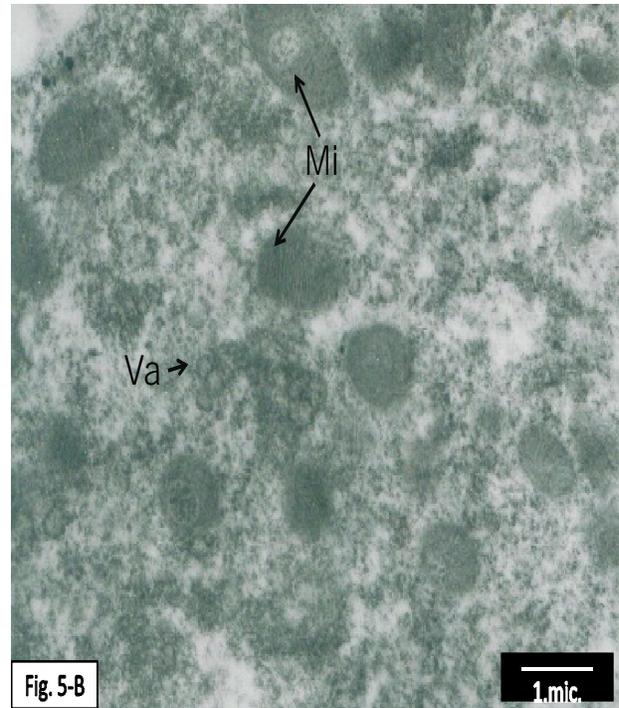
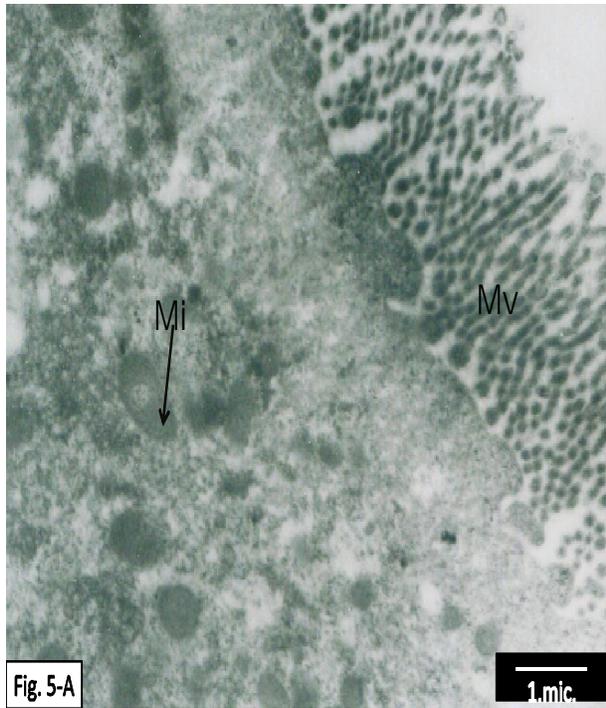
found around the rough endoplasmic reticulum was also observed.

4. Discussion:

Efficacy of the three *Bt* formulations against *S. littoralis* larvae in the field and semi-field experiments showed that the general mean of reduction rate in the field were 59.0, 55.9 and 58.6 % for Agerin, Dipel 2X and Dipel DF, respectively. While the general mean of mortality % in semi-field experiments were 60.3, 60.4 and 61.3 % for the three *Bt* formulations (Agerin, Dipel 2X and Dipel DF, respectively). It was obvious from the field and semi field experiments that no difference in the reduction rates in *S. littoralis* larvae population treated with the recommended dose of three *Bt* formulations at all sampling days. Also the bioassay data indicated that the toxicity of the three *Bt* formulations were not different from each. The LC₅₀ were close together.

Morphological deformation assay was used to evaluate the toxic effect of *Bacillus thuringiensis* Cry1 Toxins (Cerestiaens *et al.*, 2001). Zd'a'rek *et al.*, (1979) studied morphogenic effects of drugs, venoms, and other neurotoxic compounds on fleshfly pupae. These authors found that agents that paralyze neuromuscular systems at the peripheral level or suppress or modify basic motor patterns centrally cause the retention of larval morphologic characters in the pupae. Early study by Peter *et al.*, (1987) indicate that *Bt* -endotoxin induced hyperexcited activity in the insect nervous system.

Ultrastructural observations of the midgut exposed to Agerin, Dipel 2X and Dipel DF showed similar results. Microvilli were irregular and broken, mitochondria degenerated, various sizes of round granules found in the cytoplasm and distribution of nuclear chromatins in large and small clumps. The cytoplasm filled with various size of vacuoles and *Bt* cells. many other works that report the cellular changes produced in the midgut of larvae intoxicated with the Cry proteins of *Bt* such as: an increase in the volume of the epithelium cells, rupture of microvilosities, vacuolisation of the cytoplasm, changes in the organelles of the cytoplasm and rupture of cell membrane (Mathavan *et al.*, 1989; Bauer and Pankratz 1992; Bravo *et al.*, 1992; Cavados *et al.*, 2004; Knaak and Fiuza 2005 and Knaak *et al.*, 2010). Percy and Fast (1983) illustrated that the first cell damages due to the *Bt* endotoxin in midgut was related to brush border microvilli degeneration. The mode of action of Cry toxins has been characterized principally in lepidopteran insects.



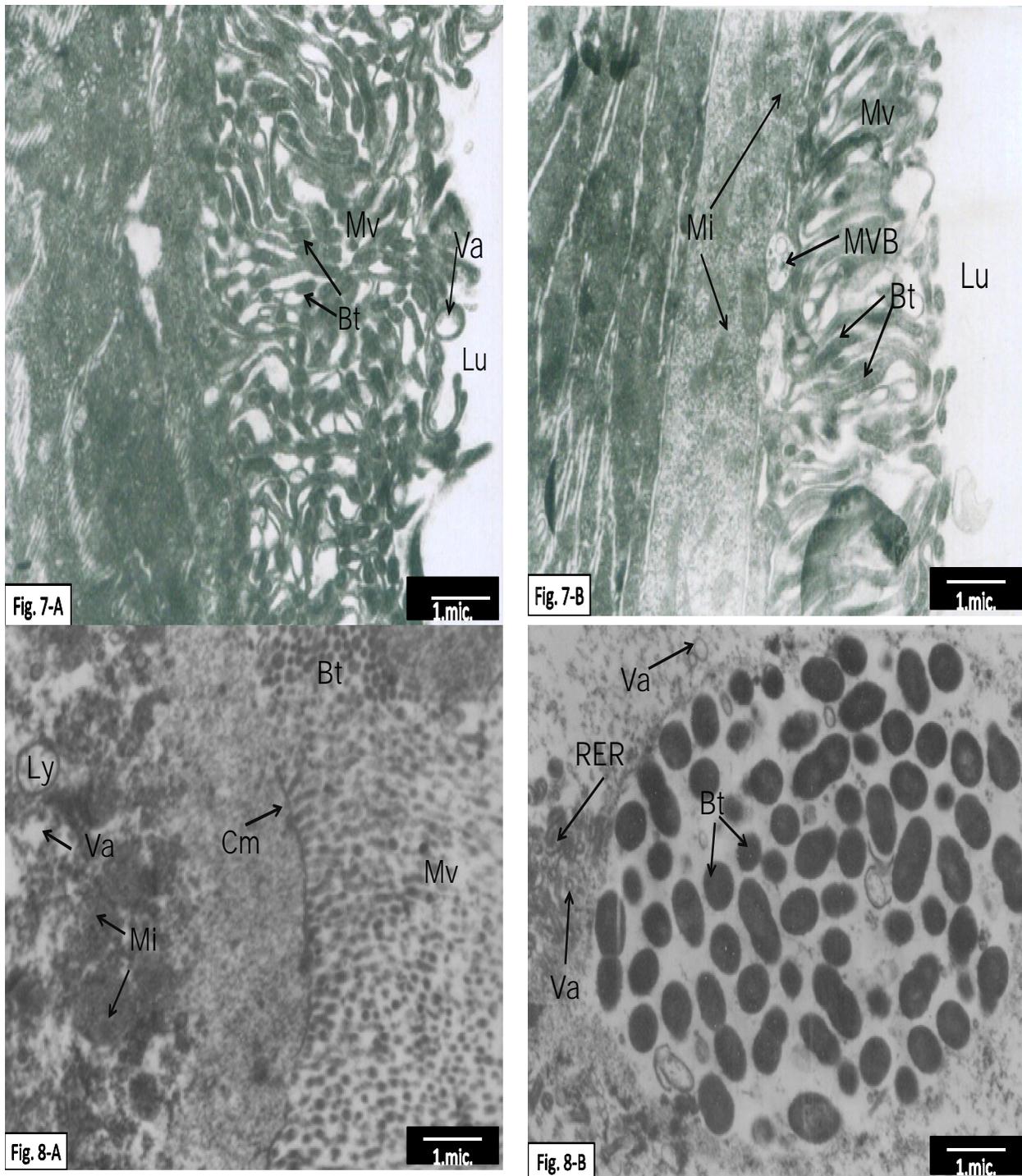


Fig. (5 A&B) ultrastructural of the midgut for untreated 1- day old 4th instar *S. littoralis* larvae. Fig. (6 A&B), (7 A&B) and (8A&B) 1- day old 4th instar larvae after feeding the 1- day old 2nd instar on castor

It is widely accepted that the primary action of Cry toxins is to lyse midgut epithelial cells in the target insect by forming pores in the apical microvilli membrane of the cells (Aronson and Shai 2001; de

Maagd *et al.*, 2001 and Bravo *et al.*, 2005). The crystal inclusions ingested by susceptible larvae dissolve in the alkaline environment of the gut, and the solubilized inactive protoxins are cleaved by

midgut proteases yielding 60–70 kDa protease resistant proteins. The activated toxin then binds to specific receptors on the brush border membrane of the midgut epithelium columnar cells before inserting into the membrane. Toxin insertion leads to the formation of lytic pores in microvilli of apical membranes (Schwartz et al., 1993). These non-specific pores render the apical membrane permeable to potassium ions as well as small molecules such as sucrose, thus disrupting the ion balance and the potential difference across the apical membrane. Selective permeability of the membrane is lost. There is significant water uptake, resulting in the cell bloating up and becoming unable to regulate osmotic pressure. There is disruption of the microvillar structures and cell organelles such as nuclei, mitochondria and ribosomes. The endoplasmic reticulum is vesiculated. The epithelial cells subsequently burst open in a process termed colloid osmotic lysis, (Hill and Pinnock 1998). Subsequently cell lysis and disruption of the midgut epithelium releases the cell contents providing spores a germinating medium leading to a severe septicemia and insect death (Bravo et al., 2005). Injuries to mitochondria were important effects associated with all treatment. Dysfunctions of these organelles can be critical since they lead to an increase of reactive oxygen species that cause damage to major cellular components (Andreassen et al., 2000). Such changes in mitochondrial morphology have previously been reported for the action of *Bt* toxins on midgut epithelia of mosquitoes and lepidopteran larvae (Lüthy and Wolfersberger, 2000; Cavados et al., 2004 and Romão et al., 2006).

The use of *B. thuringiensis* endotoxins originated vacuolization of the midgut epithelial cells in the different experimental models (Rey et al., 1998, Cavados et al., 2004). The presence of small vesicles in the cytoplasm around the endoplasmic reticulum, probably derived from the endoplasmic reticulum rupture that had lost their ribosomes (de Melo et al., 2009).

These results therefore confirm that the toxicities of the different three formulations, Agerin, Dipel 2X and Dipel DF, against *S. littoralis* are similar to each other. Therefore Egyptian *Bt* strain (Agerin) can be used for control of *S. littoralis* as it is cheap and readily available.

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Effect of soybean on fertility of male and female albino rats

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Abstract: This study aimed to investigate whether consumption of soybean is useful or harmful on reproductive hormones; ovary; uterus; mammary gland; testis and subsequent fertility. In the former experiment, male and female Wister albino rats were used in the present study. Each sex was randomly divided into 4 groups, control group fed on the basal diet (AIN93 G), three treated groups given 30, 60 and 90 gm cooked soybeans/70 kg human body weight (b.w.) for three months. Female rats showed that soybean significantly decreased free estradiol hormone (E2); progesterone hormone; follicle stimulating hormone (FSH); luteinizing hormone (LH); ovary weight and number of ovarian follicles. On the other hand soybean significantly increased total E2; sex hormone binding proteins (SHBP); uterus weight and caused uterus proliferation and cystic hyperplasia. The mammary gland showed gradual hyperplasia and mammary ducts showed proliferation. In male rats soybean significantly decreased free testosterone hormone; LH and FSH, meanwhile total testosterone hormone, SHBP, testes weight and testes diameter were significantly increased accompanied with spermatogenesis arrest.

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Keywords: Soybean; Fertility; Progesterone, Testosterone, Ovary; Testis.

1. Introduction:

Soybean (*Glycine max*) is considered a valuable crop among legumes as it's the world's largest oilseed and protein and is the primary source of protein for livestock (Shoemaker *et al.*, 2006 and Shao *et al.*, 2007). It's also considered the most important economic oil and cash crops in Egypt (El-Sherif and Ismail, 2009).

In addition soy is the richest dietary source of bioactive phytoestrogens (plant estrogens) called isoflavones (Setchell, 2001 and Caldwell *et al.*, 2005). Many studies have focused on the role of soy isoflavones on fertility but results remain controversial, the question of whether phytoestrogens are beneficial or harmful to fertility remains unresolved. Indeed considerable interest has been focused on the role of soy in females fertility this interest has stemmed from numerous studies which showed that consumption of soy components significantly increased menstrual cycle length; Duncan *et al.*, 1999 and Messina *et al.*, 2006); decreased sex hormone binding globulin (SHBG) level (Kumar *et al.*, 2002); lowered gonadotropin levels (Duncan *et al.*, 1999 and Hooper *et al.*, 2009); decreased progesterone hormone (Lu *et al.*, 2000) and decreased estrogen level (Watanabe *et al.*, 2001; Kumar *et al.*, 2002 and Tamaya, 2005). In contrast consumption of soy increased the level of E2 increased SHBG and progesterone hormone (Duncan *et al.*, 2000). However other studies found no difference in menstrual cycle length or hormone levels with soy supplementation (Wu *et al.*, 2000; Maskarinec *et al.*, 2002 and Nicholls *et al.*, 2002).

Studies focused on male fertility showed that soy lowered testosterone level (Lund *et al.*, 2004; Goodin *et al.*, 2004; Dillingham *et al.*, 2005; and Goodin *et al.*, 2007); lowered sperm concentration (West *et al.*, 2005 and Chavarro *et al.*, 2008) and serum E2 .

However others found that soy increased serum testosterone (Dalu *et al.*, 2002), increased LH level in male rats (Ohno *et al.*, 2003); increased serum E2 and estrone (E1) in men (Dillingham *et al.*, 2005) and influence spermatogenesis (Song *et al.*, 2006).

In contrast, others found that soy protein or isoflavones intake had no effects on serum total and free testosterone and SHBG in men (Teede *et al.*, 2001 and Hamilton-Reeves *et al.*, 2009) and in rats (Fritz *et al.*, 2002 and Assinder *et al.*, 2007); LH or FSH in men (Teede *et al.*, 2001 and Dillingham *et al.*, 2005) and E2 or E1 (Gardner-Thorp *et al.*, 2003).

2. Materials and Methods:

2. 1. Soybean Diet:

Commercial soybean seeds sample (Giza 22) obtained from the Agriculture Research Center; Giza, Egypt was used in the present study because it's the common soybean used in the manufacture of most soy foods present in local markets. Also it's used as a dietary source of proteins for poultry and livestock.

It contains 40 % protein, 20 % fat, 5 % ash and 35 % carbohydrates (soluble sugars and insoluble sugars) Food Technology Research Institute Agriculture Research Center, Giza, 2008.

Oligosaccharides are soluble sugars but are not broken down by the enzymes of the digestive tract and are fermented by the micro-organisms present in

the intestine, with the formation of the intestinal gas flatulence. That's why raw soybean was soaked for 12 hours at room temperature to get rid of these oligosaccharides. Also soybean was cooked at 120°C for 18 minutes in attempt to decrease the amount of the anti-nutrients present such as trypsin inhibitors, phytin, lectins, saponins, and hemagglutinins (Sat and Keles, 2002)

2.2 .Experimental Animals:-

Male and female Wister albino rats with average body weight 120 gm obtained from the private market Abou-Rawash, Giza, Egypt, were used in the present study. They were kept on vegetables and water *ad libitum* for one week under condition with a 12h light/ dark cycle and temperature of 25-27 °C prior to the experiment to remove any traces of previous soybean. Following this brief adjustment period, each sex was divided into four groups (n = 12 per group).

Control group: rats were kept on the basal diet (AIN 93 G) according to (Reeves, 1997) and water *ad libitum* for three months.

Three treated groups: each rat was fed individually on 30, 60 & 90 gm cooked soybean /70 kg human b.w. daily for three months. Doses used in our study are according to Messina, 1999 and Chang *et al.*, 2008.

All three treated groups were then given the basal diet (AIN 93G) and water *ad libitum* throughout the experimental period

2.2.1 . Organs Weight Analyses:

Weight of some organs as ovary; uterus and testes of control and treated rats were recorded at the end of the experimental period.

2.2.2. Analysis of hormones:

Determination of Free E2, Total E2, Progesterone, Free Testosterone Hormone, Total Testosterone Hormone, FSH and LH in serum samples were measured by enzyme-linked immunosorbent assay (ELISA) according to the method of Tietz (1995a) for Free E2, Maxey *et al.*(1992) for Total E2, Tietz (1995b) for progesterone Hormone, Chen *et al.* (1991) for Free Testosterone Hormone ; Griffen and Wilson(1992) for Total Testosterone Hormone; Rose (1998) for FSH; Rebar *et al.* (1982) for LH.

SHBP calculated according to De Ronde *et al.* (2006) equation.

2.2.3. Histopathological Analysis:-

Uterus, ovary, testis and mammary gland were dissected and carefully cleaned from adhering tissues then immediately fixed in bouin`s solution for uterus,

ovary and testis only while mammary gland was fixed in 10% neutral buffered formalin for 24 hours. Routine steps of dehydrating and embedding were applied, then transverse or longitudinal sections of 3-5µ were prepared then stained with haematoxylin and eosin (H&E).

2.3 Statistical Analysis:

Data were analyzed using the SPSS for windows (version 12.0). Analysis of variance (one-way ANOVA) was performed to test for any significant differences among groups and independent sample t-test was used to calculate statistical significant between the control group and each treated group. The level of significance was set as $P < 0.05$ for all statistical tests (Tello *et al.*, 2003)

3. Results:

3.1.Analysis Studies

Table I and Figs.(1-8) shows that serum level of free E2, LH, FSH in rats fed on 30mg soybean/70 kg human b.w. decreased significantly($p < 0.05$ & $p < 0.001$ for 60 & 90mg/kg b.w., respectively) compared with control group. Likewise serum level of progesterone significantly decreased in the three treated groups with ($p < 0.05$) However serum levels of total E2 and SHBP increased significantly in the three treated groups ($p < 0.001$) compared with control . Left ovary weight significantly decreased ($p < 0.001$) in all three treated groups . Meanwhile 60 and 90 gm soybean/ 70 kg human b.w. induced significant increase in uterus weight($p < 0.01$ and $p < 0.001$, respectively) compared to control.

Table II and Figs.(9-14) reveals that male serum level of free testosterone, LH and FSH in rats fed on the three doses significantly decreased for groups feed on 60, 90mg/70kgm($p < 0.001$) and for 30mg/kg($p < 0.05$) . Meanwhile serum levels significantly increased of total testosterone($p < 0.05$) and SHBP($p < 0.01$) in male rats fed only on 60 and 90 gm soybean/70 kg human b.w. In addition testis weight significantly increased ($p < 0.01$)for 30mg/kg and for 60 ,90 mg/kg($p < 0.001$) , respectively, compared with control groups .

3.2. Histopathological Studies

The histopathological studies (Figs. 15,16)showed that soybean decreased the number of ovarian follicles and caused endometrial proliferation (uterus proliferation) and cystic hyperplasia . Soybean also caused mammary gland gradual hyperplasia in a dose dependent manner as well as mammary ducts proliferation. Soybean increased testes diameter and caused spermatogenesis arrest at spermatid stage. Also Leydig cells showed decreased in number.

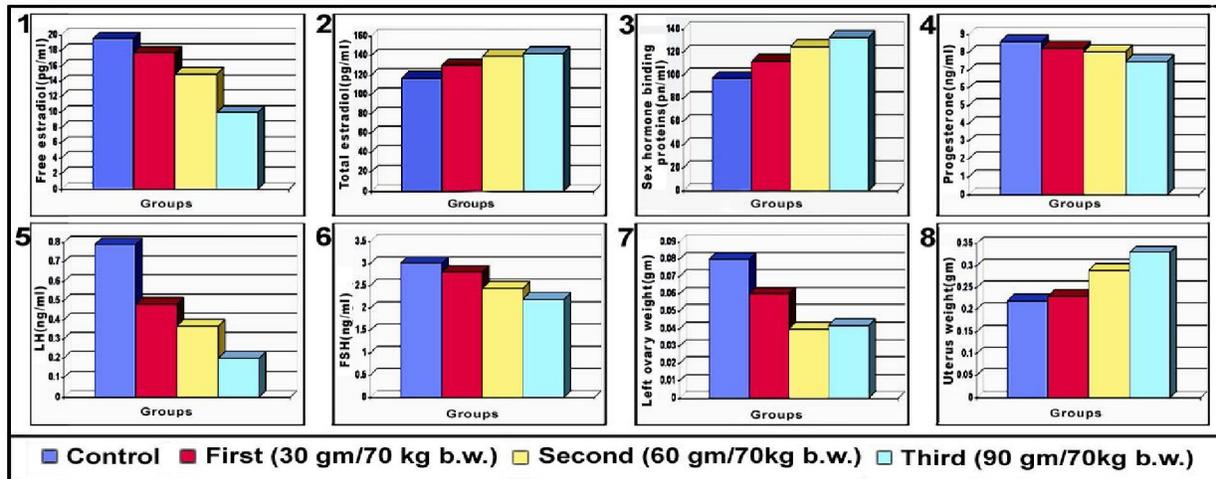
Table (I): Effect of soybean on the levels of serum reproductive hormones, ovary and uterus weight of female rats treated for three months with three different doses

Parameters Groups	Free estradiol (pg/ml)		Total estradiol (pg/ml)		Sex hormone binding proteins (pg/ml)	Progesterone (ng/ml)	LH (ng/ml)	FSH (ng/ml)	Left ovary weight (gm)	Uterus weight (gm)
	Control	Range	17.20 — 21.80	110.12 — 119.78	90.58 — 102.58	7.20 — 9.80	0.40 — 0.95	2.44 — 3.68	0.063 — 0.088	0.15 — 0.30
	Mean ± S.E	19.54±0.49	116.95 ± 1.09	97.41 ± 1.20	8.61 ± 0.23	0.79 ± 0.05	3.01 ± 0.11	0.08 ± 0.002	0.22 ± 0.01	
First group (30 g/ 70 kg b.w.)	Range	15.70- 21.60	123.00 — 136.25	103.00 — 117.75	7.40 — 9.70	0.40 — 0.57	2.22 — 3.15	0.050 — 0.080	0.18 — 0.30	
	Mean ± S.E	17.74±0.58	130.04 ± 1.22	112.30 ± 1.33	8.24 ± 0.17	0.48 ± 0.02	2.81 ± 0.08	0.06 ± 0.002	0.23 ± 0.01	
	% of change	-9.21	11.19	15.29	-4.30	-39.24	-6.64	-25.00	4.55	
	P value	P < 0.05	P < 0.001	P < 0.001	N.S.	P < 0.001	N.S.	P < 0.001	N.S.	
Second group (60 g/ 70 kg b.w.)	Range	14.20– 15.90	130.25 — 143.18	115.95 — 127.90	7.36 — 8.36	0.27– 0.50	2.10 — 3.00	0.030 — 0.060	0.18 — 0.38	
	Mean ± S.E	14.95±0.14	139.81 ± 0.97	124.86 ± 0.94	8.06 ± 0.08	0.37 ± 0.02	2.45 ± 0.07	0.04 ± 0.003	0.29 ± 0.02	
	% of change	-23.49	19.55	28.18	-6.39	-53.16	-18.60	-50.00	31.82	
	P value	P < 0.001	P < 0.001	P < 0.001	P < 0.05	P < 0.001	P < 0.001	P < 0.001	P < 0.01	
Third group (90 g/ 70 kg b.w.)	Range	8.90-12.30	132.25 — 150.36	122.25 — 140.93	6.39 — 9.00	0.10 — 0.27	1.98 — 3.07	0.020 — 0.060	0.29 — 0.38	
	Mean ± S.E	9.93±0.32	142.51 ± 1.83	132.58 ± 1.83	7.48 ± 0.26	0.20 ± 0.02	2.20 ± 0.10	0.042 ± 0.004	0.33 ± 0.01	
	% of change	-49.18	21.86	36.11	-13.12	-74.68	-49.18	-47.50	50.00	
	P value	P < 0.001	P < 0.001	P < 0.001	P < 0.01	P < 0.001	P < 0.001	P < 0.001	P < 0.001	
	ANOVA	F = 90.26	F= 82.67	F= 33.16	F= 5.50	F= 69.19	F= 14.74	F= 43.55	F = 14.78	
	A	P < 0.001	P < 0.001	P < 0.001	P < 0.05	P < 0.001	P < 0.001	P < 0.001	P < 0.001	

P= probability

N.S. = non significant

S.E= standard erro



Figs.(1-8) (1) : Effect of 30, 60 and 90 g soybean/70 kg b.w. on female free E_2 level.(2) Effect of 30, 60 and 90 g soybean/70 kg b.w. on female total E_2 level.(3) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female SHBP level..(4))Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female progesterone hormone level.(5) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female LH level.(6)Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female FSH level.(7) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female left ovary weight.(8) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on female uterus weight.

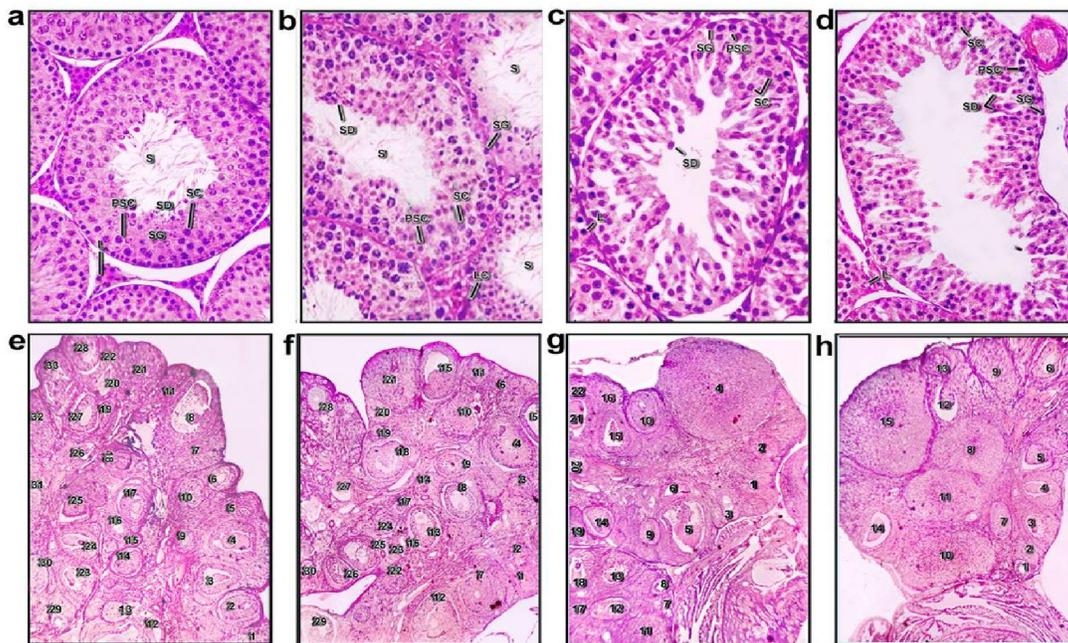


Fig. 15 (a-d) . Effect of soy on testis of treated rats compared with control groups:(a) T.S. in testis of control rat showing the normal spermatogenesis and histological structure of the seminiferous tubules,SG.(Spermatogonia), PSC. (Primary spermatocyte), SC. (Spermatocyte), SD(Spermatid),S.(spermatozoa) and LC.(Leydig cell) (H&E 400x) (b) T.S. in testis of a treated rat with 30gm soy bean/70 kg human b.w. showing normal spermatogenesis while seminiferous tubules diameter slightly increased and leydig cells slightly decreased. (H&E 400x) (c) T.S. in testes of a treated rat with 60 gm soy bean/70 kg human b.w. showing spermatogenesis arrest at spermatid stage, increased in seminiferous tubules diameter and decreased in leydig cells (H&E 400x) (d)T.S. in testes of a treated rat with 90 gm soy bean/70 kg human b.w. showing spermatogenesis arrest at spermatid stage, increased in seminiferous tubules diameter and marked decreased in leydig cells (H&E 400x) Effect of soy on ovary of treated rats compared with control groups:

Fig .15(e-h) T.S in ovary of control rat showing the normal appearance and normal number of follicles. Approximately there are (31) follicles. (H&E 100x) (f) T.S in ovary of a treated rat 30 gm soy bean/70 kg human b.w. showing the normal appearance and normal number of follicles. Approximately there are (29) follicles. (H&E 100x) (g) T.S in ovary of a treated rat with 60 gm soy bean/70 kg human b.w. showing decrease in number of follicles. Approximately there are (22) follicles. (H&E 100x) (h) T.S in ovary of a treated rat with 90 gm soy bean/70 kg human b.w. 100x showing an obvious decrease in number of follicles. Approximately there are (15) follicles. (H&E)

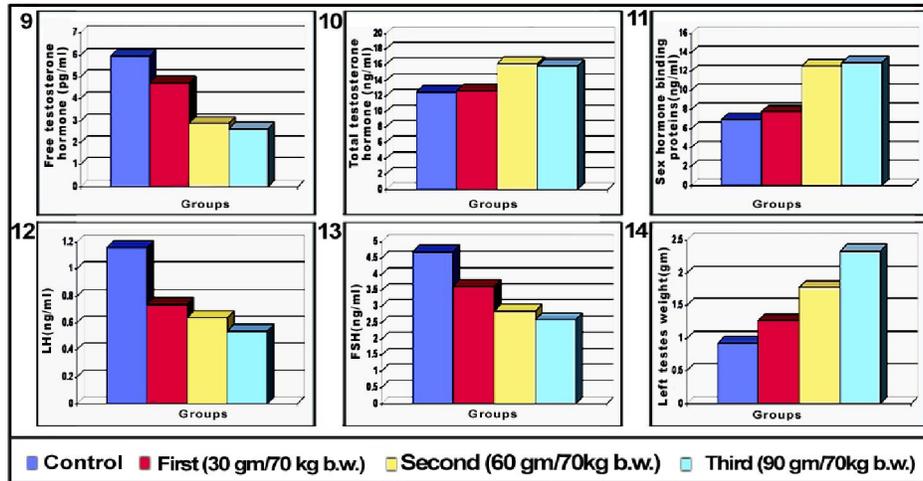
Table (II): Effect of soybean on serum reproductive hormones and testis weight of male rats treated for three months with three different doses.

Parameters Groups		Testosterone hormone (ng/ml)	Total testosterone (ng/ml)	Sex hormone binding proteins (ng/ml)	LH (ng/ml)	FSH (ng/ml)	Left testes weight (gm)
Control	Range	4.90 — 7.00	12.05 — 13.00	6.54 — 7.5	0.76 — 1.60	3.36 — 5.76	0.85 — 1.07
	Mean ± S.E	5.96 ± 0.16	12.53 ± 0.27	6.94 ± 0.20	1.16 ± 0.08	4.69 ± 0.23	0.93 ± 0.02
First group (30 gm / 70 kg b.w.)	Range	3.54 — 7.00	12.25 — 12.95	6.82 — 8.95	0.40 — 2.08	2.00 — 4.80	1.05 — 2.10
	Mean ± S.E	4.73 ± 0.32	12.61 ± 0.20	7.78 ± 0.62	0.74 ± 0.15	3.63 ± 0.23	1.27 ± 0.09
	% of change	-20.64	0.64	12.10	-36.21	-22.60	36.56 %
	P value	P < 0.01	N.S.	N.S.	P < 0.05	P < 0.01	P < 0.01
Second group (60 gm / 70 kg b.w.)	Range	2.00 — 3.54	13.90 — 18.47	10.36 — 14.47	0.40 — 0.92	2.08 — 4.00	1.22 — 2.30
	Mean ± S.E	2.89 ± 0.13	16.12 ± 1.32	12.53 ± 1.19	0.64 ± 0.05	2.86 ± 0.17	1.78 ± 0.10
	% of change	-51.51	28.65	80.55	-44.83	-42.86	91.40%
	P value	P < 0.001	P < 0.05	P < 0.01	P < 0.001	P < 0.001	P < 0.001
Third group (90 gm / 70 kg b.w.)	Range	2.27— 2.98	14.25 — 17.84	11.27 — 15.09	0.20 — 0.72	1.28 — 4.00	1.96 — 3.12
	Mean ± S.E	2.64 ± 0.07	15.78 ± 1.07	12.90 ± 1.13	0.54 ± 0.06	2.60 ± 0.38	2.34 ± 0.15
	% of change	-55.70	25.94	85.88	-53.45	-44.56	151.61%
	P value	P < 0.001	P < 0.05	P < 0.01	P < 0.001	P < 0.001	P < 0.001
	ANOVA	F = 61.02 P < 0.001	F = 5.10 P < 0.05	F = 12.52 P < 0.05	F = 8.29 P < 0.001	F = 15.31 P < 0.001	F = 39.79 P < 0.001

P= probability

N.S. = non significant

S.E= standard error



Figs.(9-14) (9) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on free testosterone hormone level of male rats (10) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on total testosterone hormone level of male rats (11) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on sex hormone binding proteins level of male rats (12) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on LH level of male rats (13) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on FSH level of male rats (14) Effect of 30, 60 and 90 gm soybean/70 kg b.w. on left testes weights of male rats.

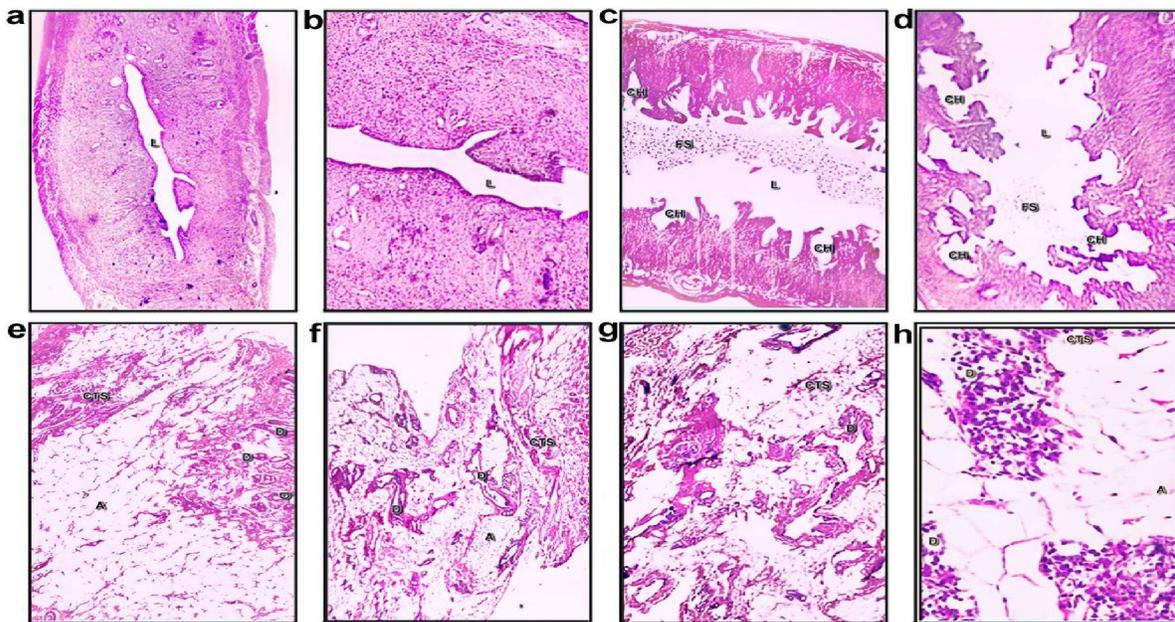


Fig.16 (a-d) Effect of soy on uterus of treated rats compared with control groups. Fig.16 (a) L.S. in uterus of control rat showing normal luminal epithelia and normal stroma. (H&E 200x) (b) L.S. in uterus of a treated rat with 30 gm soy bean/70 kg human b.w. showing normal luminal epithelia and normal stroma. (H&E 200x) (c) L.S. in uterus of a treated rat with 60 gm soy bean/70 kg human b.w. showing obvious proliferative changes in the luminal epithelia and uterine cystic hyperplasia. (H&E 200x) (d) L.S. in uterus of a rat treated with 90 gm soy bean/70 kg human b.w. showing obvious proliferative changes in the luminal epithelia and cystic hyperplasia. (H&E 200x)

Fig.16 (e-h) Effect of soy on mammary gland of treated rats compared with control groups: (e) T.S. in mammary gland of control rat showing normal histological structure: adipose tissue; connective tissue septa running through the adipose tissue; ducts growing up through the connective tissue septa. (H&E 200x) (f) Testes T.S. in mammary gland of a treated rat with 30 gm/70 kg human b.w. showing slight proliferation of ducts. (H&E 200x) (g) T.S. in mammary gland of a treated rat with 60 gm/70 kg human b.w. showing proliferation of ducts and mild hyperplasia. (H&O 200x) (h) T.S. in mammary gland of a treated rat with 90 gm/70 kg human b.w. showing proliferation of ducts and marked hyperplasia. (H&E 200x).

4. Discussion:

This study showed that serum levels of free E_2 and LH significantly decreased in female rats fed 30, 60 and 90 g soybean/70 kg b.w. Meanwhile serum levels of progesterone and FSH significantly decreased only in rats fed with 60 and 90 g/70kg human b.w.

These results correlate with previous studies showing that administration of isoflavones resulted in significant reduction of progesterone and free E_2 concentrations in rodents (Lamartiniere *et al.*, 2002). They also agree with studies on premenopausal women which showed that soy isoflavones significantly reduced serum free E_2 (Tamaya, 2005) and progesterone hormone concentration (Lu *et al.*, 2000 and 2001).

The possible explanation for the reduction of serum free E_2 by soy may be due to the weak estrogenic and / or anti-estrogenic action of isoflavones. Indeed, Ososki and Kennelly (2003) and Dixon (2004) cited that the biological effects of isoflavonoids vary according to the female biological phase. In premenopause, when the concentration of circulating hormones are high, the estrogen receptors are active and phytoestrogen exerts anti-estrogenic effect which competes with estrogen to bind with ER and displace it from its binding sites, but once bound, have a far weaker estrogenic potency than endogenous estrogens; the result is only due to a weak estrogenic action. Also Hwang *et al.* (2006) observed that isoflavones may exert their effects as estrogen antagonists in a high estrogen environment, or they may act as estrogen agonists in a low estrogen environment.

Previous studies by Tamaya (2005) interpreted that the weak estrogenic action of soy isoflavones may be due to their ability to stimulate or up regulate SHBG which will bind with free E_2 , or down regulate enzymes involved in estrogen biosynthesis, such as aromatase (CYP 19), which converts androgens into estrogens (Rice *et al.*, 2006) or inhibit 17 α -hydroxysteroid dehydrogenase type I (17 α -HSD) that converts E_1 to the more potent E_2 (Lacey *et al.*, 2005 and Brooks and Thompson, 2005); isoflavones also may inhibit the reductive/oxidative activity of 17 α -HSD type 5 which inhibits the conversion of androsterone to testosterone and androstenediol to androstenedione. Testosterone and androstenedione are substrates for the action of aromatase which converts testosterone to E_2 and androstenedione to E_1 , so isoflavones may inhibit the conversion of these androgenic precursors to E_2 or E_1 in the estrogen dependent tissues. Also our results agree with Tamaya (2005) who found that soy suppressed the gonadotropins (FSH and LH) which stimulates E_2 production.

In addition, the decrease in progesterone level may be due to the ability of isoflavones to decrease FSH which stimulates progesterone production in granulosa cells from preovulatory follicles in rats (Whitehead and Lacey, 2000 and Nejaty *et al.*, 2001), also Tiemann *et al.* (2007) found that the isoflavones inhibit 3 β -HSD an enzyme involved in progesterone synthesis from granulosa cells.

Soybean also led to the increase of total E_2 in all three treated groups. This is because the total E_2 content is composed of endogenous estrogen plus the weak phytoestrogen from soybean. And due to the increase in level of total E_2 , likewise SHBP will increase as shown in the current results in the three treated groups to bind excess total E_2 present.

Moreover Tamaya (2005) cited that isoflavones induce human HepG2 hepatoblastoma cells to increase SHBG synthesis and secretion.

Tollefsen *et al.* (2002) showed that isoflavones potentially disrupt the endocrine function of SHBP through interacting with it and inducing changes in its internal hydrophobic binding sites and decreasing the number of its binding sites to endothelial glycocalyx and megalin cells and thus decreasing the dissociation rate of sex steroids from its binding proteins.

Hammes *et al.* (2005) explained the role of endothelial glycocalyx and megalin cells in the dissociation of SHBP from its bound hormone. They clarified that the interaction of binding proteins with the endothelial glycocalyx leads to a structural modification of the hormonal binding site and thereby change its affinity. As a result sex hormones are set free and diffuse freely into the target cells. Or sex steroids are bound together with SHBP to megalin cell which mediate endocytosis of proteins bound hormones.

A possible explanation for the reduction of FSH and LH may be due to the increase in the level of total E_2 which produces a negative feedback mechanism leading to unalleviated levels of gonadotrophic releasing hormone (GnRH) of the hypothalamus which intern will stop the secretion of FSH and LH.

The present study showed a significant decrease of ovarian weight in the three treated groups and a remarkable decrease in the number of ovarian follicles in the histological study (Fig. 3 a-p). This may be due to the decrease in serum levels of free E_2 and FSH by soybean which disturb follicles development (Dubey *et al.*, 2000 and Rosselli *et al.*, 2000).

Also the present study showed significant increase in uterine weight in rats fed only 60 and 90 g soybean/70 kg human b.w., and histological results showed endometrial proliferation and cystic

hyperplasia of uterus after soybean, as seen in Figs (3a-3d) these results are supported by Kayisli *et al.* (2002) who found that soy isoflavones induced endometrial stromal-cell proliferation, yet the proliferative effect occurred at high concentrations of isoflavones and was 8–15% lower than that induced by E2 indicating that isoflavones are weak estrogens. Also Seidlova-Wuttke *et al.* (2003) and Archer (2004) cited that the increase in uterine mass may be caused by liquid imbibitions of the tissue, and subsequently through proliferation of endo- and myometrial cells.

Moreover Moller *et al.* (2010) cited that the possible explanation of increased water impaction in rats treated with soy isoflavones may be due to that isoflavones up regulate AQP3 which in turn increases the permeability of uterus to glycerin and/or urea and water, whereas isoflavones down regulate AQP1 & AQP5 which increase the permeability to water only. This would finally lead to elevated uterus luminal fluid volumes resulting in increased uterine weight. It is likely to note that during dissection huge amount of water was observed coming out of the uterus.

As far the effect of soybean on the histology of mammary gland, the present work showed gradual hyperplasia in a dose dependent manner as well as mammary duct proliferation (Figs. 4 a-d), this agrees with Thomsen *et al.* (2006) who explained the proliferation effect of soy on mammary gland due to the weak estrogenic effect of soy isoflavones.

As far male rats treated with 30, 60 and 90 g soybean/70 kg b.w., a significant decrease in serum testosterone level occurred. Likewise serum levels of FSH and LH significantly decreased compared with control group.

These results correlate with previous studies on rodents (Ohno *et al.*, 2003; Svechnikov *et al.*, 2005; Pan *et al.*, 2007; Akingbemi *et al.*, 2007; Jiang *et al.*, 2008; Zhang *et al.*, 2009 and Hancock *et al.*, 2009) and men (Kurzer, 2002 and Spentzos *et al.*, 2003) for testosterone. Also, Pan *et al.*, 2007 and Jiang *et al.*, 2008 for LH.

Decrease in serum testosterone level may be due to the ability of soy isoflavones to inhibit the enzymes involved in steroid hormones synthesis. In fact various types of cell culture studies have demonstrated the ability of isoflavones to inhibit 3 - HSD an enzyme involved in the conversions of pregnenolone to progesterone; DHEA to androstenedione; and 5-androstenediol to testosterone (Ohno *et al.*, 2002; Whitehead *et al.*, 2002 and Ohno *et al.*, 2004) and also inhibit the enzyme 17 - HSD involved in the conversion of DHEA to 5-androstenediol and androstenedione to testosterone (Krazeisen *et al.*, 2001).

Moreover, isoflavones interfere with the first and rate-limiting step in steroidogenic pathway and may be due to their ability to decrease the activity of the side-chain cleavage enzyme P450 which catalyses the conversion of cholesterol to pregnenolone (Svechnikov *et al.*, 2005).

Also Hancock *et al.* (2009) stated the reason of decreased testosterone by isoflavones which interfere with coupling of transmembrane LH receptors (LHR) with G proteins. Uncoupling of LHR from G proteins adversely affects adenylate cyclase function and impacts LH-dependent stimulation of Leydig cells these led to decreased testicular steroidogenesis.

We also found significant increase in serum levels of total testosterone and SHBP in male rats fed only on 60 and 90 g soybean/70 kg b.w.

Tanaka *et al.* (2009) cited that isoflavones could increase the production of SHBG in the liver which binds to biologically active testosterone and consequently lowers the free testosterone levels and its bioavailability to the target cells, thus increasing total testosterone.

A possible reason for the reduction of FSH and LH may be due to the increase in the level of total testosterone which produces a negative feedback mechanism leading to unalleviated levels of GnRH of the hypothalamus which intern will lead to a decrease in FSH and LH.

We also found significant increase in rat's testis weight in the three treated groups in a dose dependent manner. Also the histological study showed significant increase in testis diameter and spermatogenesis arrest at spermatid stage as seen in Figs. (3a-p). These results confirmed previous observations on rodents reported by Roberts *et al.*, 2000 and Cederroth *et al.*, 2010 and studies on men (West *et al.*, 2005 and Chavarro *et al.*, 2008).

It is well established that the development of germ cells is dependent on testosterone and FSH. The decrease of both hormones increase germ cells apoptosis (McLachlan *et al.*, 2002). FSH regulates spermatogonial development in the adult rat (Meachem *et al.*, 1999), testosterone is essential for spermatid development, while both FSH and testosterone are required for spermatocyte development (McLachlan *et al.*, 2002). Therefore, increased apoptosis of spermatocytes; round spermatids and thereby sperms is due to the disruption of the hypogonadal–pituitary–testicular axis. Our study found significant decrease in serum testosterone and FSH as cited above. Also, decreased sperm concentration may be due to the anti-estrogenic effect of phytoestrogens, indeed ER is expressed in Leydig cells (Pelletier *et al.*, 2000); ER β in sertoli cells (Saunders *et al.*, 1998) and spermatogonia (Saunders *et al.*, 1998 and Van Pelt *et*

al., 1999); both receptor types are present in spermatocytes and round spermatids (Pelletier *et al.*, 2000). A direct role for estrogen in the prevention of human germ cell apoptosis has been described by Assinder *et al.* (2007) who demonstrated that feeding a diet of high phytoestrogen content to adult male rats, not previously exposed to elevated dietary phytoestrogens disrupt normal spermatogenesis by increasing apoptosis of developing germ cells.

Also *in vitro* studies showed that incubation of seminiferous tubules in serum and hormone-free media induce apoptosis of spermatocytes and spermatids. This apoptosis is inhibited by 17 β -E2. The same population of seminiferous tubules exhibited increased apoptosis when a diet of high phytoestrogen content is consumed. This induction of apoptosis suggests, therefore, that phytoestrogens are anti-estrogenic in this respect (Pentikainen *et al.*, 2000).

Also the present histological study showed decrease in the number of Leydig cells or interstitial cells which produces testosterone hormone in a dose dependent manner as seen in Figs. (3.a-p).

It is known that LH and FSH play a major role in leydig cell development, differentiation, maintenance and function by modulating the production of sertoli cell-derived factors (Sriraman *et al.*, 2005), so the decrease in serum levels of LH and FSH may be the reason for the decrease of leydig cells. Also previous studies showed that estrogen play an important role in leydig cell proliferation and differentiation thus the anti-estrogenic and / or weak estrogenic action of isoflavones may cause decrease in number of leydig cells (Hancock *et al.*, 2009).

Moreover, increased testes weight and diameter is due to the anti-estrogenic action of phytoestrogen. Hess *et al.* (1997) stated that ER has been found to be abundant in the efferent ductules and is responsible for the reabsorption of almost 90% of the luminal testis fluid. Thus, it was logic by Oliveira *et al.* (2001) to hypothesize that estrogen receptors play a role in the regulation of fluid reabsorption in efferent ductules. So, the disruption of estrogen action, by the removal of functional ER in mice or the administration of an anti-estrogen to adult rats causes reduced fluid absorption in the excurrent duct system, leading to the increase in water retention and it's accumulation in the lumen and the flattening of epithelial cell height.

In conclusion, the present study recommend Food and Agriculture Organization (FAO) to reconsider the benefits of soybean in our daily food since it was found to have adverse effects on male and female fertility. Also, care must be taken in the composition of rodent's diet as nearly all rodent's diet

contains soybean which may interfere with results reached in any experiment.

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Improving Reproductive Performance by Glucose Injection in Damascus Does Goat during Early Summer

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Abstract: Goats are seasonally polyestrous having estrous activity during late summer, fall, and winter and showing no activity during summer and spring. The objective of the present study was to improve reproductive performance of Damascus doe goats in early summer including: estrous activity (EA), ovarian follicular (OF) growth, corpus luteum (CL) development, and progesterone (P₄) profile by injection of glucose (Glu). A total of twelve apparently healthy Damascus doe goats were used in this experiment and were classified randomly into two equal groups. Animals in group A were injected by Glu via j.v.; each animal of the treated group received 94.584 g Glu daily for nine days before the expected day of ovulation. The second group (B) was injected with saline solution and used as control. All animals in both groups were synchronized by PGF₂α (cloprostenol) three times (10 days between each interval and other) with notice that Glu was injected in the second interval. Blood samples were collected from each animal; the blood was then centrifuged and the serum was analyzed for P₄ determination. All does were subjected to ultrasonographic examination on days 5, 9, and 19 after the third injection of PGF₂α and post-treatment by Glu. The results revealed that Glu injection achieved estrous activity higher than in the control (100% vs. 50 %, p>0.05). All animals showed the estrous activity through 24-72 hours after each dose of PGF₂α and post-treatment by glucose. The number of follicles (≤5mm) in the treated group was higher than in the control group (111 vs. 94 follicle, p>0.05), while the follicular diameter did not differ between the two groups. Left ovary was more active than in right ovary (107 vs. 98 follicle, p>0.05) and the ovulation rate detected from the number of corpora lutea and progesterone level was higher (p>0.05) in the treated group than in the control. Moreover, the ovulation was significantly higher in the right ovary than in the left ovary (19 vs. 9 follicles). Corpus luteum diameter in the treated group was significantly larger than in the control group (1.2±0.11 cm vs. 0.97±0.13 cm, p>0.05). The average progesterone concentration increased significantly (2.36±0.84 ng/ml) in the treated animals than in the control (0.96±0.23 ng/ml). It could be concluded that Glu treatment led to improvement of number of estruses, ovarian follicles, corpora lutea and progesterone concentration in Damascus doe goats during early summer. Therefore, treatment by energy-yielding nutrient (glucose injection) on the estrous and ovarian activity may be recommended in periods of reproductive activity impairment in goats.

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Key words: Doe goat, EA, OF, CL, Glu, PGF₂α and P₄

1. Introduction:

The estrous activity of Damascus does goat occurs in autumn and winter and not in spring and early summer (Mahmoud, 2010). This means that ovarian activity during spring and early summer in these animals is lacked. Away from the use of known hormonal treatments (gonadotropins) which evoke on the ovarian activity, high energy-yielding nutrients are used for increasing ovulation rate in sheep (Teleni *et al.*, 1989b, Downing & Scaramuzzi, 1991) and rising FSH levels during the estrous cycle (Rhind *et al.*, 1985, Rhind & McNeilly 1986). In contrast, findings obtained by Findlay & Cumming (1976), Rhind *et al.* (1989), Xu *et al.* (1989), Smith and Stewart (1990) were not compromised with the previous reports. Whereas, Vin˜oles *et al.* (2002) reported that effect of nutrition on daily follicular development led to an increase in ovulation rate and

FSH secretion and a decrease in estradiol-17β concentration during the follicular phase of the estrous cycle in ewes with a high body condition. Further, ewes fed high energy-yielding nutrients from days 8 to 14 of the estrous cycle owned increased ovulation rate by 14% (Vin˜oles, 2003). For this reason, we prefer in this experiment to use the high energy-yielding nutrients (glucose injection) to test if it is able to resume the estrous and ovarian activity of Damascus does in early summer or not, since administration of exogenous hormones is a costly treatment and may cause severe health problems (Grøndahl, 2008).

The physiological mechanism of immediate energy-yielding nutrients (glucose) on the follicular development has been investigated. Glucose may work in direct way on the ovary and metabolic hormones such as insulin-like growth factor I (IGF-I),

since the glucose transporter proteins and specific receptors for this hormone are found in the ovarian follicles (Williams *et al.*, 2001, Muñoz-Gutiérrez *et al.*, 2004). Scaramuzzi and Radford 1983, Souza *et al.*, 1997, Monget and Martin 1997, Scaramuzzi *et al.*, 1999, Williams *et al.*, 2001, reported that feeding on glucose increased Insulin and IGF-I levels which in turn supported follicular responsiveness to gonadotrophins. Additionally, metabolic hormones may also regulate the steroid synthesis (Scaramuzzi *et al.*, 1999). So, our hypothesis in this study is to test glucose injection in the synchronized doe goat on estrous activity resumption, ovulation rate, CL development and progesterone concentration during early summer under Upper Egypt (Assiut) climatic conditions.

2. Material and Methods

Animal and managements:

This experiment was carried out in goat barn, Animal Production Farm, Faculty of Agriculture, Assiut University.

A total of twelve apparently healthy does with mean body weight of 32 ± 0.8 kg were used in this experiment and classified randomly into two equal groups ($n = 6$ for each). Animals in group A were considered as treated group while B was considered as control group for A. Both groups were housed in semi-pen pens and fed maintenance ration according to NRC (1985).

Glucose injection

Each animal in the treated group was injected i.v. by 94.584 g Glu (Algomohorya Medical Company, Egypt). Glu was calculated from the dose used by Teleni *et al.*, 1989a (525 mMole/day), which was dissolved in 264 ml distal water and given to each animal daily for nine days before the expected day of ovulation. The conversion from mMole to grams is as follows:

$525 \times 10^{-3} \times 180.16$ (molecular weight of glucose, $C_6H_{12}O_6$) = 94.584 g.

Hence, 94.854 g glucose should be dissolved in 264 ml distal water.

$$\frac{264 \text{ ml}}{24 \text{ hours}} = 11 \text{ ml / hour}$$

To avoid stress on animal, 44 ml glucose/4 hours/6 times/day for 9 days was injected in each animal. While animals in group B (control) were infused by normal saline solution (Algomohorya Medical Company, Egypt).

Estrous synchronization

All does were synchronized by prostaglandin analogue (Cloprostenol, estoPLAN® injection, Parnell Laboratories, PTY.LTD, AUST)

and each doe was injected three times by 125 μ g i.m. PGF_{2 α} according to Nuti *et al.*, 1992, Kusina *et al.*, 2001 Cueto *et al.*, 2006, Khanum *et al.*, 2007 and Fernandez-Moro *et al.*, 2008). The first injection was given on day 10/7/2007, the second injection was given 10 days after the first injection, while the third injection was followed after 10 days of the last one as shown in Table (1).

Estrus detection

After each injection of PGF_{2 α} , estrus was detected by using two fertile bucks to run with the does for 30 minutes for detection the estrous does. Each buck was allowed to run with a half number of does for 15 minutes then after that, each one was replaced by the other. Estrus detection was checked daily at 8:00 a.m. for three days throughout the experiment. Estrous signs such as vaginal discharge, vulva swelling and tail twitching and mounting have been taken into consideration during determination of estrous (Mauleon and Dazquier, 1965 and Cerbito *et al.*, 1995).

Blood collection

Time table of blood samples collection, injection of glucose and synchronization by PGF_{2 α} are presented in Table (1). Blood samples were withdrawn from j.v. at 8.0 a.m. during and after each injection by PGF_{2 α} and post-treatment by Glu, then left overnight in the refrigerator (at 4 °C) to clot, and then centrifuged at 2000 g for 20 minutes to harvest the sera, after that the sera were preserved in eppendorf tube (4 ml) and stored at -20 °C until hormonal assay (Mori and Kona, 1984 and Burfening and Berardinelli, 1986).

Table 1. Shows days of blood samples collection and injections of PGF_{2 α} and Glu.

Date of treatment	Days of blood samples collection
10 / 7 / 2007 (1 st injection of PGF _{2α})	1, 2, 3 (during estrus) 4, 6 and 11 (post-estrus)
20 / 7 / 2007 (2 nd injection of PGF _{2α} with Glu injection)	1, 2, 3 (during estrus), 4, 6 and 11 (post-estrus)
30 / 7 / 2007 (3 rd injection of PGF _{2α} and post injection of Glu)	1, 2 (during estrus), 4, 8, 12, and 16 (post-estrus)
Ultrasonography (sonar)	5, 9 and 19 after Glu injection and PGF _{2α} .

Hormonal assay

Progesterone was assayed by ELISA through the kits purchased from DRG, Instruments GmbH, Germany (2005). The DRG progesterone enzyme immunoassay kit provides materials for the

quantitative determination of progesterone in serum and plasma (DRG, 2005).

Ultrasonographic (sonar) examination

All does were examined by sonar (ultrasonography) on days 5, 9 and 19 after treatment by Glu and the 3rd injection of PGF_{2α}. Trans-rectal ultrasonography was done on all animals utilizing a real-time B-mode echo camera (Pie Medical, 100 LC, Maastricht, The Netherlands) connected to a 6/8 MHz changeable transducer. The transducer was fitted in a self-manufactured connector to favor its manipulation in the rectum. The transducer was manipulated externally, with the doe in standing position. At each examination, the number, diameter and relative position of all follicles ≥ 2 mm in diameter and corpora lutea were recorded and sketched on ovarian charts to analyze the pattern of growth of follicles.

Statistical analysis

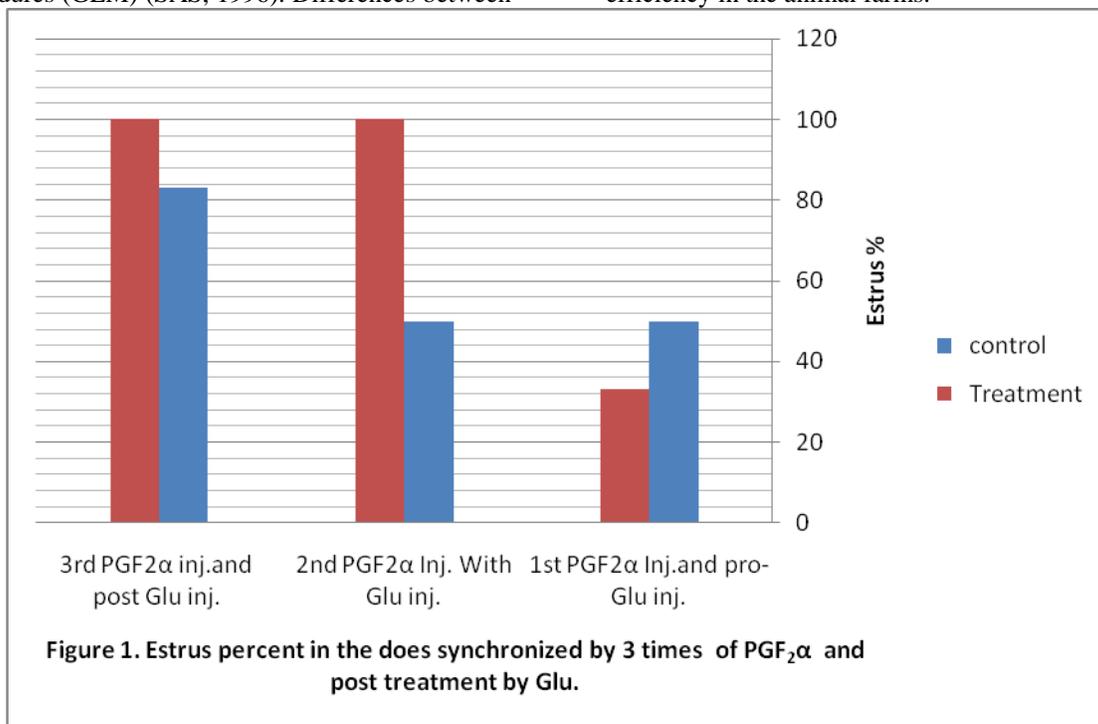
Quantitative data were analyzed by analysis of variance using the General linear model procedures (GLM) (SAS, 1996). Differences between

means were tested using Duncan's multiple range test (Duncan, 1955). Number of estruses, ovarian follicles, and corpora lutea was statistically analyzed by Chi-square analysis.

3. Results

Estrous activity:

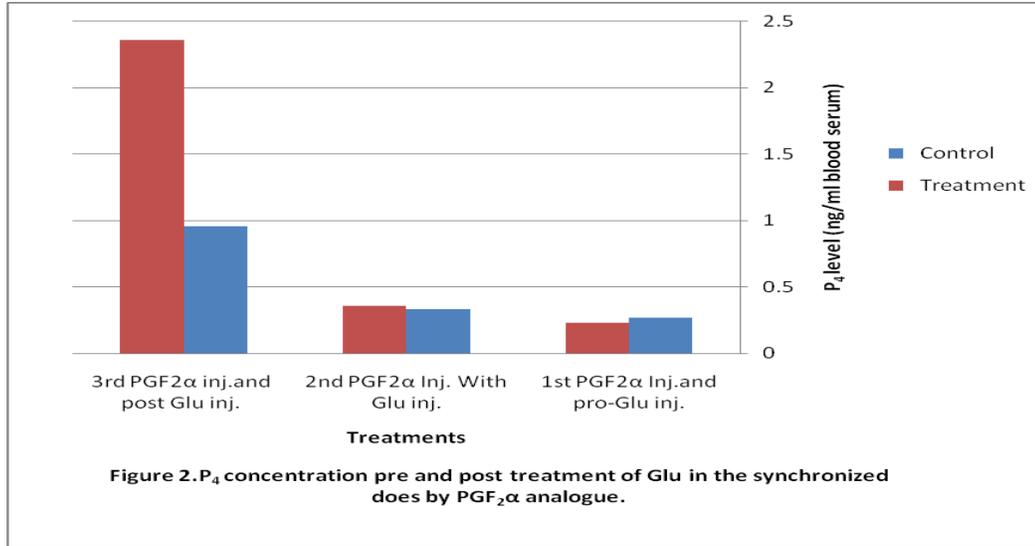
Fig. 1. Shows that the percentage of estrus detected after the 1st injection of PGF_{2α} and before treating by Glu was significantly higher (50 %) in non-treated does than in treated does (33 %). In the 2nd dose of PGF_{2α} accompanied with Glu injection, the estrus percentage was significantly higher (100%) in treated does than in non-treated does (50%). After the 3rd dose of PGF_{2α}, and post-treatment by Glu, estrus percentage was significantly higher in treated does (100%) than in non-treated does (83 %). In addition, all does exhibited the estrus through 24-72 hrs after each dose of PGF_{2α} and even post-treatment by glucose. These data suggests that synchronized does treated by Glu achieved high estrous activity, and this should be used for rising reproductive efficiency in the animal farms.



P₄ concentration (ng/ml blood serum)

After the 1st dose of PGF_{2α} and pre-treatment by Glu, P₄ concentration was almost semi-equal in the two groups (0.23±0.04 in treated and 0.27±0.02 ng/ml, in control) as in the 2nd dose of PGF_{2α} accompanied with Glu (0.36±0.07 and 0.33±0.04

ng/ml, in treated and control does, respectively). While in the 3rd dose of PGF_{2α}, and post-treatment by Glu, P₄ level increased significantly (P<0.05) in the treated does (2.36±0.84 ng/ml) than in the control group (0.96±0.23 ng/ml) (Fig. 2).

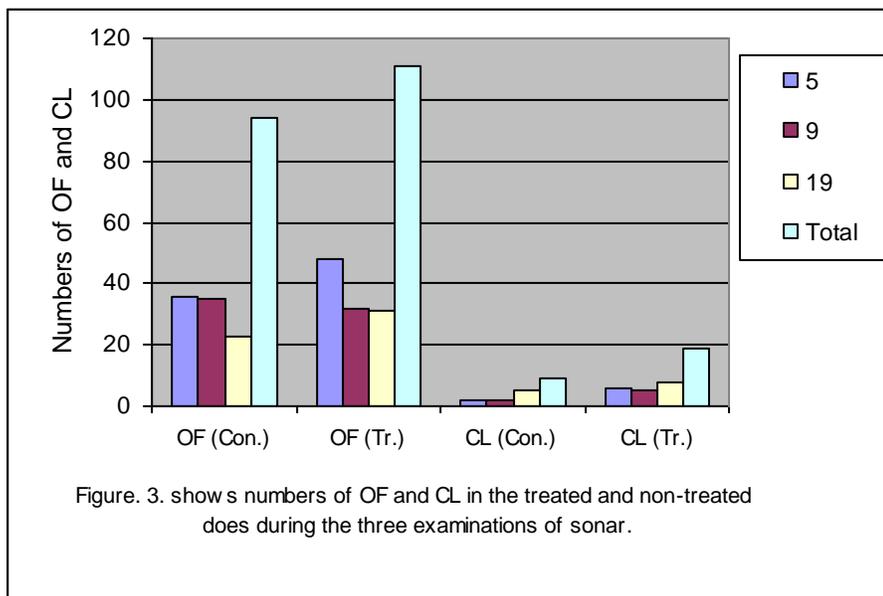


These data also indicate that P₄ profile in the synchronized does treated by Glu remained approximately similar to levels in the normal estrous cycle, it was < 1.0 ng/ml on day of estrus, then rose gradually until reached > 1.0 ng/ml by 8 days post estrus, and the peak level occurred on day 16 of the cycle, since this level was significantly higher in the treated does than in the control group (5.86±1.73 vs. 3.62±1.21 ng/ml, respectively). These results suggest that the increased P₄ concentration in the does treated by Glue may be utilized for enhancing pregnancy.

(n=111 F) compared with that non-treated does (n=94 F). Generally, numbers of OF decreased gradually during the three examinations of sonar and reached the minimal number on day 19 in the two groups (23 OF, control and 31 OF, treatment). Follicles observed in ovaries of both groups were ≤ 0.5 cm in diameter (Fig. 3). Despite the significance was absent in the two groups, left ovaries were significantly higher in follicular production than in right ovaries (107 vs. 98 follicles) (Table 2 and Fig. 4), moreover, the left ovaries of treated does were also more active than the right ovaries in OF production (61 OF vs. 50 OF) (Table 3 and Fig. 4).

Number and diameter (Cm) of OF

In Fig. 3, does injected by Glu showed sensible increase in numbers of ovarian follicles



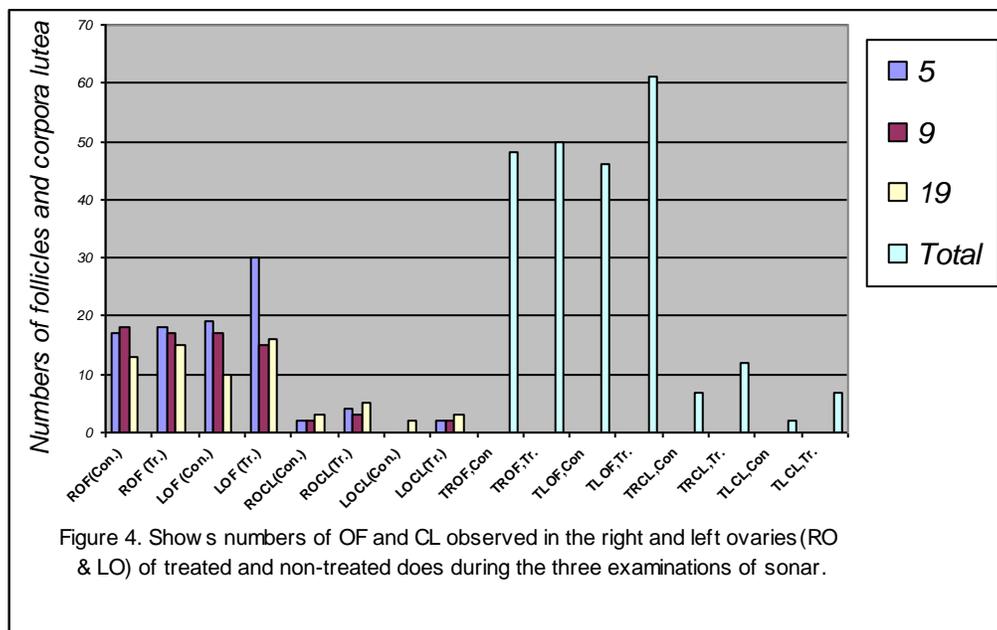


Figure 4. Shows numbers of OF and CL observed in the right and left ovaries (RO & LO) of treated and non-treated does during the three examinations of sonar.

Table 2. Shows mean ± SE diameters of OF and CL in the treated and non-treated does during the three examinations of sonar.

Sonar day	No. does/group	OF diameter (cm)		CL diameter (cm)	
		Control	Treatment	Control	Treatment
5	6	0.39±0.02	0.35±0.01	1.04±0.15	1.20±0.15
9	6	0.34±0.02	0.37±0.02	0.85±0.12	1.29±0.09
19	6	0.32±0.03	0.32±0.03	1.03±0.13	1.10±0.08
Overall mean		0.35±0.02	0.35±0.02	0.97±0.13 ^b	1.2±0.11 ^a

Values are least-squares means (L.S.M) ± standard error of L.S.M

^{A and b} Means in the same row with different superscripts are significantly different (P<0.05)

Table 3. Mean ± SE diameters of OF and CL (cm) observed in right and left ovaries of treated and non-treated does.

Sonar Day	RO				LO			
	Control		Treatment		Control		Treatment	
	OF	CL	OF	CL	OF	CL	OF	CL
5	0.42±0.03 n=17	1.04±0.15 n=2	0.36±0.03 n=18	1.27±0.23 n=4	0.36±0.03 n=19	-	0.35±0.02 n=30	1.05±0.08 n=2
9	0.38±0.04 n=18	0.85±0.12 n=2	0.38±0.03 n=17	1.32±0.16 n=3	0.31±0.03 n=17	-	0.36±0.04 n=15	1.24±0.02 n=2
19	0.35±0.03 n=13	1.13±0.20 n=3	0.35±0.04 n=15	0.97±0.07 n=5	0.27±0.05 n=10	0.88±0.06 n=2	0.30±0.04 n=16	1.32±0.05 n=3
Overall mean	0.39±0.02 n=48	1.02±0.10 ^b n=7	0.36±0.02 n=50	1.16±0.09 ^a n=12	0.32±0.02 n=46	0.88±0.06 ^b n=2	0.34±0.02 n=61	1.22±0.05 ^a n=7

Values are least-squares means (L.S.M) ± standard error of L.S.M

^{A and b} Means in the same row with different superscripts are significantly different (P<0.05)

Number and diameter (Cm) of CL

Sonar examination showed that numbers of CL during the three examinations increased

significantly ($P < 0.05$) to 6, 5 and 8 in the treated does compared with the control (2, 2 and 5 CL) (Fig. 3). This increase was associated with increasing P_4 concentration and number of OF produced from the treated does compared with the control as shown in Table 2. The average CL diameter in the treated does was significantly ($P < 0.05$) larger than in the control group (1.2 ± 0.11 vs. 0.97 ± 0.13 cm). Furthermore, the average number of CL in the right ovary was significantly higher than that found in the left ovary (19 vs. 9, $P < 0.05$), also the right ovaries of treated does contained large numbers of CL than in the left ovaries (12 CL vs. 7 CL) (Table 3 and Fig. 4). These

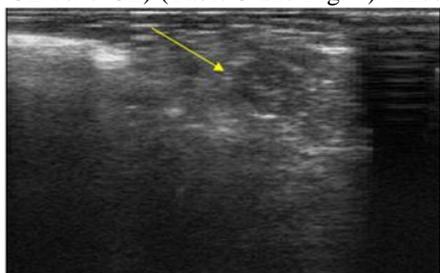


Fig 6. The arrow denotes CL size on day 5 (treatment).

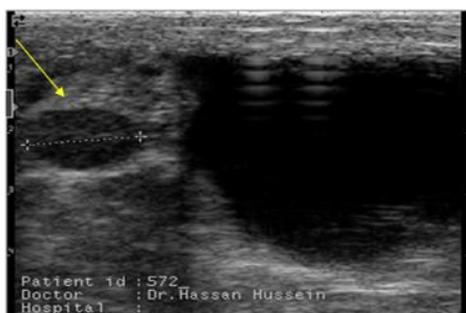


Fig 7. The arrow denotes CL size on day 19 (control).

data also denote that when the number of OF increases in one ovary the diameter of these follicles decreases in the same ovary or increases in the other ovary. Similarly, when numbers of CL increase in one ovary, their diameters would decrease in the same ovary or increase in the other ovary (Table 3 and Fig. 4). Otherwise, the average CL diameter increased slightly in the treated does compared with the control. However, Images (5-8) taken by sonar show the variability in CL size in the treated and non-treated does.

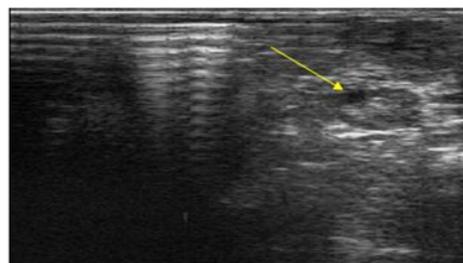


Fig 5. The arrow denotes CL size on day 5 (control).

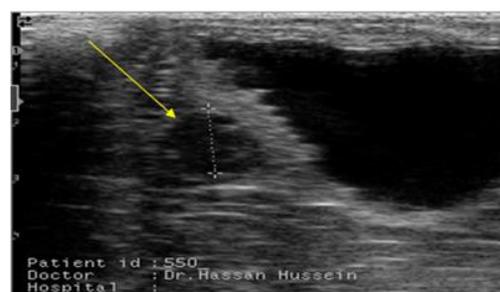


Fig 8. The arrow denotes CL size on day 19 (treatment)

4. Discussion:

It is obvious from the results that all does treated by Glu came into estrus compared with non-treated does. This means that Glu improved expression of estrus in the synchronized does. These results are similar to that obtained by Funston *et al.* (1995) who indicated that expression of estrus was prevented after depletion of glucose (2-deoxyglucose) from ewes. Ott *et al.* (1980) showed that the synchronized does goat with two injections of $PGF_{2\alpha}$ (11 days apart) 70 % of them came into estrus by 54 hrs after the 1st injection and 94 % after the 2nd injection by 53 hrs. El-Amrawi *et al.* (1993) treated cycling Saanen does with the same protocol as in the study of Ott *et al.* (1980), and reported that all does came into estrus within 48 h after the 1st injection,

and 80 % became pregnant following breeding. In one study on West African dwarf goats, Akusu *et al.* (1986) reported that most goats came into estrus by 42 and 59 hrs after the 2nd injection of $PGF_{2\alpha}$ analogue, respectively. Regarding Fig. 2. P_4 concentration remained under 1.0 ng/ml after the 1st dose of PGF_2 and the 2nd dose of PGF_2 accompanied by Glu, while after the 3rd dose of PGF_2 accompanied by Glu, P_4 level rose to > 1.0 ng/ml in the treated does compared to the control group. Furthermore, P_4 level reached the peak on day 16 of the cycle, but it was significantly higher in the treated does than in no-treated group. This increase may refer to the large numbers and sizes of CL observed in the treated group. So, the immediate effect of Glu may be accompanied by an increase in P_4 concentration.

These results are similar to that obtained by Gaafar *et al.* (2005) who indicated that plasma P₄ concentrations were 0.5±0.1 ng/ml, 0.4±0.3, 2.3±0.6 and 3.5±0.5 ng/ml at days 13-14 before the estrus, day 0 (estrus), day 3 and days 5-14 of the estrous cycle of Damascus does, respectively. They indicated also that the decline in plasma P₄ concentration was noted 24-72 hrs before the estrus comes. Thorburn and Schneider (1972) indicated that during the breeding season, P₄ concentration in the blood plasma decreased during the follicular phase (< 1.0 ng/ml) of the estrus cycle and remained at this level until reached > 1.0 ng/ml at beginning of luteal phase (Chemineau, 2004 and Yu *et al.*, 2005).

The present results showed also that treatment by Gl had a vital role in recruitment follicles especially in LO than in RO, these results are similar to that reported in previous studies in sheep (Teleni *et al.* 1984, Teleni *et al.* 1985, Teleni *et al.* 1989_a, Teleni *et al.*, 1989_b and Downing *et al.*, 1995). They indicated that intravenous infusion of glucose improved ovulation rate in ewes. Teleni *et al.* (1989_b) pointed out that the increase in the ovulation rate was strongly associated with feeding on Glu and Lupin, in other study, ovulation rate was 1.64 in Merino ewes injected i.v. by Glu (Teleni *et al.*, 1984 and Teleni *et al.*, 1985). Teleni (1989_a) indicated that all ewes treated with Glu or Glu + acetate + lupin for 9 days before the expected time of ovulation led to a significant increase in the ovulation rate (approximately 25 %, P<0.001) than the control group. Downing *et al.* (1995) showed that there was a strong relationship between Glu infusion and ovulation rate in sheep. Ovulation rate increased to 2.4±0.3 vs 2.0±0.0 when ewes were administrated Glu with amount of 60-65 mM/h for five days in the end 3- 4 days of luteal phase of the estrous cycle. Mun˜oz-Gutiérrez *et al.* (2002) and Mun˜oz-Gutiérrez *et al.* (2004) reported that ewes infused by glucose and fed on lupin tended to have more follicles and high ovulation rate. San-Martin *et al.* (1968) demonstrated that left ovaries of *Lama pacos* ovulated more frequently than the right post mating or administration HCG. Letelier *et al.* (2008) reported that ovulation rate increased in ewes supplied by glucogenic mixture at first administration. They indicated also that the higher ovulation rate found in the treated ewes may be related to an increased developmental competence of their follicles. However, the cause of inequality of ovarian function is unknown, but some previous studies clarified that inequality may refer to invasion of autonomic nerves in the ovarian stroma which regulate the steroid hormones secretion and follicular growth. Thomson *et al.* (2001) indicated that the difference between

right and left ovaries may refer to anatomical and physiological differences that regulate their functions and induce ovulation. In contrast, Potashnik *et al.* (1987), Check *et al.* (1991), Jarvela *et al.* (2000) reported that right ovaries had higher ovulations than left ovaries, the reason refers to the anatomical difference in the ovarian veins which affect blood flow characteristics into ovaries (which was observed in the left ovaries more than the right ovary). The hormonal effect has also effect on ovulation rate; previous studies indicated that the increase in ovulation rate may be related to an increase in FSH and LH levels which in turn develop the ovarian follicles. Funston *et al.* (1995) reported that depletion of Glu (2-deoxyglucose) available in ewes blocked the formation of yellow body and suppressed releasing LH from the pituitary gland. Therefore, glucose could be considered as a stimulator of hypothalamic gonadotrophic releasing factors. Downing and Scaramuzzi (1991) indicated that short-term energy inputs (4–6 days) or, more specifically, infusion of glucose via i.v. increased ovulation rate. Williams *et al.* (2001) indicated that the presence of glucose transporters (GLUT1 and GLUT4) in the granulosa and theca cells may modify the follicular function within the ovary of ewe. There is also other factor may affect ovulation rate as reported by Vin˜oles *et al.* (2002), they found that ovulation rate and FSH concentration during the follicular phase were higher in ewes recognized by high body condition than in low body condition. On the other hand, Sreewart (1990) indicated that role of immediate nutrition in increasing ovulation rate was not constant. In summary, the present results indicate that glucose supports the estrous activity of Damascus does during early summer in Upper Egypt (Assiut governorate) and modifies the ovarian activity by increasing number and size of OF and CL. Further efforts are needed to figure out role of Glu on recruitments follicles in the slimmed and fatten animals, and how Gl compensate lack of animal's appetite which occurs during hot summer in sub-tropical countries?

Conclusion

In order to resume the estrous activity during early summer, Damascus does goat are needed to be treated by glucose, since the treatment by Glu in the present experiment improved expression of estrus, aided in improvement of numbers and sizes of OF and Cl and increased progesterone production which will be useful in enhancement of early stage of pregnancy in future. Thus, treatment by energy-yielding nutrient (glucose injection) on ovulation rate in Damascus does goat may be recommended in periods of reproductive activity impairment.

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INFLUENCE OF ACUTE PANCREATITIS INDUCTION ON ZYMOGEN GRANULES OF PANCREATIC ACINAR CELLS USING IMAGE PROCESSING AND NUMERICAL ANALYSIS APPROACHES

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Abstract: Acute pancreatitis (AP) is a mild to severe inflammation of the pancreas with a clinical picture of a self – limited illness that sometimes progresses to a severe state leading to multiple organ failure eventually causing death. The initiating event of AP may be anything that injures the acinar cell and impairs the secretion of zymogen granules which enclose the digestive pro-enzymes. Therefore, the aim of this work was to assess the effect of acute pancreatitis on the ultrastructure of zymogen granules and to analyze this effect using image processing and numerical analysis approaches. **Material and Methods:** Ten male albino rats weighing 150-200g were divided into two groups; group [I] was treated with physiological saline injections *i.p.* as a control group. Acute pancreatitis was induced into group [II] by two injections of 250mg/100g b.w. of L-Arginine *i.p.* in an one hour interval as 20% solution in 0.15M NaCl. Electron micrographs obtained from zymogen granules were examined then were processed with CIS technique for image analysis and histographic analysis. **Results :** Ultrastructural results of zymogen granules of group [II] (rats received L-Arginine) revealed changes with different severity as; depletion, arrest towards the nucleus, dilatation or fusion together, some of them showed an atrophy in size, rupture of membranous boundary and eventually irregular in shape with loss of their rounded configuration and degraded. Obvious varieties appeared in coloured images and numerical values analysis that obtained from microphages of group [II] comparing with those of control group [I]. **Conclusions:** Influence of acute pancreatitis provoked deleterious effects in zymogen granules as consequence of intense inflammation. Despite of current knowledge, many hypothesis and questions remain unanswered concerning the effects of L-Arg. Image processing and numerical analysis which are considered to be valuable approaches in this study, may resolve some of mistiness of the impact of pancreatitis on the exocrine pancreas. Application of this technique gave more details of pathological changes which were unable to be seen by electron microscope only. So, it can be applied as good techniques for early diagnosis in the field of pathology to illustrate the fine details beyond that of electron micrographs.

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Key Words: Histographic analysis, image processing, L-Arginine, pancreatitis, rat, ultrastructure, zymogen granules.

1. Introduction:

Pancreatitis is a disease with a high mortality and no efficient treatment is available for it at present. Pancreatitis is inflammation of the pancreas, an organ that produces several enzymes to aid in the digestion of food. Pancreatitis may be either acute (sudden and severe) or chronic. Both types of pancreatitis can cause bleeding and tissue death in or around the pancreas. However, long-term damage to the pancreas is common, sometimes leading to malnutrition and diabetes. Necrotizing pancreatitis (in which pancreatic tissue dies) can lead to cyst-like pockets and abscesses (Schulz *et al.*, 1999; Urunuela *et al.*, 2002). Acute pancreatitis may occur when factors involved in maintaining cellular homeostasis are out of balance. Therefore, several possible causes of pancreatitis such as gallstones and certain drugs, including azathioprine, sulfonamides, corticosteroids, nonsteroidal anti-inflammatory drugs (NSAIDs), antibiotics such as tetracycline, cisplatin

anticancer drug and opioids (Kingsnorth and O'Reilly, 2006). Pancreatic acinar is specialized for the synthesis, storage, and release of digestive enzymes. Only in modeling studies, zymogen granule membrane constituents are likely to be essential for acinar cell function for two reasons. First, protein storing and packaging will, at least to some extent, depend on interactions between content and membrane components. Second, the granule membrane must contain trafficking proteins to ensure functioning of the zymogen granule as a trafficking organelle. The sequence of pancreatic acinar granules formation has been extensively studied (Seong *et al.*, 2000; Malatesta *et al.*, 2002; Andrzejewska *et al.*, 2005). Secretory components are packed in the Golgi complex; the pro-granules bud-off the transcisternae and then fuse to form an immature granule, i.e. the condensing vacuole. The latter changes its morphology and transforms into a mature electron-dense granule. The steps in granule formation involve

massive membrane shuttling, a process which may be expressed in changes in the structure of internal organelles. Finally, mature granules are stored in the apical pole of the acinar cell.

L-arginine is a semi-essential amino acid found in our diet, and it is engaged in several metabolic pathways within the human body. The body converts L-arginine into nitric oxide (NO), which is a powerful vasodilator (relaxer of blood vessels) and increases blood flow. In pancreas, L-arginine is used to release insulin. Recently, there are numerous animal studies reported about L-arginine-induced acute pancreatitis (Czako *et al.*, 2000; Tashiro *et al.*, 2001; Takacs *et al.*, 2002). Most of the authors, who studied the pathomechanisms of induced pancreatitis used 250mg/100g body weight of L-arginine twice at interval of one hour (Takacs *et al.*, 1996 ; Varga *et al.*, 1997; Czako *et al.*, 1998; Hegyi *et al.*, 2004). Therefore, this dose of L-arginine was applied in the present study to investigate the influence of acute pancreatitis induction on the zymogen granules of rat pancreatic acinar cells.

On the other hand, image processing is a technique for processing any image, it depends on the fact that the causes of colour in many structures are in response to the structural irregularities (Fortner and Meyer, 1997; Fraser *et al.*, 2003; Gendler, 2003; Rector *et al.*, 2004). Such use of this property can be considered as the key factor for mapping the way in which the electron beam of TEM interact with the internal structure of organelle to produce the digital image. This digital image was further used for better characterization of the differences in fine structural field. However, the digital image consists of a square array of image elements or pixels; at each pixel, the image brightness was sensed and assigned with an integer value (from 0 to 255 in the case of gray scale image) that was named as the gray-level. For better visualization of the image, the gray-level image is transformed into colour image and converted into hue, saturation and intensity (HIS) using a discoloured technique. The simplest way of obtaining a pseudo colour image from a gray-level image is to use the RGB mode. An RGB colour consists of three individual images exposed through Red, Green and Blue filters, which are eventually combined into a single composite colour image. Note that, the individual RGB images are not in colour. They will still be gray scale images until combine them into the final colour image. This is recognized by many of the popular image processing programs like Photoshop or Paint Shop Pro (Parker, 1997; Sonka *et al.*, 1998; Myler, 1999). These programs are excellent tools when you want to crop, resize and perform final adjustments to your colour images and hence. Also, it

can offer both more feasible and practical performance at simple tasks and good implementation, which would be impossible by TEM or other tools alone. However, the purpose of RGB colour model is to facilitate the specification of colours in some standard, generally accepted way, and is the most commonly used model in graphics devices (MacDonald, 1999; Lynch and Livingston, 2001). This model however, allows offering colour range for the pixels from an integer value 0 to 16777215 (number of colours: 256x256x256). This can be used as an additional parameter for identifying the fine details of the differences in the ultrastructure features.

On the light of this, the present study has been carried out to apply image processing and numerical analysis techniques on the TEM images to visualize the coloured images on the nanosize structure and to analyze numerically and histographically the zymogen granules ultrastructure post L-arginine – induced pancreatitis in pancreatic acinar cell.

2. Material and Methods

1. Experimental Animals and Ultrastructural Preparation of Pancreatic Acinar Cells

Ten male albino rats (*Rattus norvegicus*) ranging in weights from 150-200g were acquired from Schistosoma Biological Supply Program (SBSP) Theodor Bilharz, Research Institute, Cairo, Egypt. Housed in clear plastic cages (one rat/cage) with wood chips as bedding and were kept at constant room temperature (25°C) in a 12h light/dark cycle with free access to pellet rodent diet and water. After one week of acclimatization, the rats were divided into two groups: Group[I] was treated as control and received physiological saline injections *i.p.* In group [II] pancreatitis was induced with 250mg/100g body weight of L-Arginine (Sigma-Tec. El Salam City, Cairo, Egypt, under license of: Merck K GaA, Darmstadt, Germany) by injection *i.p.* twice at an interval of one hour as a 20% solution in 0.15M NaCl. All rats were scarified by decapitation 24h after the second L-Arginine injection.

The pancreas were rapidly excised and were processed for ultrastructural evaluation by electron microscopy as described previously by Dykstra *et al.* (2002) as follows: Freshly excised pancreas were cut into small blocks (1x1mm³) fixed in cold 4F:1G (i.e. 4% formaldehyde and 1% glutaraldehyde adjusted at pH 2.2) for 24h, and post fixed in 1% osmium tetroxide in 0.1M phosphate buffer (pH 7.3), dehydrated in an ethanolic series culminating in 100% acetone, and infiltrated with epoxide resin. After polymerization overnight at 60°C, semithin sections (0.5µm) were stained with 1% toluidine blue

in 1% sodium borate and examined with a light microscope. Areas of exocrine acinar cells were selected and the blocks trimmed accordingly. Ultrathin sections (80-90nm) were cut, placed on 200 mesh copper grids, and stained with uranyl acetate and lead citrate. The grids were examined and photographed using JEOL.JEM-1400EXELECTRON MICROSCOPE at the Central Laboratory of Faculty of Science, Ain Shams University, Cairo, Egypt. The photographs were printed on KODABROMIDE F5s GLOSSY Black and White- Schwarzweib- Kodak.

The determination of pathology was made blind from the electron micrographs that showed the most characteristic changes of L-Arginine-induced pancreatitis in rats of group [III].

2. Computer-assisted Examinations:

The electron micrographs of pancreatic acinar cells of the two groups were visualized and examined by applying Cartographic Information System software (CIS) technique (Shulei and Yufen, 2004). Combination of image processing; numerical analysis; artificial intelligent and expert system with general vision software were used to colourize; analyze and reveal the morphological and ultrastructural alterations in zymogen granules by using Adobe® ImageReady® CS Middle Eastern Version "8".

3. Results

As illustrated in figure (1) of electron micrograph that obtained from group [I], pancreatic acinar cells of control rats are characterized by numerous zymogen granules varying in size, smoothly rounded formations with a homogeneous content of high density and are crowded mainly at the apical region of the cytoplasm towards the lumen. Image analysis of this electron micrograph after being processed by CIS technique reveals that each zymogen granule is blue in colour but in different degrees of blue density starting from deep to light, which reflect that colour image can elucidate the presence of different components in the granule (pro-enzymes) as seen in figure (2), while electron photograph displays only a homogeneous electron density.

Regarding histographic analysis, it is well known in CIS technique as reported by Rector *et al.*, 2004 and Shulei and Yufen, 2004, as previously mentioned in material and methods, that the colour which has appeared, is not randomly colour, but it is related to the formation of the structure, i.e. it means that the constituents of the structure is formed of its individual elements in different colours which combine and give the specific colour of the structure.

The histographic analysis is formed of two dimensions (2D); the X and Y axis. In this study, the

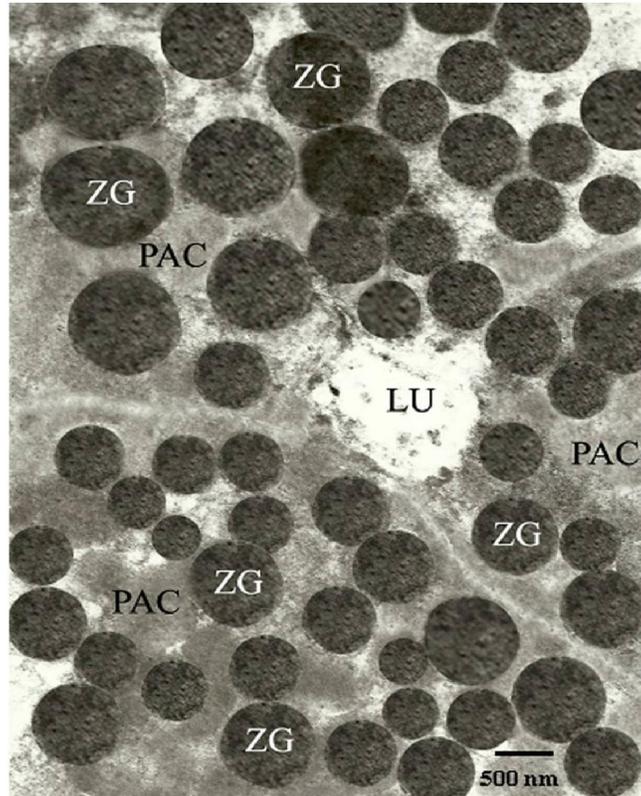
Y axis represented the amount or the concentration (quantitatively) of the elements or compounds, whereas X axis represented the different elements or compounds of the structure. Therefore, histographical analysis of a magnified zymogen granules that obtained from the coloured image and marked in white dots are coloured in blue having a value of 116.42 and pixelation area is 21210 as clearly shown in figure (3). The arrangement of the peaks of this histogram are green, yellow, red and blue, which may reflect that they are different types of pro-enzyme constituents in zymogen granules.

Ultrastructural results of zymogen granules of group [II] (rats received L-Arginine) demonstrate alterations with different severity as; depletion (i.e. decreased in number, as only ten zymogen granules are seen in the acinar cell), arrest towards the nucleus, dilatation or fusion together, some of them reveal an atrophy in size, rupture and explosion of membranous boundary and eventually irregular in shape with loss of their rounded configuration and degraded as clearly observed in figure (4). It is also noticed, that there are many electron dense particles participated all over the acinar cell, which may be due to a chemical reaction of L-Arginine with the chemical components of the cell.

The ten zymogen granules appear in the coloured image of this electron micrograph with light green colour intermixed with yellowish colouration as shown in figure (5), which is totally different from the colour of the control one. The histographical analysis of each individual granule after marked by dots gave the same arrangement of the peaks as red, green and blue similar to the other granules with a mean value of the same which is 150 and the pixelation area is 120000. The slight difference in number can be neglected as clearly noticed in figures (6-15). To prove that, a histographical analysis of three zymogen granules together (ZG 4,6,8) was applied and the result was in the same manner as obviously seen in figure (16).

These histograms of figures (6-16) insured that the ten fine structures which are seen in figure (4) of the electron micrograph are zymogen granules that were impaired due to the impact of pancreatitis induction.

An interesting observation is seen in these histograms of the ten granules, that the peaks of the three colours appear at the peripheral of the X axis as single lines in concentration intermixed with each others in a massy disturbance manner. These results may explain the hazardous effect of pancreatitis induction on the role of the zymogen granules for assemblage and storage the pro-enzymes in normal way, which reflects the external symptoms of inflammation.



Figure

Figure (1): An electron micrograph of the apical region of control pancreatic acinar cells (PAC), revealing normal architecture of numerous zymogen granules (ZG) varying in size, smoothly rounded formations with a homogeneous content of high density. At the center of the acinus, clear and rounded lumen (LU) is located. (scale bar 1cm = 500 nm)

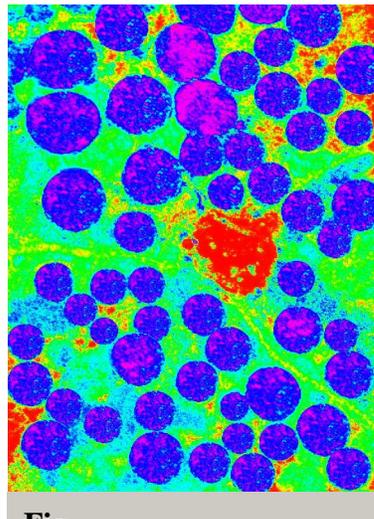


Figure (2) : Coloured image of the previous electron micrograph of control rat designating the blue colouration of zymogen granules with an extend of various density of the colour in each granule.

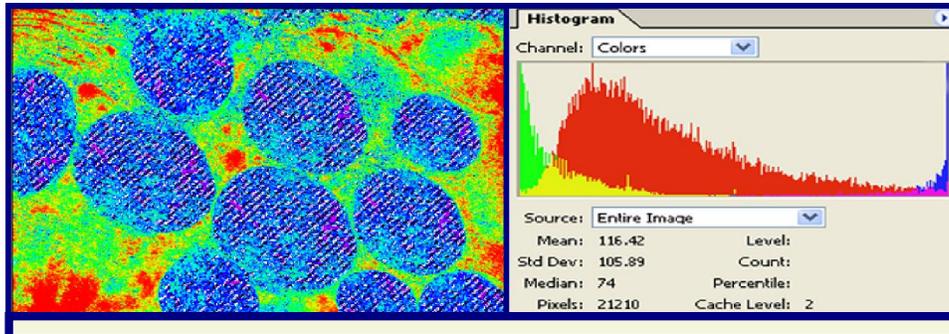


Figure (3): A magnified part of the previous coloured view of control zymogen granules after marked with white dots for histogrammic analysis, showing the arrangement of the peaks as green, yellow, red and blue with mean value of 116.4 and 21210 pixels.

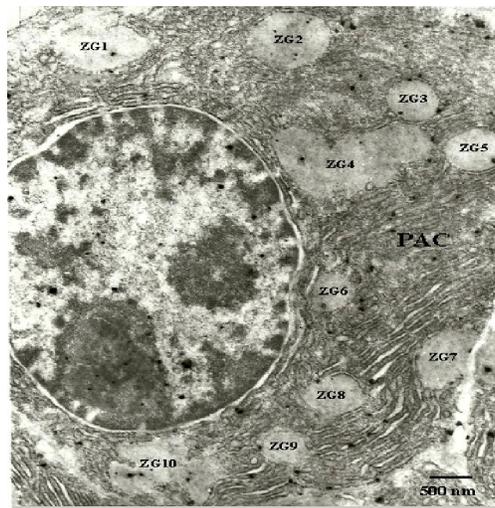


Figure (4) : Electron micrograph of a pancreatic acinar cell (PAC) obtained from group (II) of rats received L-Arginine revealing deleterious changes in zymogen granules with different severity as; arrest at the nuclear region, decrease in number, since only 10 granules are seen (ZG1 - ZG10) which reflect a sort of depletion. Some of them display an atrophy in size (ZG3, ZG6 & ZG9), while some others dilate or fuse together (ZG1, ZG4, ZG7 & ZG8) with loss of their rounded configuration. Also (ZG10) showing rupture and explosion of its membranous boundary. Many dense particles are obviously noticed all over the cell. (scale bar 1cm = 500 nm)

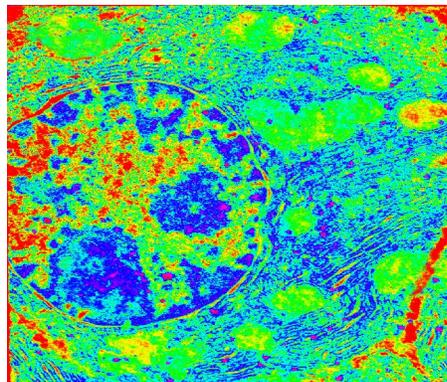
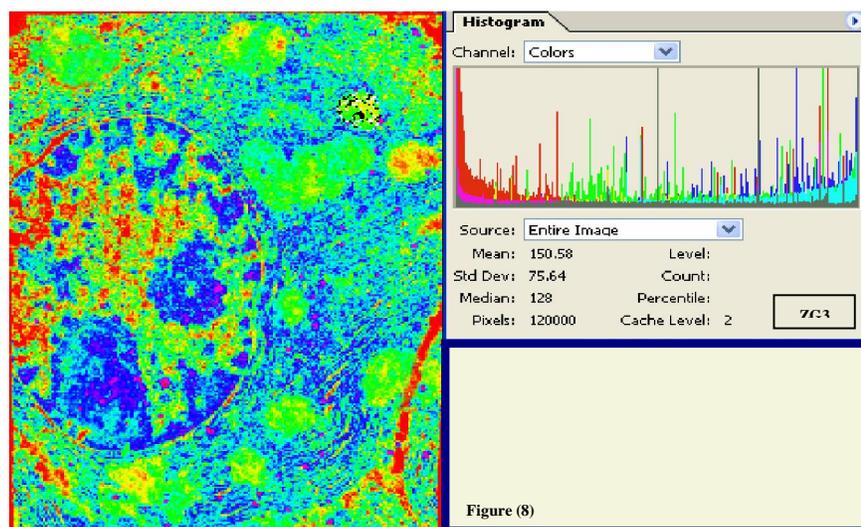
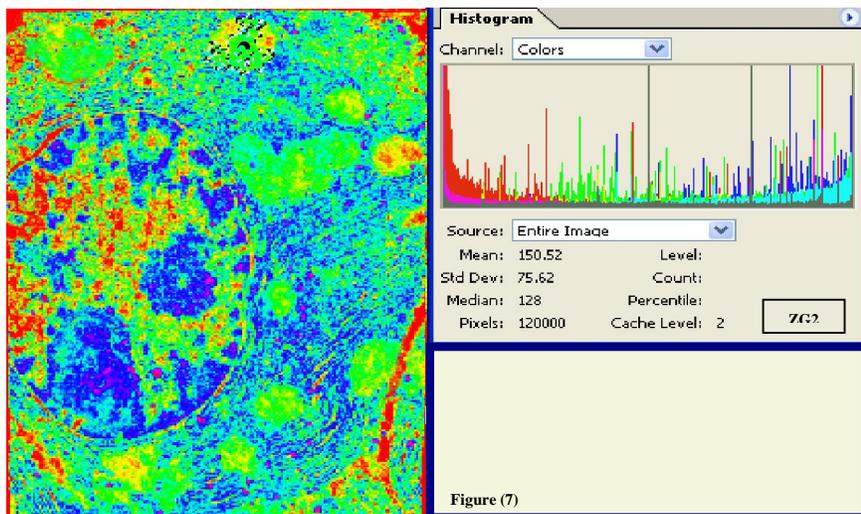
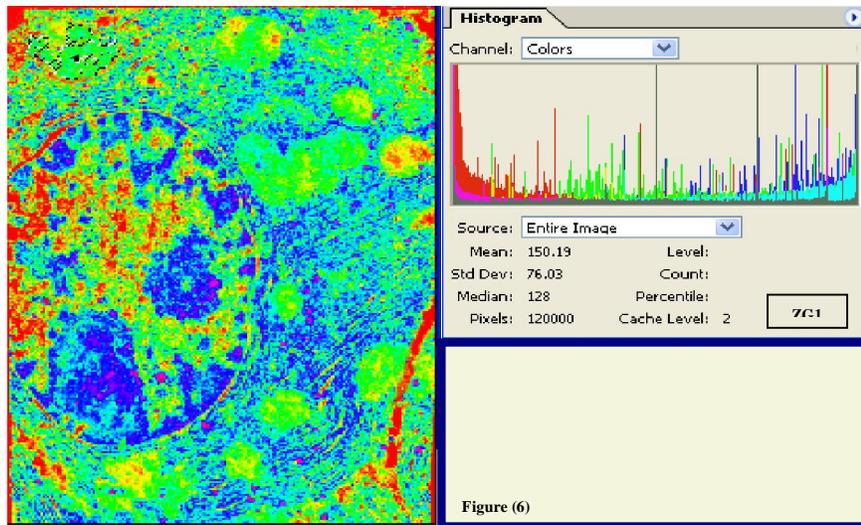
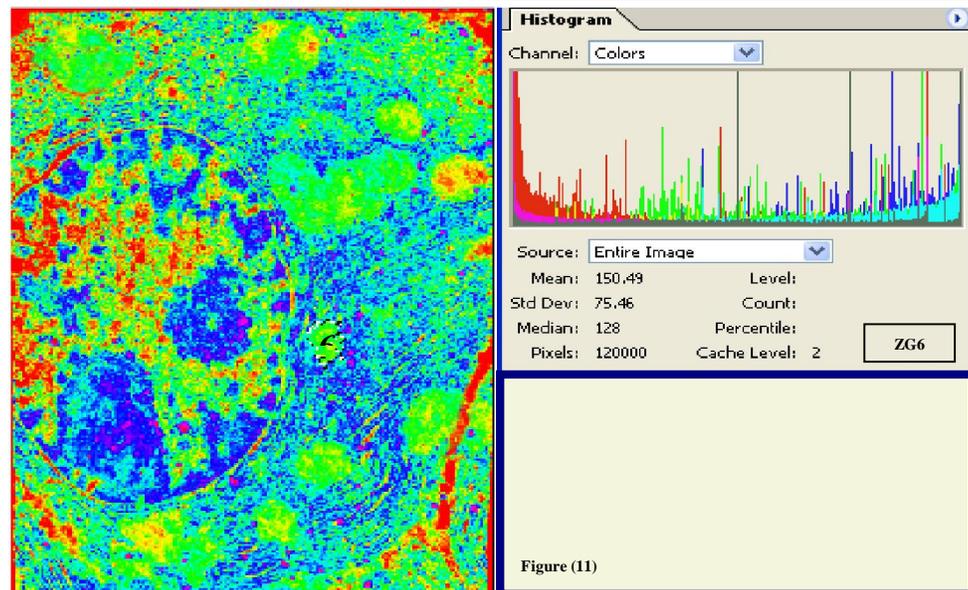
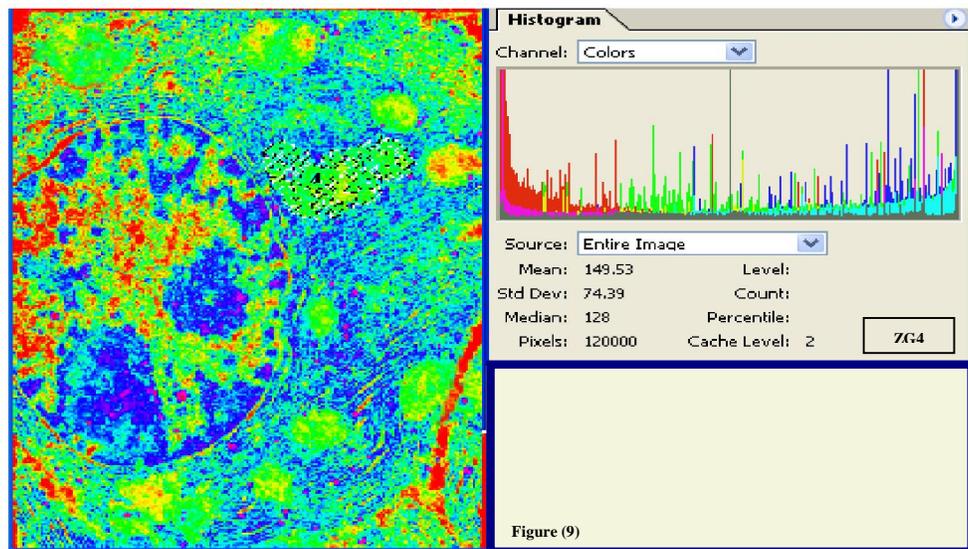
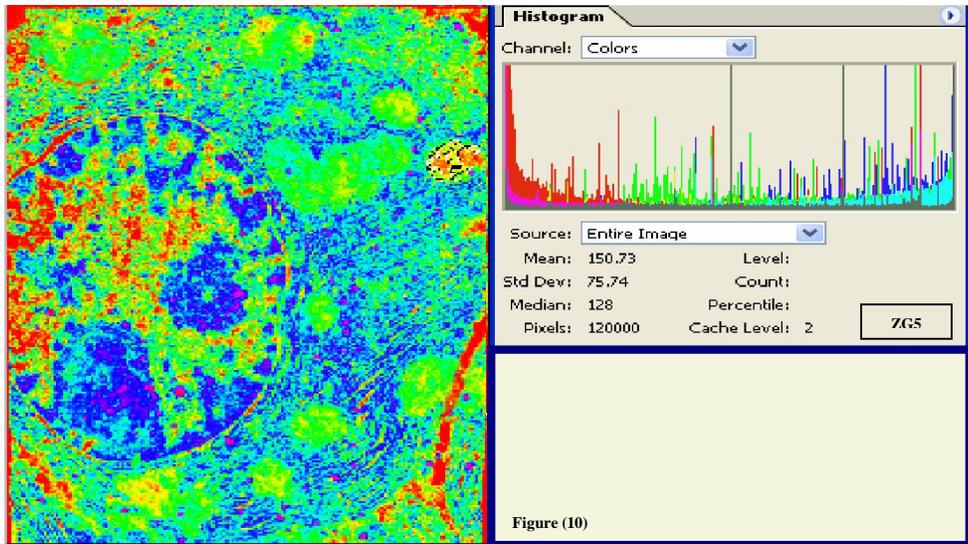
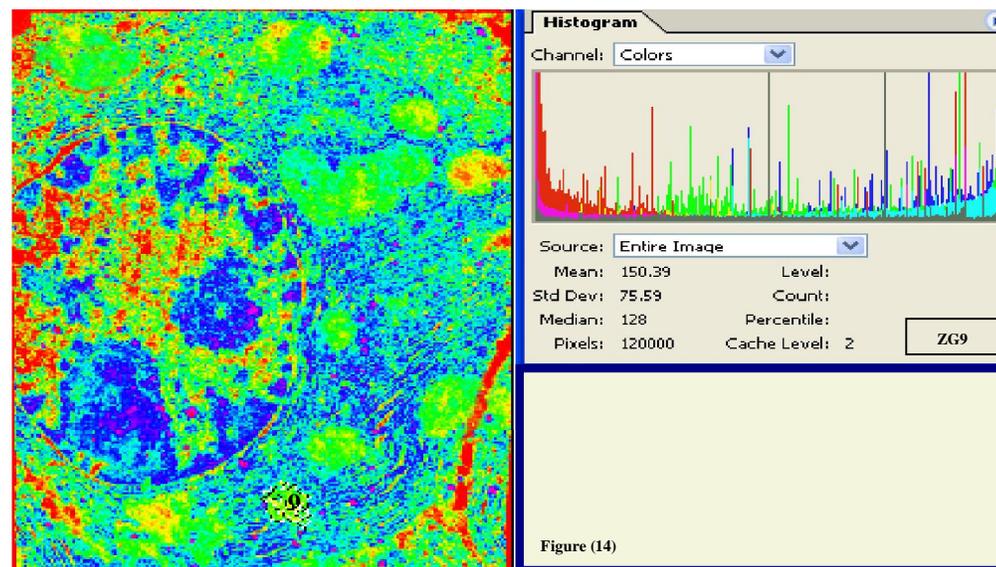
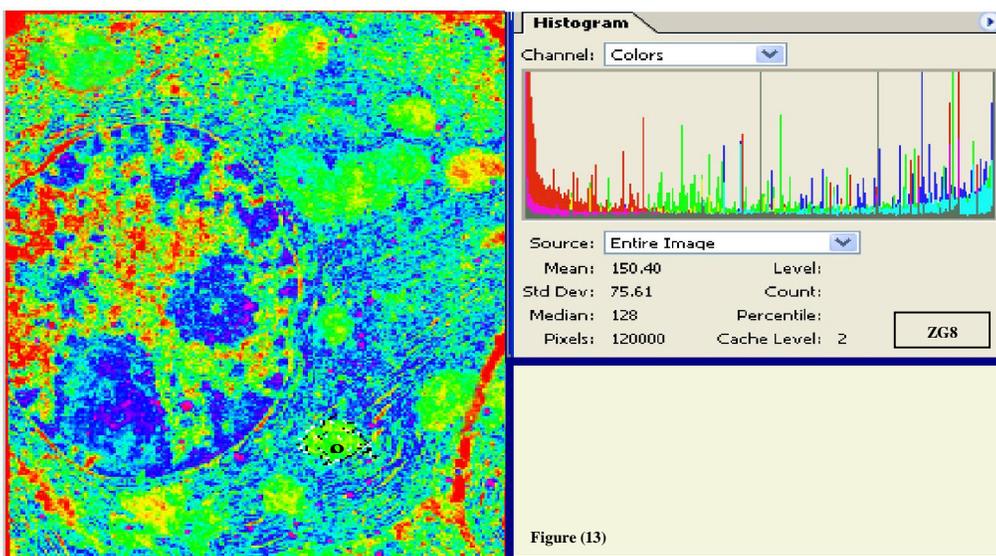
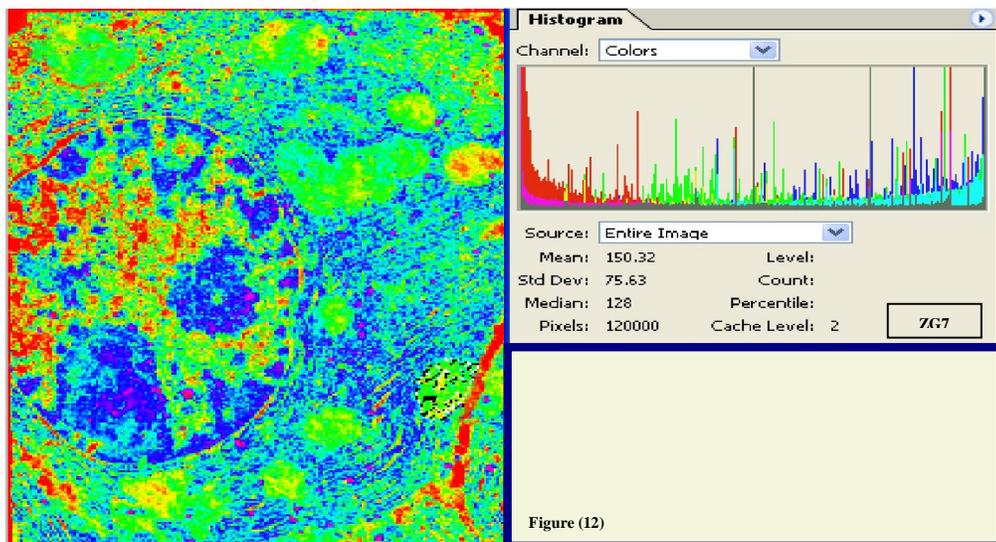
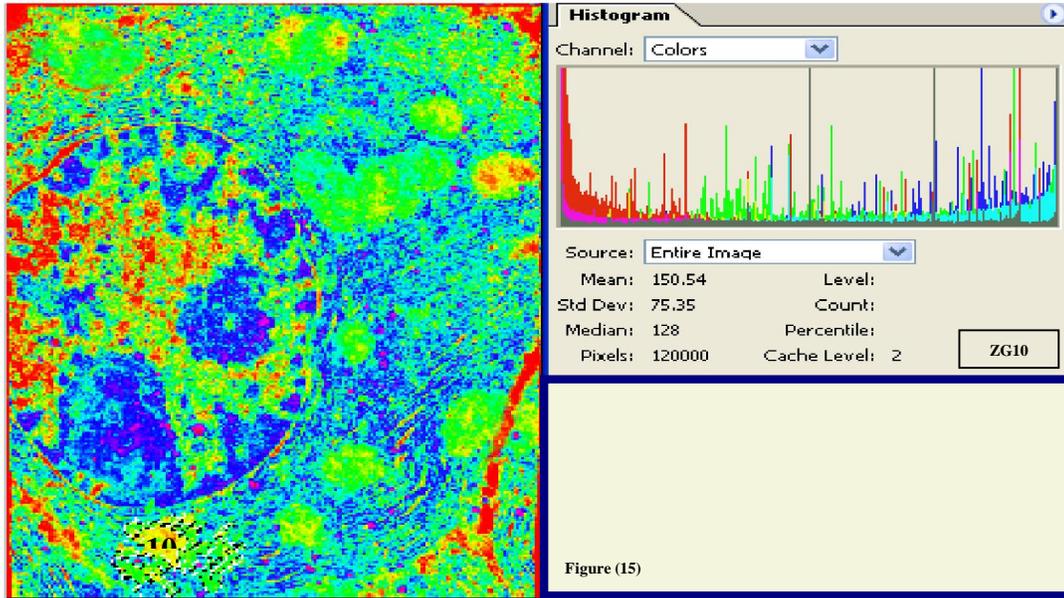


Figure (5): Coloured image of the previous micrograph of L-Arginine group displaying light green colour of the ten zymogen granules intermixed with some yellowish colouration.









Figures (6-15): Illustrating histographical analysis of the ten zymogen granules (ZG1 – ZG10) respectively. Each granule in its figure with marked dots give the same results as the others in arrangement of the peaks as red, green and blue with mean value of 150 and 120000 pixels. The slight difference in number can be neglected. Notice, that the three colours in all figures are intermixed in a messy disturbance manner at the peripheral part of X axis.

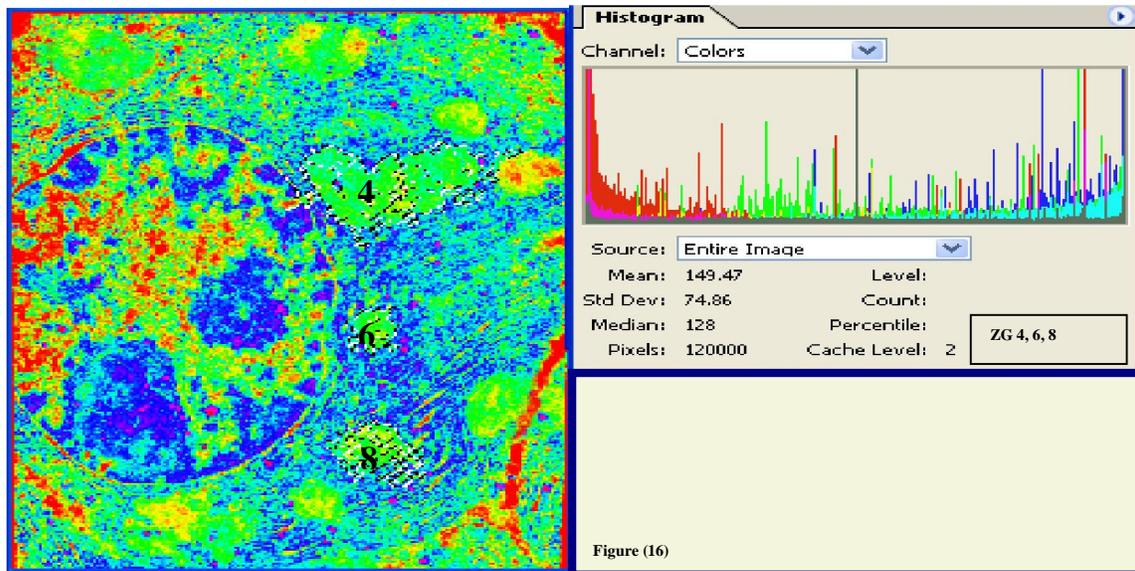


Figure (16) : Displaying the histographical analysis of three zymogen together (ZG4, ZG6 & ZG8). They give the same results of the arrangement peaks and of numerical value as the individual histogram of each one of them.

4. Discussion

Primarily, it should be recalled that the most of the work carried out on pancreatitis have been emphasizing mainly on its medical application together with some physiological and biochemical aspects. A little attention has been paid to investigate the possible impact of pancreatitis on the fine structures of the body organ - in general- and exocrine pancreas - in particular. Despite medical treatment, the lethality of severe acute pancreatitis is still high (20-30%). Therefore, it is very important to characterize the events of this severe disease on the level of the fine structure of the acinar cell, specially zymogen granules which are the main sites of assembling and storage of the digestive enzymes.

L-arginine is considered a good choice for inducing pancreatitis in animal models like rats. Arginine has gained recent attention in critical care nutrition and is considered a conditionally essential amino acid. Arginine is the specific precursor for nitric oxide production and a potent secretagogue for anabolic hormones such as insulin, prolactin, and growth hormone. Under normal conditions, arginine is considered a nonessential amino acid because it is adequately synthesized endogenously via the urea cycle (Saka *et al.*, 2004).

L-Arginine – induced pancreatitis is a slowly developing experimental model in which characteristic laboratory changes are observed 24h after induction of the disease. By this time, administration of high doses of L-Arginine can cause severe necrotizing pancreatitis confirmed by the significant elevations in the serum amylase level, as observed by Szabolcs *et al.* (2006). Acinar cell ultrastructure after taurine treatment in rat acute necrotizing pancreatitis was studied by Ates *et al.* (2006) and they found degree of injury in rough and smooth endoplasmic reticulum, Golgi apparatus, mitochondria and nucleus of acinar cells.

On contrary, recently, some authors illustrated that exogenous L-Arginine intake has multiple beneficial pharmacological effects when taken in doses larger than normal dietary consumption, as reported by Gad (2010) who illustrated that L-arginine has a positive role as an anti-aging. Also, El-Demerdash *et al.* (2010) assessed the positive effect of modulation of nitric oxide (NO) on peptic ulcer healing using L-arginine as NO precursor.

On the other hand, many cases had been reported of acute pancreatitis due to different drugs as explained by (Singh *et al.*, 2004; Memis *et al.*, 2005; Trivedi and Pitchumoni, 2005; Magill *et al.*, 2006).

Some authors were concerned with the impact of acute pancreatitis on other organs rather than pancreas, such as Camargo *et al.* (2008) who

elucidated that acute pancreatitis provoked deleterious effects in endothelium-dependent relaxing response for Ach in mesenteric rings that were strongly associated with high plasma NO level as consequence of intense inflammatory responses, and they found that the subsensitivity of contractile response to PHE in mesenteric and pulmonary rings might be due to the complications of pathological condition in the early stage of pancreatitis. Moreover, Abd-Hady *et al.* (2010) found that high level of Asymmetric Dimethyl L-arginine (ADMA) as an endogenous inhibitor of nitric oxide (NO) synthase in congestive heart failure, can explain endothelial dysfunction in heart failure in spite of increased total NO production. In addition, the effects of splenectomy on spontaneously chronic pancreatitis in mice with alymphoplasia / alymphoplasia (aly/aly) mutation were studied by Wang *et al.* (2010) and they reported that inflammation and development of the pancreatitis in aly/aly mice were suppressed effectively after splenectomy.

So, it is obvious, on the light of collecting data from these reports that the impact of pancreatitis on the fine structure of zymogen granule did not receive good attention despite of its important role in storage, docking and transient of the digestive enzymes present in pancreatic juice to a specialized plasma membrane structures called porosomes or fusion pores, to discharge its vesicular contents.

In conclusion, the present investigation indicated that pancreatitis provoked deleterious effects in zymogen granules as consequence of intense inflammation. It is therefore, worth mentioning that the present study tried to illuminate new aspects, concentrating on the fine structure of zymogen granules and determinate the pathological changes of acute pancreatitis that affected it by using image processing and numerical analysis techniques as a new method to colourize the control and treated TEM images of zymogen granules and to analyze histographically their numerical values which give good results for detection of pathological changes that occurred in their morphology and their inner fine structure which were unable to be seen in electron micrographs. Therefore, this method may resolve some of mistiness of the impact of pancreatitis on the acinar cells of exocrine pancreas, and it may be applied for early diagnosis in the field of pathology to illustrate the fine details beyond that of electron micrographs.

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A New Measurable Definition of Knowledge in New Growth Theory

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Abstract: New Growth Theory helps us make sense of the ongoing shift from a resource-based economy to a knowledge-based economy. It underscores the point that the economic processes which create and diffuse new knowledge are critical to shaping the growth of nations, communities and individual firms. In all too many contributions to New (Endogenous) Growth Theory – though not in all – central reference is made to ‘a stock of knowledge’, a ‘stock of ideas’, etc., this variable featuring centre-stage in the analysis. Yet it is immediately apparent that this is far from being a crystal clear concept. The difficulty and uncertainty of being able to capture the value associated with knowledge is a real problem. The intent of this paper is introducing new thinking and theorizing about the knowledge and its measurability in new growth theory. Moreover the study aims to synthesize various strain of the literature with a practical bearing on knowledge concept. By contribution of institution framework which is found within NGT, we can indirectly measure the knowledge concept. Institutions matter because they shape the environment for production and employment of new knowledge.

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<http://www.americanscience.org>.

Key Words: New Growth Theory (NGT), Knowledge, Institution Framework.

1. Introduction

The central notion behind New Growth Theory is increasing returns associated with new knowledge or technology. New Growth Theory is a view of the economy that incorporates two important points. First, it views technological progress as a product of economic activity. New Growth Theory is often called “endogenous” growth theory, because it internalizes technology into a model of how markets function. Second, New Growth Theory holds that unlike physical objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of growth.

New Growth Theory helps us make sense of the ongoing shift from a resource-based economy to a knowledge-based economy. It underscores the point that the economic processes which create and diffuse new knowledge are critical to shaping the growth of nations, communities and individual firms.

No amount of savings and investment, no policy of macroeconomic fine-tuning, no set of tax and spending incentives can generate sustained economic growth unless it is accompanied by the countless large and small discoveries that are required to create more value from a fixed set of natural resources (P. M. Romer, 1993, p. 345).

In all too many contributions to New (Endogenous) Growth Theory – though not in all – central reference is made to ‘a stock of knowledge’, a ‘stock of ideas’, etc., this variable featuring centre-stage in the analysis. Yet it is immediately apparent that this is far from being a crystal clear concept.

Yet again, the relevant literature frequently presents equations in which (dA/dt) is set equal to some power of A (A presents stock of knowledge) multiplied by other variables. These equations too are meaningless unless A is cardinally measurable. And yet they are never supported by any indication of how such a cardinal measure may be found or constructed. This is certainly not ‘measurement without theory’; it is theory without the minimal conceptual clarity required to make that theory worthy of attention. No amount of ‘sophisticated’ mathematical analysis can turn conceptual confusions into meaningful conclusions (Steedman, 2001).

The intent of this paper is introducing new thinking and theorizing about the knowledge and its measurability in new growth theory. Moreover the study aims to synthesize various strain of the literature with a practical bearing on knowledge concept.

2. Materials and Methods

Difficulty in Knowledge's Pricing

The centerpiece of New Growth Theory is the role knowledge plays in making growth possible. Knowledge includes everything we know about the world, from the basic laws of physics, to the blueprint for a microprocessor, to how to sew a shirt or paint a portrait. Our definition should be very broad including not just the high tech, but also the seemingly routine.

The standard approach which economists use has been to divide the world into two parts: private goods—excludable and rival, and produced by markets—and public goods—non-excludable, non-rival, and produced by government, or other non-market means, like charities. While an important exception to the rule that markets produce optimum results, public goods tended to be viewed as a very limited exception: we can rely on markets to produce the overwhelming majority of goods and services, and turn to the public sector only in a few special cases.

But not all ideas are pure public goods. While they are non-rival—many people can use them at once without depriving others of their use—economically valuable ideas are at least partially excludable. And most importantly, their excludability is more a function of socially determined property rights than it is a function of the intrinsic character of the idea.

The non-rival quality of ideas is the attribute that drives economic growth. We can all share and reuse ideas at zero, or nearly zero cost. As we accumulate more and more ideas, knowledge about how the world works, and how to extract greater use out of the finite set of resources with which the world is endowed, we enable the economy to develop further.

But in the case of knowledge, markets may not send the right price signals. The social benefits and the private costs of new knowledge creation diverge. Because additional use of knowledge has zero marginal cost, once the knowledge is created, any positive price for knowledge is too high. Because knowledge isn't fully excludable, entrepreneurs get paid less than the social value of their knowledge, and they don't have sufficient incentives to distribute it widely or invest in creating more (Cortright, 2001).

The difficulty and uncertainty of being able to capture the value associated with an invention is a real problem.

The gap between the social returns of research investment and their private returns is evidence of the inability of firms to capture the benefits of their research (Nelson & Romer, 1996). Careful econometric studies have repeatedly shown that the social rate of return to research (the value of all of the economic benefits received by society) is typically two to five times higher than that private rate of return (the profits accruing to the individual or the company that pioneered the innovation)(Jarboe & Atkinson, 1998).

Shortcoming of knowledge's Measurement

Conceptual Confusion of Knowledge

Romer's (1990) paper makes little advance over (1986) with respect to the issues at hand. At first we find a rather abstract discussion of the relations where A represents non-rival inputs and X rival inputs.

$$F(A, X) > F(A, X)$$

we are reading of non-rival knowledge and of A as 'the benefits of research and development'. Are 'knowledge' and 'the benefits of R & D' synonymous expressions? Either way, are there cardinal measures of these magnitudes? The 'existing stock of knowledge' is an input in the research sector; is the 'stock of knowledge' the same thing as the 'index of the level of technology'? Can a 'stock' be an 'index'? If they are not the same thing, how are they related? In any case, the product of the research sector is designs for new producer durables or, by the next page, 'new designs or knowledge'. Romer produces new terms (for the same thing?) at an impressive rate! At this stage in Romer's analysis A becomes an integer; but he is not really claiming to have produced a cardinal measure of the level of technology/knowledge/designs, of course. The integer nature of A is a mere artifact. Subsequently, in equation:

$$A = H A \cdot A$$

where HA is human capital in research and A is 'the total stock of designs and knowledge'. This equation is meaningless unless there are cardinal measures for both HA and A. Aghion and Howitt make it perfectly clear that the problem is not a purely empirical or data problem: 'It would be more accurate to say that formal theory is ahead of conceptual clarity. As the English side of the Cambridge capital controversy used to insist, the real question is one of meaning, not measurement. Only when theory produces clear conceptual

categories it will be possible to measure them accurately' (Steedman, 2001).

These shortcomings of Knowledge's measurement also exist in models such as Young/ Peretto/ Aghion-Howitt/ Dinopoulos-Thompson and all offering for example (non-) constant-returns and variable marginal products with respect to variables one of which – the stock of knowledge – has not been shown to be, and may well not be, cardinally measurable. Such a cavalier approach does the profession little credit, for conceptual confusions cannot yield convincing conclusions (Steedman, 2001).

Explicit Knowledge versus Tacit Knowledge

But if we look more closely, it's possible to measure entire part of knowledge. To understand why, it is helpful to divide knowledge into two types, codifiable knowledge—that which can be written down—and tacit knowledge—which is learned from experience and can't easily be transmitted from one individual to another. Credit for the distinction between these two types of knowledge is generally given to Michael Polanyi." (Polanyi, 1967). Codifiable knowledge is blueprints, mathematical formula, operations manuals, and tables of statistics, organization charts and facts.

Tacit knowledge is how to hit a baseball, ride a bicycle or know how to work with a specific group of people on a team. At key part of our knowledge is tacit in the sense that we can figure out whether to safely pass another car on a two-lane road without stopping to solve the system of simultaneous equations needed to prove that a collision will not occur (Dosi, 1996).

The distinction between tacit and explicit knowledge has drawn increasing attention among those studying business and the economy. Management experts studying innovation and competitive strategies of Japanese manufacturing firms noted the role of the development of tacit knowledge as a key step in designing new products. One of the keys to successful product development has been encouraging employees to understand and develop their tacit knowledge of particular problems and their solutions (how to knead bread) and then to work to translate and codify this information so that it can be used by the entire organization (to design a bread making machine) (Nonaka & Takeuchi, 1995).

Tacit knowledge is clearly different. Because it is embedded in the minds of individuals and the routines of organizations, it doesn't move easily

from place to place and create more difficulty in its measuring methods.

The distinction between codifiable and tacit knowledge helps explain why technology doesn't completely erase the importance of proximity in transmitting ideas. Simply having access to codifiable information doesn't mean you have knowledge. A formula specifying the solution to Fermat's last theorem—a centuries-old mathematical puzzle—would be information, but it wouldn't be knowledge unless you were one of the few hundred mathematicians who possessed the tacit knowledge to understand it (Dosi, 1996). With respect to Dosi puzzle, quantity of knowledge is ambiguous.

Empirical data also support the notion that evaluating of knowledge creation tends to be under real value. As a result of the interdependence between codifiable and tacit knowledge, even explicit innovations like those covered in patents don't flow freely from one nation to another. Frequently, in order to take full measurement of the insights provided in a patented (codified) invention, one needs also to have the complementary tacit knowledge to apply it to a particular product or process (Pavitt, 1992).

Abrupt steps in New Growth Theory Leads to an Approximate of Real

The conventional view of economics, crystallized by Alfred Marshall in the late 19th century was of the economy as a well-balanced system, always tending toward equilibrium. All of the forces acting on the economy generated signals or reactions that tended, over time, to push the economy toward an optimal state. A shortage of some particular good or service was associated with a rise in its price, which in turn called forth additional resources to produce it, ultimately triggering a greater supply and a reduction in its price. The view of economic change afforded by this model of the economy is one of smooth and continuous adjustment.

This view was challenged by Joseph Schumpeter, who argued that economic change was almost exactly the opposite: abrupt and discontinuous, rather than smooth and orderly. Schumpeter proposed that the search for higher than normal profits (quasi-rents, in economic jargon) led individuals and firms to innovate, to seek unique new practices and technologies. New products, almost by definition, give the businesses producing them a monopoly, if only a temporary one and enable firms to earn higher profits until their product is successfully imitated by a

competitor or displaced from the market by yet another new product. New businesses, with new ideas, changing the definition of markets, not simply lowering the price of some commodity, are the driving force behind change.

New Growth Theory leads us first to think differently about the role of history in shaping economic growth. The increasing returns associated with knowledge produce "path dependence": future options are constrained by past actions. New Growth Theory is also broadly consistent with an evolutionary view of how the economy changes. This evolution, moreover, happens not smoothly but in abrupt steps, as new ideas and new businesses replace old ones in a process of creative destruction. In other words, abrupt process can lead to some disability of measurement tools (Cortright, 2001).

In the view of the evolutionary economists, change isn't the smooth and continuous adjustment at the margin, but is rather the abrupt and often uneven displacement of the one technology by another. Economic growth is a disequilibrium process, and as the competitive environment changes, development and improvement of new techniques and changes in markets cause some firms to grow and others to shrink. Economies move ahead by successively generating new experiments and trials. A critical policy implication of this work is that encouraging experimentation and learning is essential to economic progress. A corollary is that a diversity of firms and institutions helps encourage and sustain experimentation (Nelson & Winter, 1982).

Such evolutionary theory is closely related to path dependence. As Arthur points out, the nonlinear qualities of increasing returns models of the economy have distinct parallels to the evolutionary theory of punctuated equilibrium (Arthur 1989). Because development is path dependent and the future cannot be predicted with any precision, business managers will have to emphasize adaptive behavior rather than optimization (Arthur, 1996). Consequently with absence of equilibrium point and abrupt steps in new growth theory, Role knowledge evaluation is an approximate of real.

3. Results and Discussion

Institutional Framework and New Definition of Knowledge

The most important job for economic policy is to create an institutional environment that supports

technological change Portland (P. M. Romer, 1994, p. 21).

Are governments obstacles to economic growth or instigators of growth? Is the government that best befits the economy one that gradually withers away, or a strong one? Much economic theory gives the impression that governments are needed only when markets won't work, to address market failures, or provide public goods like national defense, and to achieve purely social aims, like taking care of the poor and elderly. Governments that do more than the minimum, the conventional wisdom goes, sap the economy of its strength. New Growth Theory gives us a new view of the role of institutions in creating the necessary conditions for growth in an economy driven by new knowledge (Cortright, 2001).

What are institutions and why should they matter? If we think of the economy as a game, institutions are the rules of the game and the processes by which rules are determined and enforced. Formal rules, like constitutions, statutes and regulations, and governmental bodies, like courts and legislators, are institutions. So too, are informal rules that shape and limit transactions, like common business practices, cultural attitudes and values, and reputation, and the social constructs that guide and enable interpersonal and business relations.

History influences the pace and trajectory of knowledge creation. But knowledge creation is not purely the product of market forces. Non-market forces, particularly institutions can also influence what kinds of knowledge are created. A number of economists have begun to consider the role that different institutional arrangements play in economic development. Then by considering numbers of institution which are engaged in growth process and their effectiveness coefficient, knowledge measuring will be more realistic(Cortright, 2001).

Ignorance of dynamic adjustment and institutions in new growth theory leads definition of knowledge to an ambiguous environment. Institutions shape the creation of knowledge and adaptive efficiency indicates that changes of new knowledge take place over time.

Creation of New Knowledge and Institution

The cumulative learning of societies, reflected in culture and the shared mental models of how the world works, guide people's interpretations of economic and political problems and opportunities. Beliefs about the value of new

knowledge, risk taking, and the trust in social institutions influence the rate and type of economic growth in a society. The structure of incentives in society is shaped by institutions, which means that ultimately the effectiveness of markets is dependent on collective, political processes. Markets alone cannot produce the set of conditions needed for the efficient function of a market economy (Olson, 1996).

Many important institutional innovations deal with the creation and diffusion of knowledge. Some of these institutions, like patents and copyright law, have relatively long histories. Universal public education is a relatively recent development. So too are public land grant universities, peer-reviewed academic research and public-private research partnerships. As Paul Romer points out, there are many conceivable sets of institutional arrangements that can be developed to encourage the further development and deployment of economically valuable new ideas (P. M. Romer, 1993).

Importance of institutional arrangement in economic development leads to importance of institution as a key variable in measuring entire knowledge.

Dynamic Adjustment and Institution

The ability of institutions to adapt to the changing economic situation, and to develop new rules and practices to guide transactions shapes the ability of economies to continue to progress. North argues that it is this adaptive efficiency, the ability of economies and institutions to change over time to respond to successive new situations—and not static efficiency, the optimization of the allocation of resources at any given time—that is the critical factor shaping economic development. North explains:

Adaptive efficiency . . . is concerned with the kinds of rules that shape the way an economy evolves through time. It is also concerned with the willingness of a society to acquire knowledge and learning, to induce innovation, to undertake risk and creative activity of all sorts, as well as to resolve problems and bottlenecks of the society through time. We are far from knowing all the aspects of what makes for adaptive efficiency, but clearly the overall institutional structure plays a key role to the degree that the society and the economy will encourage the trials, experiments and innovations that we can characterize as adaptively efficient. The incentives embedded in the institutional framework direct the process of learning by doing and the development of tacit

knowledge that will lead individuals in decision-making processes to evolve systems that are different from the ones that they had to begin with (North, 1990, pp. 80-81).

One critical element in adaptive efficiency is the tolerance for new ideas. As Schumpeter observed, change often entails the creative destruction of the existing economic and political order. The willingness of societies to tolerate new ideas that challenge the current arrangements of business and government has varied over time, and still varies considerably among (and within) nations. In a historical sense, the openness of the West to new knowledge in the Renaissance and the Enlightenment produced the new ideas that led to the industrial revolution; the particular institutional arrangements of the United States (the Constitution, the interstate commerce clause) led to the development of a national economy. Similarly, among nations today, the relative openness to new ideas in some nations (Singapore, Taiwan) may have much to do with their recent economic success.

Governments have a crucial role to play in setting up the right structures for economies to evolve over time. Many of the most critical changes will deal with the incentives for knowledge creation. As technologies change and economies grow, our institutions will continue to need to devise new arrangements and solutions for economic problems, from allocating the electromagnetic spectrum to refining the law governing patents (Thurow, 1999).

New Growth Theory emphasizes the central role that new ideas play in driving economic progress. The careful study of history and contemporary international comparisons of development highlight the role that new ideas for arranging institutions can play in shaping the direction and pace of economic development. Then institution framework help researcher to measure knowledge's quantity accurately (Cortright, 2001).

4. Conclusion

In all too many contributions to New (Endogenous) Growth Theory – though not in all – central reference is made to ‘a stock of knowledge’, a ‘stock of ideas’, etc., this variable featuring centre-stage in the analysis. Yet it is immediately apparent that this is far from being a crystal clear concept. Really no amount of ‘sophisticated’ mathematical analysis can turn conceptual confusions into meaningful conclusions.

The real question is one of meaning, not measurement. Only when theory produces clear conceptual categories will it be possible to measure them accurately. We should now perhaps establish that our critical remarks are not directed to a pure figment of our imagination – and recognize that worries about the measurement of knowledge can indeed be found within the NGT literature. In historical order – which will make it clear that there has not been clear cut progress in conceptual clarity about measuring knowledge!

By contribution of institution framework which is found within NGT, we can indirectly measure the knowledge concept and no more directly possible to measure stock of knowledge. Institution matter because they shape the environment for production and employment of new knowledge. New Growth Theory emphasizes the central role that new ideas play in driving economic progress. The careful study of history and contemporary international comparisons of development highlight the role that new ideas for arranging institutions can play in shaping the direction and pace of economic development. Then institution framework help researcher to measure knowledge's quantity accurately.

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6/7/2011

Vegetative and Reproductive Characteristics of Iranian Gole-Gav-Zaban (*Echium amoenum* Fisch & C. A. Mey) Accessions Cultivated in Mazandaran Province

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Abstract: Iranian Gole-Gav-Zaban (*Echium amoenum* Fisch & C. A. Mey) belonged to Boraginaceae family and is considered as a valuable Iranian endemic medicinal plant that has been used widely as traditional medicine since long times. Because of its convenience and being acceptance as a remedy for different sort of diseases by people. Use one of these (besides) side a little research has been ever done on this valuable endemic medicinal plant. There for is drastically short amount of available information about it. hence there is need of more work. By these descriptions, in present study, measuring of vegetative and reproductive character of Iranian Gole-Gav-Zaban was aimed. For fulfilling these aims (objects), accessions were planted in a completely randomized design with three replications in June 2010. Bushes characteristics were observed and documented. In the vegetative phases there weren't considerable difference among accessions. But from the aspect of flower field character, the difference was significant.

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Keywords: *Echium amoenum*, Vegetative phase, Reproductive phase, Oil

1. Introduction

Echium genus (Boraginaceae) has four species in Iran (Mozaffarian, 1996) and only *Echium amoenum* Fisch & C. A. Mey has medicinal usages (Akbarinia *et al.*, 2007). In Iran, the dry violet-blue petals of it has long been used as tonic, tranquillizer, diaphoretic, cough suppressant and a remedy for sore throat and pneumonia in traditional medicine (Amin, 1991; Hooper, 1937). In spite of this fact, *E. amoenum* is totally known as a traditional herb by costumers not only in Iran but as a recently exported product which is gradually founding its right place in the past few years. Sufficient investigation has not taken place (carried on) on it. Various phytochemical petals' studying proved the existence (presence) of some compounds for instance anthocyanins, flavonoids aglycones, saponins, unsaturated terpenoids, sterols and the least amount of essential oil (Shafaghi *et al.*, 2002; Mehrabani *et al.*, 2005; Heidari *et al.*, 2006). But still there is a gap to be filled. This study is just a small step to uncover some of the characteristics of this plant. Investigation the effect of plant's accessions on bushes growth, flower yield and oil amount are considered as the objects of this study.

2. Material and Methods

2.1. Field planting

The study area is the Foshkor basin which is (one mountainous region of Chalous, Alborz Mountain, Mazandaran province) located in the north of Iran,

between longitudes 36°15' E and latitude 51°18' N. Seeds of different accessions of *E. amoenum* were collected from different regions of Iran (Tehran, Zardband, Esfahan, Hamedan, Rahim Abad (Gylan province) plus native accession from Foshkor). Then they were planted in a field that was located in Foshkor in a completely randomized design with three replications in June 2008. The distance was 40 cm in and between rows. The soil characters are followed at the table number 1.

The seed planting depth was 1-1.5 cm. At the first year of planting, the herbs didn't flower (and therefore or consequently) no seed was produced. In the first year, germination time and four-leaf stage were documented. After, completing chilling requirement, the bushes at the end of March regrow and at the beginning of April they passed rosette phase and produced flowering stems. In the second year (2009), time of stem, full blossom, bushes height at full blossom, number of flower for each bush, dry to wet flower weight rate were considered. The first picking up was done on May 8th. This way was continued up to the middle of August. In full blossom period, flowers were picked every other day and dried in room temperature isolated from sun shine. In each time, picked flowers were numbered and dried to wet flower weight rate were measured. Grinded petals were used as experiment samples. Mature seeds were collected. The weight of 1000 seeds of (for) each accession was measured.

Table 1. Soil characteristics of cultivation region

Character	Measure
Sand (%)	46
Loam (%)	38
Clay (%)	16
Soil Texture	Loam
EC (mMho)	0.602
pH	6.6
Potassium (ppm)	192
Phosphor (ppm)	28.4
Total N (%)	0.3
Organic carbon (%)	3.43

2.2. Oil extraction

Seeds were cleaned and grounded. For each accession, ten grams of the prepared seeds powder were measured and the oil was extracted by soxhlet type apparatus for 6-7 hours. Hexane was used as solution (4). The solvent was removed under vacuum in a rotary evaporator (EYELA, N.N. Series, Rikakikai Co. Ltd., Tokyo, Japan) (Azadmard-Damirchi and Duta, 2005).

2.3. Statistical analysis

Analysis of plural was done with SAS9.1 software and differences among treatments were tested with Duncan test (Level of significance $p < 0.05$).

3. Results and discussion

3.1. Effect of accessions on vegetative characters

All the cultivated accessions had been stemmed and they started flowering at the same period so the differences between them were not considerable. Full blooming time and height at the full blooming didn't show any considerable difference.

Since there is a lack of information on this plant phenotype (morphology), we present some of our observations below.

- *E. amoenum* (its seed) germinates epigeal and the cotyledons came out of the ground.
- It is a long-day plant. In first year its form is rosette. By the increase in day time length and temperature, it produces flowering stem and begins flowering. *E. amoenum* needs a cold temperature period in order to flower. Because of this character, sowing in spring does not lead to flowering in the following summer.
- Flowering stem comes out from the angle between leaf and stem.
- Main Flower stem and secondary Flower stems start to grow from angles between leave and the stem and plant around respectively.
- It is a perennial and hardy plant. The leaves keep their greenish under the snow for a while.
- The inflorescence is raceme. At the end of calyces, limpid sticky sweat liquid gathers. Two flowers from the inflorescence often bloom at the same time. So the first flowers produce seed while the upper flowers are still blooming. This lead to seed dropping.
- To produce seed there is an absolute need for pollen from another bush. Self-pollination cannot lead to seed production. Pollination takes place by insects.
- Seed is in acne form with four, three and sometimes two and rarely with single seed. They are stick in tight calyces. The seed coat is hard and groove.

Table 2. Mean comparison of vegetative and reproductive characteristics of various accessions of Iranian Gole Gav Zabab at the first year by using Duncan test in 5% level

Accessions	Characteristics			
	Days to germination	Days to four-leaf stage	Days to stem	flowering
Tehran	47 ^a	100 ^a	- _b	- _b
Hamedan	48 ^a	99.3 ^a	149.6 ^a	159.6 ^a
Esfahan	47 ^a	97.7 ^a	148.3 ^a	158.3 ^a
Roodbar	37.7 ^a	98.7 ^a	158 ^a	166 ^a
Rahim Abad	48.7 ^a	102.3 ^a	- _b	- _b
Zardband	49 ^a	105 ^a	152 ^a	161 ^a
Ezzat Abad Sofla	47.7 ^a	102.7 ^a	161 ^a	164 ^a
Feshkoor	*	*	- _b	- _b

*The native accession was collected from the natural habitat and then transplanted to the field, due to this, time of its germination and four-leaf stage were vague.

In the first year, Esfahan accession stemmed sooner than others and the native accession was the last accession which stemmed. In total, the difference was not punctual. Among other vegetative characters, the differences were not significant neither.

Table 3. Mean comparison of vegetative and reproductive characteristics of various accessions of Iranian Gole Gav Zaban at the second year by using Duncan test in 5% level.

Accessions	Characteristics					
	Days to stem	Days to flower bud appearance	Days to First Flower	Days to full bloom	Plant Height at the beginning of flowering	Plant Height at the full bloom
Tehran	55 ^{ab}	59.66 ^a	64 ^a	72 ^a	38.3 ^{ab}	63.33 ^a
Hamedan	52 ^b	59 ^a	60.66 ^a	70 ^a	36.66 ^{ab}	66 ^a
Esfehan	49.66 ^b	55.3 ^a	61 ^a	72 ^a	33 ^b	66.33 ^a
Roodbar	52.33 ^{ab}	58 ^a	62 ^a	70.33 ^a	37 ^{ab}	68.66 ^a
Rahim Abad	55.66 ^{ab}	56.3 ^a	60 ^a	68.66 ^a	37.33 ^{ab}	63 ^a
Zardband	54.33 ^{ab}	58.66 ^a	63.66 ^a	72.66 ^a	44.33 ^{ab}	70.66 ^a
Ezzat Abad Sofla	57.33 ^a	61.33 ^a	65.66 ^a	76.66 ^a	39 ^{ab}	62 ^a
Feshkooor	58 ^a	61.66 ^a	65.33 ^a	74.66 ^a	39 ^{ab}	66.33 ^a

3.2. The effect of accessions on yield and wet to dry weight rate

The flowers numbers were counted in each picking up. Among the accessions Tehran accession occupied the first rank. The lowest amount was observed in Rodbar accession. Flowering yield had not shown difference in 5% level. Wet to dry weight rate for each accession was measured and it did not revealed considerable difference.

Table 4. Mean comparison of flower's yielding characteristics of various accessions of Iranian Gole Gav Zaban by using Duncan test in 5% level

Accessions	Characteristics		
	Flower number in plant	Flower yielding (in g/6m ²)	Ratio of dry weight to fresh
Tehran	1922 ^a	1133.8 ^a	6.61 ^a
Hamedan	1665 ^a	1006.2 ^a	7.26 ^a
Esfehan	1626 ^{ab}	804 ^{ab}	8a
Roodbar	1145 ^c	581.6 ^c	7.55 ^a
Rahim Abad	1573 ^{ab}	981.5 ^{ab}	6.57 ^a
Zardband	1601 ^{ab}	886.6 ^{ab}	6.52 ^a
Ezzat Abad Sofla	1247 ^{bc}	744.8 ^{bc}	6.42 ^a
Feshkooor	1269 ^c	669.7 ^{bc}	8.33 ^a

3.3. 1000 seeds weight and oil percentage

The result showed that 1000 seeds weight and oil percentage among the repetition and treatments in 5% level of Duncan test weren't meaningful. 1000 seed's weight and oil amount are shown at the table number 5.

Table 5. Mean comparison of 1000-seed weight and oil content of various accessions of Iranian Gole Gav Zaban using Duncan test in 5% level

Accessions	1000-seed weight (g)	Oil content (%)
Tehran	7.75 ^a	35.98 ^a
Hamedan	8.41 ^a	32.33 ^a
Esfehan	8 ^a	35.37 ^a
Roodbar	8.6 ^a	32.2 ^a
Rahim Abad	9.2 ^a	36.14 ^a
Zardband	8 ^a	34.4 ^a
Ezzat Abad Sofla	8.76 ^a	35.3 ^a
Feshkooor	8.76 ^a	33.1 ^a

It was revealed that with 7 irrigation period the dry weight of flower would be 420 kilograms per hectare (Akbarinia and Pileforush, 2009) but in this study the yield were dramatically more than their report. This huge amount of difference could be explained by the impact of different climate, because the field was located in a mountainous region with rainy and foggy days (almost every day) this condition led to more lateral stem, more flowers and it prolonged flowering period as well. As mentioned before, due to the little amount of research on this plant, there is a limitation for comparison the results with other reports. Although it is acceptable that secondary metabolites are basically made beside (under the control of) plants genetic and it considered as an important factor, but the synthesis of secondary metabolites is clearly under the effect of the environmental conditions. It has already seen the major effects of the environmental conditions on the medical plant on the growth progress of medical plant quantity and quality of the active substances (Omidbaigi, 2007). Hence when it said that among different accessions at their 1000 seeds weigh and extracted oil amount, no

considerable difference were observed, It could be related to the same climate that they were grown.

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11/5/2011

A Survey on the condition of Micro Facies, Sedimentary Environment and the Cretaceous Deposits (With Particular Reference to Central Iran)

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Abstract: Micro continent of central Iran is a part of middle Iran that is bounded with ophiolitic suture zones in Sistan, Nain, Baft, Doruneh fault and Kashmar – Sabzevar ophiolites and is classifiable into Lut block, Shotori upland, Tabas subduction, Kalmard upland, Posht Badam block, Biaze - Bardsir basin and Yazd block by means of long faults which are dextral strike – slip faults and have westwards inclination. In many regions of Iran, except to Zagros, in approximate boundary of early and late Cretaceous, it is observed evidences of tectonic events which are mainly as land generating and can be compared with worldwide Austrian event, in everywhere in Iran except to rare cases (east of Tehran and Yazd). Upper Cretaceous beds in Iran do not have identical facial characteristics and it seems that in contrast to equal sedimentary condition in early Cretaceous, sedimentary basins in upper Cretaceous have been separated from each other and special condition has been dominated in each basin. As a result of that, lithostratigraphic units except to Zagros and Kopet Dagh have not been named and or have local names in upper Cretaceous of Iran. This article is an overview of the condition of Micro-facies, sedimentary environment and the Cretaceous deposits in central Iran.

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Keywords: Cretaceous deposits, central Iran, Micro-facies, sedimentary environment.

1. Introduction

In past, micro continent of central Iran was known as a part of Central Iran zone but according to Stöcklin, this motioned area, after hardening of Precambrian bed rock, had characteristics of platform in Paleozoic and has been turned in a active zone in Mesozoic and Cenozoic. Nevertheless it should be said that major structural pattern in this micro continent is type of separated blocks with main faults which each of them have different characteristics and dynamic of micro continent is not same in everywhere. Current evidences demonstrate that:

Katangan orogeny in this area has been dominated since late Precambrian and prior to a platform regime. Except to Lut block and south western edge which have exposures from Tertiary magmatic rocks, Tertiary rocks have least abundance in other parts.

In Paleozoic strata in this region, there is important stratigraphic gaps that most important of them are stratigraphic gaps in beginning of middle Triassic (Eifelian Hiatus) and late Carboniferous (Stephanian Hiatus). (Harold G. Reading, 1996)

Widespread structural – sedimentary non equality has been resulted in dividing micro continent of central Iran into some blocks as follow.

Lut block, with a length of about 900 kilometers, is most eastern part of micro continent of

central Iran. Eastern boundary is specified with Nehbandan fault and flysch zone in east of Iran and western boundary with Naiband fault and Tabas block. On the tectonic map of Iran, (Stöcklin and Nabavi), northern boundary of this block is limited to southern Kashmar basin and southern boundary to Jazmurian subsidence. In 1968, Stöcklin divided this zone into two western and eastern parts which have been separated by Shotori Mountains. Next investigations demonstrate that geological characteristics of these two blocks are not analogical. For example, very thick igneous lava with a thickness of 2,000 – 3,000 meters in Lut block in Cenozoic is not observed in Tabas block. Also tectonic movements in late Cimmerian especially middle Cimmerian which is accompanied with metamorphism and relative stability of Lut block, have a few symptoms of land generating. That is why, especially because of new results, with a review in Lut block and then Tabas block, Jazmurian subsidence and Bazman Mountains, as magmatic arc, were eliminated from this block. (Prothero, Donald R.; Schwab, Fred, 1996)

2. Stratigraphic history

Stratigraphic history of Lut block is very similar to other parts of micro continent of central

Iran. However four characteristics is dominated on stratigraphy of Lut block.

- 1- Considerable impact of early Cimmerian orogeny (Paleobalouch – Rier and Mohafez, 1972) on the rocks older than middle Triassic.
- 2- Relatively vigorous Folding, volcanism and plutonism in middle Jurassic (middle Cimmerian) particularly in Dehsalam and Chahar Farsakh which are accompanied with hardening and stability of Lut block.
- 3- Abundant of volcanic rocks in Tertiary system, particularly in Eocene, which with a thickness of 2,000 meters has covered more than half of Lut block.
- 4- Lacustrine deposits, almost horizontal, in Pliocene – Pleistocene, named Lut formation which is representative of week operation of ultimate folding in this block.

“Tabas block” which is located between Naiband fault in east and Kalmard – Kouhbana fault in west, is a part of a structural territory where in its rims and bed is crossed by faults of bed rock so that it has different stratigraphic sequence, proportion to adjacent areas in Paleozoic and Mesozoic and at the end of Mesozoic due to operation of tectonical convergent stresses, most with a trend of east – west, is turned to lands as a result of elevation of lands and uplift of mountains (Ghasemi and et al, 1381). So there is this belief that current morphological – tectonical features of this block is as a result of reactivation of fault structures and old folding in tectonical cycle of Alp. (Siever, Raymond, 1988)

Tabas block is one of regions which its evolutionary trend in Paleozoic is not concordant to adjacent areas. For example:

- × Gap of Eifelian in this area is not completely clear.
- × Upper Carboniferous rocks which are not present in other regions, has been reported in this area.
- × Volcanic mafic and intermediate activities, even though negligible, are one of characteristics of Tabas block and from this aspect Tabas block can be compared to Alborz Mountains. Mineralization of Lead, zinc and copper in Permian, Triassic and Jurassic in Alborz has generality in Tabas block too which is evidence for similarity of these two zones.

* vigorous sunsidence is one of characteristics of Tabas block. Before, it was assumed that this subsidence is limited to Shotori and Shirgasht but nowadays it is specified that most portion of block in Paleozoic, especially Mesozoic to Cretaceous, had considerable sunsidence so that there is big volume of Phanerozoic rocks in this block which Paleozoic strata, among them, have a thickness of 2,000-3,000 meters and sometimes up to 10,000 meters in Mesozoic.

“Kalmard block” is a part of micro continent of central Iran which has a north easterly trend and is located between Kalmard fault in east and covered fault of Naiin in west. History of this upland implies to two long emergences, depend on Katangan and early Cimmerian. In other words, in two long time interval this block had had characteristics of upland. (Nichols, Gary, 1999) Oldest rocks of this upland are thick shale – sand stone deposits of Kalmard formation in Precambrian that have been folded due to Katangan event and have been covered by Ordovician deposits (Shirgesht Formation) by an angular unconformity that is evidence of first long sedimentary gap. In this block, Ordovician strata to middle Triassic, in addition to have several consequently sedimentary gaps, are a limited stratigraphic – structural unit among Katangan – early Cimmerian event which have been accumulated in shallow sedimentary environments and procedure of its evolution is completely different from Tabas block. Deposits of upper Triassic have not been reported here and it seems sedimentary gap, due to early Cimmerian, is longer in comparison with Tabas block. Jurassic strata are limited to lias – Middle Douger and lack of younger deposits from middle Douger (Badamo Formation) indicates that long second emergence of this upland has been occurred since middle Douger that orogeny event, in middle Cimmerian, is main inducement for that. (Cambridge, MA, H. G., 1978)

As a structural viewpoint, common trend of folds are north east – south west in northern mid of Kalmard upland that especially have distinct appearance in Paleozoic deposits. Dip of layers is high in eastern side and sometimes is overturned, but is gentler in western side. Operation of reverse longitudinal faults has caused considerable shear structures with similar trend to Kalmard block which Rahbar mountain is one of them. “Biaze – Bardsir subsidence” is located between Posht-e- Badam fault in east and Anar fault in west. Even though many of characteristics in this subsidence such as Precambrian metamorphic bed rock, Paleozoic – middle Triassic platform strata and sand stone - shale deposits in upper Triassic – middle Jurassic are similar to other parts of micro continent but this subsidence has two characteristics, one of them is more vigorous impact of late Cimmerian event which has been accompanied with widespread emersion and metamorphism. Another one, Flysch basins which are representative of basins with vigorous sunbidence and especially it can be observed its upper Cretaceous strata from east of Anar to North of Bardsir. (Reading, H. G, 1996)

“Yazd block” is western part of micro continent of central Iran which is limited to Dorouneh fault to the north and Naiin – Baft ophiolitic band to the west.

There are two specific characteristics in Yazd block. The First one is Anarak metamorphic rocks and second one is Triassic strata of Nakhlak. In Anarak which is named some times Anarak – khors massif, there are complex of pellet – psamite sediments with carbonate and volcanic rocks, pertaining to continental slope that have been metamorphosed as regional and in green schist and blue schist facieses and are accompanied as collided plates to ophiolites, pelagic limerocks and irregular sediments. Although Davoud Zade and Lench (1981) attributed Anarak ophiolites as a part of oceanic crust of former Tethys, in Harat, which has been exposed after rotation of micro continent in current location but Almasian(1977) believes that Anarak ophiolites are of upper Proterozoic age and they can be described related to oceanic back arc basins. Triassic strata of Nakhlak (Nakhlak group) have considerable facial differences with other parts of micro continent of central Iran. According to Davoud Zade and et al., Triassic strata of Nakhlak have similar facies to Aghdarband in Triassic (Aurasia) that as a result of rotation of micro continent in Central Iran, as much as 135° in anticlockwise, have been relocated into present position. It should be said that Nakhlak in Triassic and formations of Nakhlak group and even operation and amount of rotation of micro continent are questionable and needs to review completely.

3. Sediment

Sediment is naturally-occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of fluids such as wind, water, or ice, and/or by the force of gravity acting on the particle itself. Sediments are most often transported by water (fluvial processes), wind (aeolian processes) and glaciers. Beach sands and river channel deposits are examples of fluvial transport and deposition, though sediment also often settles out of slow-moving or standing water in lakes and oceans. Desert sand dunes and loess are examples of aeolian transport and deposition. Glacial moraine deposits and till are ice transported sediments.



Fig1. Sediment in a Gulf

4. Classification

Sediment can be classified based on its grain size and/or its composition.

Grain size

Sediment size is measured on a log base 2 scale, called the "Phi" scale, which classifies particles by size from "colloid" to "boulder".(Fig1) (Table1).

Table1: Classification of Sediment

ϕ scale	Size range (metric)	Size range (inches)	Aggregate class (Wentworth)	Other names
< -8	> 256 mm	> 10.1 in	Boulder	
-6 to -8	64–256 mm	2.5–10.1 in	Cobble	
-5 to -6	32–64 mm	1.26–2.5 in	Very coarse gravel	Pebble
-4 to -5	16–32 mm	0.63–1.26 in	Coarse gravel	Pebble
-3 to -4	8–16 mm	0.31–0.63 in	Medium gravel	Pebble
-2 to -3	4–8 mm	0.157–0.31 in	Fine gravel	Pebble
-1 to -2	2–4 mm	0.079–0.157 in	Very fine gravel	Granule
0 to -1	1–2 mm	0.039–0.079 in	Very coarse sand	
1 to 0	0.5–1 mm	0.020–0.039 in	Coarse sand	
2 to 1	0.25–0.5 mm	0.010–0.020 in	Medium sand	
3 to 2	125–250 μ m	0.0049–0.010 in	Fine sand	
4 to 3	62.5–125 μ m	0.0025–0.0049 in	Very fine sand	
8 to 4	3.9–62.5 μ m	0.00015–0.0025 in	Silt	Mud
> 8	< 3.9 μ m	< 0.00015 in	Clay	Mud
>10	< 1 μ m	< 0.000039 in	Colloid	Mud

• Composition

Composition of sediment can be measured in terms of:

- parent rock lithology
- mineral composition
- chemical make-up.

This leads to an ambiguity in which clay can be used as both a size-range and a composition (see clay minerals).

5. Sediment transport

Sediment builds up on human-made breakwaters because they reduce the speed of water flow, so the stream cannot carry as much sediment load. (Fig2)



Fig2. Glacial transport of boulders. These boulders will be deposited as the glacier retreats.

Sediment is transported based on the strength of the flow that carries it and its own size, volume, density, and shape. Stronger flows will increase the lift and drag on the particle, causing it to rise, while larger or

denser particles will be more likely to fall through the flow.

6. Fluvial processes: rivers, streams, and overland flow

Particle motion

Rivers and streams carry sediment in their flows. This sediment can be in a variety of locations within the flow, depending on the balance between the upwards velocity on the particle (drag and lift forces), and the settling velocity of the particle. These relationships are given in the following table for the Rouse number, which is a ratio of sediment fall velocity to upwards velocity. Where:

- w_s is the fall velocity
- K is the von Kármán constant

u_* is the shear velocity (Table2)

Table2: Relationships for the Rouse number

Mode of Transport	Rouse Number
Bed load	>2.5
Suspended load: 50% Suspended	>1.2, <2.5
Suspended load: 100% Suspended	>0.8, <1.2
Wash load	<0.8

If the upwards velocity approximately equal to the settling velocity, sediment will be transported downstream entirely as suspended load. If the upwards velocity is much less than the settling velocity, but still high enough for the sediment to move (see Initiation of motion), it will move along the bed as bed load by rolling, sliding, and saltating (jumping up into the flow, being transported a short distance then settling again). If the upwards velocity is higher than the settling velocity, the sediment will be transported high in the flow as wash load. As there are generally a range of different particle sizes in the flow, it is common for material of different sizes to move through all areas of the flow for given stream conditions.

7. Fluvial bed forms

Sediment motion can create self-organized structures such as ripples, dunes, antidunes on the river or stream bed. These bedforms are often preserved in sedimentary rocks and can be used to estimate the direction and magnitude of the flow that deposited the sediment. (Figs.3-5).

8. Surface runoff

Overland flow can erode soil particles and transport them downslope. The erosion associated with overland flow may occur through different methods depending on meteorological and flow conditions.

- If the initial impact of rain droplets dislodges soil, the phenomenon is called rainsplash erosion.
- If overland flow is directly responsible for sediment entrainment but does not form gullies, it is called "sheet erosion".

If the flow and the substrate permit channelization, gullies may form; this is termed "gully erosion".



Fig 3. Modern asymmetric ripples developed in sand on the floor of the River. Flow direction is from right to left.

Fig 4. Sinuous-crested dunes exposed

Fig 5. Ancient channel deposit in the Stellarton Formation

9. Key fluvial depositional environments

The major fluvial (river and stream) environments for deposition of sediments include:

1. Deltas (arguably an intermediate environment between fluvial and marine)
2. Point bars
3. Alluvial fans
4. Braided rivers
5. Oxbow lakes
6. Levees

7. Waterfalls

Aeolian processes: wind

Wind results in the transportation of fine sediment and the formation of sand dune fields and soils from airborne dust.

Glacial processes

Glaciers carry a wide range of sediment sizes, and deposit it in moraines. (Fig6)



Fig6. Glacial sediments

10. Mass balance

The overall balance between sediment in transport and sediment being deposited on the bed is given by the Exner equation. This expression states that the rate of increase in bed elevation due to deposition is proportional to the amount of sediment that falls out of the flow. This equation is important in that changes in the power of the flow changes the ability of the flow to carry sediment, and this is reflected in patterns of erosion and deposition observed throughout a stream. This can be localized, and simply due to small obstacles: examples are scour holes behind boulders, where flow accelerates, and deposition on the inside of meander bends. Erosion and deposition can also be regional: erosion can occur due to dam removal and base level fall. Deposition can occur due to dam emplacement that causes the river to pool, and deposit its entire load or due to base level rise.

11. Shores and shallow seas

Seas, oceans, and lakes accumulate sediment over time. The sediment could consist of terrigenous material, which originates on land, but may be deposited in either terrestrial, marine, or lacustrine (lake) environments; or of sediments (often biological) originating in the body of water. Terrigenous material is often supplied by nearby rivers and streams or reworked marine sediment (e.g. sand). In the mid-ocean, living organisms are primarily responsible for the sediment accumulation, their shells sinking to the ocean floor upon death. Deposited sediments are the source of sedimentary

rocks, which can contain fossils of the inhabitants of the body of water that were, upon death, covered by accumulating sediment. Lake bed sediments that have not solidified into rock can be used to determine past climatic conditions.

12. Key marine depositional environments

The major areas for deposition of sediments in the marine environment include:

1. Littoral sands (e.g. beach sands, runoff river sands, coastal bars and spits, largely clastic with little faunal content)
2. The continental shelf (silty clays, increasing marine faunal content).
3. The shelf margin (low terrigenous supply, mostly calcareous faunal skeletons)
4. The shelf slope (much more fine-grained silts and clays)
5. Beds of estuaries with the resultant deposits called "bay mud".

One other depositional environment which is a mixture of fluvial and marine is the turbidite system, which is a major source of sediment to the deep sedimentary and abyssal basins as well as the deep oceanic trenches. Any depression in a marine environment where sediments accumulate over time is known as a sediment trap. (Tanley, Steven M., 1999).

13. Environmental issues

Erosion and agricultural sediment delivery to rivers

One cause of high sediment loads from slash and burn and shifting cultivation of tropical forests. When the ground surface is stripped of vegetation and then seared of all living organisms, the upper soils are vulnerable to both wind and water erosion. In a number of regions of the earth, entire sectors of a country have become erodible. For example, on the Madagascar high central plateau, which constitutes approximately ten percent of that country's land area, most of the land area is devegetated, and gullies have eroded into the underlying soil in furrows typically in excess of 50 meters deep and one kilometer wide.[citation needed] This siltation results in discoloration of rivers to a dark red brown color and leads to fish kills. Erosion is also an issue in areas of modern farming, where the removal of native vegetation for the cultivation and harvesting of a single type of crop has left the soil unsupported. Many of these regions are near rivers and drainages. Loss of soil due to erosion removes useful farmland, adds to sediment loads, and can help transport anthropogenic fertilizers into the river system, which leads to eutrophication. (Cross, T. A.; Homewood, P. W., 1997)

14. Sedimentary depositional environment

In geology, sedimentary depositional environment describes the combination of physical, chemical and biological processes associated with the deposition of a particular type of sediment and, therefore, the rock types that will be formed after lithification, if the sediment is preserved in the rock record. In most cases the environments associated with particular rock types or associations of rock types can be matched to existing analogues. However, the further back in geological time sediments were deposited, the more likely that direct modern analogues are not available (e.g. banded iron formations). (Tables 3-5)

Table 3: Continental Sedimentary Environments

	ALLUVIAL FAN	FLUVIAL	LACUSTRINE	DESERT (DUNES)	PALUDAL
Rock Type	Breccia, conglomerate, arkose	Conglomerate, sandstone, siltstone, shale	Siltstone, shale, limestone, or evaporites (gypsum)	Quartz arenite (sandstone) or gypsum	Peat, coal, black shale, siltstone
Composition	Terrigenous	Terrigenous	Terrigenous, carbonate, or evaporite	Terrigenous or evaporite	Terrigenous
Color	Brown or red	Brown or red	Black, brown, gray, green	Yellow, red, tan, white	Black, gray, or brown
Grain Size	Clay to gravel	Clay to gravel (Finning upward)	Clay to silt or sand (Coarsening upward)	Sand	Clay to silt
Grain Shape	Angular	Rounded to angular	---	Rounded	---
Sorting	Poor	Variable	Variable	Good	Variable
Inorganic Sedimentary Structures	Cross-bedding and graded bedding	Asymmetrical ripples, cross-bedding, graded bedding, tool marks	Symmetrical ripples, lamination, cross-bedding, graded bedding, mudcracks, raindrop prints	Cross-bedding	Laminated to massive
Organic or Biogenic Sedimentary Structures	---	Tracks, trails, burrows	Tracks, trails, burrows, rare stromatolites	Tracks, trails	Root marks, burrows
Fossils	---	Rare freshwater shells, bones, plant fragments	Freshwater shells, fish, bones, plant fragments	---	Plant fossils, rare freshwater shells, bones, fish

15. Recognition of depositional environments in ancient sediments

Depositional environments in ancient sediments are recognised using a combination of sedimentary facies, facies associations, sedimentary structures and fossils, particularly trace fossil assemblages, as they indicate the environment in which they lived.

16. Depositional Environments

Landscapes form and constantly change due to weathering and sedimentation. The area where sediment accumulates and is later buried by other sediment is known as its depositional environment.

There are many large-scale or regional, environments of deposition, as well as hundreds of smaller sub-environments within these regions. For example, rivers are regional depositional environments. Some span distances of hundreds of miles and contain a large number of sub-environments, such as channels, backs wamps, floodplains, abandoned channels, and sand bars.

Table 4: Transitional Sedimentary Environments

	DELTA	BARRIER BEACH	LAGOON	TIDAL FLAT
Rock Type	Sandstone, siltstone, shale, coal	Quartz arenite, coquina	Siltstone, shale, limestone, oolitic limestone or gypsum	Siltstone, shale, calcilitite, dolostone or gypsum
Composition	Terrigenous	Terrigenous or carbonate	Terrigenous, carbonate, or evaporite	Terrigenous, carbonate, or evaporite
Color	Brown, black, gray, green, red	White to tan	Dark gray to black	Gray, brown, tan
Grain Size	Clay to sand (Coarsening upward)	Sand	Clay to silt	Clay to silt
Grain Shape	---	Rounded to angular	---	---
Sorting	Poor	Good	Poor	Variable
Inorganic Sedimentary Structures	Cross-bedding, graded bedding	Cross-bedding, symmetrical ripples	Lamination, ripples, cross-bedding	Lamination, mudcracks, ripples, cross-bedding
Organic or Biogenic Sedimentary Structures	Trails, burrows	Tracks, trails, burrows	Trails, burrows	Stromatolites, trails, tracks, burrows
Fossils	Plant fragments, shells	Marine shells	Marine shells	Marine shells

Table 5: Marine Sedimentary Environments

	REEF	CONTINENTAL SHELF	CONTINENTAL SLOPE AND RISE	ABYSSAL PLAIN
Rock Type	Fossiliferous limestone	Sandstone, shale, siltstone, fossiliferous limestone, oolitic limestone	Litharenite, siltstone, and shale (or limestone)	Shale, chert, micrite, chalk, diatomite
Composition	Carbonate	Terrigenous or carbonate	Terrigenous or carbonate	Terrigenous or carbonate
Color	Gray to white	Gray to brown	Gray, green, brown	Black, white red
Grain Size	Variable, frameworks, few to no grains	Clay to sand	Clay to sand	Clay
Grain Shape	---	---	---	---
Sorting	---	Poor to good	Poor	Good
Inorganic Sedimentary Structures	---	Lamination, cross-bedding	Graded bedding, cross-bedding, lamination, flute marks, tool marks (turbidites)	Lamination
Organic or Biogenic Sedimentary Structures	---	Trails, burrows	Trails, burrows	Trails, burrows
Fossils	Corals, marine shells	Marine shells	Marine shells, rare plant fragments	Marine shells (mostly microscopic)

These depositional sub-environments can also be thought of as depositional landforms, that is, landforms produced by deposition rather than erosion. Depositional environments are often separated into three general types, or settings: terrestrial (on land), marginal marine (coastal), and marine (open ocean). Examples of each of these three regional depositional settings are as follows: terrestrial-alluvial fans, glacial valleys, lakes; marginal marine-beaches, deltas, estuaries, tidal mud and sand flats; marine-coral reefs, abyssal plains, and continental slope. During deposition of sediments, physical structures form that is indicative of the conditions that created them. These are known as sedimentary structures. They may provide information about water depth, current speed, environmental setting (for example, marine versus fresh water) or a variety of other factors. Among the more common of these are: bedding planes, beds, channels, cross-beds, ripples, and mud cracks. Bedding planes are the surfaces separating layers of sediment, or beds, in an outcrop of sediment or rock. The beds represent episodes of sedimentation, while the bedding planes usually represent interruptions in sedimentation, either erosion or simply a lack of deposition. Beds and bedding planes are the most common sedimentary structures. Rivers flow in elongated depressions called channels. When river deposits are preserved in the sediment record (for example as part of a delta system), channels also are preserved. These channels appear in rock outcrops as narrow to broad, v- or u-shaped, "bellies" or depressions at the base of otherwise flat beds. Preserved channels are sometimes called cut-outs, because they "cut-out" part of the underlying bed. Submerged bars along a coast or in a river form when water currents or waves transport large volumes of sand or gravel along the bottom. Similarly, wind currents form dunes from sand on a beach or a desert. While these depositional surface features, or bed forms, build up in size, they also migrate in the direction of water or wind flow. This is known as bar or dune migration. Suspended load or bed load material moves up the shallowly inclined, upwind or upcurrent (stoss) side and falls over the crest of the bed form to the steep, downwind or down current (lee) side. If the bed form is cut perpendicular to its long axis (from the stoss to the lee side) one would observe inclined beds of sediment, called cross-beds, which are the preserved leeward faces of the bed form. In an outcrop, these cross-beds can often be seen stacked one atop another; some may be oriented in opposing directions, indicating a change in current or wind direction. When a current or wave passes over sand or silt in shallow water, it forms ripples on the bottom. Ripples are actually just smaller scale versions of dunes or

bars. Rows of ripples form perpendicular to the flow direction of the water. When formed by a current, these ripples are asymmetrical in cross-section and move downstream by erosion of sediment from the stoss side of the ripple, and deposition on the lee side. Wave-formed ripples on the ocean floor have a more symmetrical profile, because waves move sediments back and forth, not just in one direction. In an outcrop, ripples appear as very small cross-beds, known as cross-laminations, or simply as undulating bedding planes. When water is trapped in a muddy pool that slowly dries up, the slow sedimentation of the clay particles forms a mud layer on the bottom of the pool. As the last of the water evaporates, the moist clay begins to dry up and crack, producing mud cracks as well as variably shaped mud chips known as mud crack polygons. Interpreting the character of any of the sedimentary structures discussed above (for example, ripples) would primarily provide information concerning the nature of the medium of transport. Mud cracks, preserved on the surface of a bed, give some idea of the nature of the depositional environment; specifically that it experienced alternating periods of wet and dry. All clastic and organic sediments suffer one of two fates. Either they accumulate in a depositional environment, then get buried and lithified (turned to rock by compaction and cementation) to produce sedimentary rock, or they are reexposed by erosion after burial, but before lithification, and go through one or more new cycles of weathering-erosion-transport-deposition-burial. (Motiei, H., 1994).

17. Sedimentary structures

Sedimentary structures are those structures formed during sediment deposition. Sedimentary structures such as cross bedding, graded bedding and ripple marks are utilized in stratigraphic studies to indicate original position of strata in geologically complex terrains and understand the depositional environment of the sediment. (Fig7).

18. Soft sediment deformation structures

Soft-sediment deformation structures or SSD, is a consequence of the loading of wet sediment as burial continues after deposition. The heavier sediment "squeezes" the water out of the underlying sediment due to its own weight. There are three common variants of SSD:

- load structures or load casts (also a type of sole marking) are blobs that form when a denser, wet sediment slumps down on and into a less dense sediment below.
- pseudonodules or ball-and-pillow structures, are pinched-off load structures; these may

also be formed by earthquake energy and referred to as seismites.

- flame structures, "fingers" of mud that protrude into overlying sediments.
- clastic dikes are seams of sedimentary material that cut across sedimentary strata. (Fig8)



Fig7. Ripple marks in a siltstone

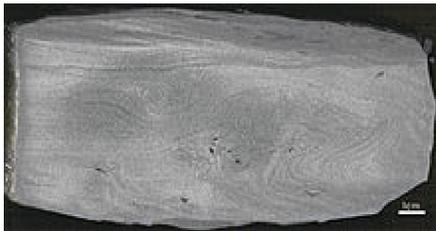


Fig8. Soft-sediment deformation in etched section of carbonaceous sandstone bed of Reedsville Formation

19. Secondary sedimentary structures

Secondary sedimentary structures form during the diagenesis of a sedimentary rock. Common secondary structures include Liesegang rings, cone-in-cone structures, raindrop impressions, and vegetation-induced sedimentary structures.

The term "Facies" can also refer to distinctive facial expressions associated with conditions such as Williams syndrome. (Fig9).

In geology, facies are a body of rock with specified characteristics. Ideally, a facies is a distinctive rock unit that forms under certain conditions of sedimentation, reflecting a particular process or environment. The term facies was introduced by the Swiss geologist Amantz Gressly in 1838 and was part of his significant contribution to the foundations of modern stratigraphy, which replaced the earlier notions of Neptunism.



Fig9. Eolianite carbonate facies (Holocene)

20. Facies types Sedimentary facies

Sedimentary facies are bodies of sediment recognizably different from adjacent sediment deposited in a different depositional environment. Generally, facies are distinguished by what aspect of the rock or sediment is being studied. Thus, facies based on petrological characters such as grain size and mineralogy are called lithofacies, whereas facies based on fossil content are called biofacies. These facies types are usually further subdivided, for examples, you might refer to a "tan, cross-bedded oolitic limestone facies" or a "shale facies". The characteristics of the rock unit come from the depositional environment and original composition. Sedimentary facies reflect depositional environment, each facies being a distinct kind of sediment for that area or environment. Since its inception, the facies concept has been extended to related geological concepts. For example, characteristic associations of organic microfossils, and particulate organic material, in rocks or sediments, are called palynofacies. Discrete seismic units are similarly referred to as seismic facies. (Fig10)



Fig10. Middle Triassic marginal marine siltstone and sandstone facies exposed

21. Metamorphic facies

The sequence of minerals that develop during progressive metamorphism (that is, metamorphism at progressively higher temperatures and/or pressures) define a facies series.

Cretaceous

Name of Cretaceous system is derived from chalk deposits in Northern Europe which is longest period, 75 million years in Mesozoic. (Setudehnia, A., 1978)

22. Cretaceous in Iran

Boundary of Jurassic – Cretaceous has not been described properly In Iran and it is believed by all

geologists in Iran that this boundary is identified with late Cimmerian tectonic event which is type of orogeny event. But new results demonstrate that on the contrary of current imagination, in most of regions in Iran, boundary of Tithonian (late Jurassic) and Berriasian (early Cretaceous) epochs are transitional and representative of deep environments. In other words, this event that named early Cimmerian has occurred in beginning of early Cretaceous and after Berriasian epoch and probably in Neocomian (prior to Barremian) that has been resulted in widespread emersion of earth from water and dominance of continental situations. That is why except to Zagros, flysch - bearing basins in east of Iran and Makran are composed of red clastic deposits, after Cimmerian event, which has reached by a transitional passing to Orbitholin - bearing carbonate strata in Barremian - Aptian. These mentioned clastic strata (Shurijeh in Kopet Dagh, Sangestan in Central Iran, Noghereh Formation and ...) do not have index fossil and as a stratigraphic viewpoint are known more of Neocomian age. Orbitholin - bearing limestone are most distinct strata from early Cretaceous of Iran which have considerable extent in Alborz (Tizkuh), Kopet Dagh (Tirgan formation), Central Iran (Shahkuh and Taft Formation) and Zagros Mountains (Darrian and Fahlian Formation). In widespread zones (except to Makran - Zabol flysch zone), Orbitholin - bearing limestone in Aptian - Barremian with transitional passing, sometimes discontinuously (Zagros), reach to grey - greenish shale - marl deposits which have Ammonites as Beudanticeras in Albian that have been named Kajdomi Formation in Zagros, Dare Zanjir in Central Iran and Sarcheshmeh and Sanganeh in Kopet Dagh. Nevertheless, there is no Albian shale in regions where erosional cycles, depend on Austrian events, are vigorous.

23. Conclusion

In many regions of Iran, except to Zagros, in approximate boundary of early and late Cretaceous, it is observed evidences of tectonic events which are mainly as land generating and can be compared with worldwide Austrian event, in everywhere in Iran except to rare cases (east of Tehran and Yazd). Upper Cretaceous beds in Iran do not have identical facial characteristics and it seems that in contrast to equal sedimentary condition in early Cretaceous, sedimentary basins in upper Cretaceous have been separated from each other and special condition has been dominated in each basin. As a result of that, lithostratigraphic units except to Zagros and Kopet Dagh have not been named and or have local names in upper Cretaceous of Iran. One of characteristics from late Cretaceous of Iran is iteration of tectonic

movements depend on events which can be compared with sub Hercynian cycle. That is why sedimentary gaps and erosional cycles as subformation are iterative in upper Cretaceous of Iran. Ultimate sedimentary gap in Cretaceous has been occurred after Maastrichtian which can be compared with Laramide event which has ended Cretaceous system. Besides sedimentary deposits, a part of Cretaceous rocks in Iran is as extrusive lava flows or intrusive bodies. (Yazdi, M., Bahrami, A., Vega, F.J., 2009) Volcanic rocks of Lower Cretaceous can be observed in Alborz and more in Sanandaj - Sirjan zone (Eghlid, Haji abd, Kabudasrahang, Orumieh, Mahabad). Volcanic rocks in upper Cretaceous have origin in mantle which has been formed in latest phases of formation of ophiolite and in deep basins and have formed a part of Cretaceous ophiolite sets of Iran. Intrusive masses, pertaining to late Cretaceous, have radiometric age as much as 64 - 70 million years which have exposures particularly in Sanandaj - Sirjan zone (Hamdan, Broujerd, Arak ...). Intrusive bodies of Bazman are also representative of beginning of subduction of Oman oceanic crust beneath Makran of Iran which has been active since late Cretaceous (64 million years ago). Besides magma activities, process of oceanogenesis, formation of oceanic crust, enclosing of suture zone of Neo Tethys in Zagros and Central Iran, thrusting of oceanic crusts over continental margins and finally mineralization process with magmatic origin imply to dynamism of Geodynamic of Iran in Cretaceous.

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An investigation of alongshore sediment transport trend, using experimental relations, morphological landscapes and coastline changes in the Persian Gulf

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Abstract: Predict of sediment transport and sedimentation rates are one of the main affecting in coastal areas management. Many tries with emphasis on effective reasons in sediment movements has been done to decide the rate of sediment transport, including the CERC formula. But accurately predict sediment transport rates and trends were affiliated of different such as accuracy and precision statistics, basic and initial data's. Since that may not be possible such information in some areas, was necessary used other techniques such as coastline changes and morphology. In this paper, alongshore sediment transport trends were considered in parts of northern coast of Persian Gulf, by local wave data's, CERC formula, morphological landscapes and coastline changes at the headlands and breakwaters. Coastal morphology and coastline changes were expounded with CORONA (1964) and SPOT (2005) satellite imageries. Alongshore sediment transport was outcome by CERC formula. Based on results, all of morphological landscapes and coastline changes in the study area were confirmed alongshore sediment transport trends got from CERC formula. In some areas that have limit data or lack of substantial document and prepare field information should used coastline changes and morphological settings with empirical relationships, were impossible to inspect the output.

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1. Introduction

Coastal areas have various human activities potential, in the business for beach dwellers and very significant role in the world economies. Management and optimum utilization of these areas involves identifying the natural factors, which verified to the different perspectives of these factors of science related. In coastal engineering analysis of sediment transport issues have great importance. Determination of sedimentation rate and trend, and correct predict of coast changes is very sensitive and important in the construction of ports. A lot of damage associated with the incidence of sedimentation and erosion in coastal areas and especially in ports, despite of considerable advances in estimating the quantity and trend of deposition. Alongshore sediment transport from oblique waves fractures is the most important processes in the coastal morphology, erosion, sedimentation and indicated the beach stability. Although according to the wave specifications changes the rate and direction of sediment transport in certain parts of the coast, but the resultant rate of annual sediment transport, shows alongshore sediment transport predominant trend. To

review and estimate alongshore sediment transport presented the various experimental relations such as, Kamphuis, Van der Meer and CERC [19, 28 and 10]. Considering that, alongshore sediment transport studies used CERC formula in Iran, coefficients of this formula have been done in relation and extracted with wave climate and sedimentation to other coastal countries. Taking of this formula needs more hesitated to use on the Iranian shores (Afsharkaveh, N. and Soltanour, M. 2010). To this purpose, sediment transport investigation was not enough with using these relationships and achievement of information is essential from the natural conditions of each region. In this field, many studies from various perspectives, has been done by the researchers such as, Wang and et al (1998), White (1998), Wang and Kraus (1999), Masselink and Pattiaratchi (2001), LaValle and et al (2001), Camenen and Larroude (2003), Soulsby and Damgaard (2005), Patsch and Griggs (2008), Brown and Davies (2009), Soltanpour and Kaveh Afshar (2010).

Coastline known as the boundary between land and water (Dolan, R., Hayden, B.P., May, P., May, S., 1980, and Horikawa, K., 1988). In fact, periodically

change at time intervals in the beach location, due to alongshore and cross-shore sediment transport and these changes due to the dynamic movements of sea water in coastal areas, such as tide and waves. On the other hand, alongshore sediment transport is one of the influence factors to sediment supply along the coast. Any change in this trend, including changes in the quantity that cause the accretion and erosion trends in coastal areas. Changes of coastline are one of the important issues of coastal scientists and used in the coastal management and coastal engineering. Position and the history of coastline changes can be produce important information in the coastal protection, coastal development projects and to calibration and numericalization of coastal area models (Hanson, H., Gravens, M.B., Kraus, N.C., 1988). To analyse the trends and coastline changes, should be investigated those in time and space, based on fundamental principles coastal strip (Boak, E.B., Turner, I.L., 2005). Short-term changes in coastline are said to forward and backward displacement of the coast in decades timescale, usually due to erosion and sedimentation processes along the coasts and the changes in the beach profile. These changes are more pronounce in coastal structures limits and some morphological landscapes such as the capes. Thus, changing in coastline position could be used as an index to determine the alongshore sediment transport trend besides beach morphology changes. On changes in coastlines and its associated phenomena, can also mentioned to many studies such as, Frihy and Dewidar (1993), Camfield and Morang (1996), Storlazzi and Field (2000), Masselink and Pattiaratchi (2001), Gharibreza and et al (2004), Chen and Chang (2009) and Anfuso and et al (2011).

Investigation of sedimentation behind breakwaters and coastal structures and review of erosion and sedimentation pattern on the adjacent coastal areas is a method for estimating alongshore sediment transport rate. Thus, field data; such as hydrographic data's in different years and their studies can be benefited and analysed conclude of them with the results of laboratory models and empirical formulas. Then exist of dredging information in courses and the volumes and removal of material from coastal sediments, as the output of the coastal zone is necessary in the study period (U. S. Army Corps of Engineering. 1994). Nevertheless, in some areas, doing of this process if it is not possible due to weakness of base data, such as recorded field data, other techniques must be use to measured accuracy of the output of experimental relations. Since most ports of the study area due to limited data or lack of substantial documented field information (or with poor information), such as hydrographic concepts and sediment exit data, only using empirical

relationships for analysis of sedimentary processes will not be without critic. Therefore, in this research used the morphological landscapes and coastline changes, with alongshore sediment transport, as a natural constants and erosion and sedimentation functions.

2. Study area

In this research, has been investigated the mostly alongshore sediment transport rate by wave's data, satellite imagery, bathymetric maps, computing the sediment transport rate and GIS. Also, coastline changes investigated in the 41 years time-span, between the 1964 and 2005, during about 400 km of the north-eastern Persian Gulf coasts, from Berke Seflin Bay to Nayband Cape. These regions located between 53°, 34' E to 55°, 17' E and 26°, 29' N to 27°, 29' N, have morphology, geology and land use variation and several commercial and fishery port and, oil terminals (Fig. 1). These areas are one of the warmest in the Middle East (Anfuso, G. Pranzini, E. and Vitale, G. 2011), which has arid climate, with 80 to 200 mm mean annual rainfall (Meteorological yearbook of Iran. 2009). Theses coasts has Semi-diurnal tide, mean level was between 1.06 to 1.59 m (Aghtouman, P. 2008) and located along the Zagros mountain anticlines with the marls, siltstones, mudstones and limestones of Aghajari, Mishan and Gachsaran formations. In addition, conglomerates and limy sandstones of Bakhtiari formation and diapirs of salty Hormoz series have exposure in some coastal areas.

Widespread exploitation of these areas, including commercial, fishing, extraction and exploration of hydrocarbon, tourism and geotourism has caused, this part of the Persian Gulf coasts have remarkable growth and advances over the past decade. On the other hand, inattention to basic studies in these areas and do not implementation of comprehensive coastal zone management causes many problems among harmful coastline changes and sedimentation problem in ports.

3. Alongshore sediment transport trend

To estimation of alongshore sediment transport potential, has been used deep-water wave data, output of wave modelling Iran Seas project (General Directorate of Coast and Port Engineering. 2009). Extracted and used wave data parameters of 25 points that employed in CERC formula, such as wave height, wave period, occurrence and angle of waves. k coefficient in CERC formula considered 0.39 according to CEM recommendation (CEM Appendix A- Glossary of Coastal Terminology, 2003).

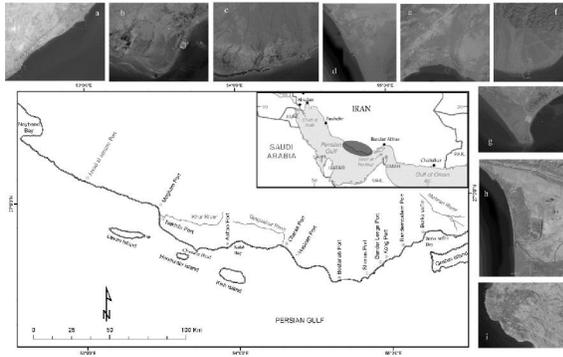


Fig 1: Study area and its major ports. a) Kong and Lenge ports coastal area. b) Sandy beach dunes and Shenah port. c) Bostaneh port coastal area. d) Hasineh port near the Hasineh salt domes. e) Charak port coastal area and Tangekhar river mouth. f) Aaftab port, Kalat salt domes and its alluvial fan. g) Chirouye coastal area and head. h) Mogham and Nakhilu coastal area and Khur river mouth. i) Nayband Cape in western of study area.

Thus obtained the net potential of alongshore sediment transport and extracted sediment transport overcome directions along the study coastal areas (Fig. 2). Based on the results, alongshore sediment transport pattern were divergent in Berke Seflin area so a trend is towards the East- South-east and the other one is to South-west. South-east trend were along to Shenah head and occurred convergence of currents in this region. This convergence pattern is because of the south-eastern current pattern between the Bostaneh coasts and Shenah head. Alongshore sediment transport pattern from the Eastern areas of Aaftab port is East and South-east and the trend seen to Bostaneh head that is converging currents. This divergence pattern causes Western alongshore sediment transport trend to the Chirouye head. Chirouye head is convergence location of this current trend with East South-eastern alongshore sediment transport current that flow from Nayband Cape. In addition, in Nayband Cape divergence of alongshore sediment transport currents occurred in to south-east and north to Nayband Gulf.

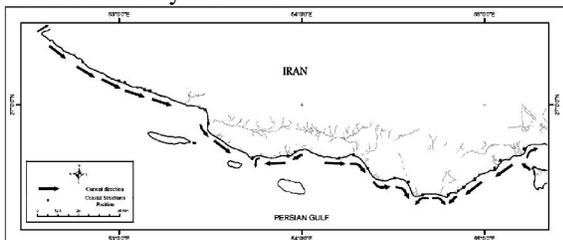


Fig 2: Pattern of alongshore sediment transport currents in coastal study area.

4. Coastline changes

The coastline changes have been considered in 41 years period between 1964 and 2005 by compared of CORONA and SPOT satellite imageries. CORONA is the first strategic management of Science and Technology Organization of United States satellite series, which has been built and used in cooperation with the USAF. At first, CORONA satellite was used with 24 inches camera, in height of 165 to 460 km from the earth that the cameras could be take images with less than 7.5 m resolution from the earth. This images out of the classified were reduces the accuracy at 2002 (NRO. 2010). CORONA and SPOT5 image that has 10 m spatial resolution have been based on compared periods shoreline positions. Noteworthy, 1964 CORONA images shows the coasts with the least interference of human impression such as ports and coastal structures, and this period have well capable of providing human effects in the coastal area. Coastline was considering the sea and land borders as exactly consistent mean high tides level (CEM Appendix A- Glossary of Coastal Terminology, 2003). The mean high tide level in different parts of the studied coastline is variable between 1.7 to 2.5 meters. Then, extracted mean high tide line from bathymetric maps and sketched waterline after corrections and cutting out errors from each one of the satellite images. These two lines were compared with separate and extract the shorelines. Mean high tide line provided by the interpolation of mean high tide levels in different parts of study area in the GIS tools, published by Iranian National Cartographic Centre (National Geographic center of Iran. 2004), and based on bathymetric maps zero line.

Accretion and regression pattern of shorelines has been obtain by comparison of two-term satellite imagery coastlines and set the critical points in the study area. Naturally, these critical points are located mostly at the limit of coastal structures such as breakwaters, and natural morphological landscapes such as heads and capes. In each of these points were calculated rate of coastline changes and used comply its results to alongshore sediment transport current trends. In this way were derived accretion and regression pattern of coastline at the limit of coastal structures and natural morphological landscapes (for example, Fig. 3). Based on these results have been determined the rate of shoreline accretion/regression within the meters scale (Table 1).

The results of coastline changes shows the accretion rate on the back of Javad al aemme, Mogham, Nakhilu, Charak, Hasineh and Shenah ports due to up drift (generally West - East) over the accretion rate due to down drift (generally East - West). Instead of this trend, the accretion rate due to up drift is less

than the accretion rate due to down drift in Aaftab, Lenge and Kong ports (Table 1). Also left coast of Chirouye head has erosional pattern and right coast of that has accessional pattern. This pattern is a way the top of head be displaced to east in study time-span (Fig. 3).

Table 1: coastline accretion/regression at the critical points in the study area (positive and negative values were respectively accretion and regression of shoreline)

Down drift accretion (m)	Up drift accretion (m)	Location	Down drift accretion (m)	Up drift accretion (m)	Location
+19	+43	Charak port	+43	+105	Javad al aemme port
+35	+122	Hasineh port	-82	+300	Moghham port
+127	+116	Bostaneh port	+33	+56	Nakhilu port
+33	+48	Shenas port	-83(right)	-45(left)	Chirouye head
+115	+57	Lenge port	+85	+54	Aaftab Old
+127	+59	Kong port	+64	+90	Charak jetty

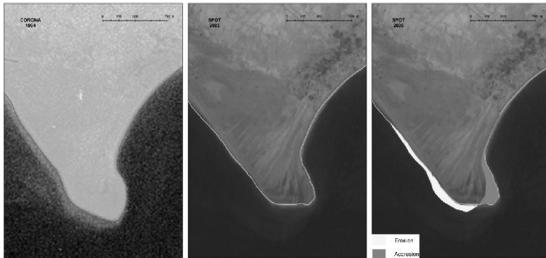


Fig 3: Extracted shorelines of Chirouye head base on CORONA (left), SPOT (mead) and sedimentation/erosion trend (right).

5. Morphological landscapes influenced of alongshore sediment transport

Coastal morphology directly affected by sedimentary processes, such as sediment supply by rivers and streams from land and coastal sediment transport currents. Alongshore currents as one of sediment transporters along the shorelines were putting order some natural morphological landscapes such as, alluvial sediments complex on drains mouths, river deltas, coastal sandbars and ridges. Thus, those be inclined over the time along the longshore currents and/or will have been special erosion or sedimentation patterns. These landscapes can be easily interpreted evaluation of satellite images. In this process have been used spot images. Therefore, morphological landscapes from Nayband cape to Chirouye head coasts indicate general alongshore trend to east. In these areas, small deltas of seasonal drains mouth (Fig. 4a) and some beach rims (Fig. 4b) have eastward trend. The morphological landscapes Between Chirouye head and Kalat bay coasts indicate general alongshore trend to west, so convergence of these trends causes Chirouye head (Fig. 4c). In these areas, small deltas of seasonal drains mouth of Kalat

bay western coast have westward trend (Fig. 4d). Kalat bay eastern coast observed reverse trend, as deltas of seasonal drains mouth have eastward trend (Fig. 4e). This eastward trend was observed to Bostaneh head coastal morphology. This scape evident clearly in the Tangekhur river mouth, Charak estuary (Fig. 5a) and drains led to the sea from Hasineh salt dome (Fig. 5e). The same evidence can be seen to Bostaneh head. In addition, morphological landscapes of Shenah western coast show the eastward trend, so that the drains mouth have eastward trend in this area. The arrangement pattern of transverse sand dunes at Shenah head indicate converge two currents and south-eastward growth of sand dune system and creation of this head (Fig. 5d). In the coastal areas from Shenah head to Berke Seflin bay, some morphological landscapes have eastward trend, so can be cited the deposition pattern of drains mouth (Fig. 5b). Morphological coastal landscapes such as mouth and bars of estuaries and spits are inclined to the east from Berke Seflin bay Eastern coast toward east to Khuran area at Mehran river delta (Fig. 5c).

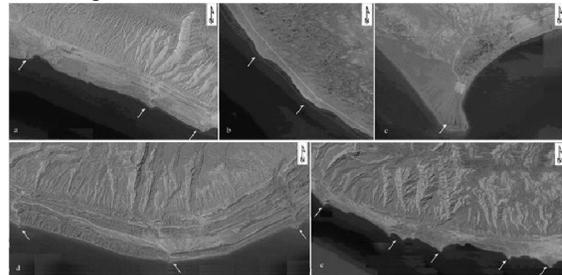


Fig. 4: a) eastward trend of seasonal drains mouth of the Nayband Cape eastern coasts. b) Eastward trend of Chirouye northwestern sandy beaches. c) Growth pattern of Chirouye head due to convergence alongshore sediment transport currents. d) Westward trend of seasonal drains mouth of the Kalat bay western coast. e) Eastward trend of seasonal drains mouth of Kalat bay eastern coast.

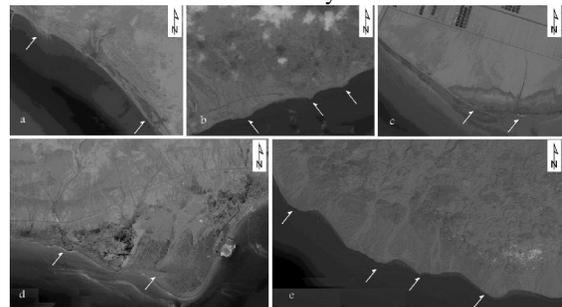


Fig. 5: a) Eastward trend of seasonal drains mouth and bars of Charak estuary. b) Westward trend of led to the sea seasonal drains mouth from Kong salt dome. c) Eastward pattern of estuaries bars and spits of Khuran area. d) Eastward trend of seasonal drains mouth of Shenah head western coast and arrangement pattern of transverse sand dunes. e) Eastward trend of led to the sea seasonal drains mouth from Hasineh salt dome.

Conclusion

According to the results of the coastline changes, can be settle the main alongshore sediment transport current along the coastal study areas. Attention to Javad al aemme and Nakhilu ports position, which sedimentation due to up drift was more than down drift in both of them, have eastward alongshore sediment current at Javad al aemme and Mogham areas and southward at Nakhilu area. Also eastward inclinations of morphological landscapes confirm this result in these areas, thus were established the result of the CERC formula. The arrangement pattern of transverse dunes, confirmed the regressional trend in the western coast and accretional trend in the eastern coast and this caused south-eastward accretion of the Chirouye head. This causes rotation of south-eastward sediment current along the eastern; towards the western coast and convergence with the south-westward sediment current in this head. This convergence was causing sedimentation and thus Chirouye head and its western coast has existed accretional model. Further, the results of the CERC Formula have shown convergence of these two currents within the Chirouye head. Attention to more accretion rate of shoreline due to down drift than up drift in Aaftab port and westward trend of mouths and small deltas of seasonal drains in western coasts of this area, the mostly sediment transport current in this region has east to west direction. Therefore, these settles conform to CERC formula results. Sedimentation within the Aaftab port pool also confirmed this trend (Fig. 6a), so the pool entrance built facing alongshore sediment transport current. However, coastal accretion trend and morphological landscapes have showed the west to east mostly sediment transport current in Hasineh and Charak areas. Based on morphological evidence, this current and westward current in Aaftab port area, divergence at Kalat bay. Thus, based on coastal accretions and sediment masses, alongshore sediment transport current were west-northwest to east-southeast in Charak port area, Tangekhur river mouth and Charak estuary and north to south in the Hasineh port area, which conform to current patterns resulted by CERC formula.

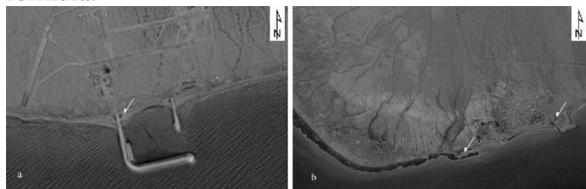


Fig 6: a) Sedimentation within the Aaftab port pool. b) Eastward trend of sand ridges on west coasts of Bostaneh port and sedimentation within its pool.

Westward mostly alongshore current was distinguished by more accretion rate of shoreline due to down drift than up drift and sedimentation on base of main breakwater in Bostaneh port conform to CERC formula results. On the other side, eastward morphological landscapes between Bostaneh port and head can sign up the west to east alongshore current (Fig. 6b), inconsistent with the CERC formula and coastline changes results. Noteworthy, the morphological landscapes such as sand ridges formed during the coastline changes study time period and inexistent in CORONA satellite image. This matter can be justified with build Bostaneh port, thus build that at 4 km away the Bostaneh head, and cutting the westward littoral drift by port, caused intensifies eastward currents effects, and the ridges formed after builds harbour. Eastward morphological landscapes from eastern coasts of Bostaneh to Shenah areas and arrangement pattern of Shenah head sandy dunes (Fig. 5d) point to occur alongshore current towards the east. Convergence of this current and south-westward current from the south-east coast of Shenah area, was created progressive shore with transverse dunes and formation of sedimentary Shenah head. All the morphological landscapes (Fig. 5b) and coastline changes from Shenah head to Berke Seflin bay (Table 2, coastline changes in Shenah, Kong and Lenge ports) conform to CERC formula results and despite the south-westward mostly alongshore currents. Meanwhile, construction of Shenah port facing to the south-westward alongshore currents has causing sedimentation in the pool. Turbulence between pool waters and waves is clearly visible in Fig. 5d. Because of the related to Qeshm island and existence of Mehran river great delta at the south-east and east of Berke Seflin bay, pattern of alongshore currents were shown rotation and dispersion in to south-east and south-west directions. Estuaries bars and spits were shown the existence of south-eastward current on the eastern coasts of Berke Seflin bay (Fig. 5c). Attention to results, in some area that limited data or lack of substantial documented and preparing the field information were impossible, to inspect the output should used coastline changes and morphological settings with empirical relationships. In-attention to vital and citing only empirical relationships may cause wrong conclusion in analysing the sediment transport currents. In this case, implementations of coastal construction projects and coastal protection programs have risks such as damaging erosion or sedimentation. Including such events, can be mentioned in the Aaftab and Shenah ports. Other benefits of combining the studies of morphology and coastline changes along the empirical relationships, was taken the results from natural processes that shape the coast over the time.

These reasons were results from the reacting all effective processes in coastal area, which referring and use such results would be useful. Thus, can interpret any of coastal area contexts, such as littoral sedimentary cell boundaries and effect of human. Meanwhile the use of tools GIS is affordable because of high-speed, low cost and good accuracy in the information against such interpretations of field data.

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3D Simulation of Flow over Flip Buckets at Dams

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Abstract: In the present numerical study, by using the Fluent software, the ability of it to predict the complex flow conditions is presented. In this purpose, experimental data over a flip bucket in different hydraulic conditions were selected. To simulate the turbulence phenomenon, $k-\varepsilon$ Standard turbulence model was selected. Moreover to predict jet surface the VOF free surface model was employed. Finally by comprising the numerical model and available experimental results, a good agreement was observed.

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Keywords: Flip Bucket; Fluent Software; VOF Free Surface Model; $k-\varepsilon$ Standard Turbulence Model.

1. Introduction

The energy dissipater structure for a spillway could be a flip bucket because it is generally the most economical solution. Improving in design parameters of a flip bucket will protect the tailrace from scouring of impacted jet. Analysis of flow with free surface which passes over a curved boundary by the gravity force is a challenging problem in hydrodynamics. From 1933 till 1954, United State Bureau of Reclamation (USBR) regarding to hydraulic model tests, covered a complete range of bucket sizes and tail water elevations, were conducted to verify the bucket dimensions and details and to establish general relations between bucket size, discharge capacity, height of fall, and the maximum and minimum tail water depth limits. Analytical studies on potential flows past spillway flip buckets were done by many researchers such as: Siao and Hubbard (1953), Tinney et al. (1961), Orlov (1968) Siao et al. (1988). Xie-Qing Xu and Xiao-Xia Sun (1990), by using the finite element method, obtained pressure distribution over spillway and flow bucket. Vischer and Hager (1998) proposed that flip buckets are used when energy has to be dissipated for a flow velocity larger than about 15–20 m/s. Roman Juon and Willi H. Hager (2000) and Valentin Heller et al. (2005) and Remo Steiner et al. (2008) performed some investigations on flip buckets, including scale effects in hydraulic models, bucket pressure distribution, and nappe trajectories with and without the presence of deflectors.

Regarding to the previous researches, in the present study by using the FLUENT Software, flow over the flip buckets at dams was numerically studied.

2. Experimental Data Collected

Selected experimental tests for this numerical study were conducted in a smooth channel by Roman Juon and Willi H. Hager (2000). The selected test cases include eight fixed-bed cases. All experimental tests were conducted in a flume with 499 mm wide and 700 mm deep with a total length of 7 m (Figure 1).

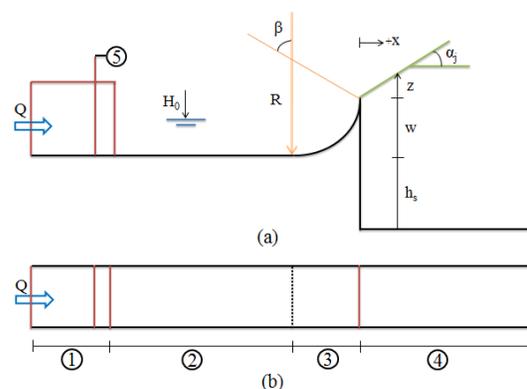


Figure 1. Schematic view of the selected experimental setup: (a) Side view (b) Plan view

In the Figure 1, notification numbers are as 1) Jet box, 2) Approach channel, 3) Flip bucket, 4) Downstream channel, 5) Start of chute. Other parameters are given in Table 1 ($F_0 = V_0 / (gH_0)^{1/2}$).

The channel had a PVC invert and right wall and a left glass wall. The flip bucket consisted of a 1 m long approach channel with a bucket of radius R and deflection angle β . The approach channel was inserted 250 mm above the original channel invert.

Table 1. Selected Experimental Parameters

	R (cm)	F ₀	H ₀
Test 1	20	5	5
Test 2	20	4	6
Test 3	20	4	5
Test 4	20	3	6
Test 5	20	3	5
Test 6	25	5	5
Test 7	25	4	5
Test 8	25	3	5

3. Numerical Modeling

In this section the turbulence model which used in the present research is described. In Reynolds averaging for the velocity components:

$$u_i = \bar{u}_i + u'_i \tag{1}$$

Where \bar{u}_i and u'_i are the mean and fluctuating velocity components. Substituting expressions of this form for the flow variables into the instantaneous continuity and momentum equations and simplifying (and dropping the over bar on the mean velocity, \bar{u}):

$$\frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x_j}(\rho u_j) = 0 \tag{2}$$

$$\frac{\partial}{\partial t}(\rho u_i) + \frac{\partial}{\partial x_j}(\rho u_i u_j) = -\frac{\partial p}{\partial x_i} + \frac{\partial}{\partial x_j} \left[\mu \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} - \frac{2}{3} \delta_{ij} \frac{\partial u_l}{\partial x_l} \right) \right] + \frac{\partial}{\partial x_j} (-\rho \overline{u'_i u'_j}) \tag{3}$$

where equations 1 and 2 are called Reynolds-averaged Navier-Stokes (RANS) equations that $-\rho \overline{u'_i u'_j}$ is called Reynolds stresses, must be modeled. by using the Boussinesq hypothesis (Hinze, 1975) relate the Reynolds stresses to the mean velocity gradients:

$$-\rho \overline{u'_i u'_j} = \mu_t \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) - \frac{2}{3} \left(\rho k + \mu_t \frac{\partial u_l}{\partial x_l} \right) \delta_{ij} \tag{4}$$

The Boussinesq hypothesis is used in the k-ε models. In the present work the Standard k-ε model (Launder and Spalding, 1972) was used to simulate the turbulence phenomenon. For Modeling the effective viscosity:

$$\mu_t = \rho C_\mu \frac{k^2}{\varepsilon} \tag{5}$$

where C_μ is a constant, k is the turbulence kinetic, and ε is the turbulence rate of dissipation. The transport equations for the Standard k-ε model are as follow:

$$\frac{\partial}{\partial t}(\rho k) + \frac{\partial}{\partial x_i}(\rho k u_i) =$$

$$\frac{\partial}{\partial t}(\rho \varepsilon) + \frac{\partial}{\partial x_i}(\rho \varepsilon u_i) =$$

$$\frac{\partial}{\partial x_j} \left[\left(\mu + \frac{\mu_t}{\sigma_k} \right) \frac{\partial k}{\partial x_j} \right] + G_k + G_b - \rho \varepsilon - Y_M \tag{6}$$

$$\frac{\partial}{\partial t}(\rho \varepsilon) + \frac{\partial}{\partial x_i}(\rho \varepsilon u_i) =$$

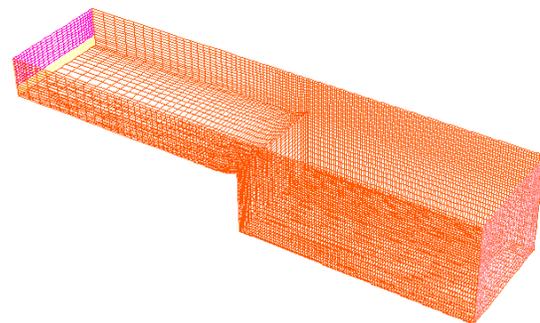
$$\frac{\partial}{\partial x_j} \left[\left(\mu + \frac{\mu_t}{\sigma_\varepsilon} \right) \frac{\partial \varepsilon}{\partial x_j} \right] + C_{1\varepsilon} \frac{\varepsilon}{k} (G_k + C_{3\varepsilon} G_b) - C_{2\varepsilon} \rho \frac{\varepsilon^2}{k} \tag{7}$$

Standard constants of k-ε model are listed in Table 2 and were used in the model.

Table 2. Standard k-ε turbulence model constants

	C _{1ε}	C _{2ε}	C _μ	σ _k	σ _ε
Standard k-ε	1.44	1.92	0.09	1.0	1.3

The volume of fluid (VOF) method was employed as a powerful computational tool for the analysis of free surface flow (Hirt and Nichols, 1981). The tracking of the interface(s) between the phases is accomplished by the solution of a continuity equation for the volume fraction of one (or more) of the phases. In the present research, both structured and unstructured mesh was used (Figure 2).



(a)



(b)

Figure 2. Computational grid in the vicinity of flip bucket: (a) 3D view, (a) Side view.

Boundary conditions which were employed in this investigation are (Figure 3): Two different inlets were needed to define the water flow (Inlet 1) and air flow (Inlet 2) in the model domain. These inlets were defined as stream-wise velocity inlets that require the values of velocity. To estimate the effect of walls on the flow, empirical wall functions known as standard wall functions (Launder and Spalding, 1974) were used. The upper boundary above the air phase was

specified as a symmetry condition, which enforces a zero normal velocity and a zero shear stress.

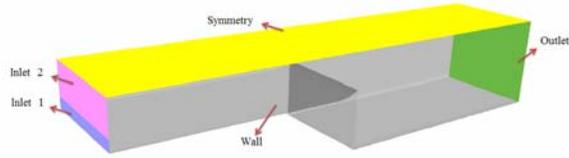


Figure 3. Solution domain and boundaries for modeled flip bucket

Other considerations in this simulation in this section are presented. The PRESTO pressure discretization was selected because this scheme was showed the best convergence in this simulation. The momentum and turbulent kinetic energy equations were discretized by first order upwind. The PISO pressure-velocity coupling algorithm was also used. Using unsteady and free surface equations required fine grid spacing and small initial time steps. To do so, a sensitivity analysis was performed on grid spacing and finally a number of meshes equal to 200000 were selected as the best result. Time steps were selected equal to 0.001 to 0.01. Due to model runs, solution convergence and water-surface profiles were monitored. The value of VOF parameter was selected equal to 0.5 which is a common practice for volume fraction results (Fluent Manual, 2005 and Dargahi, 2006).

4. Verification

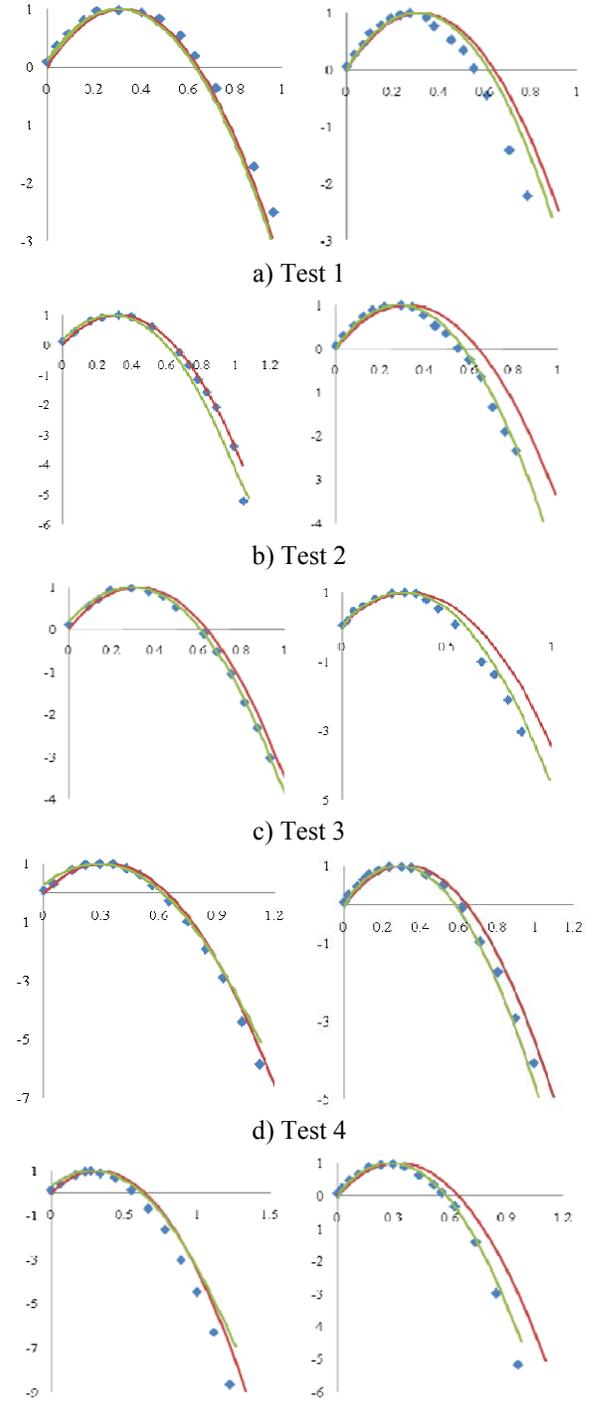
Before employing the numerical model, it is necessary to ensure about the accuracy of the numerical model. For this purpose, experimental cases which were mentioned in the previous section were employed. To evaluate the free surface, the first case was selected regarding the available flume data. Existing experimental results to validate the numerical simulation predictions included water surface profiles and pressure distributions. To calculate the jet trajectory by defining α_j as the takeoff angle and V_j as the takeoff velocity, the trajectory geometry $z(x)$ may be described for free jet flow as

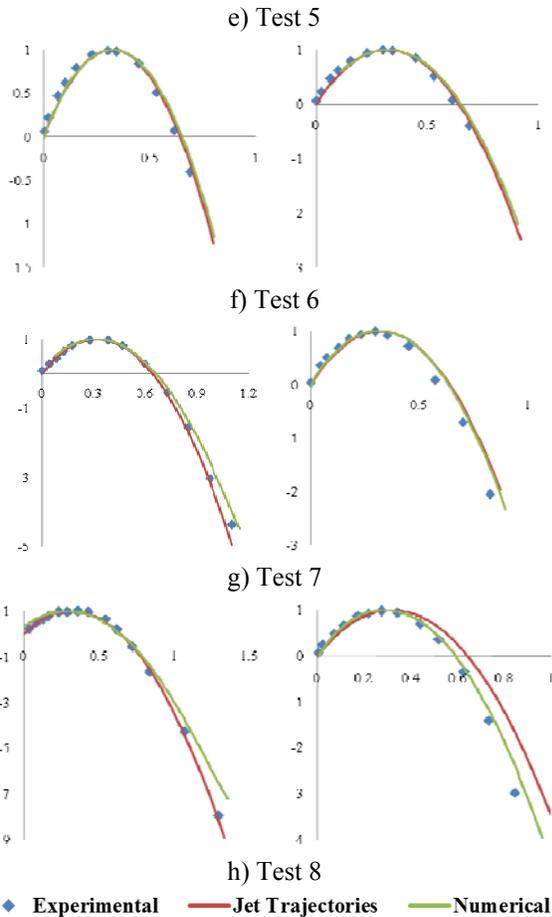
$$z = z_0 + \tan \alpha_j x - \frac{g x^2}{2 V_j^2 \cos^2 \alpha_j} \tag{9}$$

By considering the flow depth across the flip bucket remains constant, takeoff flow depth at $x=0$ and so $z_0=h_0$ for the upper nappe and $z_0=0$ for the lower nappe. The takeoff velocity V_j is V_o at $h_0 \geq 5 \text{ cm}$. By introducing the normalized coordinates relating to the upper (subscript O) nappe profile as $Z_O = (z_0 - h_0)/(z_M - h_0)$ and $X = x/(h_0 F_0^2)$ where z_M , is the maximum (subscript M) nappe elevation above the takeoff elevation, results in

$$Z_0 = \tan \alpha_j X - \frac{1}{2} \frac{X^2}{\cos^2 \alpha_j} \tag{10}$$

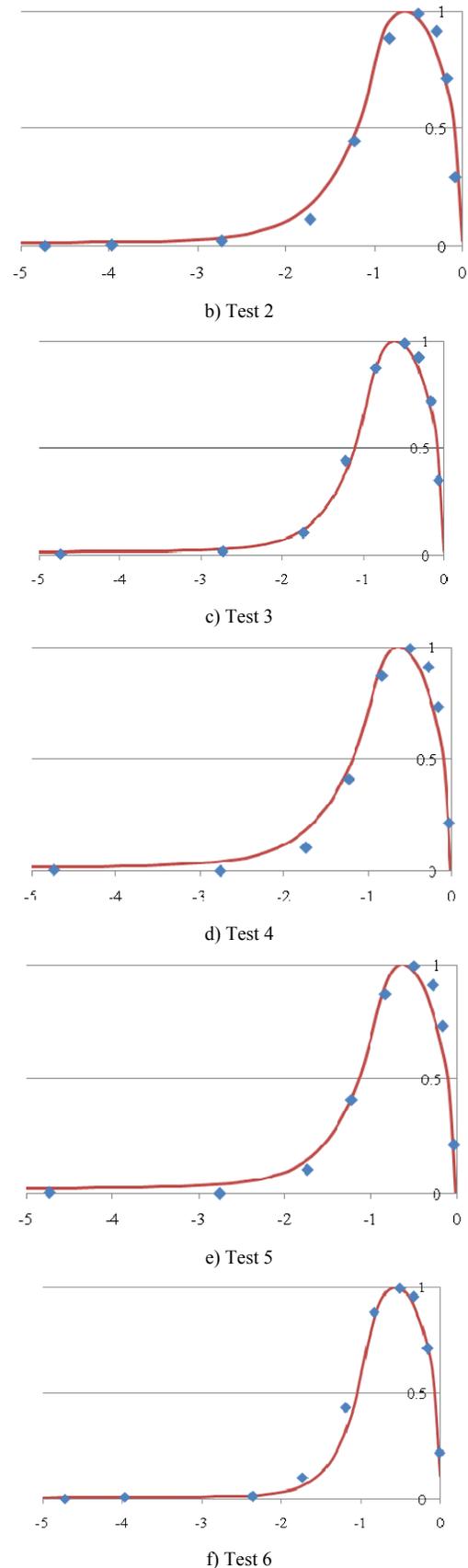
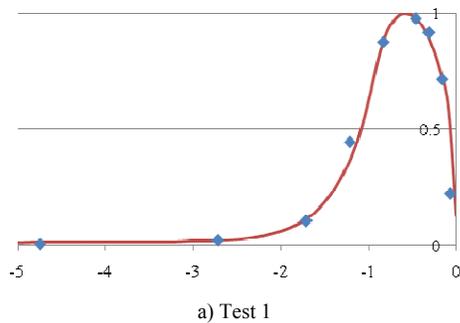
Figure 4 shows the numerical results in comparison with experimental data $Z_O(X)$ for various flow configurations and produces agreement with equation 10 provided $\alpha_j=20^\circ$ is fitted. The data for the lower (subscript U) nappe trajectory were analyzed correspondingly using $Z_U = z_U/z_M$ and $X = x/(h_0 F_0^2)$.





◆ Experimental — Jet Trajectories — Numerical
 Figure 4. Water surface profiles for flow over Flip-Bucket (left diagram upper nappe profile, right diagram lower nappe profile)

The distribution of pressures at the bottom along the flip bucket is an important design parameter for static purposes. It is equal to the sum of the static approach pressure head h_o plus a dynamic portion. Figure 5 shows the comparison between experimental and numerical results. Normalized parameter $H_p = (h_p - h_o) / (h_{PM} - h_o)$ where h_p and h_{PM} are the total and maximum pressure heads, respectively, plotted along the normalized stream wise coordinate $X_p = x / (R \sin \beta)$, where $x=0$ is located at the takeoff point, and $R \sin \beta$ is the stream wise flip-bucket length.



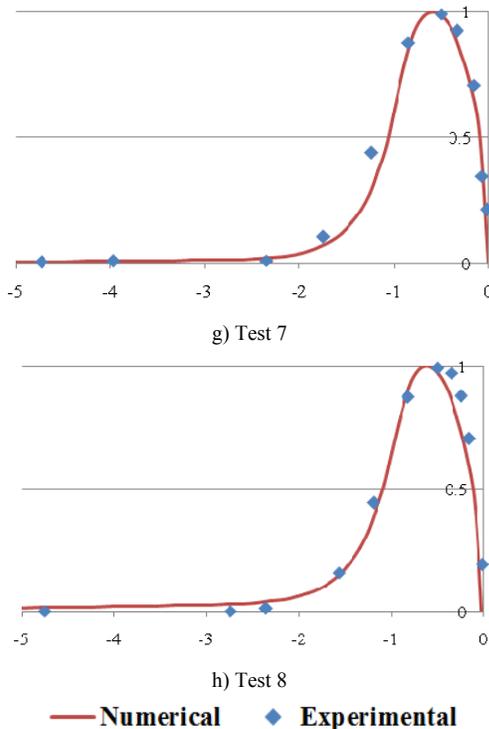


Figure 5. Comparison between computed and measured pressure head distributions at bottom

Conclusions:

One way to dissipate of the energy in large dams is using flip bucket at the terminal of over fall spillways. Improving in design parameters of a flip bucket will protect the tailrace from scouring of impacted jet. Numerical modeling and analysis of flow with free surface which passes over a curved boundary by the gravity force is a challenging problem in hydrodynamics. In the present research by using Fluent software, a flip bucket structure was numerically simulated. To simulate the geometry and verify the results, experimental tests which were conducted in a smooth channel by Roman Juon and Willi H. Hager (2000) were selected. $k-\varepsilon$ Standard turbulence model and VOF free surface model were employed in the model. The results jet trajectory properties and pressures in the bottom and its good agreement with analytical and experimental data in eight cases showed the ability of Fluent numerical model in modeling the flow over the flip buckets.

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Evaluating Strategy for Nongovernmental Scientific and Research Institutions Based on Balanced Score Card Model (Case Study: ACECR of Iran)

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Abstract: What prevents the strategies from getting operational in organizations is that, strategies remain at general level or general actions and orientations. To alleviate this problem, the researchers who proposed balanced score card model presented the concept of strategy map in this model. Strategy map tries to represent the organization's strategy in the framework of cause and effect relationships and demonstrate how the organization's strategy can be transformed into measurable objectives and specific operations which should be followed by organizational units and organization's staffs. To implement its strategies, the academic center for education, culture and research (ACECR) as one of scientific and research institutes in Iran requires a strategy map to be prepared which will provide the essential framework for implementation of the designed strategic plans. In order to design the strategy map in the present study, we made use of the related literature, references, and opinions of experts, and we prepared 40 indicators for different aspects of balanced score card model. Afterwards, we put these indicators into a questionnaire and asked the ACECR managers to let us know their opinion regarding them. Analysis of filled questionnaires by Friedman test resulted in selection of 30 indicators to be put into strategy map, and the resultant ACECR strategy map was designed deductively since no similar one existed. Subsequently, quantitative measures and objectives were considered for each indicator. Ultimately the status of this institution after the first year of implementing the strategy was analyzed using the obtained indicators and we proposed several strategies for successful implementation of the strategy and reduction of existing gaps.

[Sohail Dadkhah, Mohamad-Taghi Amini, Atefeh Khosravi, Sohaila Dadkhah. **Evaluating Strategy for Nongovernmental Scientific and Research Institutions Based on Balanced Score Card Model (Case Study: ACECR of Iran)**. Journal of American Science 2011;7(6):937-943]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Balanced score card; Strategy map; indicator; Measure

1. Introduction

Further need to systematic evolution has been considered by the gradual increase in organizational and management problems, thus scientific and research activities regarding this issue started from beginning of the twentieth century (Kim et al, 2008).

Emergence of strategic management was in the second half of the twentieth century, which is historically subsequent to appearance of scientific management; nevertheless, its evolution and establishment as a management style is relatively modern. Balanced score card model is among the methods for implementation of strategy in organizations and has attracted much attention of numerous companies and organizations in the recent decade (Ali-Ahmadi et al, 2006).

What justifies the emergence of balanced score card is to satisfy organizations' need to a strategic management system by which the role of physical and non-physical assets can be

simultaneously considered in goals and strategies of organization (Guifang, 2009). In addition to financial indicators as functional ones, guide and performance indicators are also considered in balanced score card model (Kaplan et al, 2008).

This model is a technique to transform strategy into action. In other words, it is a method to make operational the vision, mission, and strategies of organizations and its main perspective is to study the future vision of the organization. Balanced score card does not merely play the controlling role and its criteria are not utilized for description of previous performance; rather, these criteria are a tool to explain the organization's strategy and make it possible to reach organizational objectives through coordination of activities at different organizational levels (Kaplan et al, 2008; Woods et al, 2008).

Since many organizations indeed use financial and non-financial measurement indicators of performance with the purpose of gaining tactic feedbacks and controlling current activities as well as

short-term improvement, balanced score card emphasizes on use of these indicators as a part of an information system for employees at all organizational levels. Goals and indicators existing in this model are beyond a collection of financial and non-financial measurement indicators. In a top-down process, these goals and indicators have been derived from mission and strategies of working units (Shvstrandana, 2008).

Balanced score card transforms the mission and strategies of working units into concrete and measurable objectives and indicators. This model leads to equilibrium among the following indicators:

1. Between internal indicators which relate to stockholders and clients, and external indicators which are related to work processes, innovation, learning, and growth.

2. between functional indicators caused by previous activities and guide indicators which lead to formation of performance and future status of organization (Ebrahimi et al, 2009).

Implementation of strategy using BSC model requires the following steps (Kaplan et al, 2007):

- Determination of vision and mission;
- Communication and transfer;
- Programming, determination of desired values, and coordination of executive activities;
- Learning and strategic feedback.

According to Kaplan and Norton who proposed balanced score card, the key to successfully execute the strategy in organizations is that the organization's staff understand it; this in turn includes complex yet essential processes by which non obvious assets are transformed into concrete and obvious outputs. Strategy map is a useful and appropriate tool to fulfill this hard work. In other words, strategy map is a tool which makes a connection between the organization's strategy and the processes and systems which assist the implementation of strategy. This tool provides an organization's staffs a direct and clear insight to understand how their jobs and activities are ultimately connected to comprehensive goals of organization, so it coordinates them in accomplishing their jobs (Kaplan et al, 2000).

Indeed, strategy map forms the foundation of balanced score card; according to Kaplan and Norton, successful implementation of balanced score card is based upon strategy map, i.e. precise determination of cause and effect relationships among organization's strategic goals in four perspectives, including financial perspectives, customer, internal process, and growth and learning (Kaplan et al, 2000; Kaplan et al, 2009).

As the researchers who proposed balanced score card believe, the best way to draw the strategy map is to use top-down approach. Such an approach starts with analyzing organization's goal and destination, and draws the paths for reaching the mentioned destination. To this end, top managers of organization should first analyze the mission and values of organization, i.e. why this organization exists and in what values this collection believes. Afterwards, using this information, managers can determine the vision, i.e. what the organization intends to be according to its philosophy of existence. This vision must provide a clear reflection of organization's goal (cheng et al, 2008).

Similar to balanced score card, strategy map is useful for both profit companies as well as governmental and nonprofit organizations; since its four perspectives can be changed (increase or decrease) concerning the activity field of the organization, customer perspective can be regarded as the first perspective for nonprofit organizations. Therefore, a standard pattern exists for designing the strategy map, and similar to balanced score card this pattern has four separate perspective including financial perspective, customer, internal processes, and learning and growth. After designing the strategy, managers of organization can hence draw a strategy map suitable for their organization considering the nature and activities of their organizations (Kaplan et al, 2008).

In 13th November 1990, the Iranian Supreme Council of the Cultural Revolution (SCCR) approved a bill; according to its definition, ACECR is a bridge between university and society. This institution presently considers its main goal as realization of the ideals of Islamic Revolution in universities and higher education centers, accomplishing high goals of Islamic Revolution, consolidation of religious tendencies among students, development of technology using Iranian experts with the purpose of removing scientific and cultural dependencies, and establishment of the higher education system in universities based upon Islamic values. According to statute of ACECR, goals of this institution are as follows: 1. Development of research and vivification of research mentality in society to reach self-dependency; 2. Development of cultural issues in society through collaboration with Hawza and universities; 3. Development of applied and semi-industrial projects through connection with scientific and research centers in order to make use of research findings; 4. Accomplishing developmental and applied research; 5. Continuing research project in ACECR up to semi-industrial and industrial stage; 6. Providing scientific and technical services in different fields which are essential for society; 7.

Encouraging and attracting young and talented students and researchers, and programming and providing the required conditions and facilities for their scientific and research activities based on understanding real problems of society; 8. Holding official programs of scientific-practical courses according to rules of Iran's higher education.

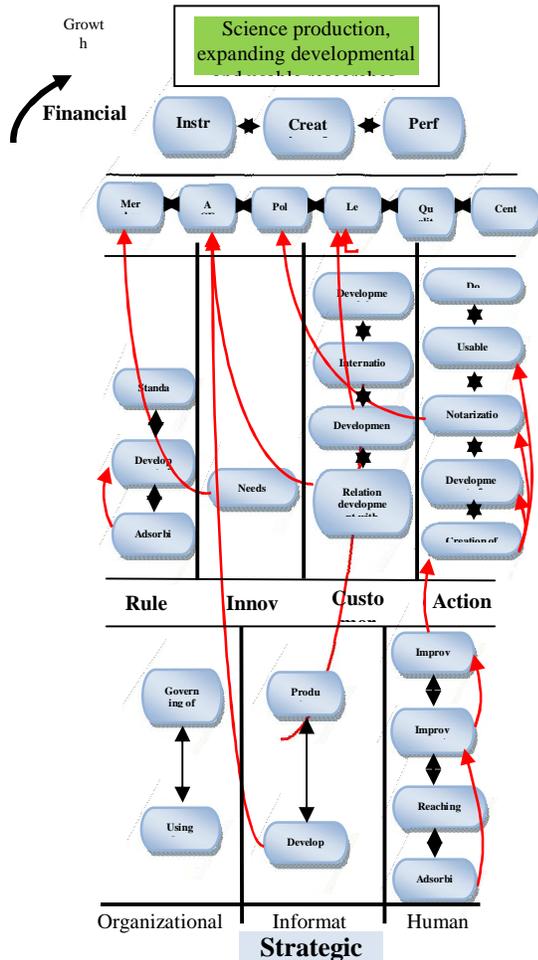


Fig 1: Strategic Map of ACECR

2. Methodology

The methodology used in this study is descriptive, analytic, practical, and also case study in ACECR. The population under study included ACECR managers in deputy of education and deputy of research, who were 210 individuals. The sample in this study was 132 managers of ACECR deputies of education and research based on De Morgan's table and according to random stratified sampling.

Table 1: Indicators extracted in order to design the strategy map

Indicators title	Perspective
1 Gain improvement	Financial
2 Creation of new financial sources	Financial
3 Equipment development in accordance with program needs	Financial
4 Expansion of educational center with country region needs	Customer
5 Quality improvement with employment based perspective	Customer
6 Scientific level upgrade in non-government high education organizations	Customer
7 Identification ACECR to society (National, Regional, International)	Customer
8 Scientific poles development for science edges expansion	Customer
9 Identification of products merchants and ACECR services	Customer
10 Skilling short time educational courses	Internal processes
11 Fundamental, developmental and acting researches development	Internal processes
12 Co-increase creation in capacities and educational & research assists development between units and ACECR research centers.	Internal processes
13 Programmed acting researches and implementation of produced results	Internal processes
14 Production, adsorption and nationalization of needed technologies	Internal processes
15 Development of short time educational courses	Internal processes
16 Presenting educational services in international level and foreign students adsorption	Internal processes
17 Science-acting educational centers development with relative performances and experienced preferences	Internal processes
18 Providing base and development of communication and assists with international research & educational organizations	Internal processes
19 Identification of needs, research and education chances of country and region	Internal processes
20 Development of communication with Science and hygiene ministries to get needed Ruler certificates	Internal processes
21 Adsorbing of supports and assist of coherent government's organizations	Internal processes
22 Standardization of certificates and going to present international certificates	Internal processes
23 Improve the scientific level of ACECR members	growth and innovation
24 Improvement of staff members pyramid	growth and innovation
25 Reach to universal rules in employment of personnel	growth and innovation
26 Adsorbing of scientific power of elites	growth and innovation
27 Expanding perspective of notification of educational acts and ordering of notification sites	growth and innovation
28 Producing of book, software and educational sources for short time educational-experienced courses	growth and innovation
29 Using of new technologies and IT in ACECR	growth and innovation
30 Attention to Islamic rules and ACECR culture government	growth and innovation

Table 2: Balanced score card model of ACECR (education and research) (The indicators' numbers are in accordance with Table 1)

Indicators and measures of financial perspective:

Indicators	Main goals	Criteria	Quantitative goals (%)
1		Cost/Income	From 70 to 65
		Annual increasing of monies (%)	10
2		Annual increasing of received loans (%)	5
		New services income/all of income	5
		Ratio of store rotation	7 (Increase)
3		Territory skeleton space/available space	80

Indicators and measures of customer perspective:

Indicators	Main goals	Criteria	Quantitative goals
4		Created centers in unreached regions	Minimum 10 centers
5		Employment for students (%)	10 % increase
6		Scientific level within non-government educational organizations	Better rank
		Mean acceptance of graduates in MSc level	Minimum 20 %
7		Results of opinion projects	85 % national notification
8		Science and technology pole	one
		Science and technology pole	three
9		Doing environmental researching	Minimum 10 projects

Indicators of internal processes perspective:

Indicators	Main goals	Criteria	Quantitative goals
10		Increase of students numbers of experienced educational courses/students numbers of general educational courses	From current 20% to 30%
		Short time experienced courses numbers/all of courses numbers	75% to 85%
11		Scientific articles	Minimum one scientific-research article or 2 scientific-promotional article for any staff member
12		Number of courses that ran in accordance with experienced and scientific capacity of ACECR	Minimum 100
		Rank	One of 5 best organizations
13		Technology	6
		Rank of organization within all of organizations	Best
		Date of completing of network	Until end of program
14		Projects with assist numbers/all projects numbers	3%
		Projects with assist numbers/all projects numbers	5%
15		Numbers of all of students of short time and experienced educational courses	From 300 hundreds to 500 hundreds persons

Indicators	Main goals	Criteria	Quantitative goals
		Students numbers in special courses/numbers of students in experienced courses	Minimum 50%
		Numbers of approved courses	From 61 to 200 courses
		Numbers of international students/numbers of all students	1%
16		Acting in Islamic countries	Minimum 3 countries
		Research and identification of possibility of accepting science-acting students from regional countries	Minimum 10 projects
17		Increasing capacity of students reception	25000 students
		Accepting students in BS/Skill	From 40% to 60%
18		Treaty numbers with international organizations	Minimum 20 cases
19		Projects numbers	Minimum 10 projects
20		Increase of certificates numbers (%)	10%
21		Being member of committees and general and governmental societies	10% increase
22		Association with credible international companies to get justification	Minimum 10 companies

Indicators of financial growth and innovation perspective:

Indicators	Main goals	Criteria	Quantitative goals
		Annual educational capitation	70 hours
			2.7 to 6 (PhD)
			17.28 to 22 (MSc)
23		Composition of personnel based on educational diploma	29.26 to 34 (BS)
			12.08 to 14 (Skill)
			38.68 to 24 (Diploma and lower)
24		Professor assistant and higher levels/all of staffs	25%
			39.7 to 45 (official and agreement)
25		Composition of personnel based on employment	60.3 to 55 (full time treaty)
			13.7 to 20 (staff)
			86.3 to 80 (non-staff)
26		Inventor/staffs	3%
27		Results of opinion	30%
28		Sources numbers	20 title (annual)
29		Specialty of monies to new technologies and IT	20% increase
30		Numbers of mentions to any person for disregard of rules	0
		Numbers of published books and seminars about ACECR culture	Minimum 30

Data collection was fulfilled through library study, questionnaire, interview, and study of existing information resources. To study the related literature and access to similar studies, library study was used. Indicators, measures, and quantitative objectives

were extracted using questionnaire and interview, and data were analyzed using SPSS 16.0 software.

Considering the related literature and studying the vision, mission, long-term goals, and macro-strategy of ACECR in fields of education and research, 40 indicators were prepared for the first questionnaire as Likert scale and this questionnaire was handed in to ACECR managers nationwide. Friedman test indicated that mean values of 30 indicators out of the 40 indicators were significantly higher than average. After determining the indicators, several measures were considered for each indicator and the chosen measures for each indicator were determined in a questionnaire. Finally, some of quantitative objectives were determined from the organization's documentations and a limited number of them from interview. Considering the determined indicators and the cause and effect relationships, strategy map of ACECR was designed in fields of education and research.

After designing the strategy map, as well as extraction of indicators, measures and quantitative objectives, we compared the current status with pre-determined goals in first year of the program implementation through analysis of obtained indicators, in order to find out how much the strategy has been successfully executed in different mentioned perspectives in first year of the program implementation, and then we analyzed the existing gaps.

Indicators and measures in the two questionnaires were designed such that they were suitable for an institution such as ACECR. To this end, subsequent to initial design, the related questionnaires were analyzed in several stages and their relevance to the subject as well as being understandable was studied. After the final questionnaire was yielded, it was handed in to experts and its reliability was confirmed by Cronbach's alpha test.

3. Results

Considering the mentioned issues in previous sections, the strategy map, table of indicators, and table of balanced score card model of ACECR are provided in this section.

All analyses have been made based on existing documentations and opinions of managers. To avoid a long discussion, comparative graphs (existing status and expected program status for each indicator) have not been shown here. Following comparison and analysis, we have studied and analyzed the related existing gaps. Measures and quantitative objectives were designed in accordance with the strategic program and other documentations of ACECR; in case that no definition existed in the program, it was

obtained by interview with experts in the organization. Relationship of the extracted indicators with the goals existing in the ACECR strategic program was determined; nevertheless, to summarize the discussion, we do not mention the goals in table.

4. Discussion and conclusion

Analysis of strategy implementation status

In this section, we have analyzed the gaps subsequent to comparison of the level of fulfillment of indicators existing in the strategy map with their expected value in the program. To avoid long discussion, comparative graphs are not provided.

Financial perspective

In general, since more than 90% of ACECR's budget is provided by its income, this has led to remarkable importance of this perspective and the strategies of its subset.

From previous times, strategy of ACECR top managers has been physical development as well as ownership of ACECR assets, and this can obviously be observed from the indicators related to this perspective. The only existing problems are Iran's economical conditions, avoiding the payment of bank loans due to execution of contraction policies, and decrease in the budget allocated to ACECR because of change in government's policies, and executors of the program does not have a considerable role regarding these problems. Totally, performance of the program executors can be considered satisfactory and to a high extent in accordance to the program.

Customer perspective

Managers have satisfied the expectations regarding the indicators of this perspective as well as physical development of this institution in most Iranian cities and special attention to employment due to possessing the Organization for cooperation in graduates' employment whose responsibility is to provide job opportunities for those graduated from universities. Furthermore, possessing a wide network of scientific-practical centers nationwide has to some extent satisfied the society needs in this field. Also, the existence of such centers plays a major role in making people familiar with ACECR. Generally, indicators of the customer perspective have been in agreement with the program.

Internal processes perspective

The main viewpoint of ACECR managers in this perspective has been to specialize the activities. The second issue is entering the international arena, which requires fundamental changes in different perspectives; no specific output has been yielded in spite of holding numerous meetings, formation of

different workgroups, and establishment of international domain in practice.

Expectations have been satisfied to a high extent in specializing the activities and development of courses and it has a promising future.

Regarding the entrance into international arena, as was mentioned before, infrastructures have been established; however, no notable success has been acquired so far. As internal market is saturating now, entrance into international arena is a vital issue considering ACECR potentials; it should be noted that time is the determinant factor.

In needs assessment, there is a gap compared to the program in both national and local levels.

Interaction with executive agencies is among the most important strategies which has attracted the managers' attention. It is noteworthy that, changes in government's policies in many years has influence much the success of ACECR programs. Therefore, membership in numerous committees and workgroups in provinces and at national level can guaranty the interests of ACECR.

Growth and innovation perspective

The most fundamental perspective among the mentioned ones is the growth and innovation perspective. Though managers try to consider this issue and understand that human resource is the most valuable wealth of ACECR, most activities related to human resource have a delay compared to the program which indicates insufficient attention of managers to employers of this institution.

Although there are gaps concerning the information wealth, they can be compensated by a new version.

Considering high importance of organizational wealth for managers, there is a gap in this domain in comparison with the program. Presently, a shift in generations is observed in ACECR; indeed, youths of the years 1979-80 who established ACECR and formed its values are currently being retired and their positions are provided to the next generation. Has the next generation been trained enough to maintain these values and are the experiences, opinions, and achievements of experienced individuals documented in the organization? Managers are responsible for transferring these knowledge and values from the antecedent generation to current generation; however, the managers' performance in this field has not been satisfactory from the researcher's point of view.

We have so far mentioned the general analysis of strategy in different perspectives of balanced score card model in ACECR. In following, we present some solutions for improvement of the current status.

Suggestions yielded from this study

1. More attention to welfare of staffs is a significant step to coordinate them with the organization's strategic program;

2. In addition to welfare of staffs, another factor which increases the staffs' commitment for executing the program is their participation in design of the program. General revision of the program with participation of staffs in middle and lower positions enhances the program's execution guaranty;

3. A relatively suitable control system exists for the program; however, it has not been considered to confirm the statistics provided by the units. So it is essential to reinforce the controlling system of the program for confirmation of the statistics' validity;

4. Another approach for reinforcement of this controlling system is to prepare a systematic and pre-determined monitoring plan to update the program;

5. Motivating the managers, other than those of central unit who have satisfactory participation, to better participate in strategic program of ACECR;

6. Making use of a foreigner expert consulting team during the organization's strategic management process;

7. Another factor which increases the commitment to program execution is causing motivation. These motivations may be financial or non-financial, such that the performance of each unit should be analyzed at the end of each year; the level of deviation from the program should be determined for each unit and the results should be reported. Also, staffs of the units with satisfactory performance should be appreciated; nevertheless, such a system does not exist at present;

8. Since most activities of ACECR are accompanied by marketing, implementation of a comprehensive marketing system in ACECR collection is essential. Certainly the establishment of such a system will alleviate the major problems of this institution in identification of markets, finding projects, needs assessment, etc. especially at international level. It should be mentioned that there are serious problems in most programs for recognition of opportunities and needs.

9. The present management system of human resource suffers from numerous weaknesses and even its most primitive components have not been executed. Revision of current status and establishment of a comprehensive system of human resource management will decrease the problems existing in the program in human wealth perspective.

Suggestions for improvement

1. Considering current conditions in the region, suitable opportunities exist for activity in Iraq and Afghanistan, even holding basic and primitive programs; however, this may encounter with

prevention of rivals, which should be taken into consideration. In general, strategy of ACECR for entrance into international arena should be totally revised due to change in political conditions of Iran in the world; otherwise, the present approach would not lead to successful outcomes.

2. In the perspective of organizational wealth which is of high significance for ACECR, it was mentioned that there is a major change in this organization, i.e. retirement of present managers and their replacement with young managers with different ideas and values. To transfer the values and experiences of previous generation to this generation, existence of a knowledge management system and its establishment in ACECR can play a vital role in such a transfer. Furthermore, by projects such as extraction of the knowledge of managers and key individuals, their valuable experiences can be documented. This documentation can even be presented in ACECR culture, since no published work exists so far; but as the managers believe, the most significant reason for success of ACECR has been following the ACECR culture.

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An Effective Preprocessing Methodology for Textual Data Classification

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Abstract: In the present rapidly changing world, a massive amount of raw data is generated, collected and organized in databases. This data contains lot of useful and important information which is hidden and not directly accessible. There is vital need for in-depth data analysis tools which can turn raw data into knowledge. This situation is known as “data rich but information poor”. It is very time consuming, slow and expensive to analyze and understand the huge volume of data manually specially when the data is in the form of text. Textual data need huge resources to preprocess it to make it ready for the data/text mining algorithms. In this paper we have proposed an effect preprocessing methodology for textual data which have produce quality data efficiently and reliably. [Dr. Muhammad Shahbaz, Dr. Syed Muhammad Ahsan, Maryam Shaheen, Muhammad Shaheen, Syed Athar Masood. An Effective Preprocessing Methodology for Textual Data Classification. Journal of American Science 2011;7(6):944-951]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Text Mining, Data Mining, Classification, Knowledge Discovery, Parsing, P-Tree

Introduction

The word data mining has many other synonyms like knowledge extraction, knowledge mining, data archaeology, data dredging and data pattern processing. Data mining is given the name from gold mining. As in gold mining people dig rocks to find gold, similarly analysts use data mining tools to find precious nuggets (knowledge) from raw data.

Data mining is the main step in the KDD process that consists of applying data analysis and discovery algorithms that, under acceptable computational efficiency imitations, produce a particular enumeration of patterns (or models) over the data [2].

The data mining phase of the KDD process basically relies on the algorithms that are useful in extracting and analyzing the patterns. Most of these methods are applied and extensively being used. Data mining step is iterative in nature as the techniques used are tried and tested many times until goal is achieved. The data mining algorithms belong to the machine learning, pattern recognition, statistics and artificial intelligence fields. Data mining algorithms consists of three components [1]:

- **Model Representation**

Mined patterns are represented by using some modeling language. The language should be selected very carefully so that correct model of data is formed otherwise it results in poor accuracy.

- **Model Evaluation**

Special quantitative measures (criteria) are defined to test a particular pattern against the

KDD goal. It shows how well a model meets its defined criteria.

- **Search**

Its main functionality is performing the optimization task of evaluation criteria.

Data Mining Methods

Data mining tasks can be divided into two groups by the kinds of pattern they discover: descriptive and predictive. Descriptive mining tasks deals with common properties of the data which are human understandable while predictive mining tasks involve the prediction of future values by making inference on current values of data.

Summarization and Visualization

Summarization methods give summaries of data. These methods describe subset of data in compact form like average, standard deviation, means etc. Visualization techniques provide graphical overview of data by which analysts can perceive data more easily that will be more helpful in data analysis. Examples include pie chart, bar chart, histograms, and multidimensional tables. More information can be studied through graphical form of data than to study texts and numerical form [2].

Classification

Classification is a way to divide data into groups which have already defined classes. Classification process is carried out in two steps: learning and classification. In learning phase, model is built by using pre-defined set of classes on data. Subset of data selected for learning purpose is called training data which is randomly selected during classification process. The learned model is then presented in the form of classification rules, decision trees, or

mathematical formulae. In the classification phase, the model which presented in some suitable form is then tested against some test data to estimate its accuracy. If accuracy is good enough then this model can be used for classification of future coming data whose class label is not known.

Regression

The process to model and analyze continuous values by using statistical methods is called regression. This technique is based on one independent variable and one or more dependent variables. Independent variable is that which is used to make prediction and dependent variable is the one which is to be predicted. Existing values are used to make prediction for future ones. The simplest form of regression is the linear regression in which data uses straight line model. CART (Classification and regression Trees) algorithm is mainly used for this purpose.

Clustering

Clustering is also a descriptive task which divides the data into groups which have no class information associated with them so that objects in the same clusters are more similar to each other than to the objects in other clusters. It is a form unsupervised learning in which classes is not defined at the start. Most common algorithms used in clustering are K-means and Kohonen feature maps. One major problem with clustering is to define the number of clusters in the beginning which can affect the accuracy.

Link Analysis

Link analysis helps in discovering the relationships and associations between the data values of the given dataset and represents these in the form of rules. These rules represent those values which frequently occur in the data set under consideration. It is also known as association rule mining. Link analysis technique is also descriptive in nature. Market-basket analysis is the most commonly used example of association analysis.

Association rules identified are written in the form $A \Rightarrow B$, where A is called antecedent and B is known as consequent. The most commonly used algorithms to find the association rules are Apriori Algorithm and FP-growth.

Outlier Detection

Outlier analysis or change detection tries to find those data values which show different behavior from the previous measured values. These are known as outliers. Some algorithms discard these as noise but in some cases where unusual happening events are of great importance, these are not thrown away. It can help in detecting the misuse of credit cards or telecommunication service. Visualization tools help a lot in detecting the outliers as human eye is very

efficient in noticing the unusual behavior or data inconsistencies, but this process remain effective with lower dimensionality as higher dimensions are difficult to perceive.

Text Mining

Textual data consists of raw data or free text which is easily understandable by human beings. The text words are in printed format or written material which can be displayed on a display screen. It is written in any of the natural languages which human beings use to communicate with each other. This kind of data is not readable and understandable by computers or machines. To make this unstructured data usable by computers, natural language algorithms are being applied on it to make it suitable for further processing.

Characteristics of Text Data

- **Large Textual Database**

In this "Information Age", most of the textual data of companies like reports, emails, web pages etc. is in electronic format. Most of the publications, books, related material are available and easily accessible through the internet.

- **High Dimensionality**

The textual data is considered to be as of sparse in nature. Each keyword is regarded as a separate dimension. This makes the data very complex to understand.

- **Unstructured Nature**

The data is in unstructured form which is not readable and understandable by machine. No specific data type and data structure is defined, the words of the text are considered as words only. It's been said that 85% data of the companies is in unstructured form [5].

- **Noisy Data**

The textual databases are noisy in nature as these contain a lot of grammatical and spelling errors. There is difference between the original text representation and short-hand words used like in SMS, chat, and e-mail [6].

Text Mining

Text mining is a step in the KDT (Knowledge Discovery in Text) process consisting of particular data mining and NLP algorithms that under some acceptable computational efficiency limitations produces a particular enumeration of patterns over a set of unstructured textual data [3].

KDT is same like KDD (knowledge Discovery in Databases) discussed in last chapter except that KDT deals with only textual databases. Similarly, text mining differs from data mining in the case that text

mining deals with only unstructured text while data mining is applied on structured databases often numerical in nature. KDT indicates the overall process of conversion of unstructured text into knowledge while text mining is the small step in the whole process of KDT which has the main purpose of extracting the useful patterns from the free text.

Text mining uses data mining, information retrieval and NLP techniques and algorithms to extract useful information hidden in the text. All these areas combined together according to the problem to form a text mining pipeline.

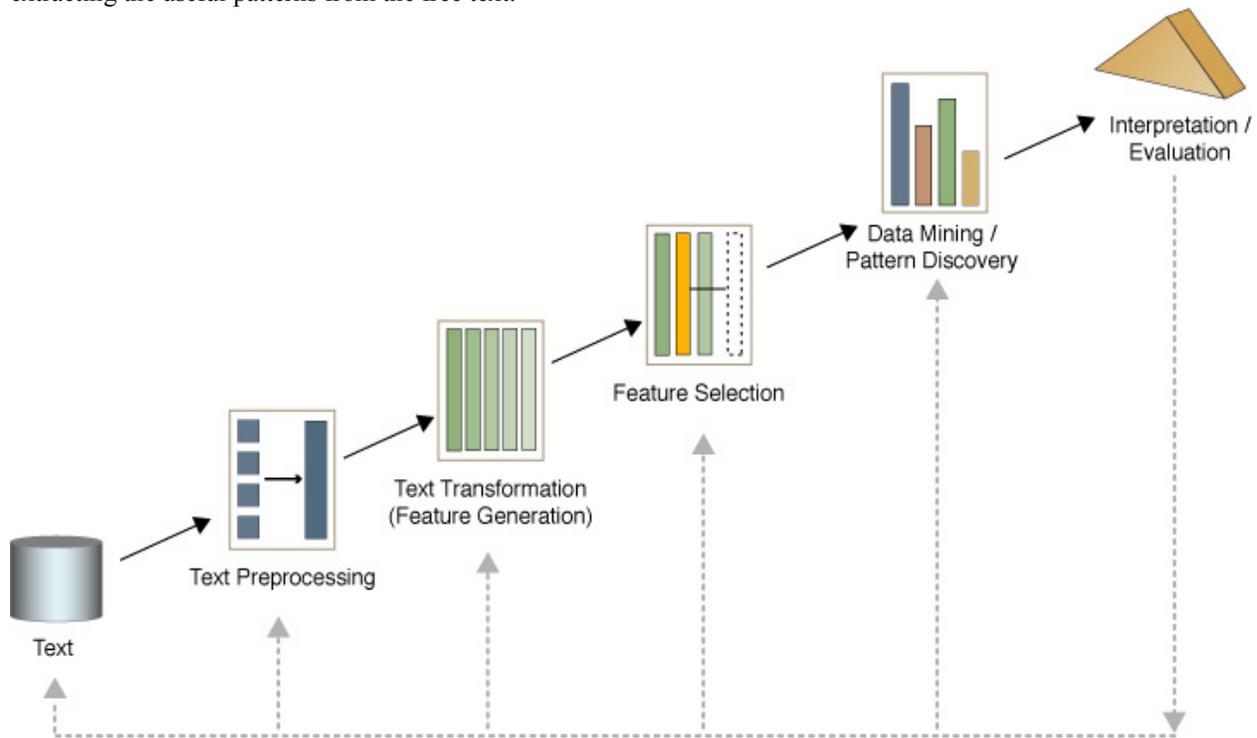


Figure 1. Text Mining Process [4]

According to Marti Hearst, “Text mining is the discovery by the computer of new, previously unknown information by automatically extracting information from different written resources” [7]. The most important thing is the bonding of the mined information together to form new piece of information or knowledge which can be investigated more by using the same usual algorithmic methods.

The limitations of text mining are: firstly, it is very difficult to write a program which can infer text data for a very long time, because with a passage of time new things are being added in the vocabulary. Secondly, sometimes novel information which has to be extracted from the text is not in mentioned in the textual data [7].

Text Mining Process

A text mining process is a multistep procedure which is shown in figure 1. It is an iterative method where the output of one stage becomes the input of the stage following it. The process which completes a text mining process consists of following stages [4]:

Text Preprocessing

The first step of text mining process is text preprocessing in which the document collection is analyzed syntactically or semantically. The meaning and grammatical structure of the language in which document collection is written is analyzed and recognized. The algorithms being applied here Part Of Speech tagging, Word Sense Disambiguation and Parsing.

Text Transformation

Text transformation deals with the feature generation part of the text analysis. The text document is considered as bag of words because the words and its occurrences are used to represent the document. The algorithms applied at this stage are stemming and stop word removal. Sometimes feature generation task is also included in the text preprocessing step of the text data mining.

Feature Selection

This stage consists of specialized techniques to select the fewer terms which can best represent the text collection. It will help out in reducing the large dimensions to small number. Feature selection

parameters can be of like information gain, chi square, mutual ratio etc. Only selected features are then kept to represent the document collection, the remaining ones are discarded.

Text/Data Mining

This is the part of process where the actual patterns are to be revealed from the textual data. At this stage the actual process of text mining or data mining is being applied on unstructured data. The interesting patterns are extracted from the textual data to convert it into valuable knowledge.

Result Evaluation

At the end the resulting features are then evaluated to check the accuracy of the applied algorithms. The knowledge is then also used to predict the future values of the data.

Peano-Count Trees Data Structure

P-Trees basically use vertical partitioning where data is divided into columns per bit rather than column per

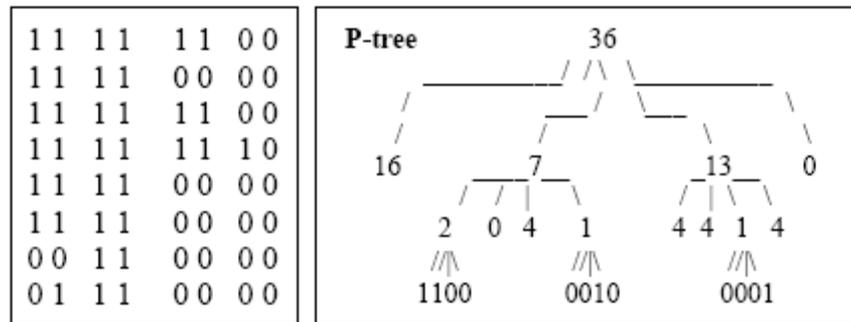


Figure 2. 8x8 bSQ File and its P-tree [8]

In the example shown above, 36 is the root count (number of one's) of whole image. This is labeled as level-0. 16, 7, 13 and 0 are the root counts of the level-1 quadrants traversed in Peano-order. 16 represent the number of ones in the first quadrant, 7 represent the number of ones in second quadrant, 13 is the root count of third quadrant while the fourth quadrant shows that there all zeros in it, number of ones are zero here. The first quadrant is composed of only 1-bit so it is known as pure-1 quadrant. Similarly if the quadrant is composed entirely of 0-bits then it is called pure-0 quadrant. As these are pure quadrants, there is no need for further branches. At last, each branch terminates i.e. leaf sequences are reached which are also pure as these consist of only one bit.

Considering the spatial data, basic P-trees are constructed for each bit position in each band. For n bands $8n$ basic P-trees are constructed assuming 8-bit values in bands. These basic P-trees are labeled as $P_{i,1}, P_{i,2}, P_{i,3}, \dots, P_{i,8}$ for all 8 bits for i^{th} band. The

attribute. If data stored in the columns is in particular sequence, following benefits can be achieved through this technology.

- Compression
- Hardware Optimization (AND operation)
- Efficient index implementation
- Only necessary data in memory

Basic P-trees

P-Trees resemble old data structures like Quad-Trees and HHcodes in the sense that these organize the data into quadrants. The idea behind this is, to divide the image into four quadrants recursively until single bits are left at leaf nodes and then count the number of ones in each quadrant, leads to the formation of P-trees. Each bit file of bSQ format is then converted into P-trees by following the recursive raster order. An 8x8 bSQ file and its P-tree is shown in the Figure 2

basic P-trees are considered as “data-mining ready” and “lossless format” [8] for storing spatial data as it provide more information about data.

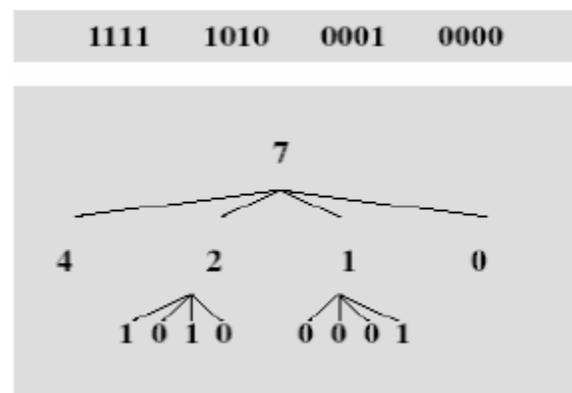


Figure 3. A 16-bit bSQ file converted into P-tree [9]

Value P-trees

A value P-tree ($P_{b,v}$) is basically the representation of value v at band b in the form of P-tree. Value v can be of any precision from 1-bit to 8-bit, so P-trees formed have value of more than one bit. Value P-trees can be constructed by combining the basic P-trees using the logical operations. For example, $P_{b,101}$ can be constructed by combining the basic P-trees as:

$$P_{b,101} = P_{b,1} \text{ AND } P'_{b,0} \text{ AND } P_{b,1}$$

Where $P_{b,101}$ gives the number of one's of band b bit 1 equal to 1, bit 2 equal to 0 and bit 3 equal to 1. Here AND operation do the pixel wise ANDing of the bits.

Tuple P-trees

The value P-trees for any combination, are then combined to form tuple P-tree. It is constructed for any value combination (v_1, v_2, \dots, v_n) of band I , shown as:

$$P(v_1, v_2, \dots, v_n) = P_{1,v_1} \text{ AND } P_{2,v_2} \text{ AND } \dots \text{ AND } P_{n,v_n}$$

It gives quadrant wise count of occurrences.

Interval P-trees

The P-Trees created by the values lying in specific intervals $[v_1, v_2]$ of band i are known as interval P-trees. These are shown as follows:

$$P(v_1, v_2) = \text{OR } P(v), \text{ for all } v \text{ in } [v_1, v_2]$$

P-Tree Variations

Peano Mask Tree (PM-tree) is a variation of P-Tree in which masks are considered rather than the counts by using the 3-value logic for representation of pure-1, pure-0 and mixed quadrants. Pure-1 is represented by 1, pure-0 by 0 and mixed quadrant is denoted by m .

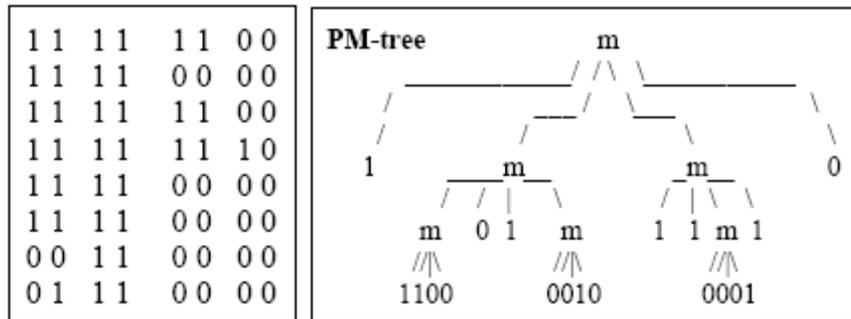


Figure 4. PM-Tree [8]

P1-tree uses 1 to represent pure-1 quadrant while 0 is used to represent pure-0 quadrant.

In P0-tree, 1 is used to represent pure-0 quadrant and 0 represents the other quadrants.

In non-pure-0-tree, 1 represents non-pure-0 quadrant which indicates pure-1 quadrant and mixed quadrant and 0 to represent pure-0 quadrant. Non-pure-1-tree is the vice versa of non-pure-0-tree.

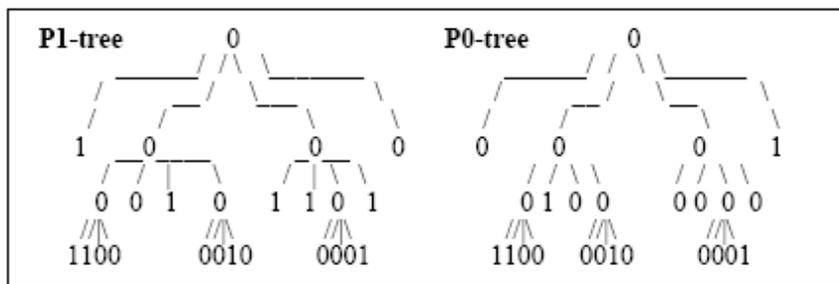


Figure 5. P1-tree and P0-tree [8]

Operations of P-Trees

AND

AND is the basic operation performed on the bits represented in the P-Tree form. It is the most widely

used operation to check the equality of bit sequences with constant. AND operation can be performed in different ways but most important ones are level wise ANDing and Pure-1 path ANDing.

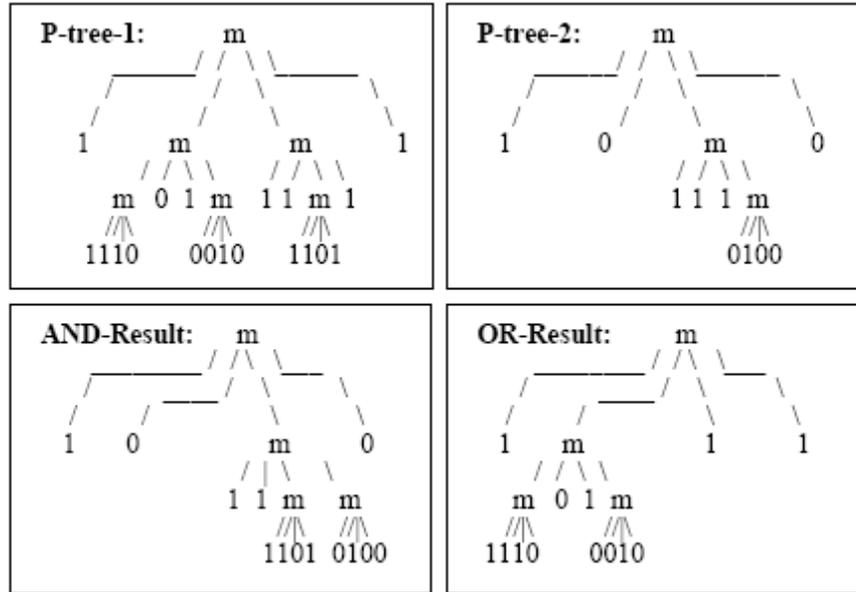


Figure 6. P-Tree AND and OR Operations [8]

In level-wise ANDing [8], rules are being specified to perform the AND operation. Operands are given in the P-tree form with mentioned roots. These rules can be of the form: ANDing of pure-1 P-tree with any P-tree give result in the form of P-tree showing second operand. Pure-0 P-tree will be generated when a pure-0 P-tree is ANDed with any P-tree.

In pure-1 path ANDING process [8], only basic P-trees are stored then the value and tuple P-trees are generated when these are needed. Here assumption is that P-trees use the depth first scheme for the paths to the pure-1 quadrant. Quadrants are identified by hierarchical scheme, that an id number is being attached to each quadrant at each level. These numbers are 0 for upper-left quadrant, 1 for upper-right quadrant, 2 for lower-left quadrant and 3 for lower-right quadrant. The same quadrant numbers are being tagged on at each level.

For an 8x8 image, the pixel at (3,6) has values (011, 110), so quadarant id is calculated as by combining two bits such as (01.11.10)=1.3.2. The quadrant can also be written as 132 instead of 1.3.2 for easiness as shown in the figure 6.

In this algorithm, the paths to the pure-1 quadrant are considered to be in the depth-first sequence. In this scheme, the paths are being represented in the form of quadrants which obey Peano-ordering. Peano Quadrant is the process of identifying the quadrant id as shown above. So

ANDing is done by scanning the operands and then output the pure-1 paths which are matched.

In the example shown in the below figure, two mask P-trees for two operands are given. The ANDing result of these two P-trees is shown in a form of P-tree. Considering the depth-first order the first value is 0 which means it is 0 quadrants. Second quadrant is mixed, so it will first retrieve the leaf node of this quadrant which has one value such as: 100, 101 and 102. Similarly, it will identify the other quadrants and then AND the values.

0	100	101	11
	102	103	
	12		13
2	3		

Figure 13. Quadrant Numbers [8]

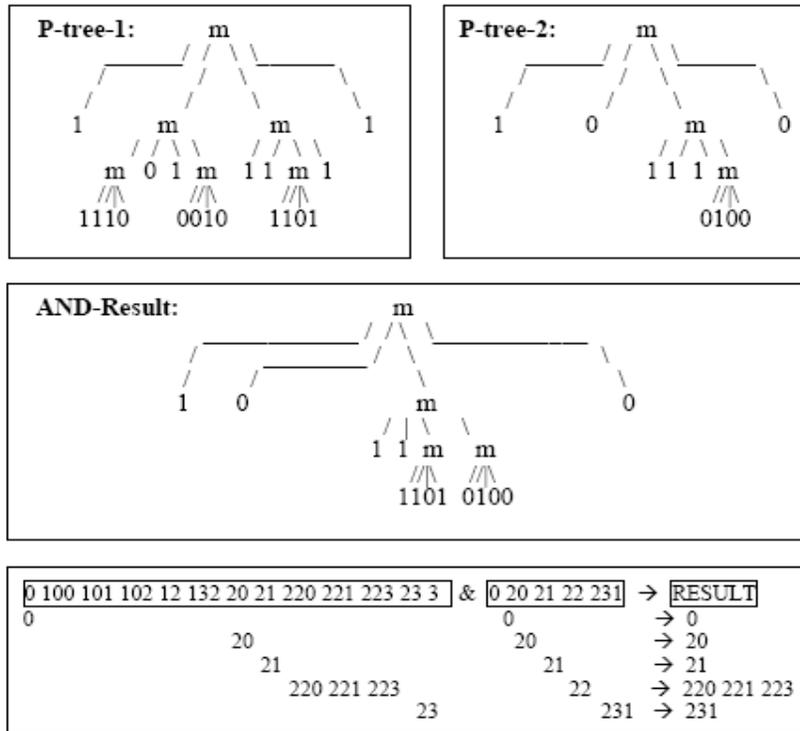


Figure 8. ANDing of PM-trees using Pure-1 Path [8]

OR

OR operation can be implemented in the similar way as the AND operation is being implemented. Most of the times it is implemented as ANDing the first operand with the complement of second one.

Every P-tree shows the natural property of complement. The complement process is very simple; it just takes basic P-tree and then complements the counts at each level (this is done by subtracting the counts from pure-1 counts at that level). Complement gives the number of zeros for each quadrant in a P-tree.

Complement

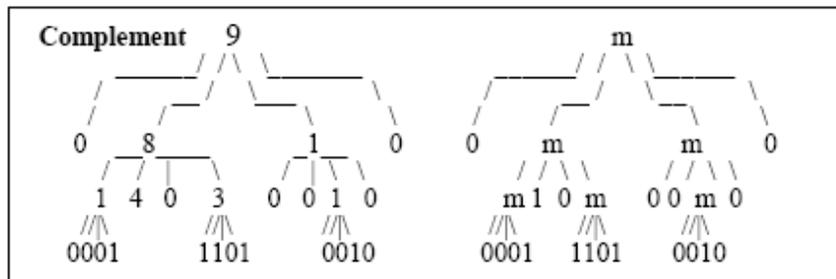


Figure 9. Complement Operation of P-Tree [8]

Count

Count operation basically counts the number of ones in each quadrant for a given P-tree in Peano order. This helps in identifying the number of bit sequences that can satisfy a particular condition. Counting algorithm can be implemented as a shift operation on integer taking one bit at a time OR it can be implemented by counting the occurrences of one's

directly from the look up table taking multiple bits at a time.

Proposed Solution

In this chapter, a solution is being given to the problem that document should be represented in some structured form so that data mining algorithms can be directly applied to it. This proposed methodology discussed below, converts the

document into ready form after applying some necessary steps.

Preprocessing step:

After removing the stop words (most common words like the, a, an, the, of, or and so on) and applying stemming (truncating the words to their common root such as “printing”, “prints”, “printed” to the root “print”), the important terms from each document in the collection are collected, this can best describe the documents in the whole collection.

Document Model:

Each document in the collection is now represented as a vector by using the vector space model. Terms are the dimensions and documents are the points in the space. This whole document-term collection is now represented as term-document matrix.

The most common used method to represent the relation between terms and documents is tf-idf weighting scheme, which combines the local and global weights together. It discriminates the term from the collection and gives importance to those terms which mostly occur in a document and less occurring in the whole document collection.

$$\text{weight}_{ij} = \text{freq}_{ij} * \log \left(\frac{N}{\text{docf}_i} \right)$$

Where N= total number of documents in collection

docf_i= number of documents in which term i occur

freq_{ij}= frequency of term i in document j

This is most widely used weighting scheme to discriminate the term from the document collection point of view.

Tf-ITF measurement is proposed for the term-document data weights, which gives importance to the terms occurring frequently in the document and document is more specific about the topic. It is a local weighting scheme only as it considers the document in consideration not the whole collection of documents. ITF measurement (already proposed) gives high weights to the documents which contain less terms i.e., these documents are more specific about the topics; if documents contain more terms then the document is generic in nature.

$$tf - ITF = tf \times \log \left(\frac{M}{\text{doc}_{ti}} \right)$$

Where M= total number of terms extracted from the document collection

doc_{ti}=number of terms in a particular document

This weighting scheme shows document richness (relative information about the terms in a document) information. When multiplied with term frequency it gives high weight to those terms which are frequent

in the topic specific document. ITF is same for one document representing its length and richness. When term frequency factor is being added in it, then this weighting scheme shows the high weighting for the terms occurring mostly in the document scenario and low weights to the terms occurring less frequently.

Conclusion

This weighting scheme can be used for the shortening purpose of documents as only frequently occurring terms are being extracted from each document. These terms show the document main theme and topic. These frequently occurring terms or important ones are being used to represent the documents in a convenient and useful manner. These important terms in each document can represent some relationships between the documents which is helpful in further analysis.

This is more useful in knowledge extraction part of the whole mining process. As essential features of a text document are extracted by the pre-processing technique and are represented by the form a model. This model will further analyzed to mine the information being hidden in the data like relationships between the documents, importance of each term in particular document scenario, document main theme and so on. This will be done the future analysts.

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3/18/2011

Creation of next generation of Open Source Science Databases

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Abstract: From 1990s onwards, biological and chemical research in both the public and private sectors throughout the world has been transformed into industrial scale by the creation of databases with large amounts of high-quality, freely available DNA sequence data. These databases have not only enabled the comprehensive cataloging of human genes but have also accelerated the discovery of new forms of cellular regulation rendering biology and chemistry a discovery science thus providing the basis for novel experimental approaches. We however feel that the potential opportunities, accessibility and power of open source science and publicly available data have not transformed into gains and significant impact on scientific discovery. In this paper we have identified many issues with the existing conventional chemical biology and molecular biology databases and propose the development of ChemBank v3.

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Keywords: biological research, open source science, databases

1. Introduction

Life Science research in post-genomic era is integrative, collaborative and mainly insilico. Therefore, in our opinion the life science research community should be provided with an integrated, transparent access to data and analytical tools of experimentation. In this perspective the Broad Institute's mission is to develop powerful new tools for genomic medicine and to make those tools available to the world. Currently, researchers outside of the Broad cannot easily access the wealth of information being generated by the chemical biology platform within the Broad. Although this data is all publicly available through the PubChem database, PubChem does not provide users with sufficient context to be able to fully interpret the data. Therefore, it is essential that we create a new database to provide this additional context and information. Without this, we are making data public without making it useful.

The Chemical Biology Platform at the Broad developed the original ChemBank and the most recent updated version is ChemBank v2. ChemBank has been created to provide a platform for sharing data on assays and compounds in what can be termed as "open source" science. ChemBank v2, although pioneering in sharing chemical and biological data to the community at large, is limited in terms of the details and underlying experimental design. As a user you only get to see the result of the experiment and not how we got to these results. The information on the compounds is rather limited with no details on how to synthesize them. Similarly, in the absence of

experimental and protocol design information users of the data are rather limited in terms of reproducing the experiment and extend science. As a result, researchers outside of the Broad cannot easily access the wealth of information being generated by the chemical biology platform within the Broad. Although this data is also publicly available through the PubChem database, PubChem does not provide users with sufficient context to be able to fully interpret the data. Therefore, it is essential that we create a new version of ChemBank database i.e., ChemBank V3, to provide this additional context and information. Without this, we are making data public without making it useful.

2. Next Generation of Chemical Database

In the section above, we discussed the limitations of existing chemical database at Broad. In our opinion, these limitations need to be removed on priority basis to enable chemical biology and drug discovery as an integrative, collaborative and explorative science. To achieve this objective, we are proposing the development of ChemBank v3. This database would contain information on small molecules contained in the Broad Institute screening collections along with details of the assays performed on those molecules and any results. Where possible, the database would link to other external databases containing related information, such as ChemSpider and PubChem. Such a database would be transformative in enabling effective use of this research data and in establishing new standards for quality and transparency in public databases. This

proposal articulates about the scope and background, the current state of the art, the objectives & methodology along with milestones and other consideration for the project.

We fully expect that this new version of ChemBank will be used as a model for other new databases and for improvements to PubChem and other existing databases. Our goal with ChemBank is not to supplant these other databases, but to provide an example that it is possible to provide context rich data which they may emulate.

Development of ChemBank V3 will enable us to create a chemical sample repository that links physical compound samples used throughout the probe development process, including primary screening, follow-up chemistry, target identification, and Connectivity Map profiling. Probe-development projects involve ongoing chemical syntheses, including multiple independent syntheses of the same compound. To fully support probe development, *ChemBank* v3 must associate biological data with the physical sample used, not just the compound structure, and with sample-specific analytical chemistry information. *ChemBank* v2, which is the current public sharing site, (and PubChem) associates most information only at the level of abstract structure, not physical sample. We will release chemical sample repository as the first component of *ChemBank* v3 that includes analytical chemistry results on the quality of compounds, and synthesis pathway information when available. This repository will link out to PubChem and ChemSpider to make it simpler to use these resources for probe development. At the outset, the repository will contain both public and DSA versions, as not all samples will be publicly disclosed compounds.

ChemBank v3 will also provide a searchable repository of small molecule assays. The screening center captures all biological assays in an electronic lab notebook. We will provide a read-only version of the public portions of these notebooks with both browse and search capability that will any user to quickly locate assays or protocols of interest. Users can then link from these assays to the small molecule results generated from them.

There are several major challenges associated with this project. There are technical challenges associated with the required integrations. The new ChemBank site must be integrated with the PubChem and ChemSpider sites externally, and additionally the back end must integrate with several commercial

products licensed to the Broad Institute, including the CambridgeSoft eNotebook Data Warehouse and the Dotmatics Browser.

Additionally, there is a user interface design challenge since the goal is to make the site approachable for those who are not familiar with the experiments it contains. Our internal interfaces are designed for expert users and so work very differently.

3. Conclusion

The development of ChemBank v3 is a research intensive activity. In our opinion, this will translate into at least two research papers in reputed international journals. Also as Life Science research in post-genomic era is integrative, collaborative and mainly in-silico, the development of ChemBank V3 will help the scientific and research community achieve the following objectives and advantages. The advantages mentioned below once achieved will help the design and creation of other scientific databases. We feel that as modern day science is data intensive, lessons learned in one scientific domain can be mapped to other scientific domains.

The following are the objectives that will be achieved by development of ChemBank v3:

- i) Support dry lab (In-silico) experiments
- ii) Avoid reenactment of experiments
- iii) Achieve interoperability of data and applications
- iv) Enable reusability of workflows and results
- v) Share results through transparent exchange of data
- vi) Provide inter-application communication
- vii) Create, store and access experimentation procedure/methodology i.e workflows as the workflows are considered the research results in the life science research.
- viii) Support the autonomous development and collaborative Research.
- ix) Most of the genomics databanks and tools do not yet provide enough standardized computer-readable metadata to facilitate the workflow automation and integration. ChemBank v3 will ease the bottleneck of domain-specific knowledge expert needed to interpret what the data actually represents before using it in the integration experiments.

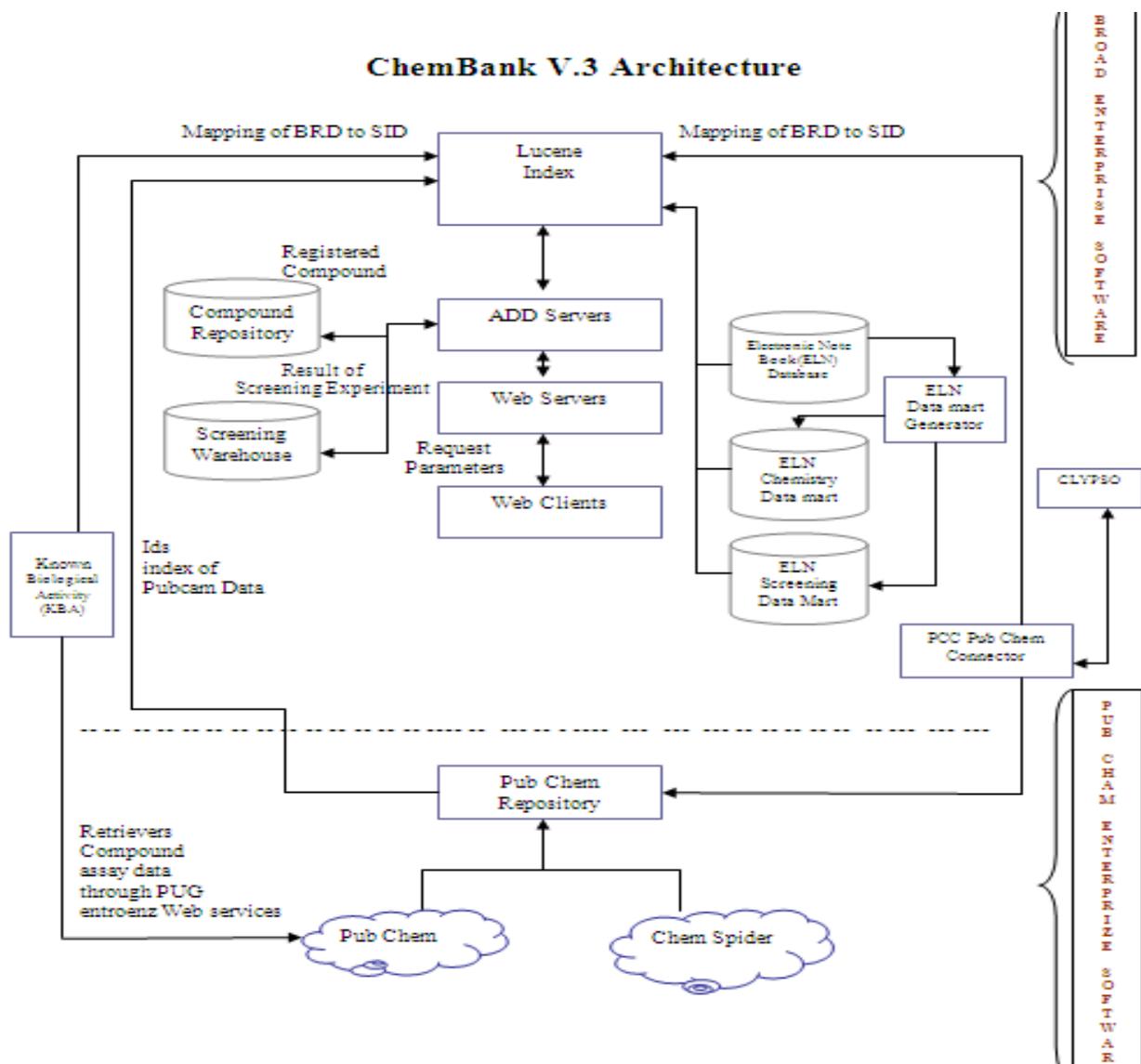


Figure 1: ChemBank V3 Architecture

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2/8/2011

An Algorithm for the Removal of Redundant Dimensions to Find Clusters in N-Dimensional Data using Subspace Clustering

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Abstract: The data mining has emerged as a powerful tool to extract knowledge from huge databases. Researchers have introduced several machine learning algorithms to explore the databases to discover information, hidden patterns, and rules from the data which were not known at the data recording time. Due to the remarkable developments in the storage capacities, processing and powerful algorithmic tools, practitioners are developing new and improved algorithms and techniques in several areas of data mining to discover the rules and relationship among the attributes in simple and complex higher dimensional databases. Furthermore data mining has its implementation in large variety of areas ranging from banking to marketing, engineering to bioinformatics and from investment to risk analysis and fraud detection. Practitioners are analyzing and implementing the techniques of artificial neural networks for classification and regression problems because of accuracy, efficiency. The aim of his short research project is to develop a way of identifying the clusters in high dimensional data as well as redundant dimensions which can create a noise in identifying the clusters in high dimensional data. Techniques used in this project utilizes the strength of the projections of the data points along the dimensions to identify the intensity of projection along each dimension in order to find cluster and redundant dimension in high dimensional data. [Dr. Muhammad Shahbaz, Dr Syed Ahsan, Ishtiaq Hussain, Muhammad Shaheen, Syed Athar Masood. An Algorithm for the Removal of Redundant Dimensions to Find Clusters in N-Dimensional Data Using Subspace Clustering. Journal of American Science 2011;7(6):956-964]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Classification, Regression, Clusters, Data mining, Algorithm

Introduction

In numerous scientific settings, engineering processes, and business applications ranging from experimental sensor data and process control data to telecommunication traffic observation and financial transaction monitoring, huge amounts of high-dimensional measurement data are produced and stored. Whereas sensor equipments as well as big storage devices are getting cheaper day by day, data analysis tools and techniques wrap behind. Clustering methods are common solutions to unsupervised learning problems where neither any expert knowledge nor some helpful annotation for the data is available. In general, clustering groups the data objects in a way that similar objects get together in clusters whereas objects from different clusters are of high dissimilarity. However it is observed that clustering disclose almost no structure even it is known there must be groups of similar objects. In many cases, the reason is that the cluster structure is stimulated by some subsets of the space's dimensions only, and the many additional dimensions contribute nothing other than making noise in the data that hinder the discovery of the clusters within that data. As a solution to this problem, clustering algorithms are applied to the relevant subspaces only.

Immediately, the new question is how to determine the relevant subspaces among the dimensions of the full space. Being faced with the power set of the set of dimensions a brute force trial of all subsets is infeasible due to their exponential number with respect to the original dimensionality.

In high dimensional data, as dimensions are increasing, the visualization and representation of the data becomes more difficult and sometimes increase in the dimensions can create a bottleneck. More dimensions mean more visualization or representation problems in the data. As the dimensions are increased, the data within those dimensions seems dispersing towards the corners / dimensions. Subspace clustering solves this problem by identifying both problems in parallel. It solves the problem of relevant subspaces which can be marked as redundant in high dimensional data. It also solves the problem of finding the cluster structures within that dataset which become apparent in these subspaces. Subspace clustering is an extension to the traditional clustering which automatically finds the clusters present in the subspace of high dimensional data space that allows better clustering the data points than the original space and it works even when the *curse of dimensionality* occurs. The most of the

clustering algorithms have been designed to discover clusters in full dimensional space so they are not effective in identifying the clusters that exists within subspace of the original data space. The most of the clustering algorithms produces clustering results based on the order in which the input records were processed [2].

Subspace clustering can identify the different cluster within subspaces which exists in the huge amount of sales data and through it we can find which of the different attributes are related. This can be useful in promoting the sales and in planning the inventory levels of different products. It can be used for finding the subspace clusters in spatial databases and some useful decisions can be taken based on the subspace clusters identified [1, 2]. The technique used here for indentifying the redundant dimensions which are creating noise in the data in order to indentifying the clusters consist of drawing or plotting the data points in all dimensions. At second step the projection of all data points along each dimension are plotted. At the third step the unions of projections along each dimension are plotted using all possible combinations among all number of dimensions and finally the union of all projection along all dimensions and analyzed, it will show the contribution of each dimension in indentifying the cluster which will be represented by the weight of projection. If any of the given dimension is contributing very less in order to building the weight of projection, that dimension can be considered as redundant, which means this dimension is not so important to identify the clusters in given data. The details of this strategy will be covered in later chapters.

Subspace Clustering

Subspace clustering is a newer form of clustering which can find different clusters in subspaces within a dataset. Often in high dimensional data, many dimensions can be *redundant* and can create a noisy data for existing clusters. “Features selection eliminates the redundant and unrelated dimensions by analyzing the whole dataset. Subspace clustering algorithms searches for *relevant dimensions* allowing them to find clusters those exist in multiple overlapping dimensions. This is a particularly important challenge with high dimensional data where the *curse of dimensionality* occurs [3, 4]”.

What is subspace clustering?

Automatically identifying clusters present in the subspace of a high dimensional data space that allows better clustering of the data points than the original space. Cluster analysis exposes the groups or clusters of similar groups. “Objects are normally shown as point in multidimensional space. Similarity between objects is often determined by distance

measures over the various dimensions in dataset. Changes to existing algorithms are essential to keep up the cluster quality and speed since datasets have become larger and more varied [4]”.

Conventional clustering algorithm gives importance to all dimensions to learn about each object. In high dimensional data, often more dimensions are unimportant and can be considered as redundant. These irrelevant & redundant dimensions can confuse the clustering algorithms by hiding clustering in noisy data. In very high dimensions it is common for all of the objects in a dataset to be nearly equidistant from each other, completely masking the clusters. Feature selection methods have been working somewhat successfully to improve cluster quality. These algorithms find a subset of dimensions on which to perform clustering by removing irrelevant and redundant dimensions. Unlike feature selection methods which examine the dataset as a whole, subspace clustering algorithms localize their search and are able to uncover clusters that exist in multiple, possibly overlapping subspaces [5, 6].

“Another thing with which clustering algorithms fight is the *curse of dimensionality* [6]”. As the number of dimensions in a dataset increases, distance measures become increasingly worthless. Additional dimensions spread out the points until, in very high dimensions; they are almost equidistant from each other. Figure 4.1 illustrates how additional dimensions spread out the points in a sample dataset. The dataset contains 20 points arbitrarily placed between 0 and 2 in each of three dimensions. Figure 4.1(a) shows the data projected on one axis. The points are close together and are about half of them in a one unit sized area [6]. Figure 4.1(b) shows the same data in extended form into the second dimension. By adding another dimension, points are spread out along another axis, pulling them further apart. Now only about a quarter of the points fall into a unit sized area. In Figure 4.1(c) a third dimension is added which spreads the data further apart. A one unit sized bin now holds only about one eighth of the points. If we continue to add dimensions, the points will continue to spread out until they are all almost equally far apart and distance is no longer very important. The problem is made worse when objects are related in different ways in different subsets of dimensions [6]. It is this type of relationship that subspace clustering algorithms seek to uncover. In order to find such clusters, the irrelevant features must be removed to allow the clustering algorithm to focus on only the relevant dimensions. Clusters found in lower dimensional space also tend to be more easily interpretable, allowing the user to better direct further study [6].

Subspace clustering is also more general than feature selection in that each subspace is local to each cluster, instead of global to everyone. It also helps to get smaller descriptions of the clusters found since clusters are defined on fewer dimensions than the original number of dimensions. An example of subspace clustering can be in bioinformatics with DNA micro array data. One population of cells in a micro array experiment may be similar to another because they both produce chlorophyll, and thus be clustered together based on the expression levels of a certain set of genes related to chlorophyll. However,

another population might be similar because the cells are regulated by the circadian clock mechanisms of the organism. In this case, they would be clustered on a different set of genes. These two relationships represent clusters in two distinct subsets of genes. These datasets present new challenges and goals for unsupervised learning. Subspace clustering algorithms are one answer to those challenges. They excel in situations like those described above, where objects are related in multiple, different ways.

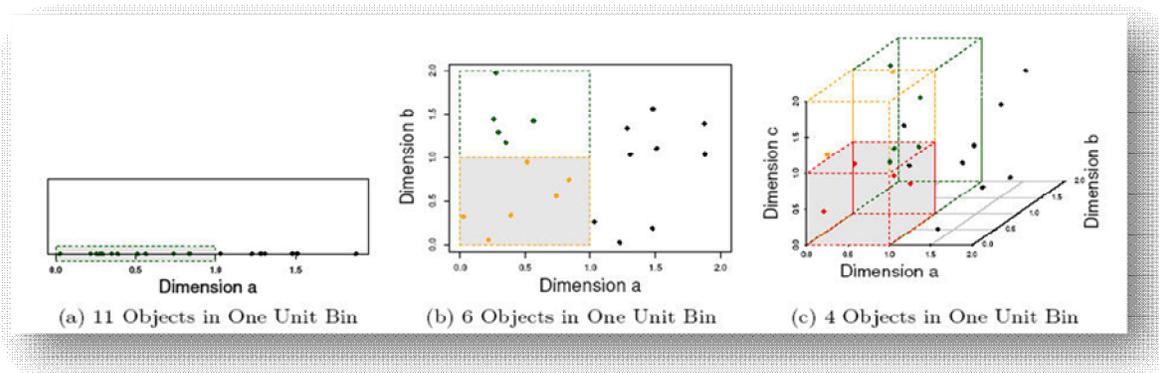


Figure 1. Dimension

Why subspace clustering?

Clustering is a great data exploring methodology which is able to identify previously unknown patterns in data. Subspace clustering is an extension of conventional clustering, based on the observation that different clusters (groups of data points) may exist in different subspaces within a given dataset. This point is particularly important with respect to high dimensional data where the curse of dimensionality can occur and can reduce the worth of the results. Subspace clustering is important due to following points.

- Most of the clustering algorithms have been designed to identify clusters in the full dimensional space so they are not effective in identifying clusters that exist in subspaces of the original data space [2].
- Many times the data records contain some missing objects. Such missing objects are normally replaced with objects taken from given distribution [2].

The clustering results formed by most of the clustering algorithms rely a lot on the order in which input records are processed [2, 8].

Dimension Projection Theory

In this section a theory of dimension projection is described. Just for an example for understanding, only three dimensions are considered

at first. In the first step, different data points are taken as input in which it is known that two clusters exist and is visible in all three dimensions and it is assumed that data is normalized in all of dimensions. The third cluster is visible in 2 dimensions but not visible in third dimension. For convenience the coordinates of all axis or dimensions are normalized.[7] The input data for the given example is described in the Table 1. The Table 2 shows the weights of the coordinates along all of the dimensions. Weights are calculated in such a way that the number of points are counted along each dimension on each and every coordinate and then total count becomes the weight of the coordinate along that dimension. Like Table 2 shows that the coordinate 5 (5th index along X-Axis) has 2 points so its intensity of weight is 2. The input data belongs to the three dimensions. There are three known clusters exist in the data. The two of them are visible in all three dimensions (Cluster 1 and Cluster 2). But the third cluster (Cluster 3) is visible only in two dimensions (X and Y-Axis) and is dispersed in third dimension (Z-Axis) and is not clearly visible in this dimension.

Drawing the points in 3 dimensional space XYZ plane will look something like as showing in Figure 2. The points in XY, YZ and XZ planes are also shown in Figure 3, Figure 4 and Figure 5 respectively. The Figure 3 which is showing points in

XY plane shows that three clusters exists but Figure 4 and Figure 5 are showing that there are two clusters only and remaining data points are scattered along Z-Axis which are not forming any cluster.

The shaded area in blue color is representing the projection of data points along X-Axis, the shaded area in the brown color is representing the projection of data points along Y-Axis and the shaded area in the red color is representing the projections of the data points along Z-Axis. The height of the shaded area shows the weight of the projection at that specific coordinate along that dimension. If the data is being visualized in three dimensions then it is observed that there are only two clusters present in the data as shown in Figure 2. The Figure 6 is also showing the overlapping of projections along X and Y-Axis but Z-Axis is has

very less overlapping of projections of data points. The existence of more clusters needs to be checked since more clusters might be present but not visible due to the presence of some dimension(s). Dimensions will be removed one by one and then data will be visualized for having more clusters and process will end up until data is visualized by removing all dimensions for all possible combinations and the numbers of clusters are also stored in some data structure to analyze later. The visualization is assumed in this project as an automatic process of finding the number of clusters in that given dimension. If one dimension is removed which is X-Axis in this case then the projections of the data points along YZ dimensions as follows.

Table 1. Intensity of weight

Cluster 1			Cluster 2			Cluster 3		
X	Y	Z	X	Y	Z	X	Y	Z
5	21	29	19	5	4	13	18	4
5	23	27	19	7	2	13	19	1
6	21	28	19	9	1	14	16	16
6	22	28	20	6	3	14	17	30
6	24	26	20	8	3	14	18	25
7	20	30	21	5	4	14	20	10
7	21	27	21	7	4	15	17	27
7	23	28	21	8	2	15	19	12
8	21	30	21	9	1			
8	23	29	22	6	3			
8	24	28	22	8	3			
9	22	26						
9	24	26						

Table 2. Projection

X – Projection		Y – Projection		Z – Projection	
Coordinate	Weight	Coordinate	Weight	Coordinate	Weight
5	2	5	2	1	3
6	3	6	2	2	2
7	3	7	2	3	4
8	3	8	3	4	4
9	2	9	2	10	1
13	2	16	1	12	1
14	4	17	2	16	1
15	2	18	2	25	1
19	3	19	2	26	3
20	2	20	2	27	3
21	4	21	4	28	4
22	2	22	2	29	2
		23	3	30	3

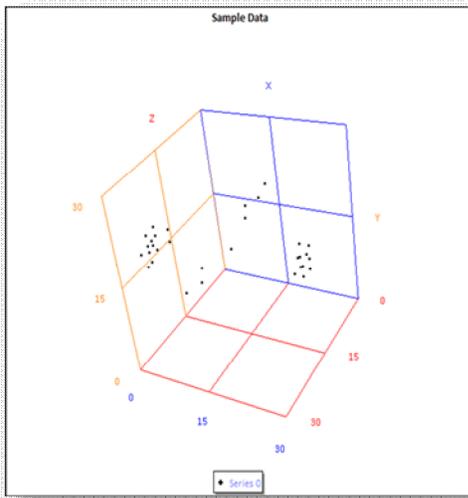


Figure 2

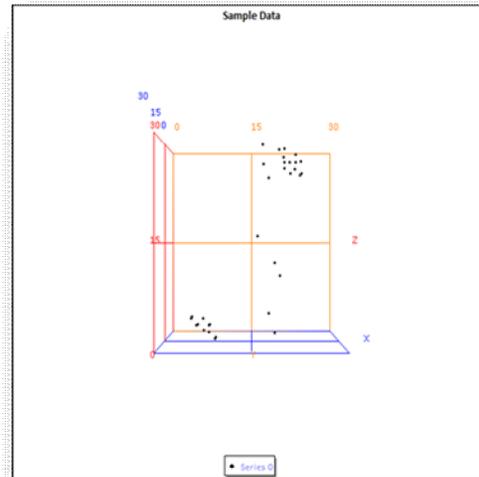


Figure 4

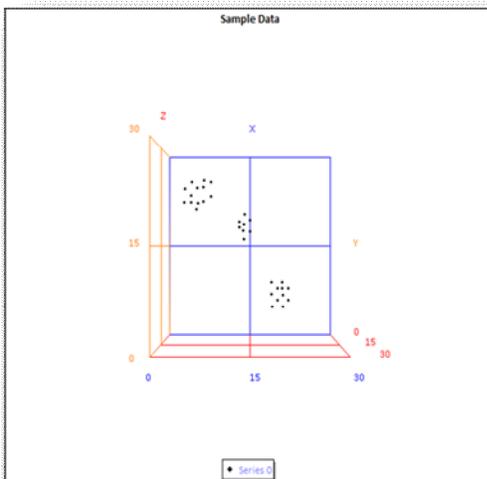


Figure 3

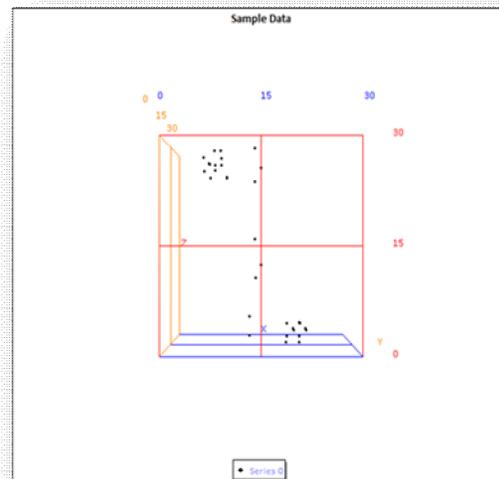


Figure 5

If the projections of data points are drawn along each dimension (in this case X-Axis, Y-Axis and Z-Axis) then accumulative projections of data points will be shown as in Figure 6.

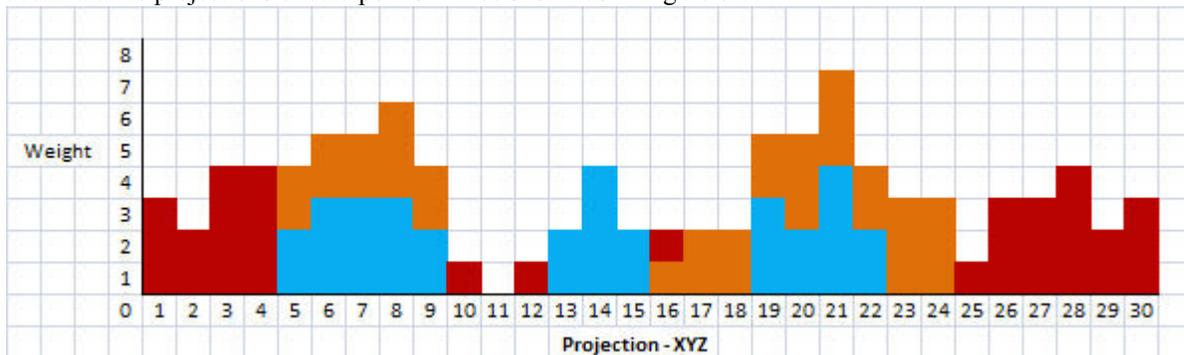


Figure 6

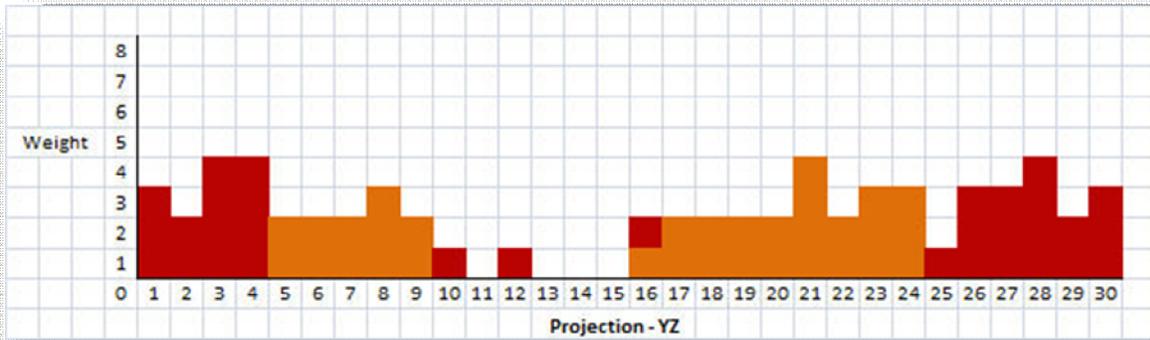


Figure 7

The Figure 7 shows that there is no overlapping of projection of data points when X-Axis is removed but only single point is overlapping which is at 16th coordinate. So removing X-Axis might not be that effective in identifying more clusters in the

data since Figure 4 is also showing the two clusters. Now if another dimension which is Y-Axis is removed to check for more clusters by visualizing the data then the projections of data points along XZ dimensions will be as follows.

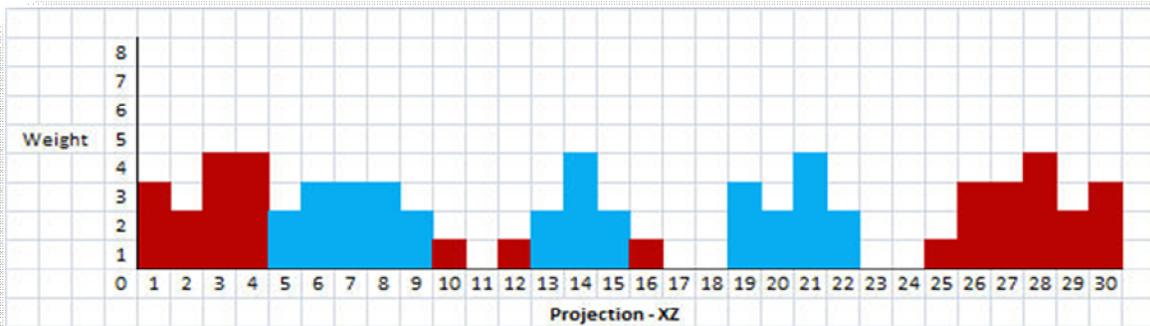


Figure 8

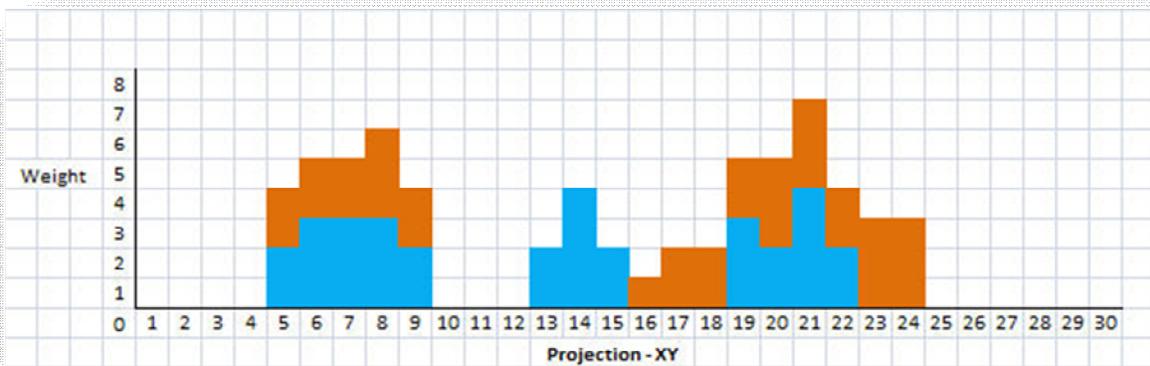


Figure 9

The above Figure 8 is showing that there is no projection overlapping exists by removing the Y-Axis and then plotting the projections of data points. Figure 5 is also plots the data points along XY dimensions and showing the existence of only two clusters. So removing Y-Axis is also not contributing in finding the more clusters in the given dataset. If we remove another single dimension which is Z-Axis and visualize the data, projections of the given data points will be shown as follows.

The Figure 9 is showing that that projection overlapping of the data points along XY dimension is larger than previous figures and most of the points

are overlapping. If data is visualized in these two dimensions as in Figure 3, it is shown that another cluster becomes visible which was not present previously. So after removing the Z-Axis, another cluster becomes visible so removing Z-Axis is contributing a lot in finding more clusters in the given dataset.

The procedure doesn't stops here. Now combinations of the dimensions are going to be removed to check further existence of clusters. If the X-Axis and Y-Axis are removed then the projection of data points along Z-Axis will be drawn as follows in Figure 10.

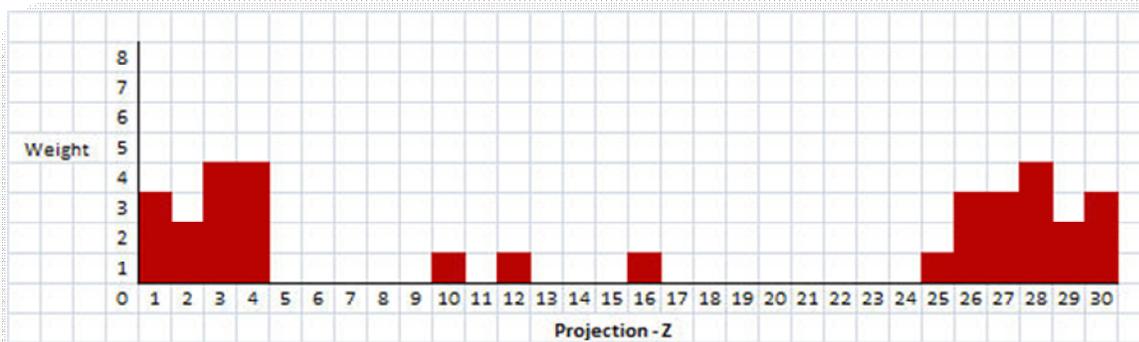


Figure 10

The Figure 10 is showing that data points are mostly scattered along Z-Axis and mostly not adjacent to each other. Visualizing the data in only Z-Axis is not yielding more clusters so this dimension is not so important and removing X-Axis and Y-Axis

might not contribute in cluster identification. Now if another combination of dimensions which is X-Axis and Z-Axis is removed and projection of data points are drawn along Y-Axis then figure will be something like below.

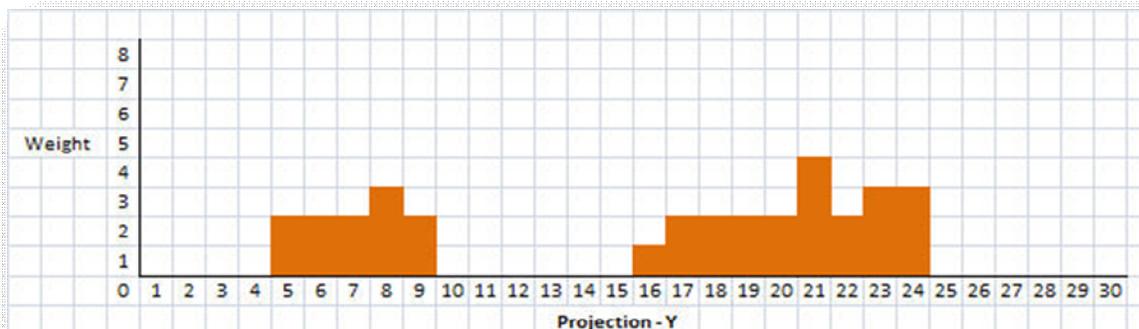


Figure 11

Figure 11 is showing the solid segment of projections which is representing the presence of clusters when data is visualized along Y-Axis only so this dimensions can be considered important in cluster identification. Finally if we remove Y-Axis and Z-Axis and projection are drawn only along X-Axis then it will be look like below in Figure 12.

In Figure 12, it is clear that along X-Axis projections of data points have more weight and data points are more adjacent and hence more chance of existence of clusters. If data is visualized along X-Axis only then it is clear that there are three clusters exist so this is also an important dimension in fining the clusters in the given data set. From the above

analysis it is clear that the Z-Axis is the only dimension which seems redundant and can be removed to discover more clusters available in the given dataset. In original data there were only two clusters but by removing one dimension one more cluster is found and adding Z-Axis dimension in the data is causing to create a noise in the data and hindering the clusters identification. This procedure was used for three dimension data but it can be used as it is for n-dimensional data as well and the projection drawn in this procedure also helps to find out number of clusters within the data with respect to all dimensions.

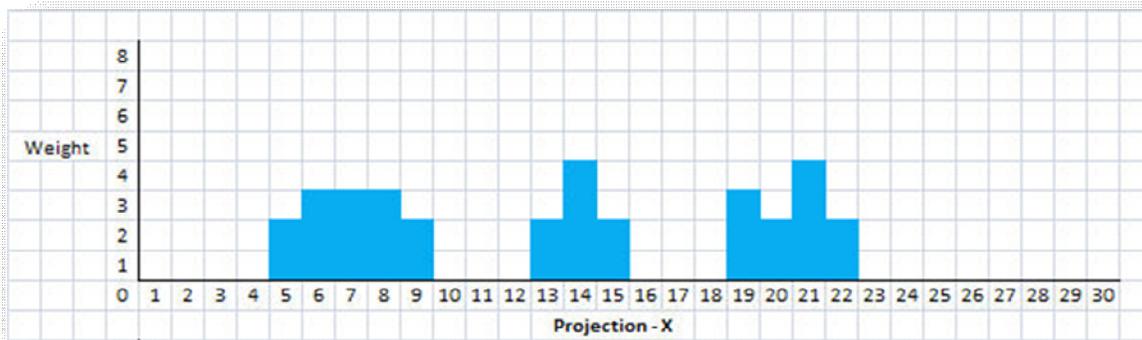


Figure 12

Algorithm

The above technique can be written in as an algorithm form.

1. Normalize the dimensions so that all dimensions should have same coordinates limit.
2. Generate the accumulative union of all the projections taken in all dimensions in such a way that weights of the final output projection on each coordinate will show the sum of all total number of data points at coordinate.
3. Visualize the data and identity number of clusters in the presence of all dimensions and store them in some data structure (visualization is assumed as an automatic process in this project)
4. Remove the dimensions one by one and identify the number of clusters available after removal and store them in data structure.
5. Remove all possible combination of dimensions which will 2^n and identify the number of clusters after removal store them in data structure.
6. Analyze the data structure with respect to the dimension combination and mark that

dimension as redundant which has less number of clusters in its presence.

This algorithm is efficient for less number of dimensions. As long as the dimensions are increased in the data, the algorithm efficient will become poor. Visualization of the data is also the beyond of the scope of this project but implantation of the algorithm is based on this idea.

Conclusion

In high dimensional data there can be number of clusters exists and there are different techniques or methodologies introduced to identify them with respect to different dimension and in that techniques sometimes it is figured out that some of the dimensions might not be so important in identifying cluster because of the dispersed data in that dimension and creating a noise in the data for indentifying clusters. The above technique uses the Projection of data points along each dimension to determine the weight or intensity of the data points along each dimension and visualization process to identify the number of cluster present in the data along that particular dimension. Weight is calculated

by counting the number of data points along that dimension. By removing the dimensions one by one and then all possible combinations of dimensions and then visualizing the data, it makes clear that which dimension is less important in order to find out the clusters in given subspace. The algorithm written has limitations of performance as it can work well with less number. of dimension and will become slow in high dimensions. Visualization process is considered as an automatic procedure which will return number of clusters given in the dataset. At the end the dimension which can be redundant can be removed which is creating noise and has less contribution in cluster identification in high dimensional data.

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Competence of Nurses' Managers in Different Work Environment at Assiut University Hospitals

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Abstract: Background: Healthcare providers are increasingly inclined to question the quality and efficacy of the care they provide. Nurse competence plays an important role in guaranteeing the quality of nursing interventions and outcomes. It is claimed that a key responsibility of nurse administrators is to ensure staff nurse competence. Nurses should maintain and demonstrate competence throughout their professional career. Nurse Managers have to continuously assess safe patient care. Aim of the Study: to assess competence of nurses' managers at different work environment at Assiut University Hospitals, and compare nurse's competence at different work environments at Assiut University Hospitals. Subject and Methods: the present study is descriptive, was conducted in all units of Assiut University Hospitals. It included all nurses' managers who are working in different departments at the time of the study. A personal interview questionnaire sheet which consist of two parts: ¹st Personal characteristics data which include name, age, department, marital status, educational level, position, years of experience and years of experience of the present position (head nurse, supervisor, assistant director, director of nursing), ²nd Nurse Competence Scale (NCS) was consisted of seventy three items structured in seven competence categories: helping role (seven items), teaching- coaching (sixteen items), diagnostic functions (seven items), managing situations (eight items), therapeutic interventions (ten items), ensuring quality (six items) and work role competences (nineteen items). The Scoring System was four-point scale (0 = not applicable in my work, 1 = very seldom, 2 = occasionally and 3 = very often in my work). The levels of competence are measured with a Visual Analogue Scale (VAS 0-100 mm), which the total score of the VAS with 0 meaning a very low level of competence, 1-30 mild level of competence, 31-60 good level of competence, 61-99 excellent level of competence and 100 a very high level of competence. Results: the nurses' managers in main Assiut University Hospital are most competent than Pediatric and Women Health Hospital in all competence categories. The level of competence categories in emergency is highest than special & general, intensive care unit and operating room. The total VAS mean levels of competence of all categories ranged from 55.93 to 73.5. Conclusions: nurses' managers have excellent level of competence in work role category, followed by teaching coaching category, then in managing situation category. Main Assiut University Hospital nurses' managers are competent than Pediatric Hospital and Women Health Hospitals in all competence categories. The emergency units nurses' managers are competent than other different work settings following by operating rooms. [Kawther Abd El-Motagally Fadel, Samah Mohamed Abdalah, Fatma Rushdy Mohamed and Eman kamel hossny. competence of Nurses' Managers in Different Work Environment at Assiut University Hospitals . Journal of American Science 2011; 7(6):965-975]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Competence, nurse manager, work environment.

1. Introduction:

There is no doubt that every member of the society would agree that all healthcare providers in practice should be competent. For nurses to work efficiently and effectively, the areas of competency must be identified for specific roles and settings. Competencies describe the specific job requirements and job environments. Competency-based outcome focus on education and social change abilities, including competent effective reflective practice, generation of nursing knowledge, leadership and social change in order to improved health for individuals, communities, populations, and global environments. Ministries of health, professional organizations, and healthcare organizations must ensure that appropriate expectations for competence are set, and that their staff performs to standard. Healthcare organizations must meet certain criteria to provide services. These

organizations, through certification, licensure, and/or accreditation, are able to exert control on health providers and, as a result, to influence the quality of care (Meretoja, 2004b).

With the increasing complexity of nursing services, hospital employers are demanding qualified and competent staff nurses for high quality clinical practices (Nonaka and Takeuchi, 1995). Employees' perceptions of their performance was proposed as an outcome indicator which would lead to improved quality of provided nursing services and their desire to improve themselves and participate in life-long learning. The imperativeness of studying nurses' self-assessment of their competencies is that, opportunity for learning would contribute to nurses' organizational commitment, which would in turn contribute to improved nursing performance (McNeese-Smith, 2001; Zhang et al., 2001).

Nursing competence usually is defined as personal skills developed through professional nurse training courses, and is considered to be an outcome of these courses. Competence, which is considered an individual characteristic (Archibald and Bainbridge, 1994; DeBack and Mentkowski, 1986), is a group of broad abilities and practical skills that might be changed when the environment changed.

Benner offers a framework of five stages of effective nursing practice that places the competent nurse at the third level. These five stages are: novice, advanced beginner, competent, proficient, and expert (Benner, 1982).

Nowlen (1988) discussed three models of continuing professional development: the update model, the competence model, and the performance model. In competence model, in addition to the knowledge that the professional needs, there are also personal skills (e.g., critical thinking or interpersonal relationships), personal traits (e.g., ethical, takes initiative, self directedness), and a positive self-image required of professional.

Nowadays, competence within the healthcare workforce is an important issue for educators and a concern for employers. Nurses today are required to keep pace with rapid changes in healthcare and provide quality patient care in a cost-efficient manner. Hospitals now compete with an array of outpatient agencies that offer exciting opportunities for the expert, experienced nurse. For this reason, nurse managers must seek ways in which to develop, retain, and reward competent staff (Carey and Campbell, 1994; Jasper, 1994).

Significance of the Study

Researches in nurse competence assessment and studies closely related to this concept have focused upon a relatively narrow area of clinical practice. Most of the work has concentrated on nurse students or on the nurse graduation. There is a lack of researches about assessment of levels of nurses' managers' competence. So, there are some indications that nurse competence profiles must be assessed in different work environment for different levels of nurses' managers.

Aim of the Study

The present study aims to

1. Assess competence of nurses' managers at different work environment at Assuit University Hospitals.
2. Compare nurse's competence at different work environments at Assuit University Hospitals.

2. Subject and Methods

1.1) Study Design

The present study is descriptive.

1.2) Setting

The present study was conducted in all units of Assiut University Hospitals, Main Hospital with bed capacity 1789; Pediatric Hospital with bed capacity 216; Women Health Hospital with bed capacity 303.

1.3) Subjects:-

The present study included all nurses' managers who are working in different departments at the time of the study.

In Main Hospital the total number was seventy five [one director of nursing, three assistant director, fifteen supervisors, and fifty six head nurses]. In Pediatric Hospital the total number was thirty one [one director of nursing, one assistant director, and twenty nine head nurses]. In Women Health Hospital the total number was ten [one director of nursing, one assistant director, one supervisor, and seven head nurses].

1.4) Data collection tool

A personal interview questionnaire sheet which consist of three parts.

1.4.1) Personal characteristics data

It was designed to collect personal data as name, age, department, marital status, educational level, position, years of experience and years of experience of the present position (head nurse, supervisor, assistant director, director of nursing).

1.4.2) Nurse Competence Scale (NCS)

It consists of seventy three items structured in seven competence categories: helping role (seven items), teaching- coaching (sixteen items), diagnostic functions (seven items), managing situations (eight items), therapeutic interventions (ten items), ensuring quality (six items) and work role competences (nineteen items). The competence categories were derived from Benner's model (1984) and Benner et al., (1996) competency frame work.

1.4.3) Scoring System.

The used scoring system is four-point scale (0 = not applicable in my work, 1 = very seldom, 2 = occasionally and 3 = very often in my work). The levels of competence are measured with a Visual Analogue Scale (VAS 0-100 mm), with 0 meaning a very low level of competence, 1-30 mild level of competence, 31-60 good level of competence, 61-99 excellent level of competence and 100 a very high level of competence (Meretoja & Ieino-kilphi, 2003., Meretoja et al., 2004a,b).

2. Administrative Design:

An official permission had been obtained to collect necessary data from administrative responsible personnel of Assuit University Hospitals.

3. Operational Design

3.1) Preparatory phase

This phase took about four months from November 2007 until February 2008. In review the available literatures pertinent to the study topic.

3.2) Pilot Study

A pilot study was fulfilled to test the questionnaire clarity, feasibility, and applicability. It was carried out on thirteen nurses' managers from Assuit University Hospitals. Data collected from the pilot study were analyzed, and necessary modifications were done prior to finalization of the study tool. Clarity has also served in estimating the time needed for filling the forms, and it revealed that each questionnaire would take about 20 minutes for filling. Nurses' manager included in the pilot study was excluded from study sample.

3.3) Data Collection

The researcher met with each subject in the study to explain the purpose of the study and to ask for participation. After obtaining verbal consent, the study tool handles to participated nurse manager to be filled. The data collection was done through structured interview with participants to fill the forms. This took about twenty minutes for each participant interview. The whole duration for data collection took about three months from February to April 2008.

4.) Statistical Analysis

Data entry and analysis were done using SPSS version 12 (Statistical Package for Social Science). Data were presented using descriptive statistics in the form of frequencies and percentages, mean, standard deviation, range and chi-square. For multiple group comparisons of quantitative data, one-way analysis of variance test (ANOVA) was used. Statistical significance was considered at p -value ≤ 0.05 .

3. Results:

Table 1 shows that, half (50.0%) of the studied nurses managers are working in general and special units and 23.3% in the intensive care units. About two thirds of them are less than 30 years old (64.7%), more than half were married (62.1%). The majority of them had bachelor of nursing sciences (94.8%) the minority were having master degree (5.2%), more than three quarters (84.5%) are head nurses. As regard years of experience (44.0 %, 38.7%, and 30.0%) of nurses in main, pediatric and women health hospitals respectively had five to less than ten years of experience. On the other hand more

than half of the studied nurses (58.1%) in Main, Pediatric, and Women Health Hospitals respectively have less than five years experience in nursing administration.

Table 2 reveals that, more than one third of nurses' managers used competencies very often for items of supporting patient's coping strategies, planning patient care according to individual needs, decision making guided by ethical values, Modifying the care plan according to individual need, and developing the treatment culture of their unit(44.9%, 41.4%,40.5%38.8%,37.1%) respectively.

Table 3 reveals that, all items of teaching coaching category were low in percentage, except developing orientation programs for new nurses in her unit, and coaching others in duties within her responsibility area (56.0%, 50.0%).

Table 4 shows that, more than one third of the studied nurses' managers using items of coaching other staff member in patient observation skills, coaching other staff member in use of diagnostic equipment, and developing documentation of patient care(47.4%,44.8%,43% respectively) with a score used very often. While more than one third of the nurses' managers in the study using item of Able to identify family member's need for emotional support (35.4%) with a score used of very seldom.

Table 5 illustrates that, 59.5%, 60.3% of studied nurses' managers used very often items of acting appropriately in life threatening situations, and keeping nursing care equipment in good condition respectively. While the lowest percentage of them using item of promoting flexible team cooperation in rapidly changing situations (5.2%) either not applicable or very seldom for both.

Table 6 depicts that, more than one third of studied nurses' managers used very often for all items of therapeutic interventions except items of utilizing research finding in nursing interventions, and evaluating systematically patient care outcomes (16.4%, 26.7%). Also, one third of the nurses' managers in the study used occasionally all items of therapeutic interventions. While the low percentage of nurse's manager not applicable for items of coordinating multidisciplinary team's nursing activities (3.4%).

Table 7 reveals that, more than one third of studied nurses' managers used occasionally for all items except items of able to identify areas in patient care needing further development and research, and evaluating critically unit's care philosophy half of them used occasionally(50,8%,51.7%).

Table 8 shows that, the highest percent of studied nurses' used very often for items of mentoring novices and advanced beginner, aware

of the limits of their own resources, and familiar with their organization's policy concerning division of labor and coordination of duties (63.8%,58.6%,56.9%) respectively. While the low percent for both items of taking care of themselves in terms of not depleting their mental and physical resources, and utilizing information technology in their work (20.7%).

Table 9 shows that mean scores of competence categories of the nurses' managers. The nurses' managers in main Assuit University Hospital are most competent than other two hospitals in all competence categories (13.74±4.40; 29.72±10.18; 13.73±4.81; 17.85±5.04; 21.21±5.73; 10.53±4.28; 43.42±8.77). And there were statistically significant differences among Assuit University Hospitals as regarded to work role category at p value ($P \leq 0.018$).

Table 10 provides data on the studied nurses' managers' level of competence. The level of competence categories in emergency is highest than all other work environment (66.96, 65.75, 72.32, 78.38, 74.99, 65.27, 80.15). The total VAS mean levels of competence of all categories ranged from 55.93 to 73.50.

Table 11 reveals that, the studied nurses' manager of main Assuit University Hospital have excellent level of competence than other two hospitals in all competence categories, helping role; teaching coaching; diagnostic functions; managing situations therapeutic interventions; ensuring quality; and work role (69.3%, 56.%, 68.%, 80.%, 76.%, 57.3% and 89.3%), and there were statistically significant differences among three university hospitals as regarded to categories of managing situations and work role at p value ($P \leq 0.033; 0.020$).

Table (1): Personal characteristics of the nurses' managers at Assuit University Hospitals (n=116)

Personal characteristics	Main Hospital (n=75)		Pediatric Health Hospital (n=31)		Women Health Hospital (n=10)		Total (n=116)	
	No.	%	No.	%	No.	%	No.	%
Department:								
Emergency units	10	13.3	6	19.4	0	0.0	16	13.8
ICUs	18	24.0	8	25.8	1	10.0	27	23.3
Operating rooms	9	12.0	2	6.5	4	40.0	15	12.9
General and special units	38	50.7	15	48.4	5	50.0	58	50.0
Age: (years)								
< 30	47	62.7	21	67.7	7	70.0	75	64.7
≥ 30	28	37.3	10	32.3	3	30.0	41	35.3
Mean ± SD	29.4±4.9		29.2±5.8		29.4±6.1		29.37 ± 5.27	
Range	23- 46		23 - 45		23 - 42		23 - 46	
Marital status:								
Single	28	37.3	11	35.5	5	50.0	44	37.9
Married	47	62.7	20	64.5	5	50.0	72	62.1
Education:								
Bachelor	70	93.3	30	66.8	10	100.0	110	94.8
Master	5	6.7	1	3.2	0	0.0	6	5.2
Occupation (management positions):								
Head nurse	65	86.7	24	77.4	9	90.0	98	84.5
Supervisor	7	9.3	6	19.4	0	0.0	13	11.2
Assistant director	2	2.7	0	0.0	0	0.0	2	1.7
Director	1	1.3	1	3.2	1	10.0	3	2.6
Years of experience:								
< 5	20	26.7	13	41.9	4	40.0	37	31.9
5 -	33	44.0	12	38.7	3	30.0	48	41.4
10 or more	22	29.3	6	19.4	3	30.0	31	26.7
Mean ± SD	7.0±4.2		6.5±4.6		7.5±5.5		6.97 ± 4.46	
Range	2 - 16		2- 19		2 - 20		1 - 20	
Administrative position experience:								
< 5 years	21	28.0	14	49.0	6	60.0	41	58.1
5 - years	34	45.3	5	13.0	1	10.0	39	27.4
10 years or more	20	26.7	12	38.0	3	30.0	36	14.5
Mean ± SD	5.7±4.2		3.3±2.6		4.1±4.9		5.11 ± 4.15	
Range	1 -17		1- 8		1- 15		1 - 17	

Table (2): Distribution of helping role category among the studied nurses' managers at Assuit University Hospitals (n=116).

Items of Helping role category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Planning patient care according to individual needs	12	10.3	9	7.8	47	40.5	48	41.4
2- Supporting patient's coping strategies	8	6.9	12	10.3	44	37.9	52	44.9
3- Evaluating critically own philosophy in nursing	26	22.4	23	19.8	45	38.8	22	19.0
4- Modifying the care plan according to individual need	13	11.2	18	15.5	40	34.5	45	38.8
5- Utilizing nursing research finding in relationships with patients	28	24.1	29	25.0	35	30.2	24	20.7
6- Developing the treatment culture of unit	14	12.1	15	12.9	44	37.9	43	37.1
7- Decision making guided by ethical values	8	6.9	16	13.8	45	38.8	47	40.5

Table (3): Distribution of teaching-coaching category among the studied nurses' managers at Assuit University Hospitals (n=116)

Items of teaching coaching category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Mapping out patient education needs carefully	15	12.9	13	11.2	48	41.4	40	34.5
2- Finding optimal timing for patient education	18	15.5	22	19.0	39	33.6	37	31.9
3- Mastering the content of patient education	19	16.4	25	21.6	41	35.3	31	26.7
4- Providing the individualized patient education	17	14.7	31	26.7	35	30.2	33	28.4
5- Coordinating patient education	24	20.7	27	23.3	41	35.3	24	20.7
6- Able to recognize family members' needs for guidance	31	26.7	35	30.2	33	28.4	17	14.7
7- Acting autonomously in guiding family members	22	19.4	39	33.6	36	31.0	19	16.0
8- Taking student nurse's level of skill acquisition into account in mentoring	16	13.8	29	25.0	40	34.5	31	26.7
9- Supporting student nurses in attaining goals	11	9.8	16	13.8	52	44.8	37	31.6
10- Evaluating patient education outcome together with patient	12	10.3	29	25.0	51	44.0	24	20.7
11- Evaluating patient education outcome together with family	26	22.4	26	22.4	42	36.2	22	19.0
12- Evaluating patient education outcome together with care team	7	6.0	25	21.6	57	49.1	27	23.3
13- Taking active step to maintain and improve profession skills	1	0.8	19	16.4	48	41.4	48	41.4
14- Developing patient education in unit	31	26.7	34	29.3	36	31.1	15	12.9
15- Developing orientation programs for new nurses in her unit	3	2.6	16	13.8	32	27.6	65	56.0
16- Coaching others in duties within responsibility area	4	3.4	14	16.1	40	30.5	58	50.0

Table (4): Distribution of diagnostic functions category among the studied nurses' managers at Assuit University Hospitals (n=116)

Items of Diagnostic Functions category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Analyzing patient well-being from many perspective	12	10.3	24	20.7	42	36.2	38	32.8
2- Able to identify patient's need for emotional support	17	14.6	29	25.0	40	34.5	30	25.9
3- Able to identify family member's need for emotional support	26	22.4	41	35.4	37	31.9	12	10.3
4- Arranging expert help for patient when needed	7	6.1	20	17.2	45	38.8	44	37.9
5- Coaching other staff member in patient observation skills	4	3.4	21	18.1	36	31.1	55	47.4
6- Coaching other staff member in use of diagnostic equipment	7	6.1	24	20.7	33	28.4	52	44.8
7-Developing documentation of patient care	9	7.8	17	14.7	40	34.5	50	43.0

Table (5): Distribution of managing situations category among the studied nurses' managers at Assuit University Hospitals (n=116)

Managing Situations category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Able to recognize situations posing a threat to life early	6	5.2	22	19.0	34	29.3	54	46.5
2- Prioritizing her activities flexibly according to changing situations	9	7.8	20	17.2	41	35.3	26	39.7
3- Acting appropriately in life threatening situations	4	3.4	14	12.1	29	25.0	69	59.5
4- Arranging debriefing session for the care team when needed	13	11.2	15	12.9	48	41.4	40	34.5
5- Coaching other team member in mastering rapidly changing situations	9	7.8	19	16.5	50	43.1	38	32.7
6- Planning care consistently with recourses available	5	4.3	19	16.2	43	37.3	49	42.2
7- Keeping nursing care equipment in good condition	6	5.1	7	6.2	33	28.4	70	60.3
8- Promoting flexible team cooperation in rapidly changing situations	6	5.2	6	5.2	51	44.0	53	45.6

Table (6): Distribution of therapeutic interventions category among the studied nurses' managers at Assuit University Hospitals (n=116)

Therapeutic Interventions	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Planning own activities flexibly according to clinical situation	14	12.1	8	6.9	55	47.4	39	33.6
2- Making decisions concerning patient care taking the particular situation in account	14	12.1	16	13.8	42	36.2	44	37.9
3- Coordinating multidisciplinary team's nursing activities	4	3.4	15	12.9	46	39.7	51	44.0
4- Coaching the care team in performance of nursing intervention	7	6.0	14	12.1	50	43.1	45	38.8
5- Updating written guidelines for care	14	12.0	15	12.9	46	39.7	41	35.4
6- Providing consultation for the care team	7	6.1	12	10.3	40	34.5	57	49.1
7- Utilizing research finding in nursing interventions	25	21.6	23	19.8	49	42.2	19	16.4
8-Evaluating systematically patient care outcomes	9	7.8	28	24.1	48	41.4	31	26.7
9- Incorporating relevant knowledge to provide optimal care	10	8.6	14	12.1	42	36.2	50	43.1
10- Contributing to further development of multidisciplinary clinical paths	10	8.6	21	18.1	38	32.8	47	40.5

Table (7): distribution of ensuring quality category among the studied nurses' managers at Assuit University Hospitals (n=116)

Ensuring Quality category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Committed to her organization's care philosophy	19	16.4	19	16.4	42	36.2	36	31.0
2- Able to identify areas in patient care needing further development and research	14	12.1	21	18.1	59	50.8	22	19.0
3- Evaluating critically unit's care philosophy	20	17.2	22	19.0	60	51.7	14	12.1
4-Evaluating systematically patient's satisfaction with care	10	8.6	23	19.8	51	44.0	32	27.6
5- Utilizing research findings in further development of patient care	22	19.0	29	25.0	44	37.9	21	18.1
6- Making proposals concerning further development and research	21	18.1	34	29.3	50	43.1	11	9.5

Table (8): Distribution of work role category among the studied nurses' managers at Assuit University Hospitals (n=116)

Work Role category	Not applicable		Used very seldom		Used occasionally		Used very often	
	No.	%	No.	%	No.	%	No.	%
1- Able to recognize college's need for support and help	3	2.6	9	7.8	44	37.9	60	51.7
2- Aware of the limits of my own resources	3	2.6	13	11.2	32	27.6	68	58.6
3- Professional identity service as resource in nursing	4	3.4	16	13.8	55	47.4	41	35.4
4- Acting responsibly in term of limited financial resources	4	3.4	13	11.2	49	42.2	50	43.2
5- Familiar with organization's policy concerning division of labor and coordination of duties	3	2.6	13	11.2	34	29.3	66	56.9
6- Coordinating student nurse mentoring in the unit	7	6.0	19	16.4	42	36.2	48	41.4
7- Mentoring novices and advanced beginner	3	2.6	10	8.6	29	25.0	74	63.8
8- Providing expertise for the care team	6	5.2	12	10.3	49	42.2	49	42.3
9- Acting autonomously	9	7.8	14	12.1	50	43.1	43	37.0
10- Guiding staff member to duties corresponding to their skill levels	3	2.6	12	10.3	42	36.2	59	50.9
11-Incorporating new knowledge to optimize patient care	4	3.4	14	12.1	35	30.2	63	54.3
12- Ensuring sooth flow of care in the unit by delegating tasks	4	3.4	11	9.5	47	40.5	54	46.6
13- Taking care of myself in terms of not depleting my mental and physical resources	22	19.0	27	23.2	43	37.1	24	20.7
14- Utilizing information technology in work	18	15.5	38	32.8	36	31.0	24	20.7
15- Coordinating patient's overall care	2	1.7	13	11.2	47	40.5	54	46.6
16- Orchestrating the whole situation when needed	3	2.6	8	6.9	42	36.2	63	54.3
17- Giving feedback to colleges in a constructive way	19	16.4	16	13.8	43	37.1	38	32.7
18- Developing patient care in multidisciplinary team	6	5.2	14	12.1	49	42.2	47	40.5
19- Developing work environment	3	2.6	10	8.6	42	36.2	61	52.6

Table (9): Mean scores of competence categories among the studied nurses' managers in different Assuit

University Hospitals (n=116)

Competence categories	Main Hospital	Pediatric Hospital	Women Health Hospital	F. Value	P. value
	Mean ± SD	Mean ± SD	Mean ± SD		
1. Helping Role	13.74±4.40	13.32±4.32	12.10±5.52	0.624	0.537
2. Teaching Coaching	29.72±10.18	26.90±9.50	26.30±8.84	1.201	0.305
3. Diagnostic Functions	13.73±4.81	13.25±5.03	12.40±3.37	0.394	0.675
4. Managing Situations	17.85±5.04	17.45±4.53	15.70±6.70	0.805	0.449
5. Therapeutic Interventions	21.21±5.73	18.87±8.40	17.40±5.64	2.450	0.091
6. Ensuring Quality	10.53±4.28	9.41±4.02	8.60±3.71	1.459	0.37
7. Work Role	43.42±8.77	40.41±10.19	35.00±9.92	4.181	0.018*

*(P≤0.05)

Table (10): Total VAS (Visual Analogue Scale) means scores of competence categories in different work environments at Assuit University Hospitals (n=116)

Competence categories	VAS mean level of competence				Total Mean
	Special and general units	Emergency units	Intensive care units	Operating rooms	
1. Helping Role	64.28	66.96	63.31	62.85	64.24
2. Teaching Coaching	58.80	65.75	58.02	60.00	59.73
3. Diagnostic Functions	62.88	72.32	61.02	66.66	64.24
4. Managing Situations	71.04	78.38	73.61	75.00	73.16
5. Therapeutic Interventions	64.31	74.99	69.25	68.88	67.52
6. Ensuring Quality	51.82	65.27	57.40	59.25	55.93
7. Work Role	71.47	80.15	72.18	76.70	73.50

Table (11): Distribution of competence levels of each competence category among the studied nurses' managers at Assuit University Hospitals (n=116)

Competence categories	Main Hospital (n=75)		Pediatric Hospital (n= 31)		Women Health Hospital (n= 10)		p-value
	No	%	No	%	No	%	
1. Helping role:							0.329
• Mild	6	8.0	4	12.9	2	20.0	
• Good	17	22.7	10	32.3	4	40.0	
• Excellent	52	69.3	17	54.8	4	40.0	
2. Teaching coaching:							0.962
• Mild	7	9.3	3	9.7	1	10.0	
• Good	26	34.7	13	41.9	4	40.0	
• Excellent	42	56.0	15	48.4	5	50.0	
3. Diagnostic functions:							0.604
• Mild	6	8.0	2	6.5	0	0.0	
• Good	18	24.0	11	35.5	4	40.0	
• Excellent	51	68.0	18	58.0	6	60.0	
4. Managing situations:							0.033*
• Mild	3	4.0	0	0.0	2	20.0	
• Good	12	16.0	9	29.0	3	30.0	
• Excellent	60	80.0	22	71.0	5	50.0	
5. Therapeutic interventions:							0.061
• Mild	7	9.3	5	16.1	0	0.0	
• Good	11	14.7	6	19.4	5	50.0	
• Excellent	57	76.0	20	64.5	5	50.0	
6. Ensuring quality:							0.395
• Mild	14	18.7	5	16.2	2	20.0	
• Good	18	24.0	13	41.9	4	40.0	
• Excellent	43	57.3	13	41.9	4	40.0	
7. Work role:							0.020*
• Mild	1	1.3	0	0.0	0	0.0	
• Good	7	9.4	10	32.3	4	40.0	
• Excellent	67	89.3	21	67.7	6	60.0	

*(P≤0.05)

4. Discussion

The nurse manager is accountable for excellence in the clinical practice of nursing and the delivery of patient care on a selected unit within the health institution. This function is the primary focus of the nurse manager to meet this responsibility. The nurse manager has the authority to plan and implement strategies and programs consistent with the organization policies, goals, and objectives, as well as with professional standard. The manager is responsible for safe and caring environment that promote health teaching. The manager is responsible for assessing patient and family response to nursing care as well as evaluating the effectiveness and quality of care and services (Sullivan & Decker, 2005).

The present study confirms that regarding departments exactly half of study subjects who work in general and special units in different hospitals in the study while less than one quarter of them working in the intensive care units in the same hospitals. Regarding age, about two thirds of nurses' managers were less than thirty years old; more than one third of them have experience from five to less than ten years. Accordingly they have short years of experience (table, 1). These results is might be attributed to nurses' managers were from Pediatric and Women Health Hospital and these hospitals are new. This means that they will be in the work force for long years. To perform competently, personal characteristics are contributing factors to their development that have to be continuously identified and fulfilled.

More than half of nurses' managers are married; the majority of them had bachelor sciences of nursing, and more than three quarters of them head nurses. Defloor et al., (2006) clarify that the continuous presence of nurses' managers with experience and additional education will be necessary, particularly in emergency situations and they should be available for consultation

These results are in accordance with (McCloskey and McCain, 1988) who mentioned that the degree of education nurses had received best distinguished top and medium performers from poor performers during the first year of work. The level of experience was the best predictor of critical care skills. The top performers had also more feedback from supervisors than the poor performers. The results of their study also indicated that education, job satisfaction and feedback are determinants of job performance. In addition, they view the importance of manager leadership skills, manager expectations and communications with nurses are important for effective performance.

In the present study from competence categories (individual competencies), the nurses'

managers considered most competent in developing orientation program for new nurses in their units, coaching other staff member in patient observation skills. These may be attributed to implementation of an orientation program to all new graduated is an old rule for head nurses and staff nurses in Assuit University Hospital. The role of nurses' managers to coach staff nurses as a job description for them and nurses' managers considered least competent in developing patient education in their units. Moreover, decisions taken in particular situation and in providing ethical and individualized care (tables, 2, 3). This result is consistent with Bartlett et al., and Scholes et al., (2000) who mentioned that the importance of combining ethics and values, reflective practice, context-specific knowledge and skills are elements of competent performance.

Also, nurses' managers are considered most competent in keeping nursing care equipment in good condition. This indicates the presence of internal commitment and feeling of responsibility toward their units accordingly to their organization and least competence in coaching team members in mastering rapidly changing situations (tables, 5).

Least competent nurses were in evaluating patient education outcomes, utilizing research findings and contributing to further development of patient care (tables, 2, 6, 7, 8). This may be attributed to lack of integration and collaboration between nursing service and nursing education in the form of no research findings and recommendations applied in the hospital and also nurses' managers did not try to know what are new researches results are and they never read after graduate. Low competence in research utilization is verified by O'Conner et al., (2000) who clarify that nurses in general medical and surgical wards not utilize research finding in clinical practice while differ from the findings of Mccaughan and Parahoo, (2001) who mentioned that, more than half percent of medical and surgical nurses utilize research in clinical practice.

In Assiut University Hospitals nurse's managers considered that they were most competent as regard to work role category and there are a statistically significant differences between three hospitals regarding this category, followed by teaching-coaching category in the same Hospitals (table, 9). This may be attributed to that, Assuit University Hospitals considered a teaching based hospitals and the hospital have a training center, and every nursing staff members had a clear work role in order to be a role model in the work environment. As emphasized by (Meretoja and Leino-Kilpi, 2003) in their study of competence assessment made by nurse managers and practicing nurses, in which nurses'

managers assessed nurses more competent in teaching coaching category.

Assessment levels of competence as regard to competence categories in different work environments. The finding of the present study revealed that, the nurses' managers level of competences considered as excellent. The total VAS mean levels of competence of all categories ranged from 56 to 73. The nurses' managers considered that they were most competent in skills and tasks falling into the categories of managing situations, helping role and diagnostic functions (table, 10). This result is consistent with Meretoja, (2002) who clarifies that, the university hospital setting were high patient acuity and short length of stay that reflect great complexity, high risk patients and the need of rapid nursing responses to patient care.

The findings of the present study show that, nurses' managers related their own competence as excellent in three Assuit University Hospitals and there were statistically significant differences among the three hospitals as regarding to work role and managing situation categories (table, 11). It might be attributed to that, the main Assuit University Hospital is the oldest hospital and nurse managers are more experienced and received more training programs in clinical service than those of pediatric and women hospitals, in which they are new developed and less experienced employees. This result is inconsistent with Harisson and Nixon (2002) who mentioned that, the organizational culture, and the environment of care or resources available may have an effect on how nurses define the purpose of nursing and prioritize nursing actions.

Conclusions

In the light of the study results, the following conclusions can be drawn:

- 1- Nurses' managers have excellent level of competence in work role category, followed by teaching coaching category, then in managing situation category.
- 2- Main Assuit University Hospital nurses' managers are competent than Pediatric Hospital and Women Health Hospitals in all competence categories.
- 3- The emergency units nurses' managers are competent than other different work settings following by operating rooms.

Recommendations

Based on the forgoing conclusions, the following recommendations are proposed:-

- 1- Developing a career ladder for different nursing categories to encourage nurses' managers to improve their level of competency.

- 2- Developing a Performance appraisal tool specific for nursing categories to recognize and promote them based on career ladder.
- 3- Continuing education (in the form of workshops or training courses) to nurses' managers regarding developing patient education and how to deal with rapidly changing situations.
- 4- More researches are needed to evaluate the outcomes of competencies not only in terms of individual nurses but also in terms of patient and unit outcomes.

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Online Classes and Traditional Classes in adult education

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Abstract: Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home. Distance education delivers classes (live or pre-taped) to students in their home, office, or classroom. It is used by K-12, higher education, continuing education and business. As the cost of delivering quality education increases, institutions find that limited resources prevent them from building facilities, hiring faculty, or expanding curricula. They are using distance education to maximize resources and are combining their assets with others to produce programming. Distance education is offered internationally, nationally, regionally, and locally over all forms of conferencing technology. The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS)), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

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Keywords: Online Classes, Traditional Classes, distance education

Introduction:

Led the way when dealing with those massive training programs available to speak to the technological tools that we expect to occur that planners and decision makers that planners and decision makers of large structures, especially university education according to the image Access to the development of community information are available on these tools are selected and used. Massive wave of data produced in today's world it nicknamed the "information age" has all day and through various means of communication in the world will move on its size are added. Other hand, as we're not the world witnessed the development of the role of information communication devices transporting feedback fast and absorb the information around the world, we forget.

Therefore, information and communication as the main lever or two important move in developing wings, we learn. Meanwhile, proper utilization of the capacities of these two valuable and effective indexes in the general development concept for any society and the principles of a critical need is considered. With a view to clarifying this issue can be paid in the best way to create a platform for developing data standards and access to a knowledge based society, what really can be. To achieve a clear and practical

answer in this area before all the existing definitions and indicators mentioned placed.

Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn. The contract between teacher and learner, whether in a traditional classroom or distance education, requires that the student be taught, assessed, given guidance and, where appropriate, prepared for examinations that may or may not be conducted by the institution. This must be accomplished by two-way communication. Learning may be undertaken either individually or in groups; in either case, it is accomplished in the physical absence of the teacher in distance education. Where distance teaching materials are provided to learners, they are structured in ways that facilitate learning at a distance.

What do the education institutions offer?

Archived video footage and virtual real-time lectures, online assignments and presentations, electronic academic material, multimedia as part of

classrooms – all these have been part of higher education for a while now.

However, Online Education means taking entire degree program online, via your laptop. This means an entirely new experience, yet not everybody is ready for it.

Taking Online Classes via Online education program requires specific learning skills, which some people lack.

The Pros of Online Classes

The key advantages of using an online class are –

1. Time flexibility

For some people there is nothing worse than getting up before 9 in the morning. Traditional higher education often requires just that. But with online education students have the possibility to adjust schedules to their life, rather than adjust their life to predetermined schedules. Other people benefit greatly from it too: parents, full-time employees, and anyone else who for this or that reason is too busy to attend traditional classes.

2. Geographic flexibility

Online institutions make possible something unprecedented: it no longer matters where you live. You can live in one of the world and study daily at an institution based in another without ever leaving your native country, or even your room, for that matter. Even in terms of local travel online education is a revolution: there are no more bus, train, or car trips, no traffic jams, no being late for the bus/train, no time and money spent on travel.

3. Class Notes

Not everybody knows how to write great class notes. Online courses provide electronic transcripts of every lecture. This is great for anyone who has short attention spans or does not like to write during lectures.

4. More educational means

Much more so that in traditional classrooms, online education incorporates online multimedia possibilities into instruction.

Possible cons of online classes include:

What are the Disadvantages of Online Courses? Here are some –

1. Credits:

Not all online course credits are transferable to traditional degree programs!

2. Require self-discipline

Excellent self-discipline and time management without the aid of strict schedules, attendance requirements, and personal communication

3. Lack of interpersonal interaction

No interpersonal relationships with other teachers or students; only via email, message boards, and other online means of communication.

Disadvantages of Online Classes: Disadvantages to Consider

This article will focus on the disadvantage of taking Online Classes. Online education is not exactly a trend yet, but it is becoming increasingly popular.

The reason for this is that it offers new opportunities where none existed before – Many people wouldn't have been able to acquire the necessary higher education without it. However, like all things in life, taking Online Classes has some drawbacks and disadvantages as compared to the traditional classrooms.

That said, online classes are not perfect for everyone. To avoid getting caught in the hype and making the wrong decision, consider the pros and cons of online education.

Online Classes VS Traditional Classes: Comparison between the Two Methods

Nowadays it is not enough to choose the university you want to learn at. Today, you have to first decide whether you want an online degree or an offline/traditional education.

Online education is a growing force in the field of additional and higher education. It is probable that in the near future, within a decade or two, online education will be the global standard.

Considering the differences between these two methodologies of education can provide you the basic knowledge and even surprising opportunities.

Online VS Traditional Classes

Attendance

Traditional institutions require physical presence and participation in classrooms. This entails extensive travel and expenses. For many only this already makes higher education impossible. Online education requires no traveling at all, saving time, money, and energy. Busy people will therefore be able to combine extensive studies with work and family. Education is available to sailors on submarines and to astronauts in space!

Virtual classrooms vs. real classrooms

There are two camps around this issue – Those who love attending campus-based lecture and those would rather stay at home. Virtual education means there are no campuses and no classrooms. For those who prefer to be at home and are comfortable with cyberspace this is a virtual paradise. For those who are technophobic, get confused by online multi-media, and who prefer direct human contact this may be a veritable digitalized hell. But the amount of people who are uncomfortable with technology and the

internet is decreasing exponentially. Most people are addicted to the internet. And video communication is becoming standard nowadays, allowing top-quality group video communication online.

Traditional and Online Schedules

Online institutions deliver many or all courses via modules.

These modules can be scheduled by the student him or herself to be taken virtually at any time of day or night. This is obviously impossible with traditional classes, however requires a high degree of self-motivation and the ability to meet requirements while enjoying greater freedom.

The Value of online classes/degree earned as compared to the traditional ones

When it comes to quality, going to Online Classes becomes universal as going to a traditional college class.

One has to remember that the world is changed rapidly and the online education is now a great alternative to the traditional one. Just like a person got used to choose between campus-based colleges and universities, today the online education grows to be an option. Of course, with its different varying quality of degrees, just like any on-campus degrees.

Conclusion:

Distance education delivers classes (live or pre-taped) to students in their home, office, or classroom. It is used by K-12, higher education, continuing education and business. As the cost of delivering quality education increases, institutions find that limited resources prevent them from building facilities, hiring faculty, or expanding curricula. They are using distance education to maximize resources and are combining their assets with others to produce programming. Distance education is offered internationally, nationally, regionally, and locally over all forms of conferencing technology.

The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as

satellite, ITFS, microwave, cable, fiber optic, and computer connections.

Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation.

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Distance Education and e-learning: Similarities and differences

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Abstract: Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation. Distance education can be used for some aspects of most disciplines. For example, several institutions of higher education already have developed certificate programs, undergraduate programs, and graduate programs in health and physical education that are delivered using distance education methods.

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Keywords: Distance Education, E-learning

Introduction:

Distance education is education designed for learners who live at a distance from the teaching institution or education provider. It is the enrollment and study with an educational institution that provides organized, formal learning opportunities for students. Presented in a sequential and logical order, the instruction is offered wholly or primarily by distance study, through virtually any media. Historically, its predominant medium of instruction has been printed materials, although non-print media is becoming more and more popular. It may also incorporate or make use of videotapes, CD or DVD ROM's, audio recordings, facsimiles, telephone communications, and the Internet through e-mail and Web-based delivery systems. When each lesson or segment is completed, the student makes available to the school the assigned work for correction, grading, comment, and subject matter guidance by qualified instructors. Corrected assignments are returned to the student. This exchange fosters a personalized student-instructor relationship, which is the hallmark of distance education instruction. Historically, most distance education courses were vocational in nature, but today courses are offered for academic, professional, and avocational purposes for students of all ages. There are numerous specialized programs, such as those for blind persons and for parents of small children with hearing impairments. Distance education is available in practically any

field, from accounting to zoology. Courses are offered in gemology, high school diploma, journalism, locksmithing, child day care management, yacht design, and many fascinating subjects. Distance education courses also vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Since 1890, more than 130 million Americans have studied at DETC member institutions, including Franklin D. Roosevelt, Walter P. Chrysler, Walter Cronkite, Barry Goldwater, Charles Schulz, and many other distinguished alumni of DETC members. Unlike most distance education courses offered by traditional colleges and universities that are semester and classroom oriented, with courses offered by most of the DETC-accredited institutions you can study any time and anywhere. Distance education is especially suited for busy people who wish to increase their knowledge and skills without giving up their jobs, leaving home, or losing income. You learn while you earn. Many courses provide complete vocational training; others prepare you for upgrading in your present job, without losing wages, experience or seniority. You receive individual attention, and you work at your own pace. In recent years, technology has played a significant role in transforming the traditional distance education school into a dynamic, interactive distance learning method using toll-free telephone lines, as well as a diverse array of personal computers, video devices, CD and DVD ROMs,

online courses over the Internet, interactive devices, and other modern technological innovations. The future for distance study promises to be exciting.

Educational methods in distance learning:

Today, under the new system replaced the traditional systems of learning and learning week (ie tutoring methods, lectures) are:

- Multimedia courses:

These courses and widely used elements of image, communication, graphics and simulated components, animation and communication elements for guidance and tips, and talk back on course and curriculum issues are held.

- Enhanced communication mechanisms:

The mechanism of any texts simultaneously, and asynchronous audio-visual communications to protect you. This case allows students to practice on topics learned will give.

- Written test:

thus, question and test via a distributed communication network, are corrected and returned. These exams through video conferencing support and runs.

- Virtual Seminar:

thereby different groups of students in different geographical environments linked together makes.

- Collaborative virtual laboratories:

the laboratory of the Group's activities are supported. Workshops such as software engineering.

-Smart academic factors:

academic factors that inform intelligent, support and guidance students pay.

Key factors in the process of distance education:

the process of remote training, the following factors contribute:

- Students:

Regardless of educational content, role and main element in the learning process students are responsible.

- Coaches and Teachers:

Success depends on a lot of educational activities the ability, skills and knowledge are the coaches and professors.

- Facilitators of communication:

Facilitator bases, as the bridge between students and mentors are. Must base expectations of teachers and educational needs of students and service coordination and communication to create.

- Support staff:

One of the important pillars of any development of distance education programs, by development group finds. Operational support staff such as student registration, copy and distribute their resources,

order textbooks, security and copyright, and are responsible for the report.

- Management:

The group decision makers, builders and judges are considered to be educational and should be considered among the factors above, establish the correct relationship formation.

In its original form, teachers using distance education traveled to remote sites and taught a class, or corresponded with students through mail, telephone, or fax machine. Individualized study has been a method of reaching the remote student for some time. Detailed course instructions are sent to the learner who performs the assigned tasks and returns the completed work to the teacher for evaluation and reassignment if necessary.

Technology has raised the quality of individualized distance instruction. The use of various forms of electronic media increases time effectiveness and improves the delivery of information. Video, audio, and computer-based applications may enhance the product received by the independent learner. Electronic delivery can occur using synchronous communication, in which class members participate at the same time, or asynchronous communication where participants are separated by time (Romiszowski, 1993).

Video/audio models of distance education include broadcast television, cable television, satellite, microwave, fiber optics, and audio graphics. The most widely used format is broadcast and cable television (Parrott, 1995). However, developments in satellite and fiber optic systems have produced other successful programs. The interactive capability of many of these networks has produced a distance classroom that is nearly identical to a regular classroom. Teachers and students can interact through both two-way video and one-way video with two-way audio systems. The recent development of Desktop Video Conferencing (DVC) which brings interactive video capability to the desktop computer, further enhances learning opportunities.

The linking of computer technology through the use of the Internet or CD-ROM with television transmission provides a potentially new dimension to distance education. This technique can link university professors to high school teachers, or to physically disabled students, in a distance setting (McLean, 1996).

Another form of interaction is the use of computer conferencing. This method utilizes asynchronous communication in such forms as an e-mail list group, an Internet discussion group, or other types of conferencing software. Asynchronous methods of communication are especially appealing to the

learner who has difficulty scheduling specific time- and place-bound course work.

The main aspects of Distance Education are as follows-

1. Geography: The point of Distance Education is to educate despite geographical differences. Online education effectively abolishes geographical as well as time differences, allowing an unprecedented number of students from all over the world to study in an institution, at any time of day.

2. Why higher education and Why take it from Distance: The world of today requires advanced education. Nowadays, advanced degrees are the standard – Having more than one education is not extraordinary but sometimes a must. Foreign studies are also common.

With the increased penetration of the Internet, Distance Education, offering anything from individual classes to complete doctoral degrees online, is a natural development of modern educational processes and requirements.

3. Distance Education as we know it today: It is a web-based education developed using e-Learning software tools and other distance-communication means. With increasing reliance on information, the demand for better and faster education grew and brought about the Internet.

4. Who Uses Distance Education? More and more people acquire higher education. Even professionals with full-time careers acquire new degrees, without change of pace at work. Distance education is perfect for the Military and for social institutions of all kinds. Parents can now combine higher education with family. Foreign education has never been easier – all it takes now is to log on.

Distance Education reaches out to all those segments of population which only a decade or so ago were almost completely neglected by educational systems.

In the nearest future cultural, educational, corporate diversity will reach never-before-seen peaks.

Distance education is any type of schooling that takes place away from a physical campus. Distance education is also known as:

- distance learning
- virtual learning
- online learning
- e-learning
- online education
- web-based training

Conclusion:

Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or

learning center. The instructor may be located in a media classroom, studio, office or home.

Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend on matching technological capabilities to education needs.

The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

In the earlier days of distance learning, it was most common to see distance learning used for rural students who were at a distance from an educational institution. The student might watch a telecourse on a television stations, read texts, mail in assignments and then travel to the local college to take an exam.

This model is still in use, but as the technology has become more sophisticated and the cost of distance learning dropped as equipment prices dropped, the use of distance education has increased.

High front-end costs prevented an early widespread adoption of electronically mediated learning. Distance learning has been aggressively adopted in many areas because it can meet specific educational needs. As the concept of accountability became accepted and laws required certain courses in high school in order for students to be admitted to state colleges, telecommunications was examined as a way to provide student access to the required courses. Many rural school districts could not afford the special teachers to conduct required courses. Distance education met this need by providing courses in schools where teachers were not available or were too costly to provide for a few students. It also fulfilled a need for teacher training and staff development in locations where experts and resources were difficult to obtain. These systems link learner communities with each other and bring a wide array of experts and information to the classroom.

Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups. In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation.

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Effect of Chlorhexidine in Prevention of Oral Lesions in Leukemic Children Receiving Chemotherapy

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Abstract: Leukemia is the most common childhood cancer. Untreated leukemia results in death from infections or hemorrhage. The primary treatment of ALL is chemotherapy which is usually associated with a number of side effects among which is oral mucositis (stomatitis). It is one of the most debilitating complications following chemotherapy treatment administration. These lesions may produce discomfort and pain which interfere with eating, patient compliance to treatment and potential risk of oral infection. Good and consistent oral hygiene is one of the basic roles of the pediatric nurse to prevent and reduce the complication of oral infection. It includes oral assessment before the initiation of chemotherapy treatment and during its administration followed by creating an oral care plan. Chlorhexidine gluconate is effective in the prevention of oral lesion and in decreasing the severity of stomatitis. The aim of the present study is to determine the effect of using chlorhexidine gluconate in the prevention of oral lesions in leukemic children receiving chemotherapy. The study was conducted at the Haematology Unit of Alexandria University Children's Hospital at EL-Shatby and at the Oncology department at the Health Insurance Student Hospital in Alexandria. The subjects of this study comprised 50 children of both sexes with acute lymphoblastic leukemia. Children were divided into two groups: group I (study group) received 0.1 % of chlorhexidine gluconate and group II (control group) who was left to the routine hospital care. Tool consisted of three parts to collect the study data: Children's Bio socio-demographic data; Children's Medical data; Oral assessment guide (OAG) tool. The main result showed that children among the study group had healthier oral cavity and lower degree of oral mucositis no one developed severe oral mucositis compared to the children in the control group following 10 days of chemotherapy administration. The main recommendation is to create an oral care plan to each child individually involving cleaning teeth by using a mouth wash with Chlorhexidine gluconate. This is important for preventing oral complications, decreasing severity of oral mucositis and treating gingivitis (swelling, redness and bleeding of the gums).

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Key words: lymphoblastic leukemia, chemotherapy, oral mucositis, Chlorhexidine gluconate.

1. Introduction:

Malignant diseases are one of the most common causes of death among children below the age of 15 years after accidents⁽¹⁾. Among childhood malignancies, leukemia, is the most common childhood cancer accounting for about one third of pediatric malignancies^(2,3).

Chemotherapy is usually associated with a number of side effects mainly nausea, vomiting, anorexia, alopecia, neuropathy, constipation, hemorrhagic cystitis, moon face, mood changes and oral mucositis^(4,5). Oral mucositis (stomatitis) is one of the most debilitating complication following chemotherapy administration. Stomatitis is an inflammation of the oral mucosa which may include the cheek, lips, tongue, palate and floor of the mouth^(6,7). Oral mucositis can occur in any region of the mouth but more frequently affects non-keratinized regions such as the buccal mucosa, soft palate and the floor of the mouth⁽⁸⁾.

Oral mucositis normally lasts for 3 weeks. It begins on the 3rd-5th day from starting chemotherapy with a peak on the 7th-14th day after chemotherapy.^(9,10) Mucositis is caused by direct effect of chemotherapy by interfering with actual cell production, maturation and replacement and indirectly due to bone marrow depression during which neutropenia and thrombocytopenia lead to increased risk of bleeding and infection^(11,12). The severity of oral mucositis depends on the type of chemotherapeutic drug, dosage, frequency of drug administration, the child's age, neutrophil count and level of oral care^(11,12).

Preventive care for oral mucositis is very important especially in patients receiving high-doses of chemotherapy. Consistent oral hygiene is one of the basic roles of the pediatric nurse in the prevention and reduction of the severity of oral mucositis and oral infection. It includes oral assessment before the initiation of chemotherapy and daily assessment

during chemotherapy administration then creating an oral care plan⁽¹³⁾.

There are different substances used in mouth care such as hydrogen peroxide, saline rinse, and herbal medicine as chamomile⁽¹⁴⁾. Other preparations that are used to prevent or treat mucositis include 12% Chlorhexidine gluconate because of its dual action against candidal and bacterial infection^(15,6).

Chlorhexidine gluconate is a biguanide antiseptic and disinfectant. It is effective against both gram-positive and gram-negative bacteria but more effective against Gram-positive bacteria. It has been shown to have an immediate bactericidal action and a prolonged bacteriostatic action. It inhibits some virus and it is also active against some fungi. It acts by disrupting the bacterial cells plasma membrane. Chlorhexidine gluconate is used to treat gingivitis (swelling, redness, and bleeding of the gums).^(16,17) It is often used as an active ingredient in mouthwash designed to kill dental plaque and other oral bacteria so it is used to improve bad breath.⁽¹⁶⁾ The mouth of the child should be rinsed by chlorhexidine and kept in contact with the mucosal membrane for at least 30-90 seconds to be effective. For best effectiveness food, drink and mouth rinses should be avoided for at least one hour after use.^(16,18)

Poor oral health has significantly negative effects on systemic health so the pediatric nurse has an important role in providing oral care to children to reduce the impact of oral microbial flora, reduce cancer therapy related to mucositis, maintain nutritional status and to prevent soft tissue infections that may have systemic sequelae^(5,11).

Aim of the work:

The aim of the study is to determine the effect of using chlorhexidine in the prevention of oral lesions in leukemic children receiving chemotherapy.

Research Question

What are the effect of using chlorhexidine in the prevention of oral lesions in leukemic children receiving chemotherapy?.

2. Subjects and Methods

Research design:

It is a quasi-experimental study.

Setting:

The study was conducted at the Haematology Unit in Children's University Hospital at EL-Shatby and at the Oncology Department of Sporting Student's Hospital in Alexandria.

Subjects:

A Convenient sample of 50 children with acute lymphoblastic leukemia were selected according to the following criteria:

- Both sexes
- Free from any other disease.
- Free from any oral lesion.
- Age ranged from 2-16 years.
- Children were taken in the first day of starting chemotherapy either during induction or intensification phase.

The subjects of the study were divided into two groups by simple randomization:-

Group I (Treated group)

It Included 25 children with acute lymphoblastic leukemia who received oral hygiene by 0.1 % of chlorhexidine gluconate when they started chemotherapy.

Group II (Controlled group)

It included 25 children with acute lymphoblastic leukemia who received routine hospital care of oral hygiene.

Tool :It consisted of:

Children's Bio socio-demographic data, such as: name, age, sex, and residence area.

Children's Medical data, such as:

1-Type of ALL:

- B.ALL
- T.ALL

2-Platelet (PLT) count which was classified into:

- Severe thrombocytopenia (PLT < 20.000).
- Moderate thrombocytopenia (PLT 20.000- 40.000).
- Mild thrombocytopenia (PLT > 40.000).⁽¹⁹⁾

3-White blood cells (WBCs) count which was classified into:

- WBCs \geq 50.000.
- WBCs < 50.000.⁽¹⁹⁾

4-Clinical manifestation: Hepatomegaly, Splenomegaly, Hepato- splenomegaly.

5- Protocol of treatment which was classified into high risk and low risk protocol.

-High risk protocol (age 1-9 years with initial WBCS \geq 50.000/u/L or age >10 years and < 21 years with any WBCs count or with T-cell Acute lymphoblastic leukemia (ALL) or with overt testicular leukemia at diagnosis or had center nervous system (CNS) disease at diagnosis).⁽¹⁹⁾

-Low risk protocol (age 1-9.99 years or initial WBCS < 50.000/u/L or with T-ALL are not eligible or with overt testicular leukemia at diagnosis are not eligible or had CNS disease at diagnosis are not eligible).⁽¹⁹⁾

6- Stage of chemotherapy included induction or intensification phase.

• Oral assessment guide (OAG) tool

It was developed by Eilers *et al.*⁽⁹⁾ to assess the condition of oral cavity and the degree of stomatitis for leukemic children.

The tool consists of 8 items: Voice; Swallow.; Lips and angle of the mouth; Tongue; Saliva ; Mucus membrane ; Gingiva and Teeth.

The scoring system of the tool is as follows: Each of the eight items of oral assessment guide is scored as 1, 2 or 3; where:

Score 1 for normal findings.

Score 2 for mild abnormality without compromise of either mucosal integrity or loss of function.

Score 3 for severe abnormality with compromise of either mucosal integrity or loss of function.

Scoring system for assessment of each part of oral cavity:

Score of voice

Communicate with patient and listen whether:

Score 1: The voice is normal.

Score 2: The voice is deep /raspy (hoarse).

Score 3: Patient has difficulty in talking, crying or had painful cry.

Score of swallow reflex

Ask patient to swallow and observe whether:

Score 1: The swallowing is normal.

Score 2: Patient experiences some pain on swallowing.

Score 3: Patient is unable to swallow.

Score of lips

Observe lips and feel tissue, assess whether they are:

Score 1: Smooth, pink, moist.

Score 2: Dry or cracked.

Score 3: Ulcerated or bleeding.

Score of tongue

Observe the tongue and assess whether it is:

Score 1: Pink, moist, and papillae present.

Score 2: Coated or there is loss of papillae with a shiny appearance, with or without redness.

Score 3: Blistered or cracked.

Score of saliva

Insert depressor into mouth, touching the centre of the tongue and the floor of the mouth and observe whether:

Score 1: The saliva is watery.

Score 2: The saliva is thick; or ropy.

Score 3: There is absence of saliva.

Score of mucous membrane

Observe the mucous membrane in the oral cavity and determine if it is:

Score 1: Pink and moist.

Score 2: Reddened or coated (increased whiteness) without ulceration.

Score 3: Ulcerated with or without bleeding.

Score of gingiva (Gums)

Gently press the gums with end of spatula and observe whether:

Score 1: They are pink and firm.

Score 2: They are oedematous with or without redness.

Score 3: There is spontaneous bleeding or bleeding with pressure.

Score of teeth or denture bearing area

Observe the appearance of the teeth or denture bearing area and determine whether:

Score 1: They are clean with no debris.

Score 2: There are plaques or debris in localized area (between teeth if present).

Score 3: There are plaques or debris generalized along gum line or denture bearing area.

The eight subscale scores of oral assessment guide are summed to obtain an overall assessment score that ranging from 8-24.

The total assessment score was categorized as follows:

- If an overall assessment score was 8 or less than 9, it denotes healthy oral cavity.

- If an overall assessment score ranges from 9-16, it denotes moderate mucositis.

- If an overall assessment score ranges from 17-24, it denotes severe mucositis⁽⁷⁾.

Method

1. Official written approval consent for conducting the study was obtained from the responsible administrative personnel.
2. Informed consent was obtained from the parents after explaining the aim of the study.
3. Confidentiality was ascertained.
4. Oral assessment guide tool that was developed by Eilers *et al.* (1988) was adopted.
5. Tool was tested for content validity by 5 experts in the pediatric nursing field and the validity of the tool was 100%.
6. A pilot study was conducted on 5 children with acute lymphoblastic leukemia who received chemotherapy and was satisfying the prescribed criteria to test the clarity and applicability of the tool. These patients were excluded from the studied subjects.
7. The children were divided into two groups by simple randomization: Group I (treated group), and Group II (controlled group).
8. All leukemic children, either treated group or controlled group, were assessed for oral cavity by inspection and digital palpation of the oral mucosa using oral assessment guide (OAG) tool on the first day of starting chemotherapy and after 10 days.
9. Group I (study group) received oral hygiene with 0.1% Chlorhexidine gluconate on the first day of starting chemotherapy 2 times daily in the form of mouth rinse for old children. For young children, it was applied by cotton pad immersed in the used solution for one minute, 30 minutes after breakfast and the second time of mouth

wash 30 minute after the last meal time on the buccal, labial mucosa, lateral surface of the tongue and the soft, hard palate. The children and their mothers were instructed about avoiding food and drink for at least one hour after using mouth wash. This procedure was done every day from the first day of starting chemotherapy and lasted for 10 consecutive days.

10. Group II (controlled group) received routine hospital care of oral hygiene.
11. Evaluation of the degree of stomatitis was categorized according to whether the child had normal oral cavity (scored 8), moderate stomatitis (scored 9-16) or severe stomatitis (scored 17-24).
12. A comparison was done between the two groups, for determining the effect of chlorhexidine gluconate on prevention of oral lesion in oral cavity.
13. The data collection was done during the period from November 2008 to August 2009.

Statistical analysis:

Data were coded and transferred into specially designed formats to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid any errors during data entry. Data were analyzed using a personal computer with statistical package for social sciences (SPSS) version 13.

The following statistical measures were used:

- Descriptive measures included: Percentage, Mean, Standard deviation.
- Chi square test, Fisher's Exact Test, T test was used for test of significance.
- The 0.05 levels was used as the cut off values for statistical significance ($p \leq 0.05$)

3. Results:

Table (I) illustrates the socio demographic characteristics of the studied subjects. 54 % of the subjects was in the preschool age i.e. age 2-6 years, while 20 % of the subjects was in the adolescence age i.e. Age 12-16 years. Moreover, the mean age of the subject was 6.94 ± 4.474 year.

Regarding sex, it was observed from this table that the highest frequencies (66%) of studied subjects were boys, while 34 % were girls.

Concerning the residence, 60 % of the studied subjects were from urban areas and 40 % of them were from rural areas.

Table (II) shows the percentage distribution of the studied subject according to their clinical data. It was found that equal percentage (80%) of studied and controlled groups had leukemia type (B.ALL). As regards clinical manifestation, nearly half of the

studied group (48%) compared to 24% of the controlled group had Hepato-Splenomegaly, While 44% of the controlled group and 24% of the studied group did not suffer from Hepato-splenomegaly. There was no statistically significant difference between the two groups. Concerning platelets (PLT) count, 72 % of the studied group compared to 68% of the controlled group had mild thrombocytopenia. i.e. (PLT count > 40.000). On the other hand, 12% of the studied group compared to 20% of the controlled group had Severe thrombocytopenia (PLT count < 20.000). There was no statistically significant difference between the two groups. The mean of PLT count of the studied and the controlled groups was 132160 ± 131454 and 176800 ± 165293 respectively. No statistically significant difference was found between the means of both groups.

Concerning white blood cells (WBCs) count, equal percentage (92%) of the studied and the controlled groups had WBCs count < 50.000 . The mean WBCs count of studied and controlled groups was 9788 ± 17065 and 9922.4 ± 14963 respectively. There was no statistically significant difference between the mean of both groups.

Regarding protocol of treatment, 64 % of the controlled group and 60% of the studied group received standard risk protocol of treatment. There was no statistically significant difference between both groups. Concerning stage of chemotherapy, equal percentage (68%) was found in the treated and the controlled groups during the induction phase.

As classified in table III which portrayed post 10 days chemotherapy oral assessment categories of studied and controlled groups, it was found that the studied group had more normal oral assessment concerning most of their oral assessment categories than that of the controlled group. As regards voice, the majority of the studied group (96%) had normal voice compared to 68% of the controlled group. On the other hand, none of the studied group had difficulty in talking, crying or had painful cry compared to 20% of the controlled group. Statistically significant difference was found between both groups where $P=0.027$. Concerning swallowing, the majority of the treated group (96%) had normal swallowing compared to 52% of the controlled group. Only 4% of the studied group suffered from some pain during swallowing compared to nearly one third of the controlled group (32%). None of the studied group suffered from the inability to swallow compared to 16% of the controlled group. The difference was statistically significant between both groups where $P=0.002$. Concerning lips, about three quarter of the studied group (76%) had smooth, pink and moist lips compared to 32% of the controlled group. 64% of the controlled group had dry or

cracked lips compared to about one quarter (24%) of the studied group. Statistically significant difference was found between both groups where $P=0.007$.

Regarding tongue, the children who had pink and moist tongue constituted the highest frequency in studied group (92%) while 44% were in the controlled group. Nearly half of the controlled group (52%) had coated tongue or loss of papillae compared to 8% of the studied group. None of the studied group had blistered or cracked tongue compared to 4% of the controlled group. There was statistically significant difference between both groups where $P=0.001$. Regarding saliva, 96% of the studied group had watery saliva compared to 64% of the controlled group. On the other hand, only 4% of the studied group had thick or ropy saliva compared with 36 % of the controlled group. Statistically significant difference was found between the studied and controlled groups where $P=0.004$. Concerning mucous membrane, it was found that the majority of the studied group (88%) and nearly half of the controlled group (48%) had pink and moist mucous membrane. However, 8% of the controlled group had ulcer with or without bleeding in mucous membrane compared to none of the treated group. Statistically significant difference was found between both groups where $P=0.023$. In the gingival of children, the results showed that slightly less than half of the controlled group (48%) had edema with or without redness in gingival, while 16% was found in the studied group. Statistically significant difference was found between both groups where $P=0.02$. Concerning teeth, 20% of the controlled group had plaque or debris in localized area along gum compared to only 4% of the studied group. No statistically significant difference was found between both groups.

Total scores of post 10 days chemotherapy oral assessment of the studied and the controlled groups are presented in table (IV). As classified in this table, nearly three quarters of the studied group (76%) had healthy oral cavity (OAG score=8) compared to 24% of the controlled group. On the other side, 16% of the controlled group had severe mucositis (OAG score from 17-24) compared to none of the treated group. There was statistically significant difference between both groups where $P=0.005$.

Table (V) shows the comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their age. It was observed from this table that three quarters (75%) of children of the treated group whose age ranged from 2-6 years, had healthy oral cavity compared to 20% of the controlled group. None of the treated group whose age ranged from 2-6 years suffered from severe mucositis compared to 6.7% of the controlled group

and there was no statistically significant difference. As Regards children whose age ranged from 6-12 years, it was found that 71.4 of the treated group had healthy oral cavity compared to 16.7% of the controlled group. On the other hand, none of the treated group whose age ranged from 6-12 years suffered from severe mucositis compared to one third (33.3%) of the controlled group and there was no statistically significant difference between them. Regarding children whose age ranged from 12-16 years it was found that the majority (83.3%) of the treated group had healthy oral cavity compared to half (50%) of the controlled group. No one of the treated group whose age ranged from 12-16 years suffered from severe mucositis compared to 25% of the controlled group and there was no statistically significant difference.

Table (VI) reveals the comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their sex. It was found that 70 % of boy of the treated group had healthy oral cavity compared to 46.15 % of the controlled group. No one of the boys of the treated group suffered from severe mucositis compared to 7.7% of the controlled group. There was no statistically significant difference. Regarding girls, all the treated group had healthy oral cavity compared to no one of the controlled group. None of the treated group had severe mucositis compared to 25 % of the controlled group. Statistically significant difference was found between both groups where $P=0.000$.

Table (VII) illustrates the comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their protocol of treatment. It was found that 73.3% of the treated group who received standard risk protocol of treatment had healthy oral cavity compared to 18.8% of the controlled group. However, no one of the studied group who received standard risk protocol of treatment suffered from severe mucositis compared to 18.7% of the controlled group. Statistically significant difference was found between both groups where $P=0.004$. On the other hand, the majority of the studied group (80%) who received high risk protocol of treatment had healthy oral cavity compared to one third (33.3%) of the controlled group, while 20% of the studied group who received high risk protocol of treatment suffered from moderate mucositis compared to more than half (55.6%) of the controlled group. There was no statistically significant difference between both groups.

Table (VIII) clarifies the comparison between the total percent scores of studied and controlled

groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their stage of chemotherapy. It was found that slightly more than three quarters (76.5%) of the studied group during the induction phase had healthy oral cavity compared to nearly one quarter (23.5%) of the controlled group. No one of the studied group during the induction phase suffered from severe mucositis compared to 23.5% of the controlled group. Statistically significant difference was found between both groups

where $P=0.005$. On the other hand, three quarters (75%) of the studied group, during the intensification phase, had healthy oral cavity compared to only one quarter (25%) of the controlled group. 25% of the studied group, during the intensification phase, suffered from moderate mucositis compared to 75% of the controlled group. Statistically significant difference was found between both groups where $P=0.041$.

Table (I): Bio socio-demographic characteristics of the studied subjects.

Socio-demographic Characteristics	Treated group (N=25)		Controlled group(N=25)		Total	
	No	%	No	%	No	%
1- Age /years						
• Pre-school age (2-6)	12	48	15	60	27	54
• School age (6-12)	7	28	6	24	13	26
• Adolescence age (12-16)	6	24	4	16	10	20
Total	25	100	25	100	50	100
Mean \pm S.D	7.24 \pm 4.702		6.64 \pm 4.31		6.94 \pm 4.474	
t-value	0.470					
p	0.640					
2- Sex						
• Male	20	80	13	52	33	66
• Female	5	20	12	48	17	34
Total	25	100	25	100	50	100
3- Residence						
• Urban	14	56	16	64	30	60
• Rural	11	44	9	36	20	40
Total	25	100	25	100	50	100

Table (II): Percentage distribution of the studied subjects according to their clinical data:

Clinical Data	Treated group (N=25)		Controlled group (N=25)		X ²	P
	No	%	No	%		
1. Type of leukemia						
• B.ALL	20	80	20	80	0.000	1.000
• T.ALL	5	20	5	20		
Total	25	100	25	100		
2. Liver and spleen (clinical manifestation)						
• Hepatomegaly	2	8	1	4	4.137	0.247
• Splenomegaly	5	20	7	28		
• Hepato-spleenomegaly	12	48	6	24		
• None	6	24	11	44		
Total	25	100	25	100		
3. Platelet count						
• Mild thrombocytopenia (PLT > 40.000)	18	72	17	68	0.571	0.715
• Moderate thrombocytopenia (PLT 20-40.000)	4	16	3	12		
• Severe thrombocytopenia (PLT <20.000)	3	12	5	20		
Total	25	100	25	100		
Mean\pm S.D	132160 \pm 131454		176800 \pm 165293			
t- value	1.057					
p	0.296					
4. WBCs count						
• Low risk (WBCs<50.000)	23	92	23	92	0.001	1.000
• High risk (WBCs \geq 50.000)	2	8	2	8		
Total	25	100	25	100		
Mean\pm S.D	9788 \pm 17065		9922.4 \pm 14963			
t- value	0.032					
p	0.977					

5. Protocol of treatment						
• Standard risk	15	60	16	64	0.085	0.771
• High risk	10	40	9	36		
Total	25	100	25	100		
6. Stage of chemotherapy						
• Induction phase.	17	68	17	68	0.000	1.000
• Intensification phase.	8	32	8	32		
Total	25	100	25	100		

Table (III): Post 10 days chemotherapy oral assessment categories of treated and controlled groups

Categories	Treated group N=25		Controlled group N=25		X ²	P
	No	%	No	%		
1-Voice					7.195	0.027*
• Normal	24	96	17	68		
• Deeper or raspy	1	4	3	12		
• Difficulty talking ,crying or had painful cry	0	.0	5	20		
2-Swallow					12.715	0.002*
• Normal swallowing	24	96	13	52		
• Some pain on swallowing	1	4	8	32		
• Unable to swallow	0	.0	4	16		
3-lips					10.027	0.007*
• Smooth , pink and moist	19	76	8	32		
• Dry or cracked	6	24	16	64		
• Ulcerated or bleeding	0	.0	1	4		
4- Tongue					13.302	0.001*
• Pink, moist and papillae present	23	92	11	44		
• Coated or loss of papillae	2	8	13	52		
• Blistered or cracked	0	.0	1	4		
5- Saliva					8.0	0.004*
• Watery	24	96	16	64		
• Thick or ropy	1	4	9	36		
• Absent	0	.0	0	.0		
6- Mucous membrane					7.513	0.023*
• Pink and moist	22	88	12	48		
• Reddened or coated without ulceration	3	12	11	44		
• Ulceration with or without bleeding	0	.0	2	8		
7- Gingival					5.882	0.02*
• Pink and firm	21	84	13	52		
• Edematous with or without redness	4	16	12	48		
• Spontaneous bleeding or bleeding with pressure	0	.0	0	.0		
8- Teeth					3.030	0.082
• Clean and no debris	24	96	20	80		
• Plaque or debris in localized area along gum	1	4	5	20		
• Plaque or debris generalized along gum	0	.0	0	.0		
Total	25	100	25	100		

Table (IV) Total percent scores of post 10 days chemotherapy oral assessment of treated and control groups:

Oral assessment guide score (OAG)	Treated group No=25		Controlled group No=25		X ²	P
	No	%	No	%		
Healthy oral cavity (OAG =8)	19	76	6	24	10.617	0.005*
Moderate mucositis (OAG score= 9-16)	6	24	15	60		
Severe mucositis (OAG score =17-24)	0	0	4	16		
Total	25	100	25	100		

* Statistically significant $p \leq 0.05$

Table (V) Comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their age.

Total percent scores of oral assessment guide (OAG)	Age											
	Preschool 2-6 years				School 6-12 years				Adolescence 12-16 years			
	Treated group		Controlled group		Treated group		Controlled group		Treated group		Controlled group	
	NO	%	NO	%	NO	%	NO	%	NO	%	NO	%
Healthy oral cavity (OAG =8)	9	75	3	20	5	71.4	1	16.7	5	83.3	2	50
Moderate mucositis (OAG score= 9-16)	3	25	11	73.3	2	28.6	3	50	1	16.7	1	25
Severe mucositis (OAG score =17-24)	0	0	1	6.7	0	0	2	33.3	0	0	1	25
Total	12	100	15	100	7	100	6	100	6	100	4	100
FET	4.993				4.286				2.061			
P	0.069				0.114				0.667			

Table (VI) Comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their sex.

Total percent scores of oral assessment guide (OAG)	Sex							
	Boys				Girls			
	Treated group		Controlled group		Treated group		Controlled group	
	NO	%	NO	%	NO	%	NO	%
Healthy oral cavity (OAG =8)	14	70	6	46.15	5	100	0	0
Moderate mucositis (OAG score= 9-16)	6	30	6	46.15	0	0	9	75
Severe mucositis (OAG score =17-24)	0	0	1	7.7	0	0	3	25
Total	20	100	13	100	5	100	12	100
FET	2.75				14.857			
P	0.204				0.000*			

Table (VII) Comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their protocol of treatment.

Total percent scores of oral assessment guide (OAG)	Protocol of treatment							
	Standard risk protocol of treatment				High risk protocol of treatment			
	Treated group		Controlled group		Treated group		Controlled group	
	NO	%	NO	%	NO	%	NO	%
Healthy oral cavity (OAG =8)	11	73.3	3	18.8	8	80	3	33.3
Moderate mucositis (OAG score= 9-16)	4	26.7	10	62.5	2	20	5	55.6
Severe mucositis (OAG score =17-24)	0	0	3	18.7	0	0	1	11.1
Total	15	100	16	100	10	100	9	100
FET	9.587				4.269			
P	0.004*				0.097			

Table (VIII) Comparison between the total percent scores of treated and controlled groups regarding oral assessment guide (OAG) following 10 days of chemotherapy and their Stage of chemotherapy.

Total percent scores of oral assessment guide (OAG)	Stage of chemotherapy							
	Induction phase				Intensification phase			
	Treated group		Controlled group		Treated group		Controlled group	
	NO	%	NO	%	NO	%	NO	%
Healthy oral cavity (OAG =8)	13	76.5	4	23.5	6	75	2	25
Moderate mucositis (OAG score= 9-16)	4	23.5	9	53	2	25	6	75
Severe mucositis (OAG score =17-24)	0	0	4	23.5	0	0	0	0
Total	17	100	17	100	8	100	8	100
FET	10.286				4.186			
P	0.005*				0.041*			

4. Discussion:

Chemotherapy treatment continues to be the mainstay in the treatment of leukemia. but is usually associated with a number of side effects mainly nausea, vomiting, anorexia, alopecia, neuropathy, constipation, hemorrhagic cystitis, moon face, mood changes and mucosal ulceration⁽²⁰⁾.

Oral mucositis (stomatitis) is one of the most debilitating complications following chemotherapy administration. Chemotherapy effects on highly proliferative tissues remain significant. Oral mucositis affects up to 40% of patients undergoing chemotherapy per year in the United States⁽²¹⁾. Mucositis affect all mucous membrane covered surfaces from the mouth to the rectum. It significantly reduces the quality of life and patients' compliance with treatment. Unresolved or untreated mucositis can lead to infections, impaired nutritional status, speech, comfort and other complications that can increase morbidity, and impact patient outcomes. Mucositis is a dose-limiting toxicity for both chemo and radio therapy, and therefore can directly impact survival^(20, 22-25).

The sites of mucositis lesions induced by both radiotherapy and chemotherapy are the non-keratinized mucosa, such as the buccal and labial mucosa, the ventral and lateral surfaces of the tongue, the floor of the mouth, and the soft palate⁽¹⁸⁾.

Oral complications may be prevented by oral assessment prior to the initiation of chemotherapy and then at least daily following the administration of chemotherapy. Adherence to a mouth care protocol and using mouth wash helps to maintain the moisture in the mouth, removes the remaining debris and toothpaste, and reduces the accumulation of plaque and infection⁽¹⁸⁾.

Chlorhexidine gluconate 0.12% is used against candidal and bacterial infection. It inhibits some viruses and it is active against some fungi^(4, 16, 26).

The biological characteristics of the present study reflect that the incidence of leukemia was high in preschool age (Table I). This result was in line with Sherif *et al.*⁽²⁷⁾ who conducted a study about demographic characteristics and history of risk exposure among acute leukaemic children in Alexandria. He reported that most of the acute leukemic children are belonging to the age of 2-5 years. Poncher *et al.*⁽²⁸⁾ who conducted a study about treatment of acute leukemia in children with and without folic acid antagonists also reported that Preschool age children were primarily affected.

It was noticed from the current study that the majority of the studied subjects were boys (Table I). The result was consistent with Jackson *et al.*⁽²⁹⁾ who conducted a study about why acute leukemia is more

common in boys. The finding could be justified by the fact that the presence of a sex responsive gene near to the ABO blood group gene locus on chromosome '9' which relatively protects group O among girls against acute leukemia. The finding of the present study is also supported by many authors who mentioned that acute leukemia occurred more frequently in boys than girls^(4,30). Furthermore, Zorlu *et al.*⁽³¹⁾ who conducted a study about evaluation of risk factors in children with acute lymphoblastic leukemia also reported that the risk of the development of ALL was found to be higher among boys than girls.

The result of the present study revealed that leukemic children from urban areas were more than rural areas (Table I). This result could be attributed to the fact that urban areas are more advanced in using high technology than rural areas. So there was more exposure to chemical substances and X-ray. Accidental exposure to Electro Magnetic Fields (EMF), as X-ray and drug especially during first trimester of pregnancy may be contributing factors to leukemia. This result was in agreement with Freda *et al.*⁽³²⁾ in their study about aggregation of childhood leukemia in geographic areas of Greece. They reported that there was high association between incidences of childhood leukemia and localized environmental exposure in urban areas to a lesser extent in semi urban areas. Tilinca *et al.*⁽³³⁾ who conducted a study about accidental ionizing radiation exposure and its impact on the population also found that incidence of leukemia in urban areas is more than that in rural areas. On contrary to the finding, Koushik⁽³⁴⁾ conducted a study about an ecologic study of childhood leukemia and population mixing in Canada. He found that population growth in rural areas was associated with an increased risk of leukemia particularly for ALL subtype due to population mixing which is not observed in urban areas.

The result of the present study revealed that the majority of the subjects had B.ALL (Table II). This result was in agreement with Magnani *et al.*⁽³⁵⁾ who conducted a study about increasing incidence of childhood leukemia in northwest Italy, and found marked increase in B cells of ALL cases. Rios *et al.*⁽³⁶⁾ also reported B-cell precursor ALL showed high frequency than T lineage ALL.

The current study revealed that the majority of treated and controlled groups had low white blood cells count (Table II). This finding could be explained by the fact that in all types of leukemia the proliferating cells depress bone marrow production of the formed elements of the blood by competing for and depriving the normal cells of the essential

nutrients for metabolism which lead to neutropenia (decrease WBCs counts) resulting in infection.⁽³⁷⁾

The result of the present study showed significantly higher percentage of the treated group having normal post 10 days chemotherapy oral assessment concerning most parts of their oral cavity compared to the controlled group (Table III). These findings could be attributed to using chlorhexidine for the treated group that had the ability to control gingivitis. It was often used as an active ingredient in mouthwash designed to kill dental plaque and other oral bacteria^(38,39). This result is in accord with many authors who reported that there was a significant decrease in the incidence and severity of oral mucositis and ulceration in children who received the preventive oral protocol using 0.12 % chlorhexidine mouth wash compared to the controlled group and reported the value of chlorhexidine mouth rinses in the prophylaxis of oral candidiasis in the myelosuppressed patient^(8,10,13,40,41). Moreover Vickars and Spinelli⁽⁴²⁾ who conducted a study about efficacy of chlorhexidine and nystatin rinses in prevention of oral complications in leukemia mentioned that potential bacterial and fungal pathogens were identified less frequently in the patients using chlorhexidine oral rinse. Contrary to the finding of the present study, Pitten *et al.*⁽⁴³⁾ who conducted a study about whether cancer patients with chemotherapy-induced leukopenia benefit from an antiseptic chlorhexidine-based oral rinse, reported that the chlorhexidine-based product did not provide a clinical benefit for cancer chemotherapy patients. Spijkervet *et al.*⁽⁴⁴⁾ who conducted a study about chlorhexidine inactivation by saliva also reported that chlorhexidine mouth rinsing was of limited value in decontaminating the oral cavity. Furthermore, Wahlin⁽⁴⁵⁾ who conducted a study about effects of chlorhexidine mouth rinse on oral health in patients with acute leukemia reported that there was increase in number of patients who had a burning sensation in the mouth, and a tendency toward increased numbers of salivary enterococci, enterobacteria, and/or *Pseudomonas* in patients who rinsed with chlorhexidine so did not support using of chlorhexidine.

It was noticed that the majority of studied subject had ulcerative lesions present in lips, tongue and mucous membrane as shown in (Table III). Similar to the findings found by Cheng *et al.*⁽⁴⁶⁾ who conducted a study about prevention of oral mucositis in pediatric patients treated with chemotherapy: a randomised crossover trial comparing two protocols of oral care reported that most of the ulcerated lesions were located in the buccal mucosa and labial mucosa.

It was noticed from Table IV that the controlled group significantly had higher percentage of stomatitis

at post 10 days chemotherapy oral assessment compared to treated group (Table IV). This could be attributed to the dual effect of chemotherapy on the oral mucosa; direct and indirect. The direct effect mediated by the treatment-induced stomatotoxicity resulting in mucosal atrophy and the indirect effect is through the systemic effects of chemotherapy, such as bone marrow suppression which affects the severity of oral complications⁽¹¹⁾. This finding was in accord with Pinto *et al.*⁽⁸⁾ who conducted a study about Prevention of oral lesions in children with acute lymphoblastic leukemia and reported that there was a high frequency of mucositis in children with ALL who did not receive chlorhexidine.

Concerning the degree of stomatitis, it was found that the children who used chlorhexidine had healthy oral cavity. 24% of treated group suffered from moderate oral mucositis and no one suffered from severe oral mucositis (Table IV). This might be attributed to the fact that the chlorhexidine had the ability to control, prevent, kill dental plaque and other oral bacteria⁽⁴⁾. Many authors were in line with the results of the present study who reported that chlorhexidine mouth rinse significantly reduced the incidence of oral mucositis in the treated group and the severity of oral mucositis was less compared to control group^(10,40,47). Moreover, Cheng *et al.*⁽⁴⁶⁾ cited that on their study about the prevention of oral mucositis in pediatric patients treated with chemotherapy: a randomized crossover trial comparing two protocols of oral care, also reported that OAG scores for mucositis in patient who use chlorhexidine was 8-13 (moderate mucositis).

The present study revealed that the majority (73.9%) of children of controlled group developed moderate and severe mucositis during neutropenia compared to 26.1% of treated group who developed moderate oral mucositis (Table VII). This result was in harmony with Cheng *et al.*⁽¹⁰⁾ who performed a study about evaluation of an oral care protocol intervention in the prevention of chemotherapy-induced oral mucositis in pediatric cancer patients. The study revealed that the majority of the children of controlled group during neutropenia developed oral ulcerative lesions and only one third of the subjects using the oral care protocol (chlorhexidine mouth rinse and 0.9% saline rinse) developed oral ulcerative lesions.

Conclusion

Based on the findings of the present study, it was concluded that Chlorhexidine was an effective solution in preventing and decreasing oral mucositis and gingivitis (swelling, redness, and bleeding of the gums) in leukemic children receiving chemotherapy. However, children in the treated group had healthier

oral cavity and lowest moderate degree of oral mucositis and no one of them developed severe oral mucositis compared to children in controlled group following 10 days of chemotherapy administration and significant differences were illustrated.

Recommendations

- Based on the findings of the present study the following recommendations are suggested:
- Responsibility of the nurses toward all children being treated from leukaemia and receiving chemotherapy is preventing and decreasing oral complication of chemotherapy through assessing oral cavity by using standardized grading system as an oral assessment guide (OAG) tool prior to the initiation of chemotherapy and at least daily following the administration of it.
- Creating an oral care plan to each child individually involving cleaning the teeth by using a mouth wash with Chlorhexidine gluconate is an important recommendation in preventing oral complications and decreasing severity of oral mucositis and treating gingivitis (swelling, redness and bleeding of the gums).
- Leukemic children receiving chemotherapy and their mothers should be informed about the possible oral complications of chemotherapy, how to detect and decrease the incidence of mucositis, and how to maintain oral hygiene.
- Direct family involvement in children oral care should be encouraged for maximum treatment compliance of their leukemic children.

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Posttraumatic Stress among Undergraduate Emergency Nursing Students

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Abstract: Undergraduate emergency nursing students are often exposed to stress when helping patients in emergency situations. Emergency nursing students are vulnerable to the development of symptoms of post-traumatic stress Disorder (PTSD). Stress reactions among helpers can be regarded as a natural behavior and reaction when experiencing a traumatizing event and by the stress resulting from helping or wanting to help a traumatized or distressed person. Any trauma exposure can trigger post traumatic stress disorder. Selley reiterates that health workers as well as primary victims are at risk of developing PTSD. The aim of this study was to examine posttraumatic stress among undergraduate emergency nursing students. Methods: The sample of this study consisted of 250 undergraduate students attended and studied emergency nursing course during the period from February till May 2009. Two instruments were used to measure reactions to traumatic events, Impact of Event Scale Revised (IES-R) and the Post Traumatic Symptom Scale (PTSDS). Results: Of those who reported a traumatic situation the majority of them scored 30 or more on the IES-R subscale. Scores over 30 indicate a stress reaction with certain likelihood of post-traumatic disorder. On the PTSDS-subscale the majority of students scored 5 or more, which indicates a relative strong reaction. Conclusion: The high prevalence of post-traumatic stress in undergraduate emergency nursing students indicates an inability to cope with stress in daily life.

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Keywords: Posttraumatic Stress; Undergraduate; Emergency; Nursing; Student

1. Introduction:

The way in which stress is experienced by students in higher education has

been a topic which has raised increasing interest, leading to the need of identifying stressors and their consequences on students' health and well-being. Stress is defined as the physiological, psychological and behavioral response of an individual attempting to adapt to internal and external pressure^[1, 2]. Researchers have found that the perception of high stress levels in students can lead to poor academic performance, depression, attrition and serious health problems. Nursing students have higher perceived stress levels than the general student population^[2,3]. It has been widely recognized by those engaged in nursing education that clinical practice is a significant and essential part of a student nurses' education. The clinical setting is fundamental to the nursing students learning because it offers opportunities for them to work with 'real' patients with real problems. It is commonly accepted that nursing profession by its nature, place personnel at risk of experiencing critical incidents^[4,5]. One of the nursing specialties that considered as most stressful is emergency nursing.

Emergency nursing is a specialty area of the nursing profession that deals with human responses to any trauma or sudden illness and requires immediate intervention to prevent imminent severe

damage or death. Undergraduate emergency nursing students are often exposed to traumatic stress when helping patients in emergency situations. Emergency nursing students face many challenges on a day to day basis; seeing victims of shooting and stabbing; persons who are burned or beaten, accident victims, and every conceivable acute cardiac emergency and serious illness. These stressful situations let nursing students to report the resurgence of painful life events or symptoms of psychological injury when learning about or witnessing critical symptoms^[6-8].

Any event which is outside of the realm of normal human experience and very distressing is considered a traumatic stressor or critical incident. Such events usually involve a perceived threat to the physical integrity of the individual and evoke reactions of intense fear, horror and/or helplessness. In times of stress, a student normally engages in certain coping strategies to handle the stressful situations and the associated emotions. The more an individual adopts adaptive coping strategies, the less his/her stress, and better his/her mental health^[2]. Psychological and behavioral responses of persons after exposure to a traumatic situation may be no reaction, a normal stress response, psychological and behavioral syndrome or may lead to psychological disorders. If unmanaged, approximately 22% of persons who experience critical incident stress will still be symptomatic for 6 - 12 months after the event

and approximately 4% will be at risk for developing post-traumatic stress disorder (PTSD)^[9].

Posttraumatic stress disorder (PTSD) is an anxiety disorder. Anxiety is derived from the Greek root meaning "to press tight". It is generally considered a healthy adaptive response to stress, anxiety is experienced by all individuals during their life and follows fear, threat, danger, and/or the absence of an environment that signifies safety. In the *Diagnostic and Statistical Manual of Mental Disorders*^[1], the criteria for diagnosis of PTSD are defined as (1) exposure to a traumatic event, with a response including fear, helplessness, or horror; (2) reexperiencing the event in a variety of subjective experiences that may include intrusive recollections of the event and psychological distress; (3) persistent avoidance of stimuli associated with the trauma accompanied by 3 or more of the following symptoms: avoidance of emotions and activities that arouse recollections of the event, memory impairment related to the event, diminished interests, detachment, restricted affect, and unrealistic perception of the future; and (4) increased level of arousal evidenced by symptoms that include sleep disturbance, startle response, emotional instability, hypervigilance, and difficulties in concentration. These criteria and symptoms are then classified as affecting a person by impairing the person's level of function.. PTSD is considered acute if symptoms persist for at least 1 month and is classified as chronic if symptoms persist longer than 3 months^[10].

The lifetime prevalence of PTSD is 1%-3% in the general population, 15%-20% in emergency response personnel, nursing and 26%-30% in Vietnam War Veterans,^[9]. Selley reiterates that health workers as well as primary victims are at risk of developing PTSD. Hamaideh & Ammouri,^[11] found that nurses experience high levels of job stressors in highly stressful areas of work such as Intensive Care Units. Clinical experience in such stressful area is one of the most anxiety producing components of the nursing program which has been identified by nursing students^[11]. Nursing programs have one of the highest dropout rates because of burnout. Students who cannot handle the stress often become exhausted and quit^[12]. Untreated PTSD is disabling, and firm recommendations exist for early treatment to prevent reduction in the quality of life. Therefore, the aim of this study was to examine posttraumatic stress among undergraduate emergency nursing students.

The aim of this work

The aim of the work is to examine posttraumatic stress among undergraduate emergency nursing students.

Research questions:

- 1- What are the most perceived stressful events among undergraduate emergency nursing students?
- 2- What are the post-traumatic symptoms experienced by emergency nursing students during their clinical experiences?

2. Materials and Methods:

Study design:

A descriptive design was used in this study.

Setting:

The study was conducted at the Faculty of Nursing, Alexandria University, at Critical Care & Emergency Nursing Department.

Subject:

All undergraduate nursing students (250) who attending and studying emergency nursing course were included during the period from February till May 2009. All students were studying the emergency nursing course for the first time and had no experience in caring for emergency or critically ill patients. Also, they were trained in the same clinical areas during their studying of emergency nursing course.

Tool:

The tool used in this study was "Post-traumatic Stress among Undergraduate Emergency Nursing Students structured interview schedule"
"This tool consisted of three parts:

The first part of the tool is the Impact of Event Scale Revised (IES-R). The IES-R is a self-administered, 22-item questionnaire based on three clusters of symptoms identified in the Diagnostic and Statistical Manual of Mental Disorders, third edition (DSM-III), as indicators of posttraumatic stress disorder (PTSD). Intrusion is assessed with eight items on the scale. Avoidance is assessed with eight items on the scale. Hyperarousal is assessed with six items on the scale. The IES-R is used widely to evaluate acute stress symptoms, and post-traumatic symptoms. This scale is based on the Horowitz *et al.*,^[1] original Impact of Event Scale (IES),^[9-13, 20].

The original IES consisted of items used to assess only two of the three symptom categories of PTSD (re-experience and avoidance) and, thus, while valid for use in assessing post-traumatic stress symptoms, it was not a valid measure of PTSD because it did not assess hyperarousal symptoms that are included in the most recent diagnosis criteria.13 Subsequently, the IES was revised (IES-R) and now comprises 22 items covering three symptom categories including eight re-experience/intrusion

items, eight avoidance items, and six hyperarousal items.

The IES-R is not a diagnostic or screening tool for PTSD; rather, it relies on a patient's own report of symptoms and is used to gauge response no sooner than two weeks after a traumatic event, as well as to evaluate recovery. It is used to rate the severity of intrusion (dreams about the event), avoidance and numbing (effort to avoid reminders of the event), and hyperarousal symptoms (feeling watchful and on guard as anger, irritability, hypervigilance, difficulty concentrating,) on a five-point severity scale (0 = not at all; 4 = extremely; $\alpha = 0.92$). The total score is the sum of all items (range 0 --88). Total scores >30 indicate the existence of a clinical level of distress.

The second part of the tool is the Post Traumatic Stress Syndrome Questions Inventory (PTSS), a self-report scale based on the Diagnostic and Statistical Manual for PTSD^[7,21]. This questionnaire is commonly used in a variety of patient populations and has excellent sensitivity and specificity for PTSD. The PTSS-10 is a questionnaire assessing 10 common symptoms of PTSD. The measure range is from 1 point (none) to 7 points (always). The total score ranges from 10 to 70, with higher scores indicating more symptoms; A total score of greater than 35 is associated with a high probability that the person fulfills the diagnostic criteria for PTSD^[7, 21].

In addition to the data regarding demographic factors and students characteristics, including age, sex, clinical trauma experience and students' descriptions of a traumatic event will be obtained.

Methods:

Official permission to conduct the study was obtained from the head of Critical Care & Emergency Nursing Department. The content validity of the tool was tested by experts in the field of critical care and nursing education and necessary modifications were done. Internal consistency of the subscales of IES-R (The first part of the tool) was calculated using Cronbach's Alpha. It was found to be consistent (intrusion = 0.86, avoidance = 0.92, hyperarousal = 0.83). The reliability of the PTSS- 10 {the second part of the tool} was measured (Cronbach alpha was 0.92), indicating a high internal consistency and the test-retest reliability provided good support for the internal consistency and stability (test retest reliability, $r = 0.89$). Explanation of the aim of the study for students was done and the written consent to participate in the study was obtained. The anonymity and confidentiality of responses, voluntary participation and right to refuse to participate in the study were emphasized to students.

A pilot study was carried out on a sample of ten students who were selected randomly to ascertain the clarity and applicability of the tool and the necessary modifications were done. The students were classified into ten groups each group contains 25 students and it was interviewed once by the researcher using the tool. Each interview lasted from 1 to 2 hours.

Statistical analysis:

The raw data were coded and transformed into coding sheets. The results were checked. Then, the data were entered into SPSS system files (SPSS package version 13) using personal computer. Output drafts were checked against the revised coded data for typing and spelling mistakes. Finally, analysis and interpretation of data were conducted.

The following statistical measures were used:

- Numbers and percentage: used for describing and summarizing quantitative data.
- Range, arithmetic mean (X) and standard deviation (SD) used for normally distributed quantitative data.
- P value of 0.05 was used to assess the significance of the result.
- Statistical tests used in the present study were Student t- test was used for comparing between two means

3. Results:

The majority of the students were females (75.6%) and less than 20 years old (67.2%). Table (1) shows the students' descriptions of the most stressful events in their clinical experience which include : seeing patients die (43.2%), stress related to feeling overworked (42.8%), trauma-related injuries (36.4%) performing cardiopulmonary resuscitation (30.4%), and feeling unable to save a specific patient (28%). Table (2) reveals that nearly two thirds of the emergency nursing students (60%) had high level of post traumatic stress {Impact of Event Scale Revised (IES-R)} with Mean \pm SD {47.00 \pm 11.31} which indicated the existence of a clinical high level of distress. More than half of the emergency nursing students (56.4%) had high level of hyperarousal symptoms, nearly half of them had high level of avoidance and intrusion symptoms (48.8 & 46.4, respectively). Table (3) illustrates that female students experienced a higher level of stress symptoms than male students and a statistically significant relation was found between sex and intrusion, avoidance, hyperarousal, and the total score of stress symptoms ($\chi^2=23.212$ & $t= 5.481$, $\chi^2= 0.051$ & $t= 0.598$, $\chi^2= 6.705$ & $t= 3.234$ and $\chi^2=12.417$ & $t= 4.038$ respectively). Table (4) reveals that Less than half of the students (43.3%) who

experienced high level of stress symptoms were in the age of 20 years or less with a statistically significant relation was found between age and total score of stress symptoms ($t=2.099^*$, $p=0.037$). Table (5) shows that students had score in Post Traumatic Stress Syndrome Questions Inventory (PTSS) as follows low score 56.4%, moderate score 4.0 % and high score 39.6 % respectively. In addition , Table(6) shows that more than one third of female students

(34%) fulfill the diagnostic criteria for PTSD in a higher level than male students (5.6%) with a statistically significant difference was found between sex and (PTSS) ($\chi^2= 11.942$ at $p= 0.003$ and $t= 4.223$ at $p <0.001$ respectively). Concerning the relation between age and (PTSS), table (7) illustrates that there was no statistically significant relation was found ($t=0.150$, $p=0.881$).

Table (1): Distribution of students according to their description of traumatic event.

Descriptions traumatic event	No.	%
Seeing patients die	108	43.2
Open wounds	33	13.2
Massive bleeding	35	14.0
Trauma-related injuries	91	36.4
Performing “futile” care to patients	57	22.8
Performing cardiopulmonary resuscitation	76	30.4
Stress related to feeling overworked	107	42.8
Stress related to not being able to save a specific patient	70	28.0
Verbal abuse from family members	12	4.8
Verbal abuse from other nurses	1	0.4

Table (2): Distribution of the students according to their level of post-traumatic symptoms using Impact of Event Scale Revised (IES-R)

Item	Scale subcategories						Scale (total)	
	Intrusion		Avoidance		Hyperarousal		N	%
	N	%	N	%	N	%		
Low	102	40.8	112	44.8	58	23.2	86	34.4
Moderate	32	12.8	16	6.4	51	20.4	14	5.6
High	116	46.4	122	48.8	141	56.4	150	60.0
Range	1.00-30.00		5.00-30.00		3.00-24.00		18.00-77.00	
Mean ± SD	16.56 ± 5.50		16.16 ± 4.92		14.28 ± 4.04		47.00 ± 11.31	

Table (3): Relation between sex and intrusion, avoidance, Hyperarousal, and scale1.

		Low		Moderate		High		$\bar{X} \pm SD$
		No.	%	No.	%	No.	%	
Intrusion	Male	40	16.0	1	0.4	20	8.0	13.38 ± 4.56
	Female	62	24.8	31	12.4	96	38.4	17.58 ± 5.40
	Test of sig.	$\chi^2=23.212^*$, $p <0.001$						$t= 5.481^*$, $p <0.001$
Avoidance	Male	28	11.2	4	1.6	29	11.6	15.84 ± 5.38
	Female	84	33.6	12	4.8	93	37.2	16.27 ± 4.77
	Test of sig.	$\chi^2= 0.051$, $p= 0.975$						$t= 0.598$, $p= 0.550$
Hyperarousal	Male	21	8.4	8	3.2	32	12.8	12.85 ± 4.17
	Female	37	14.8	43	17.2	109	43.6	14.74 ± 3.90
	Test of sig.	$\chi^2= 6.705^*$, $p= 0.035$						$t= 3.234^*$, $p= 0.001$
Scale 1	Male	31	12.4	0	0.0	30	12.0	42.07 ± 10.90
	Female	55	22.0	14	5.6	120	48.0	48.59 ± 11.00
	Test of sig.	$\chi^2=12.417^*$, $p= 0.002$						$t= 4.038^*$, $p <0.001$

χ^2 : Chi square test

t: Student t-test

*: Statistically significant at $p \leq 0.05$

Table (4):Relation between age intrusion, avoidance, Hyperarousal, scale1

Age		Low		Moderate		High		$(\bar{X} \pm SD)$
		No.	%	No.	%	No.	%	
Intrusion	20	64	25.6	22	8.8	82	32.8	16.96 ± 5.41
	> 20	38	15.2	10	4.0	34	13.6	15.72 ± 5.64
	Test of sig.	$\chi^2 = 1.594, p = 0.451$						t=1.685, p=0.093
Avoidance	20	73	29.2	13	5.2	82	32.8	16.51 ± 4.91
	> 20	39	15.6	3	1.2	40	16.0	15.46 ± 4.89
	Test of sig.	$\chi^2 = 1.641, p = 0.440$						t=1.578, p= 0.116
Hyperarousal	20	35	14.0	37	14.8	96	38.4	14.57 ± 3.80
	> 20	23	9.2	14	5.6	45	18.0	13.68 ± 4.46
	Test of sig.	$\chi^2 = 1.949, p = 0.377$						t=1.638, p=0.103
Scale 1	20	52	20.8	8	3.2	108	43.2	48.04 ± 10.79
	> 20	34	13.6	6	2.4	42	16.8	44.87 ± 12.09
	Test of sig.	$\chi^2 = 3.980, p = 0.137$						t=2.099*, p=0.037

χ^2 : Chi square test t: Student t-test *: Statistically significant at p = 0.05

Table (5):Distribution of the students according to Post Traumatic Stress Syndrome Questions Inventory (PTSS)

(PTSS) Scale2	No.	%
Low	141	56.4
Moderate	10	4.0
High	99	39.6
Range	0.00-66.00	
Mean ± SD	33.88 ± 10.87	

Table (6): Relation between sex and Post Traumatic Stress Syndrome Questions Inventory (PTSS) {scale 2}

		Low		Moderate		High		$(\bar{X} \pm SD)$
		No.	%	No.	%	No.	%	
Scale 2	Male	46	18.4	1	0.4	14	5.6	28.93 ± 10.20
	Female	95	38.0	9	3.6	85	34.0	35.48 ± 10.63
	Test of sig.	$\chi^2 = 11.942^*, p = 0.003$						t= 4.223*, p <0.001

χ^2 : Chi square test t: Student t-test *: Statistically significant at p = 0.05

Table (7):Relation between age and Post Traumatic Stress Syndrome Questions Inventory (PTSS) {scale 2}

		Low		Moderate		High		$(\bar{X} \pm SD)$
		No.	%	No.	%	No.	%	
Scale 2	20	94	37.6	6	2.4	68	27.2	33.95 ± 10.52
	> 20	47	18.8	4	1.6	31	12.4	33.73 ± 11.63
	Test of sig.	$\chi^2 = 0.353, p = 0.838$						t=0.150, p=0.881

χ^2 : Chi square test t: Student t-test *: Statistically significant at p = 0.05

4. Discussion

Nursing is generally considered a stressful profession. Nurses by virtue of their work may be occasionally or routinely exposed to stressful and sometimes traumatic situations in their work especially in emergency care. Within emergency care context, traumatic incidents may include situations such as being threatened or assaulted, witnessing an

assault, being held hostage or providing care in the wake of a disaster. Individual nurses may exhibit symptoms similar in both nature and severity to PTSD after repeated exposure to these stressful situations^[11]. Nursing students who attend emergency nursing specialty also facing various kinds of stressors such as workload, inadequate preparation, and dealing with issues of death and

dying. Besides, they exposed to various academic stressors as other college students such as midterm and final examinations, paper works and assignments. Exposure to a traumatic incidents will inevitably leads to psychological complications such as post traumatic stress, anxiety and depressive disorders. These complications may persist for years after the original trauma and resurface in response to other stressful situations. High stress levels in nursing students may affect memory, concentration, and problem-solving ability. It may lead to poor academic performance and scholastic achievement^[2,3].

In the current study, it was noted that the emergency nursing undergraduate students face a lot of academic stressors, as they described that the most stressful events in their experience are seeing patients die, stress related to feeling overworked and trauma-related injuries. This result is supported by Walton^[6], Seyedfatemi *et al.*,^[2] and Burnard *et al.*,^[13] who found that the most frequent academic source of stress was "increased class workload" and the most frequent environmental sources of stress were being "placed in unfamiliar situations which indicate the existence of a high clinical level of distress. Students have a large amount of preparatory work during their clinical training. As in their clinical rotations, students must exhibit a high level of responsibility and accountability in dealing with patients. Students often perform procedure that can cause serious harm to their patients and fear making a mistake. They use highly technical equipment. Time management can be a pressure as they have many tasks that must be accomplished in a short period of time. They deal with patients that are seriously ill or often dying.

The results of the current study revealed that students have high level of stress symptoms and this can be explained that the emergency nursing students have had specialized education, training, and experience to gain expertise in assessing and identifying patients' health care problems in crisis situations. In addition, the emergency nurse establishes priorities, monitors and continuously assesses acutely ill and injured patients, supports and attends to families, supervises allied health personnel, and teaches patients and families within a time limited, high-pressured care environment. This is in line with many studies which indicate that nursing students may be more prone to stress during their clinical practice in highly stressful specialties such as ICUs, ER, OR, and Psychiatric Units than other students^[11,12]. Emergency nursing students ranked coping with 'death and dying' more highly as a source of distress than did those in other specialties^[12-14].

In the present study, many of the items ranked as stressful by the nursing students were also identified by other populations, such as amount of

material to learn, examinations and lack of timely feedback from faculty. In addition, the nursing students identified feelings of inadequacy in dealing with acutely ill patients. This is in line with Jonsson *et al.*,^[7] who studied post-traumatic stress among Swedish ambulance personnel and reported their scores 31 or more on the IES-15 subscale. Scores over 31 indicate a stress reaction with certain likelihood of post-traumatic disorder^[7].

In the present study, more than half of students had low (PTSS) score and more than thirty had high (PTSS) score. The low score of (PTSS) among nursing students could possibly be explained in several ways. The fact that they are most of the time under close observation & supervision and support from their clinical instructors in the clinical areas. Regarding the high score of (PTSS) for some students, this can be due to the presence of individual differences among nursing students, students are different in their identification of stressors especially with the complex and frequently changing healthcare environment such as Intensive Care Units and Emergency Departments. The variation between individuals in term of the perceptions of stress is most likely to arise from differences in personal factors as the ability to cope and levels of companionship during clinical practice. Because personal factors influence the perceptions of stress, it is important for the emergency nursing educators to consider how emergency nursing students might be supported, and what are the most effective coping strategies that should be utilized to overcome or decrease the stress levels of these students.

In the current study, the score of (IES-R) differs according to students' gender, PTSD is significantly higher in female than in male students. This is in agreement with Girard *et al.*,^[15] who found that women were significantly more likely than men to have high levels of PTSD symptoms after critical illness. Several studies have demonstrated that women are more vulnerable to PTSD, even after controlling for differences in the type of trauma, and a higher incidence of pre-existing anxiety and/or depression disorders is postulated to play some role in the difference in PTSD rates between the sexes^[16-18].

In the present findings, the rates of PTSD symptoms are most prevalent in younger age students. It may be attributed to students' lack of experience to cope with stressful situations in the emergency clinical setting. On the same line, Eckardt,^[19] found that the prevalence of post-traumatic stress disorder was high in younger age because they tend to be more exposed to precipitating situations.

Conclusion:

It is obvious from these findings that the emergency nursing students are exposed to a variety of stressors and suffer from PTSS. Also, This study Provides evidence for nursing educators that helping students to overcome stress during their emergency clinical practice is important.

Recommendations:

Orientation programs for first-year students should include stress management as a topic of discussion, workshops on stress and strategies to cope with stress. Such workshops might also be conducted during the academic year. Counseling center should introduce effective coping strategies through counseling programs for new students and support at risk students during their clinical practice. The availability of student counseling service, peer learners, and preceptor-ship may be helpful for increasing adaptive coping and decreasing stress. Students should be informed of the presence of counseling center and counseling team in the faculty. Clinical instructors should discuss with the emergency nursing students the most commonly identified sources of stress. The training in emergency nursing specialty should be postponed to the fourth year. Faculty administrators should consider incorporating stress management training into orientation activities for nursing students.

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Prevalence and Outcome of Acute Kidney Injury in the intensive care unit according to RIFLE criteria: A single-center study

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Abstract: Acute kidney injury (AKI) is common in the intensive care unit (ICU) and is associated with significant morbidity and mortality. This requires clinicians to be familiar with recent advances in definitions, diagnosis, prevention, and management of AKI in the ICU. The Acute Dialysis Quality Initiative (ADQI) represents the efforts of a workgroup seeking to develop consensus and evidence-based statements in the field of AKI. The ADQI group proposed a consensus graded definition, called the RIFLE criteria (Risk, Injury, Failure, Loss, and End stage). Objective: To estimate the prevalence of AKI in ICU and assess the ability of the RIFLE criteria to predict the outcome of AKI in ICU. Methods: We performed a retrospective cohort study in the internal medicine ICU, Zagazig University Hospital, in the period from January 2010 to December 2010. We excluded patients younger than 15 years, patients receiving chronic hemodialysis admitted to ICU, kidney transplant patients, length of hospital stays were <24 hours, or readmitted to the ICU during the study period. RIFLE criteria classified AKI patients into three stages of increasing severity Risk(R), Injury (I), and Failure (F). The outcomes of AKI patients in ICU were recovery, kidney loss, end stage renal disease (ESRD) or death. Results: The total number of ICU admissions during the study period was 8304 patients. After application of exclusion criteria, the number of the study became 5440 patients. According to RIFLE criteria 1885 (34.65%) had AKI. RIFLE criteria classified them into Risk 13.32%, Injury 11.91% and Failure 9.41%. The crude outcome of AKI patients as follow 77.24% recovered, 9% lost kidney functions and required renal replacement therapy (RRT), and 2.28% reached ESRD. The crude mortality of AKI patients was 20.47% versus 7.76% mortality in patients without AKI. The hospital recovery stratified by RIFLE criteria decreased with worsening RIFLE classes (R, I, F) 84.27%, 79.62% and 64.25% respectively. Patients' lost kidney functions and required RRT stratified by RIFLE criteria increased with worsening RIFLE classes 5.79%, 7.4% and 15.62% respectively. Patients reached ESRD stratified by RIFLE criteria increased with worsening RIFLE classes 1.2%, 2% and 4.1% respectively. The hospital mortality AKI patients stratified by RIFLE criteria increased with worsening RIFLE classes 14.48%, 18.36% and 31.64% respectively. The urinary output (UOP) criteria associated with lower mortality and higher recovery rate than creatinine criteria. Conclusion: The prevalence of AKI in the internal medicine ICU, Zagazig University Hospital according to RIFLE criteria is 34.65%. RIFLE criteria are useful in predicting the outcome of AKI patients.

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Keywords: Prevalence; Acute Kidney Injury; intensive care unit; RIFLE criteria

1. Introduction:

Acute renal failure (ARF) has traditionally been defined as abrupt loss of kidney function that results in the retention of urea and other nitrogenous waste products and dysregulation of extracellular volume and electrolytes. The loss of kidney function is most easily detected by measurement of the serum creatinine (SCr) which is used to estimate the glomerular filtration rate (GFR) [1] ARF now increasingly referred to as AKI [2]. The Acute Dialysis Quality Initiative convened in 2002 and proposed the RIFLE classification specifically for AKI in critically ill patients [3]. The most severe classification met by either criterion should be used. Of note, patients with primary kidney diseases such as glomerulonephritis were excluded from this definition [4]. The RIFLE classification is comprised

of three stages of increasing severity, which correspond to risk (stage 1), injury (stage 2), and failure (stage 3). Loss and ESRD are removed from the staging system and defined as outcomes [5].

The cause of AKI in the ICU is commonly multi-factorial and frequently develops from a combination of hypovolemia, sepsis, medications, and hemodynamic perturbations. It is frequently not possible to isolate a single cause, thereby further complicating search for effective interventions in this complex disease process [6]. Sepsis is most common cause of AKI in a general ICU, accounting for up to 50% of cases [7], medications are also common cause of AKI [8]. Nearly all cases of ICU-associated AKI result from more than a single insult [9].

In the critically ill patient, the first kidney insult is often not predictable, therefore prevention of AKI

in the ICU often means prevention of a secondary insult in an at-risk patient [10]. Previous intervention and treatment trials have not had any significant impact on overall outcomes of patients with AKI [5], while in parallel; there is growing recognition of the strong association between the severity of AKI and subsequent morbidity and mortality, as well as costs during hospitalization [11] and in the longer term following hospital discharge [12].

AKI is a common clinical problem in ICU patients and typically portends an increase in morbidity and mortality [13]. AKI occurs in approximately 7% of all hospitalized patients [14] and in up to 36% to 67% of critically ill patients depending on the definition used [9]. Based on 75,000 critically ill adults, more severe AKI occurs in 4% to 25% of all ICU admissions [15]. On average, 5% to 6% of ICU patients with AKI require renal replacement therapy RRT [16]. The true incidence of ESRD after AKI is unknown because epidemiologic studies do not routinely or consistently report rates of renal recovery [17].

Morbidity, a less appreciated consequence of AKI in the ICU, is associated with increased cost [11], increased length of stay [18] and increased risk of ESRD [19].

Reported mortality in ICU patients with AKI varies considerably between studies depending on AKI definition and the patient population studied. In the majority of studies, mortality increases proportionately with increasing severity of AKI [20]. In patients with severe AKI requiring RRT, mortality is approximately 50% to 70% [21]. In a UK-based study, overall survival in 1,095 patients with severe AKI (serum creatinine >6.7 mg/dl) was 59%. Of these 16% remained on long-term dialysis [22]. In the French study, the mortality was 58%, and among the survivors, mean serum creatinine was 2.6 mg/dl at the time of discharge from ICU [23].

While AKI requiring RRT in the ICU is a well-recognized independent risk factor for in-hospital mortality [11], even small changes in SCr are associated with increased mortality [24]. There is no current consensus on the indications for RRT in AKI. The only absolute indications for RRT in critically ill patients are metabolic acidosis, hypervolemia, and hyperkalemia that do not respond to other forms of therapy, although the early initiation of RRT might be beneficial in theory, data guiding the optimal timing of dialysis in patients with ARF is scarce [25]. We sought to estimate the prevalence of AKI in ICU and assess the ability of the RIFLE criteria to predict outcome in those patients.

2. Patients and Methods:

We constructed a retrospective cohort study on all adult hospitalizations during a 12 month in the period from January 2010 to 31 December 2010, at the internal medicine ICU of Zagazig University Hospital. All admitted patients were screened using the computerized hospital admissions and discharges database.

Exclusion criteria: Patients receiving chronic hemodialysis admitted to ICU or who had a kidney transplant, patients younger than 15 years, or if their length of hospital stays were <24 hours, and we only considered the first admission for patients who were readmitted to the ICU during the study period.

Demographic information: Collected from the database (age, gender, dates and source of admission, type of admission, intensive care unit admission, and hospital mortality).

Recording data: Primary diagnosis, presence of co morbidities, and need for mechanical ventilation. Physiologic data included Glasgow Coma Scale (GCS), vital signs, PaO₂/FiO₂ ratio, pH and serum electrolytes. Urine output was recorded at least once every one hour, and serum creatinine was measured at least once daily.

The RIFLE criteria diagnosed and classified our patients into [3]

RIFLE	SCr Criteria	UOP Criteria
Risk	1.5-fold increase in the SCr or *GFR decrease by 25%	<0.5 mL/kg per hour for 6 hours.
Injury	Twofold increase in the SCr or GFR decrease by 50 %	<0.5 mL/kg per hour for 12 hours.
Failure	Threefold increase in the SCr or GFR decrease by 75 %	<0.5 mL/kg per hour for 24 hours, or anuria for 12 hours.
Loss	Complete loss of kidney function (e.g., need for RRT) for > 4 weeks.	
ESRD	Complete loss of kidney function (e.g., need for RRT) for > 3 months.	

*GFR was measured by Cockcroft-Gault formula: creatinine clearance (mL/min) = [(140 - age) × weight (kg)] / [72 × serum creatinine (mg/dL)] (×0.85 for women).

Prognosis of AKI:

1. Renal Recovery, either.

Complete renal recovery: Return of renal function to baseline

Partial renal recovery: Persistent change in RIFLE classification but not persistent need for RRT

2. Kidney loss:

3. ESRD:

4. Mortality: patients who died during the study.

The total numbers of ICU admissions during the study period were 8304 patients.

After application of exclusion criteria, the total number of the study became 5440 patients.

RIFLE criteria identified 1885 from studied patients suffered from AKI in different grades.

Their mean age was 56.02±13.7 (18-88) years.

Their gender 1035 "55 %" males and 850 "45 %" females

Time of AKI diagnosis: 55% of AKI patients were diagnosed on the day of admission and 45% developed AKI later during the periods of staying in ICU.

Co morbid disease: 575 (30.5%) from all AKI patients associated with other co morbid disease

Each of the severity classes (R, I, F) was reevaluated according to UOP criteria or SCr criteria and we choose the most severe classification met by either criterion

RIFLE criteria, classified AKI patients into Risk 725 patients (485 defined by SCr criteria and 240 defined by UOP criteria), Injury 648 patients (388 defined by SCr criteria and 260 defined by UOP criteria) and Failure 512 patients (308 defined by SCr criteria and 204 defined by UOP criteria)

Recorded hospital mortality in non AKI patients was 276 =7.76%.

Statistical Analysis

Data were collected, entered and checked to an SPSS version 15. Data were expressed as mean ± standard deviation and Chi square (χ^2) test was used for qualitative data to test the association between a factor exposure and outcome and Z test (test of proportion) was used for comparison of two proportions [26].

*P value of <0.05 was considered significant

3. Results:

The actual studied number was 5440 patients RIFLE criteria identified 1885 patients from a studied number suffered from AKI in different grades, so the prevalence of AKI in the ICU was 34.65%.

RIFLE criteria classified ICU patients into Risk 725 (13.32%), Injury 648 (11.91%) and Failure 512 (9.41%).

The crude outcome of AKI patients in our ICU: (Table 1)

The crude total recovery of all AKI patients 77.24%

The crude total lost kidney functions and required RRT of all AKI patients 9%

The crude ESRD of all AKI patients 2.28%

The crude mortality of all AKI patients 20.47%

Table (1): The crude outcome of AKI patients

	No	%
AKI patients	1885	= 34.65%
Recovery	1456	= 77.24%
Kidney loss "RRT"	170	= 9%
ESRD	43	= 2.28%
Mortality	386	= 20.47%

Natural history and Clinical outcomes stratified by RIFLE category: Figure (1)

Risk category: From 725 patients 165 patients initially recovered and the total end recovery 611 (84.27%) patients. 455 (62.75%) patients progressed to the next stages, most of them recovered later, 42 (5.79%) patients lost kidney functions and required RRT and 9 (1.2%) patients reached ESRD. The remaining 105 (14.48%) patients died.

Injury category: From 648 patients 246 patients initially recovered and the total end recovery 516 (79.62%) patients. 285 (43.98%) patients progressed to the next stages, most of them recovered later, 48 (7.4%) patients lost kidney functions and required RRT and 13 (2%) patients reached ESRD. The remaining 119 (18.36%) patients died.

Failure category: From 512 patients 270 patients initially recovered and the total end recovery 329 (64.25%) patients. 80 (15.62%) patients lost kidney functions and required RRT and 21 (4.1%) patients reached ESRD. The remaining 162 (31.64%) patients died.

Outcome comparison between RIFLE classes Table (2)**Recovery:**

The recovery stratified by RIFLE criteria showed statistically significantly decrease with worsening RIFLE classes .P<0.001

Lost kidney function and RRT

Patients lost kidney functions and required RRT stratified by RIFLE criteria showed statistically significantly increase with worsening RIFLE classes. P<0.001

Patients end by ESRD

Patients reached ESRD stratified by RIFLE criteria showed statistically significantly increase with worsening RIFLE classes. P=0.003

Mortality:

The hospital mortality of AKI patients stratified by RIFLE criteria showed statistically significantly increase with worsening RIFLE classes .P<0.001

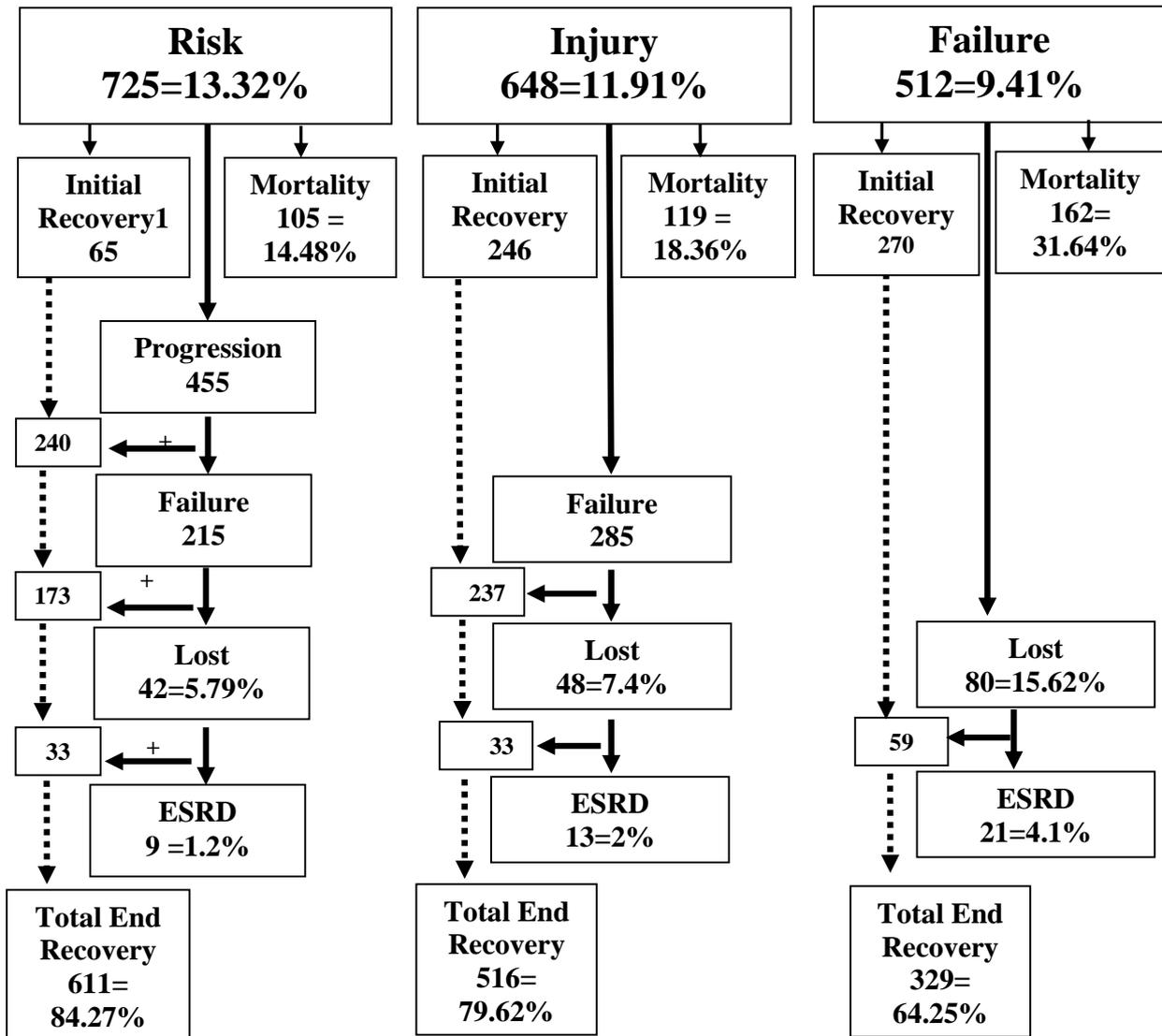


Figure (1) Natural history and Clinical outcomes stratified by RIFLE category

Table (2): Outcome comparison between different RIFLE classes

	Risk		Injury		Failure		X ²	P
	No	%	No	%	No	%		
Recovery	611	84.27%	516	79.62%	329	64.25%	71.61	<0.001
Loss (RRT)	42	5.79%	48	7.4%	80	15.62%	38.48	<0.001
ESRD	9	1.2%	13	2%	21	4.1%	11.35	0.003
Mortality	105	14.48%	119	18.36%	162	31.64%	56.96	<0.001

Table (3) : Mortality analysis among patients defined by serum creatinine versus urinary output criteria

	SCr	UOP
Number	1181	704
Mortality %	276 23.53%	110 15.62%
Z test.	2.35	
P value	<0.05	

Patients defined by creatinine criteria were associated with a statistically significantly higher mortality than those defined by UOP criteria. P<0.05

Table (4) : Mortality analysis stratified by RIFLE category between patients defined by serum creatinine versus urinary output criteria

	RISK		INJURY		FAILURE	
	SCr	UOP	SCr	UOP	SCr	UOP
Number (No)	485	240	388	260	308	204
Mortality No.	79	26	84	35	113	49
%	16.28%	10.83%	21.64%	13.46%	36.68%	24.01%
Z test.	2.08		2.82		3.08	
P value	P<0.05		P<0.05		P<0.05	

In all RIFLE classes' patients defined by creatinine criteria were associated with a statistically significantly higher mortality than those defined by UOP criteria. P<0.05

Mortality analysis among patients with AKI versus those without AKI

Mortality was statistically significantly higher among patients with AKI 20.47% versus patients without AKI 7.76% [Z test=7.9, P <0.05]

Mortality analysis among patients with AKI alone versus those with other co morbid diseases

The total number of AKI patients with other co morbid diseases 575 (30.5%) patients from all AKI

patients, classified as Risk 210 (36.52%), Injury 200 (34.78%) and Failure 165 (28.69%) patients.

The crude mortality of AKI patients with other co morbid diseases (40.69%)

Mortality was statistically significantly higher in patients with other co morbid diseases 40.69% versus those with AKI alone 11.6% [Z test13.04, P<0.05].

Table (5): Mortality analysis stratified by RIFLE classes among patients with AKI alone versus those with other co morbid diseases.

	RISK		INJURY		FAILURE	
	AKI alone	Co-Morbid	AKI alone	Co-Morbid	AKI alone	Co-Morbid
Total No.	515	210	448	200	347	165
Mortality. No.	41	64	48	71	63	99
%	7.96%	30.47%	10.71%	35.5%	18.15%	60%
Z test.	6.64		6.29		9.46	
P value	P<0.05		P<0.05		P<0.05	

In all RIFLE classes mortality statistically significantly higher in AKI patients with other co morbid diseases versus those with AKI alone <0.05

4. Discussion

AKI previously termed ARF refers to a sudden decline in kidney function causing disturbances in fluid, electrolyte, and acid– base balance. More than 35 definitions of AKI currently exist [4].The Acute Dialysis Quality Initiative convened in 2002 and proposed the RIFLE classification, specifically for AKI in critically ill patients [3].AKI in the ICU is

common, increasing in incidence [27] and is associated with a substantial increase in morbidity and mortality [28].There is limited information on whether the epidemiology of AKI in critically ill patients in different regions of the world has changed over time and there is controversy on whether its outcome has improved [29]. So we sought to estimate the prevalence of AKI in ICU and assess the ability

of the RIFLE criteria to predict the outcome in ICU patients.

The prevalence of AKI in the internal medicine ICU, Zagazig University Hospital was 34.65%, classified by RIFLE criteria into Risk, Injury and Failure. 13.32%, 11.91%, and 9.41% respectively. Nearly similar results obtained by Bagshaw *et al.*, [30] who reported that AKI occurred in 36.1% of ICU patients and classified by RIFLE criteria R, I and F 16.2%, 13.6% and 6.3% respectively. Their study was done in 57 ICUs across Australia during a 5 year period and this may explain the slight difference in comparison to the current study. Also Ostermann *et al.*, [9] study reported the prevalence of AKI in 41,972 ICU patients was 35.8% and classified by RIFLE criteria R, I and F. 17.2%, 11 % and 7.6 %, respectively.

In contrary to our results Thakar *et al.*, [31] study found that the overall prevalence of AKI among patients admitted to Veterans Affairs ICUs including 71,486 patients the prevalence of AKI was 22%, however this difference can be explained by the fact that they studied patients who complicated by AKI during their stay in the intensive care unit. The lowest prevalence of the AKI in ICU reported by Brevet *et al.*, [23] was 7%, their study focused on the AKI occurring in the ICU in a 20 center, prospective 6 months performed in France in 1991, but this old study was carried for a short period and did not depend on RIFLE criteria for diagnosis of AKI. This low prevalence may explore the higher sensitivity of the RIFLE criteria for diagnosis of AKI and suggesting that the incidence of detectable AKI is annually increasing and much higher than previously appreciated.

The highest prevalence was reported by Hoste *et al.*, [28] was 67% ,with RIFLE classes R, I and F 28%, 27% and 12% respectively, they constructed a retrospective cohort study in seven ICUs serving medical, surgical, neurological, trauma and solid organ transplant patients during a 12 month period, this can be explained by the fact that their study was carried on different ICUs including surgical, neurological, trauma and solid organ transplant patients, expected to include high risk patients after surgery, trauma, hence they are more prone to AKI.

Regarding the progression of AKI to the next stages, the present study found that 62.75% of patients with RIFLE class R progressed to class I or class F, and more than 43.98% of the patients with RIFLE class I progressed to class F, this was compatible with the result obtained by Eric *et al.*, [32] study which found that more than 50% of patients with class R progressed to class I or class F, and more than one-third of the patients with class I progressed to class F.

The percentage of patients who lost kidney function and required RRT in this study were 9%, those patients when stratified by RIFLE criteria their percentages increase with worsening RIFLE classes 5.79%, 7.4% and 15.62, respectively. Nearly similar results obtained by Eric *et al.*, [32] who found in their study patients requiring RRT classified by RIFLE criteria Risk, and Failure was 4.15% and 14.2% respectively. Also Shigehiko *et al.*, [33] who found among patients who survived to hospital discharge that 13.8% required RRT at the time of discharge. The small difference in results may relate to the argumentation in timing of initiation of RRT.

The percentage of patients who developed ESRD in this study was 2.4%; we also found when those patients stratified by RIFLE criteria their percentage increase with worsening RIFLE classes. R, I and F 1.2% , 2% and 4.1% respectively, although there is limited information about the percentage of patients ended by ESRD after AKI in ICU. However the similar results were obtained by Ostermann *et al.*, [9] study which found that 2.3% patients with AKI in ICU had developed ESRD.

Regarding mortality we found that the crude mortality of AKI patients in the ICU was 20.47%. Nearly similar results were obtained by Garzotto *et al.*, [34], who found that AKI mortality in the ICU was 21.7%. We also found that the hospital mortality AKI patients stratified by RIFLE criteria increased with worsening RIFLE classes 14.48%, 18.36% and 31.64% respectively. Similar results were obtained by Bagshaw *et al.*, [30] who found progressive increased in mortality from R, I to F 17.9%, 27.7% and 33.2% respectively, Eric *et al.*, [32] found progressive increased in mortality from R, I to F 8.8%, 11.4% and 26.3% respectively also many others studies confirmed our results as Hoste *et al.*, [15], Garzotto *et al.*, [34], Kuitunen *et al.*, [35], Ahlstrom *et al.*, [36], Uchino *et al.*, [37], Ricci *et al.*, [38], Ostermann *et al.*, [9] and Abosaif *et al.*, [39].

When we compared mortality among patients with AKI versus patients without AKI, we found that mortality in patients with AKI nearly 3 folds higher than patients without AKI 20.47% versus 7.76% respectively. Similar results obtained by many studies, Bagshaw *et al.*, [40] who found 24.2% versus 8.9% respectively and Eric *et al.* [32] found ICU mortality rate stratified by RIFLE criteria R, I and F was 8.8%, 11.4% and 26.3%, respectively versus 5.5% for patients without AKI, also de Mendonça *et al.*, [41] found ICU mortality was 3 times higher in AKI patients than in other patients. Lastly Ricci *et al.*, [38] found among the 13 studies in which patient level data on mortality were available for patients without AKI; mortality was 6.9% in non-AKI patients versus 31.2% in AKI patients.

As an expecting we found that AKI patients with other co morbid diseases have worst mortality 40.69 % versus 11.6% for patients with AKI alone. Mortality also progressively increased with worsening RIFLE criteria R, I and F 30.47%, 33.55% and 60% respectively. Similar results obtained by de Mendonça *et al.*, [41] and Sirvent *et al.*, [42].

Interestingly when we compared the outcome among patients defined by SCr criteria versus those defined by UOP criteria, we found that UOP criteria carried a less mortality than SCr criteria, this mean that the UOP criteria had better predictive values than SCr criteria. These results matched with the results obtained by Eric *et al.*, [32] who reported that patients with class F based on SCr have a higher hospital mortality compared with patients having class F on UOP criteria. This result may be explained by the fact that SCr is not an early sensitive marker for AKI [1] and an early change in UOP may alarm for an early renal disease evoking early intervention. In contrary to our result Bagshaw *et al.*, [40] reported that mortality rates were higher in AKI patients defined by UOP criteria than in patients defined by SCr criteria but the modified UOP criteria used in that study may be responsible for this difference. As they defined AKI as an acute SCr level $\geq 133 \mu\text{mol/l}$ or a 24-hour UOP $< 410 \text{ ml}$ and not having received prior renal replacement therapy, these criteria different from the RIFLE criteria.

Conclusion

The prevalence of AKI in the Internal Medicine Zagazig University Hospital ICU is 34.65%. RIFLE criteria represent a simple and easy to use for the detection and classification of AKI on ICU admission and useful in predicting the outcome of AKI patients.

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Postural Changes during Normal Pregnancy

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Abstract: This study was conducted to determine the postural changes during normal pregnancy. Forty normal primigravid women at first trimester of pregnancy (12 weeks' gestation) from the Out-Patient Clinic of Obstetric Department at Bab EL-Sheria Hospital, AL-Azhar University shared in this study. Their ages ranged from 20 to 30 years old and body mass index did not exceed 30 kg/m². Thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle were evaluated by the formetric II at 12, 22 and 32 weeks' gestation in Spinal Shape Analysis Laboratory at Faculty of Physical Therapy, Cairo University. The obtained results showed a statistically highly significant increase ($P < 0.001$) in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle between 12&22, 22&32 and 12&32 weeks' gestation. Accordingly, it could be concluded that there is a statistically highly significant increase in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle during normal pregnancy.

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Key words: Pregnancy, Posture, Formetric II, Thoracic kyphosis, Lumbar lordosis, Pelvic inclination.

1. Introduction:

Pregnancy is a normal physiologic state that is characterized by growth of both the mother and fetus. There are extensive biomechanical, physiological and structural changes to provide a suitable environment for nutrition, growth and development of the fetus as well as to prepare the mother for the process of parturition (Artal *et al.*, 2000).

Many of the dramatic changes that occur during pregnancy are mediated by the changing hormone levels. Progesterone and estrogen are well known hormones for causing salt and water retention, also relaxin secreted by the corpus luteum till the 12th weeks' gestation, then from placenta after that, tends to soften the ligaments, thus joints are more vulnerable to injuries (Peggy, 2001).

Progesterone, relaxin and estrogen hormones in pregnancy are known to affect the musculoskeletal system for the preparation of labour. Although, the effect of relaxin is disputed, but progesterone and estrogen are known to influence the biomechanical structures of the pregnant posture by changing the structure of connective tissue and increase mobility of joint capsules and spinal segment, as well as the pelvic joint structure (Schauberger *et al.*, 1996).

Deviation from good balanced posture usually results in poor posture during pregnancy, the C.O.G. is being anteriorly, the head elevated, the cervical spine hyperextended and the knee as well as ankle joints extended (Rungee, 1993).

Artal and Toole (2003) reported that increased ligamentous laxity secondary to the influence of

increased levels of estrogen and relaxin predispose pregnant women to increased incidence of strains and sprains. Also, the pregnant uterus enlarges and the mother's weight distribution is altered so, the front of the abdomen becomes heavier, and normal curvature of the lumbar spine is exaggerated. This alters the mother's gait, making falls more likely than in the non-pregnant state (Cunningham *et al.*, 1997).

Pregnant women typically develop hyperlordotic posture, which contributes to a very high prevalence (50%) of low back pain (Artal and Toole, 2003). Also, joint laxity is coupled with the increased lumbar lordosis and protuberant abdomen, which leading to unsteadiness of gait and trauma from falls as a result of loss of balance which is common during pregnancy than any other time in women's life (Gabbe *et al.*, 1996).

Postural changes have often been implicated as a major cause of back pain in pregnant women (Lane, 2007). While, Franklin and Conner-kerr (1998) found that from the first to the third trimesters of pregnancy, lumbar lordosis, posterior head position and pelvic tilt increases. However, the magnitudes and the changes of these posture variables are not related to back pain.

The increased weight in pregnancy may significantly increase the forces across joints such as hips and knees as much as 100% during weight bearing activity. Such large forces may cause discomfort to these normal joints and increase damage to arthritic or previously unstable joints (Artal and Toole, 2003).

The increasing weight is distributed primarily in the abdominal girth. After 12 weeks of pregnancy, the uterus expands out of the pelvis and moves superiorly, anteriorly and laterally. So, many of the problems evoked are postural, caused by inability of the woman to adapt to her forward movement of C.O.G that resulted in increasing the lumbar lordosis and anterior tilting of the pelvis (Mayo Clinic Staff, 2007).

Black and Anastasi, (1995) found that in 34 pregnant women lumbar lordosis and thoracic kyphosis increased between the fourth and ninth months of pregnancy. The increased lordosis could be due to increase growth and weight of the anteriorly displaced fetus, producing anterior tilting of the pelvis (Franklin and Conner-kerr, 1998). In contrast, Ostgaard *et al.*(1993) found no change in lumbar lordosis with advancing pregnancy.

Collition (1996) reported that posture changes which occur during pregnancy, help the woman to maintain balance in upright position as fetus grows.

Moreover, hyperlordotic posture causes paraspinal muscles to become shortened and strained, thus resulting in mechanical imbalance between abdominal and paraspinal muscles which contributes to a very high prevalence (50%) of low back pain in pregnant women (Fast *et al.*, 1990). Balance may be affected by changes in the posture of pregnant women, predisposing to loss of balance and increased the risk of falling (Artal & Toole, 2003).

Because of the importance of postural changes during pregnancy and their impact on the women's life during pregnancy and after delivery, so it seems to be important to study these postural changes.

2. Subjects, Material and Methods:

Subject's Criteria: -

Forty normal primigravid women having single fetus at first trimester of pregnancy (12 weeks' gestation which confirmed by ultrasound) from the Out-Patient Clinic of Obstetric Department at Bab EL-Sheria Hospital, AL-Azhar University shared in this study. Their ages ranged from 20 to 30 years old and body mass index did not exceed 30 kg/m². All participated women were housewives and free from any musculoskeletal and/or neurological disorders, previous fractures and/or operations at the back, pelvis and lower extremities, diabetes mellitus, varicose veins and hypertension. All pregnant women did not take any medications that might affect the neuromuscular functions at least three months before pregnancy and/or during the study course. Gestational age of each pregnant woman participated in this study was detected and calculated starting from the first day of last menstrual cycle – date of inclusion in the study then ÷ 7 days and confirmed by

ultrasonography before the beginning of this study by obstetrician.

Instrumentation:

- 1) Recording data sheet: All data and information of each pregnant woman of who participated in this study were recorded in a recording data sheet.
- 2) Weight-height scale: It was used for measuring the body weight and height of each pregnant woman in this study to calculate the body mass index.
- 3) Ultrasound machine: It was used at start of 12, 22 and 32 weeks gestation to estimate the gestational age of the fetus and to exclude any fetal congenital anomalies, hydramnios as well as twins of each pregnant woman who participated in this study.
- 4) Formetric II: It is an optical 3D-spine, posture and measurement system, which is reliable, valid and safe to be used during pregnancy (Drerup and Hierholzer, 1994). Formetric II instrument system serves for the determination of the geometry of the back surface of the human being based on non-contrast 3D - scan and derived from it, a spatial reconstruction of the spine by means of a specific mathematical model (Drerup and Hierholzer, 1996). It was used for evaluation of all pregnant women (Fig. 1).

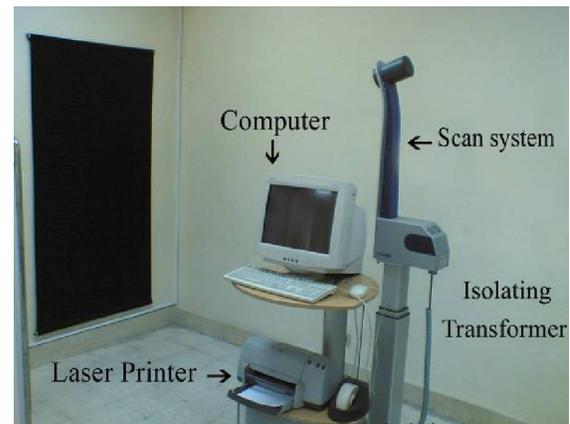


Fig. (1): Components of the formetric II instrument.

Methods:-

A full history was taken from each pregnant woman before starting this study at her first trimester (12 weeks' gestation) according to the items of the recording data sheet. The height was measured before starting the study, while the weight was repeatedly measured and body mass index was calculated according to the following equation: Body mass index = weight/height (kg/m²) before starting each measurement at 12, 22 and 32 weeks' gestation. After that, each pregnant woman was instructed carefully about the evaluative procedures and she was advised to evacuate her bladder and removed her shoes as

well as socks (i.e. bare feet) before starting the measurement procedures.

Measurement Procedures:-

1- System calibration:

Formetric II has no external calibration, but it has internal calibration. That means it calibrates itself after entering the patient's personal data (internal calibration for system configuration only).

2- Data of each pregnant woman:

Before starting spinal measurement, the Physical Therapist should feed the computer with data of each assessed pregnant woman including body weight (kg) and height (cm) which are important in calibration of the measurements and should be saved in the software of the system.

3- Imaging using Formetric II:

Each pregnant woman was standing bare feet in a neutral, upright position in a distance of 2 m in front of the 3D scanning equipment. The scanner adjusted according to the height of each pregnant woman. The scanning time was very short (40ms), in order to eliminate movement artifacts. The formetric II system analyzed the backs surface form in a sophisticated, automatic way, with no need for manual fixation of markers on the vertebrae. Anatomical landmarks, vertebral position and rotation were automatically detected, using the reconstructed high- resolution surface and anatomical and pathological knowledge models. The resulting model showed the complete form and the measurement data of the examined spine and pelvis but the subject's trunk had to be bared skin (Fig. 2).

4-Processing and editing:

The data of each pregnant woman was preceded and edited into the formetric II software in which spinal image was generated.



Fig. (2): The scanning of the spine. (Posterior view)

Statistical analysis:

The collected data in this study was statistically analyzed using descriptive statistics as mean, standard deviation and percentage. Comparison of means: by using T-test and Anova test were used for comparison within groups and in between groups. Level of significance: For all the statistical tests done, the threshold of significance was fixed at the 5% level (P- value). A P-value > 0.05 indicates non significant result. A P-value < 0.05 indicates significant result and the P-value was the degree of significance. The smaller the P- value obtained, the more significant was the result (Bendate and Piersol, 1991).

3. Results:

I- Physical characteristics of the women:

The ages of the pregnant women ranged from 20 to 30 yrs, with a mean value of 25.65 ± 2.85 yrs, height ranged from 153 to 171 cms, with a mean value of 161.5 ± 0.06 cms and their weight in the 12, 22 and 32 weeks' gestation of normal pregnancy ranged from 59 to 79 kgs, 64 to 85 kgs and 69 to 93 kgs, respectively, with a mean value of 68.05 ± 7.3 kgs, 74.5 ± 7.4 kgs and 79.75 ± 7.52 kgs, respectively.

II- Thoracic kyphosis angle:

The thoracic kyphosis angle of the pregnant women at the 12, 22 and 32 weeks' gestation of normal pregnancy ranged from 44.4° to 56.4° , 50.2° to 62.7° and 57.3° to 68.4° respectively, with a mean value of $50.78^\circ \pm 3.58^\circ$, $56.86^\circ \pm 3.72^\circ$ and $63.08^\circ \pm 3.7^\circ$ respectively. There was a statistically highly significant increase ($P < 0.001$) between 12&22 weeks' gestation, 22&32 weeks' gestation and 12&32 weeks' gestation as shown in table (1), Fig. (3). Repeated measurement ANOVA revealed a statistically highly significant difference ($P < 0.001$) within subjects and between subjects.

III- The lumbar lordosis angle:

The lumbar lordosis angle of the pregnant women at the 12, 22 and 32 weeks' gestation of normal pregnancy ranged from 24.6° to 35.8° , 29° to 42.1° and 33.3° to 52.3° respectively, with a mean value of $30.55^\circ \pm 3.27^\circ$, $35.94^\circ \pm 3.66^\circ$ and $42.92^\circ \pm 5.02^\circ$ respectively. There was a statistically highly significant increase ($P < 0.001$) between 12&22 weeks' gestation, 22&32 weeks' gestation and 12&32 weeks' gestation as shown in table (1), Fig. (3). Repeated measurement ANOVA revealed a statistically highly significant difference ($P < 0.001$) within subjects and between subjects.

IV- The pelvic inclination angle:

The pelvic inclination angle of the pregnant women at the 12, 22 and 32 weeks' gestation of normal pregnancy ranged from 13.7° to 23.2°, 16.3° to 29.5° and 18.3° to 33.5° respectively, with a mean value of 18.66°±3.08°, 22.78°±3.53° and 27.77°±3.78° respectively. There was a statistically

highly significant increase ($P < 0.001$) between 12&22 weeks' gestation, 22&32 weeks' gestation and 12&32 weeks' gestation as shown in table (1), Fig. (3). Repeated measurement ANOVA revealed a statistically highly significant difference ($P < 0.001$) within subjects and between subjects.

Table (1): Thoracic kyphosis, lumbar lordosis and pelvic inclination angles at 12, 22 and 32 weeks' gestation.

	Thoracic kyphosis angle (°)			Lumbar lordosis angle (°)			Pelvic inclination angle (°)		
	12 WGs vs. 22	22 WGs vs. 32	12 WGs vs. 32	12 WGs vs. 22	22 WGs vs. 32	12 WGs vs. 32	12 WGs vs. 22	22 WGs vs. 32	12 WGs vs. 32
Mean difference	6.01	6.22	12.33	5.39	6.97	12.37	4.12	4.98	9.11
Percentage of change	12%	12%	24%	18%	23%	41%	22%	27%	49%
t-value	18,71	19,17	37,89	6,93	8,97	15,89	8,99	10,86	19,85
Level of significance	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001

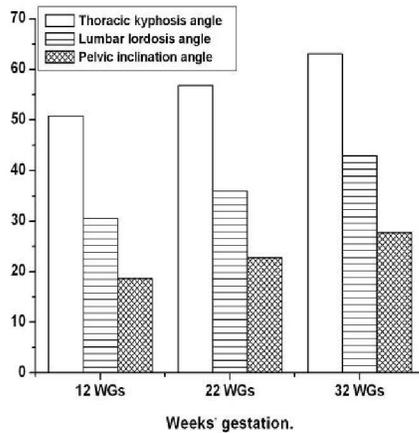


Fig. (3): Mean values of Thoracic kyphosis, Lumbar lordosis and pelvic inclination angles at 12, 22 and 32 weeks' gestation.

4. Discussion

Postural changes occurring in pregnancy may influence the musculoskeletal system and locomotor function. In the non pregnant women the line of gravity falls in line with the ear, shoulder joint, hip joint, middle of the knee joint and through the middle of the forefoot. In the pregnant woman the line of gravity falls posterior, to compensate the increase in abdominal weight (Alane, 2004).

Forty normal primigravidae women at first trimester of pregnancy (12 weeks' gestation which confirmed by ultrasound) shared in this study. In this study we studied the postural changes during normal pregnancy including lumbar lordosis angle, thoracic kyphosis angle and pelvic inclination using an

objective method (Formetric II) which gives a numerical and quantitative data.

Formetric II is an optical 3D-spine, posture and measurement system, which is reliable, valid and safe to be used during pregnancy (Drerup and Hierholzer, 1994). Formetric II instrument system serves for the determination of the geometry of the back surface of the human being based on non-contrast 3D- scan and derived from it, a spatial reconstruction of the spine by means of a specific mathematical model (Drerup and Hierholzer, 1996).

The results of this study found that, there was a statistically highly significant increase ($P < 0.001$) in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle between 12&22 weeks' gestation, 22&32 weeks' gestation and 12&32 weeks' gestation.

Results of this study agreed with those of Black and Anastasi (1995) who found that lumbar lordosis and thoracic kyphosis increased between the fourth and ninth months of pregnancy.

The results of this study also, agreed with that of Ibrahim (2002) who found that, lumbar curvature showed a very highly significant increase between 20 and 24, 28 &32 weeks' gestation, with mean values of 34.04±6.62, 43.94±7.69, 47.12±7.48 and 52.62±7.16 degrees respectively using flexible curve rule.

Also, the results of this study were supported by Franklin and Conner-kerr(1998) who found that from the first to the third trimesters of pregnancy, lumbar lordosis, posterior head position, lumbar angle and pelvic tilt increases. However, the magnitudes and the changes of these posture variables are not related to back pain.

The results of the current study supported by those Bullock *et al.* (1987) who found a significant

increase in lumbar and thoracic curves during pregnancy, which was still evident at the end of puerperium.

The increase in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle during pregnancy could be explained by the changing hormone levels. Progesterone and estrogen are well known hormones for causing salt and water retention, also relaxin secreted by the corpus luteum till the 12th weeks gestation, then from placenta after that, tends to softens the ligaments, thus joints are more vulnerable to injuries (Peggy, 2001).

Progesterone, relaxin and estrogen hormones in pregnancy are known to affect the musculoskeletal system for the preparation of labour. Although, the effect of relaxin is disputed, but progesterone and estrogen are known to influence the biomechanical structures of the pregnant's posture by changing the structure of connective tissue and increase mobility of joint capsules and spinal segment, as well as the pelvic joint structure (Schauberger *et al.*, 1996).

The increased lordosis adaptation could be due to increase growth and weight of the anteriorly displaced fetus producing anterior tilting of the pelvis (Black and Anastasi, 1995).

The body's C.O.G. shifts upward and forward due to the increases in weight of the uterus and its contents, lumbar lordosis increase to compensate for the shift of the C.O.G. and the knees hyperextended probably due to the change in the line of gravity, weight shifts toward the heels to bring the C.O.G. to a more posterior position (Kisner and Colby, 1990).

The increasing weight is distributed primarily in the abdominal girth. After 12 weeks of pregnancy, the uterus expands out of the pelvis and moves superiorly, anteriorly and laterally. So, many of the problems evoked are postural, caused by inability of the woman to adapt to her forward movement of C.O.G that resulted in increasing the lumbar lordosis and anterior tilting of the pelvis (Mayo Clinic Staff, 2007).

This increase could be explained as pelvic tilt is controlled by muscular action of the abdominal muscles, hip flexors, hip extensors and spinal extensors muscles. The alternation of strength or resting length of these muscles will also change the angle of pelvic tilt and, in turn, the lumbar curvature. Increased lordosis will result from a forward tilt of the pelvis occurring due to weak abdominal muscles, the lordotic posture is one in which the lumbosacral angle is increased and the pelvis tilts forward. The condition may exist in parallel with increased thoracic kyphosis and a forward-held head. The anterior longitudinal ligament will be lengthened, the posterior lumbar disc space narrowed, and the facet joint approximated with accompanying dural

compression and synovial irritation. Hip flexors are tight, as well as lumbar extensors, while the abdominals are weak and stretched (Franklin and Conner-kerr, 1998).

The results of this study are not in agreement with the results of Ostgaard *et al.* (1993) who found that no change in lumbar lordosis with advancing pregnancy.

Conclusion:

It can be concluded that there was a statistically highly significant increase in the thoracic kyphosis angle, lumbar lordosis angle and pelvic inclination angle during normal pregnancy.

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Predictors of Fertility among Egyptian Females at Reproductive Age at El-Manial Maternity Hospital

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Abstract: Background: The most common and well documented risk factors which can contribute to female infertility include over weight or underweight; hormonal imbalances; fibroid; reduced oocyte quality; chromosomal abnormalities; sexually transmitted diseases; age older than 27; history of pelvic inflammatory diseases; smoking and alcohol intake; and immune system disorders. **Aim** of this study was to explore the predictors that might affect Egyptian female fertility. **Subject & Methods. Design:** A Descriptive design was adopted in this study to explore the predictors that might affect Egyptian female fertility. **Sample,** a total of 300 married infertile women were recruited from the outpatient gynecological clinic at El Manial Maternity Hospital, Cairo University, Egypt according to the certain criteria. **Tools** utilized for Data collection were collected by using an interviewing questionnaire schedule. **Results of the present study** revealed that age of the woman (P=0.008); age at marriage (P=0.007); BMI (P=0.010); eat snacks (P=0.043); fatty saturated diet (P=0.029); polycystic ovary (P=0.040); cervicitis (P=0.012); utilized contraceptives methods (P<0.001); frequency of sexual intercourse/week (P=0.028) were a predictors that might affect the female fertility. **The study concluded that,** the women with the following profile: older age at marriage, overweight and obese, depending on fatty saturated diet, eat snacks, had history of polycystic ovarian syndromes, had cervicitis, used contraceptive methods, might be at risk for the occurrence of infertility. **Recommendation,** based on the findings of the present research the following recommendation is suggested: Raise women's awareness regarding to adopting healthy life style as follow dietary program and practice exercising.

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Key words: Predictors - Fertility –Reproductive Age

1. Introduction

Infertility is a widespread problem that has an emotional, psychological, social and economic impact on couples and society (Ricci, 2009). Infertility is a medical diagnosis of the reproductive system, and is defined as the inability to achieve pregnancy after one year of frequent, unprotected intercourse (Orshan, 2008). Primary infertility applies to a man or woman who has never been able to conceive while, secondary infertility applies to an inability to conceive after one or both partners have conceived previously (Ricci, 2009). Women older than 35 years having difficulty conceiving may receive a diagnosis of infertility before a full 12 months. (Covington and Burns, 2006).

Worldwide, the prevalence of infertility is approximately 13%, with the range from 7-28%, depending on the age of the woman (kumar Ashim et al., 2007). In Egypt, El-awady and Abdelazeem (2008) reported that the prevalence of the primary and secondary infertility was 2.5% and 7.9% respectively; also, they added that, the overall prevalence of infertility is 10.4%. In normal fertile couples having frequent, timing intercourse, the success of conception is estimated to be approximately 20-25% (Kelly-Weeder & Cox, 2006).

Approximately 90% of couples with unprotected intercourse will conceive within one year (Fraser & Cooper, 2010).

Ricci (2009) mentioned that, the risk factors which can contribute to female infertility include over weight or under weight (can disrupt hormone function); hormonal imbalances leading to irregular ovulation; fibroid; tubal blockages; reduced oocyte quality; chromosomal abnormalities; sexually transmitted diseases (STDs); age older than 27; history of Pelvic inflammatory disease (PID); smoking and alcohol intake; decreased frequency of coitus; congenital anomalies of the cervix and uterus; and immune system disorders.

Rowe (2006) reported that, as a woman ages beyond 35years (particularly after age 40years), the likelihood of becoming pregnant is less than 10% per month, and a woman's peak fertility is in her early 20s. In addition, Gurevich (2010) indicated that, healthy couples younger than 30 years who have regular sexual intercourse and use no contraception have a 25% to 30% chance of achieving pregnancy each month.

Worldwide, PID is one of the leading causes of ectopic pregnancy and preventable infertility which affect women's upper reproductive tract,

including the structures of the uterus, ovaries, and fallopian tubes (salpingitis) which is considered the most common manifestation of the disease (Bosky, 2007). Moreover, PID is known to be a long-term consequence of sexually transmitted diseases as well as of bacterial vaginosis, pelvic surgery, and other gynecologic procedures that cross the cervix (Morse, 2010). In the same context, women who are not treated for PID right away can experience serious complications, ranging from infertility to ectopic pregnancy to chronic pelvic pain (Mardh, 2004).

Many lifestyle choices can negatively affect female fertility. Women who smoke are three times likelier to have difficulty conceiving and less likely to become pregnant with infertility treatment and the more cigarettes a woman smokes the less her chances of conceiving (Zavos & Panayiotis, 2011). Also, they added that, women smokers who do become pregnant have more miscarriages. Moreover, Zosia (2011) reported that tobacco smoke can reduce female fertility by affecting hormonal function within the ovary which can reduce the number and quality of eggs; and ultimately could impair fertilization.

Obesity has a strong association with infertility and menstrual irregularities, while, some of the ovulation problems and menstrual changes are explainable by women with polycystic ovarian syndrome (PCOs) who are also obese, and women who do not have PCOs but are overweight also have the same problems (sallmen,2006). In addition, Hoeger, (2006) found that obesity at 23 years and at 7 years both independently increased the risk of menstrual problems by the age 33 years. In the same context, Garcia, (2006) reported that overweight and obesity in early adulthood may increase the risk of menstrual problems and infertility. Also, added that 20% over ideal weight is considered obese, and a body mass index (BMI) of 25-30kg/m² is considered overweight and a BMI of over30 is considered obese.

Ovulatory disorders are the leading cause of female infertility, resulting in the disruption of hormones, menstrual cycles, and conception; and approximately 15% of such disorders are linked to weight disorders, mainly being overweight and obese (Hirschberg, 2009). Also, added that women who are overweight and obese are less likely to respond to fertility drugs, because excess weight interferes with the proper absorption of a variety of drugs used in infertility treatment.

Moreover, abnormal hormones can be addressed as a result of excess weight which can negatively impact on ovulation and cause over-production of insulin, which may cause irregular ovulation (Boyles, 2007). Also, there is a link between obesity, excess insulin production and the infertility condition known as polycystic ovarian

syndrome which associated with irregular menstrual cycles, anovulation (decreased or stopped ovulation), obesity and elevated levels of male hormones (Pasquali & Gambineri, 2006).

Cottrell (2010) reported that, frequent vaginal douching is associated with adverse reproductive health outcomes as increased the risk of pelvic inflammatory disease, secondary infertility, and ectopic pregnancy. Also, added that douching may impact on health because it disturbs the chemical and microbial balance of the vagina and possibly leading to bacterial vaginosis and other bacterial infections. Moreover, douching may force pathogens up through the cervix causing uterine infections where organisms are more likely to cause pelvic inflammatory disease, an infection linked with infertility (Boskey, 2007).

The nurse has a crucial role in the prevention and management of infertility, the nurse should perform careful assessment for the presence of risk factors as age, chronic disease, stress, and poor diet. Also, education is another important role, that the nurse should teach the couples the signs and timing of ovulation, the most effective times for intercourse, other fertility awareness behaviors that the nurse may inform the women about avoiding douches and avoiding artificial lubricant. Moreover,, the nurse may teach the women about home assessment of cervical mucus and basal body temperature (BBT) recording. The nurse can alleviate some of the anxiety associated with diagnostic testing by offering explanation about timing and reasons for each test. In addition, the nurse should be familiar with the fertility problem, the couple's stage of coping, and fertility centers for referral (Ricci, 2007 and Davidson, London and Ladewing, 2006).

Significant

Infertility has a profound emotional, psychological and economic impact on affected couples and society (Davidson, London and Ladewing, 2006). According to statistics collected by the Centers for Disease Control (2011) reported that 6.1 million women between the ages of 15 to 44 years have an impaired ability to have children, and 2.1 million married couples are experiencing infertility, also, statistics found that 9.2 million women had made use of infertility services at some time in their life. However, in Egypt there is scattered nursing researches that determine factors affecting female fertility; so, the current study will explore the profile of infertile women and determine the factors affecting female fertility. Also, this study will contribute to improve the nursing practice especially in relation to women follow – up and monitor for

early detection of problems that may predispose to infertility.

Operational Definition

Predictors: in the current research refers to factors that might affect female fertility as measured by interviewing questionnaire schedule.

Aim

The aim of this study was to explore the predictors that might affect Egyptian female fertility.

Research Question

1- What are the Predictors that might affect Egyptian females at reproductive age?

2. Subjects and Methods

Design

A Descriptive design was adopted in this study to explore the predictors that might affect Egyptian female fertility.

Setting

The setting used to carry out this research was the outpatient gynecological clinic at El Manial Maternity Hospital, Which is a university, affiliated hospital providing free health care to outpatient gynecologic patients, as well as inpatient. The total annual patient visits to outpatient infertility clinic are 2219 (statistic department, 2010) and care is provided by physicians, as well as professional and diploma nurses who are responsible for giving nursing care.

Sample

A total of 300 married infertile women were recruited for the study according to the following inclusion criteria: women having primary or secondary infertility, at the reproductive age, and can read and write. Women who had tubal factors of infertility and their husbands were responsible for infertility were excluded.

Tool

Tool used to collect data was the interviewing questionnaire schedule. It was designed and filled by the researcher and the content of tool was determined through an extensive review of literatures about infertility. This tool includes data related to **a)Socio-demographic characteristics and women lifestyles** as age, educational level, occupation, duration of marriage, weight, height, and calculation of BMI, nutritional habits as kind of diet, had snakes, and cigarettes smoking; **b)obstetrical profile** as Parity, number of abortion, mode & place of previous delivery, age at marriage, menstrual history as (age at menarche, regularity, interval,

duration and amount of menstrual flow, consistency, using of medications to regulate her menstruation, or to induce ovulation, and menstrual abnormalities); **c) medical history** includes chronic disease as anemia, diabetes, heart disease, renal disease, liver disease, thyroid problems, and toxoplasmosis; **d) gynecological and sexual history** as ,pelvic inflammatory disease, vaginitis, cervicitis, polycystic ovarian syndrome, and types & duration of contraceptive methods if used, frequency of intercourse/week, had dyspareunia, use of chemical lubricants for intercourse and use of antiseptic douches immediately after intercourse.

Tool Validity

Tool was submitted to a panel of three medical and nursing experts in the field of obstetrics and gynecology to test the content validity. Modification was carried out according to the panel judgment on clarity of sentences and the appropriateness of content.

Ethical Consideration

An official permission was granted from the director of the El Manial Maternity Hospital. The researcher introduced herself to the women who diagnosed with infertility and met the inclusion criteria and informed them about the purpose of this study in order to obtain their acceptance to participate in this study. The researcher assured that the study posed no risk or hazards on them. All women were informed that the participation in the study was voluntary. A written consent was obtained from women who were willing to participate in the study.

Pilot Study

A pilot study was carried out on 10% of the total sample to check clarity of items and determine the feasibility of the study.

Procedure

Data was collected through a period of 9 month from May 2010 to January 2011. Researcher collected data after the women had been fully informed and consented for participation in the study. Data was collected through interviewing questionnaire schedule.

1. Interviewing schedule to collect data related to socio-demographic characteristics and lifestyles, obstetric profile, medical history, gynecological, and sexual history. The researcher met the women at outpatient gynecological clinic where they came for the first time or for follow up of their condition. The researcher asked questions in simple Arabic language and recorded the answers in the schedule. The

interview consumed about 20 minutes for each woman.

Also, Anthropometric assessment was carried out after obtaining the baseline data, that the researcher measured women height through tape measurement. and weight utilizing bath scale, accuracy was obtained through balancing zero prior to obtaining each weight and then body mass index is calculated by dividing the subject weight in kilograms by the square of her height in meters ($BMI = \text{kg} / \text{m}^2$). World Health organization (WHO) (2000); Jeannette, Robert and Cynthia (2004) categorized the body mass index as the following values: A BMI less than 18.5 is under weight; A BMI of 18.5 – 24.9 is normal weight; A BMI of 25.0 – 29.9 is overweight; A BMI of 30.0 – 39.9 is obese; A BMI of 40.0 is higher or severely (or morbidly) obese. The Anthropometric assessment was consumed about 10 minutes for each woman.

Information about the **assessment of menstrual flow amount** was obtained through asking women to point on the picture which illustrated the amount of blood stain in peripad and recorded based on Nichols and Zwelling (1997, p998) as (peripad blood stain < 10ml = scant; peripad blood stain 10: 25 ml = Mild; peripad blood stain 25: 50ml = moderate; peripad blood stain 50:80ml = heavy). Information about the **physical and gynecological assessment** was obtained from the physician to complete data related to these parts.

Statistical analysis

Collected data were coded and tabulated using personal computer. Statistical package for social science (SPSS) version 11 was used. The researcher used the descriptive as well as inferential statistics. The descriptive statistics include the arithmetic Mean as an average, describing central tendency of observation of each variable studied; the standard deviation as a measure of dispersion of results around the mean; and the frequency distribution and percentage of observation for each variable studied were used. Multiple regression analysis was also used as inferential statistics to examine the differences and similarities within the sample and to identify predictors that might affect female fertility at reproductive age. Statistical significance was considered at p -value <0.05.

3. Results

Findings of this descriptive research will be presented in two main sections: 1) description of the sample; 2) predictors that might affect female fertility.

I: Description of the Sample

This section includes: a) socio-demographic characteristics and women lifestyles, b) infertility

description, c) obstetrical profile, d) medical history, e) gynecological and sexual history.

a) **Socio-demographic characteristics and lifestyles**, the results indicated that the age range was 16-44 years with a mean of 28.62 ± 6.32 years. Forty-nine point seven percent of the sample was distributed at the age category (21 - 30 years); while 36.3% of them was distributed at the age category (31-40 years); 4% of them was distributed at the age category (41-44 years); and 10% of them was distributed at the age (≤ 20 years). Ninety-one percent of sample was housewives. High percentages of the sample (33.7%) had secondary school education, and low percentages of the sample (10%) had primary school education, while, (27.3%, 14.7%, and 14.3% respectively) of them can read & write, had preparatory and university education.

The weight range of the sample was 38-162 kilograms, with a mean of 73.40 ± 17.00 kilograms; and the height range of the sample was 1.43-1.76 meter, with a mean of 158.1 ± 6.212 meter, regarding to BMI categories of the sample, the results revealed that 1.3% of the sample was under-weight, while, 24.4% of the sample was normal weight. However, 33.3% of the sample was overweight, while 35% of the sample was obese, and 6% of the sample was morbidly obese, with mean BMI of 29.3 ± 6.31 (table, 1). Fifty seven percent of the sample had snacks between meals, and 42.3% of them depend on fatty-saturated diet. While, 2% of the sample was cigarettes smokers with a number range of 5-20 cigarettes/ day with a mean of 10.3 ± 6.02 cigarettes.

b) **Infertility description**, 57% of the sample had primary infertility, while 43% had secondary infertility. Mean duration of infertility was 4.32 ± 3.55 years.

c) **Obstetrical profile**, Age range at marriage was 15-40 years with a mean of 25.99 ± 7.53 years. Regarding to the menstrual history, age range at menarche was 8-20 years with a mean of 12.88 ± 1.51 years; 61% of the sample had irregular menstruation; menstrual duration range was 2-15 days with a mean of 4.55 ± 1.66 days; also, women had moderate, mild, and heavy amount of menstruation (54%, 12%, & 31.7% respectively), and only 2.3% of them had scanty menstruation. Forty point seven percent of the sample had menstrual abnormalities as oligomenorrhea, menorrhagia, and hypermenorrhea (50%, 32.8%, and 17.2%, respectively). In addition, 28% of the sample used hormones to regulate their menstruation, while, 85% used it with the purpose of

induce ovulation. Regarding to parity, 43% of the sample had secondary infertility, and 17.3% of them had history of abortion, while 25.7 % of them completed their pregnancy (15.7 % primipara, and 10 % multipara).

Fifty-seven point one percent of them were delivered by cesarean section (CS), while, 28.6% of them were delivered by normal vaginal delivery (NVD), and 14.3% of them were delivered by vaginal delivery with episiotomy. Eighteen-point three percent of the sample used different methods of contraception such as intrauterine device, contraceptive pills and contraceptive injections (58.2%, 21.8%, and 20% respectively) with mean duration of contraceptive use was 19.60 ± 12.745 month.

d) Medical history, results indicated that 15.3% of the sample had history of medical disease as anemia, renal disease, rheumatic fever, hypertension, rheumatoid arthritis, diabetes mellitus, hyperthyroidism, and toxoplasmosis (45.6%, 21.7%, 10.8 %, 8.6 %, 8.6 %, 6.5 %, 6.5%, and 6.5% respectively).

e) Gynecological and Sexual history, results indicated that 79.7% of the sample had history of gynecological disease as vaginitis, polycystic ovary (PCO), cervicitis, and pelvic inflammatory disease (29 %, 36.3%, 32.2%, and 2.5% respectively). Mean sexual intercourse/week was 3.04 ± 1.46 times, 52% of the sample had sexual intercourse (3-4 times), while, 36.4% of them had sexual intercourse (<3 times); and only 10.6% of them had sexual intercourse (>4 times); 16.7% of the sample had dyspareunia; 8.7% of the sample used antiseptic douches immediately after intercourse and only 1.3% of the sample used chemical lubricants for intercourse.

II: Predictors that might affect female fertility

This section includes Predictors that might affect female fertility. Multiple regression Analysis was carried out using Socio-demographic and lifestyles predictors, obstetrical predictors, and gynecological & sexual predictors, as independent variables and female fertility as dependent variable to explore the predictors that might affect female fertility.

1. Demographic and lifestyles Predictors. Results indicated that age, BMI, fatty saturated diet and had snacks were important predictors that might affect the female fertility ($P=0.008$, 0.010 , 0.029 & 0.043 respectively); However, educational level, and cigarettes smoking were not statistically significant ($P = 0.380$, & 0.735 respectively) (figure, 1).

2. Obstetric Predictors. Results indicated that, age at marriage, use of family planning methods, menstrual irregularities, menstrual abnormalities, and mode of previous delivery were a predictors that might affect the female fertility ($P=0.007$, <0.001 , <0.001 , <0.001 & <0.001 respectively). However, age at menarche was not statistically significant ($P = 0.319$) (figure, 2).

3. Gynecological and Sexual Predictors. Polycystic ovary, cervicitis and frequency of sexual intercourse / week were a predictors that might affect the female fertility ($P= 0.040$, 0.012 & 0.028 respectively). On the other hand, history of pelvic inflammatory disease (PID), vaginitis, dyspareunia, use of chemicals lubricants for intercourse, and use of antiseptic douches immediately after intercourse were not statistically significant ($P = 0.238$, 0.772 , 0.340 , 0.678 , & 0.244 respectively) (figure, 3&4).

Table (1): Distribution of the Sample According to Category of Body Mass Index (n=300)

Body Mass Index Category	Frequency	%
A BMI < 18.5 (under weight)	4	1.3
A BMI 18.5-24.9 (normal weight)	73	24.4
A BMI 25-29.9 (over weight)	100	33.3
A BMI 30-39.9 (obese)	105	35
A BMI >40 (morbidly obese)	18	6

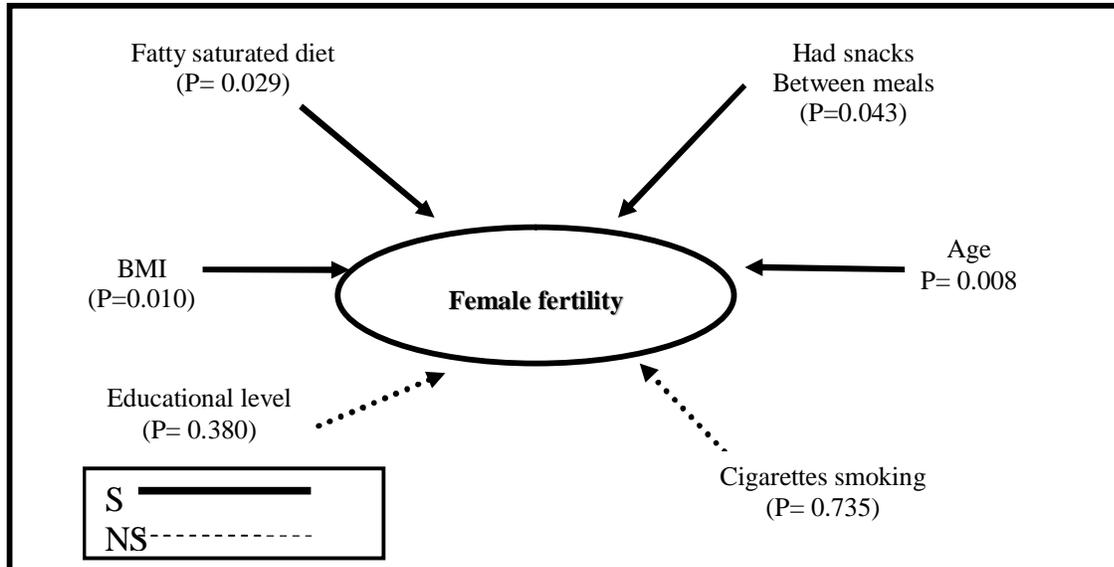


Figure (1) Socio-demographic and Lifestyle Predictors That Might Affect Female Fertility

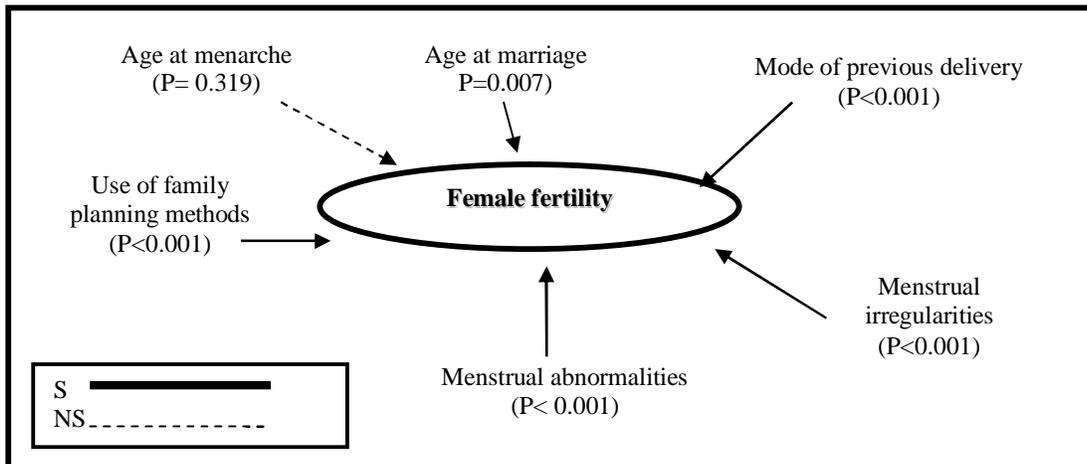


Figure (2) Obstetric Predictors That Might Affect Female Fertility

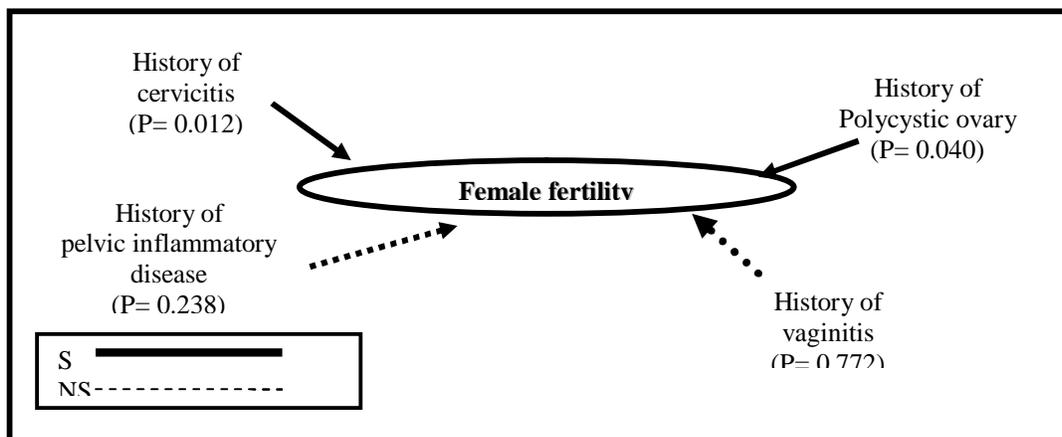


Figure (3) Gynecological Predictors That Might Affect Female Fertility

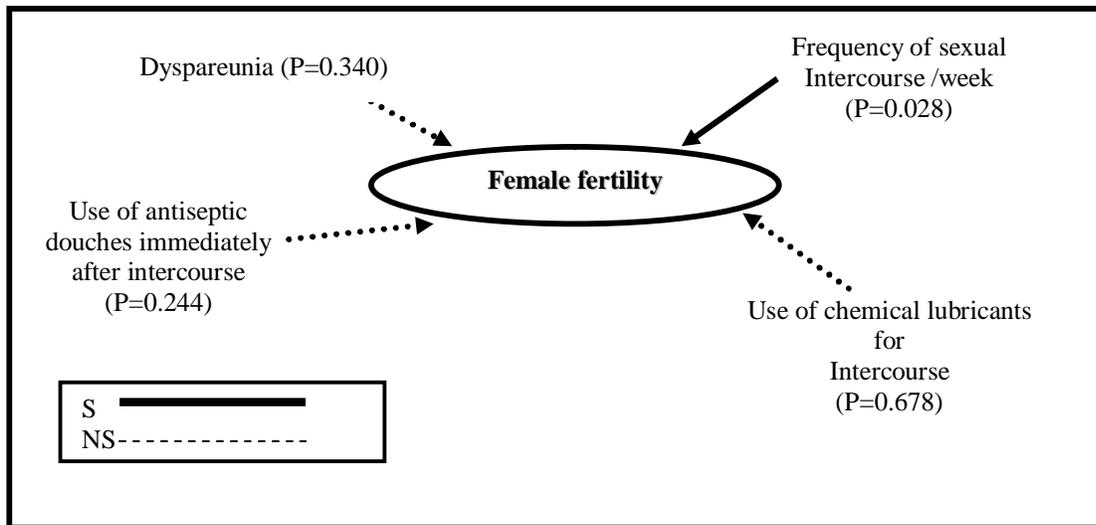


Figure (4) Sexual Predictors That Might Affect Female Fertility

Discussion

This research presents important findings related to Predictors that might affect females fertility that women may have risk factors that can contribute to infertility, and those risk factors can be genetic, environmental or related to lifestyle, and the most common and well documented risk factors for infertility in women are age, obesity, pelvic inflammatory diseases, polycystic ovarian syndrome, timing & frequency of sexual intercourse, and menstrual abnormalities. Results of this research by utilizing the Multiple regression Analysis showed that demographic characteristics and lifestyle predictors as age of the women, body mass index, fatty saturated diet, and had snakes are a predictors that might affect the female fertility, while educational level and cigarettes smoking didn't affect the female fertility. Age of the women, body mass index, and fatty saturated diet play a crucial role in declining the female fertility.

Findings of this research indicated that slightly less than half of the sample was in the age range 31-44 years old and only tenth of the sample was (≤ 20 years). This finding is matched with the data in the study of Gurevich, (2010) who reported that, as a woman ages beyond 35 years (and particularly after age 40 years), the likelihood of becoming pregnant is less than 10% per month. Moreover, this finding is supported by Rowe, (2006) who reported that fertility reach peak in most women in the 20s, and gradually begins to decline in the late 20s, and around age 35, fertility starts to decline at a much more rapid pace. This natural declining in the fertility by aging may be due to women are born with all eggs they ever have, while they are born with over a million eggs, and by puberty just 300,000 are left, from this huge number

of eggs, only 300 will ever become mature and be released in the process of ovulation. Also, way before menopause begins, women' bodies reproductive capabilities slow down, becoming less effective at producing mature, healthy eggs. As women age and become closer to menopause, their ovaries respond less well to the hormones that are responsible for helping the eggs ovulate (Gurevich, 2010).

More than two-thirds of sample was overweight and obese, slightly less than half of them depending on fatty saturated diet on their meals, and had snakes between meals and these factors have a significant relation with declining female fertility. These findings are supported by Pasquali & Gambineri (2006), who reported that obese women are characterized by comorbidities particularly type2 diabetes mellitus and cardiovascular diseases, also, they develop some specific problems, including fertility-related disorders. Moreover, findings are matched with the data of the study of Pasquali, Gambineri & Pagotto (2006) who reported that women who extremely overweight were 43% less likely to conceive than women who were either of average weight or slightly obese. He added that weight and menstrual irregularity are related and weight loss of 15lbs (6.5kg) in anovulatory obese women results in restoring ovulation and return to fertility for many women.

In the same context, these findings are supported by (Steeg, 2007) who reported that women with BMI of 30 or more had the most trouble conceiving during their reproductive life, women with BMI of 35 was found to be 26% less likely to achieve a spontaneous pregnancy than women who were normal weight, and women with BMI of 40 or more was 43% less likely to get pregnant. In addition,

Chavarro, Rich-Edwards, Rosner and Willett (2008), found that eating disorders, constant stress, depending on carbohydrate and junk food intake had been shown to lead weight gain which had in turn linked to fertility problems. These findings may be related to that the main factor implicated in the association between obesity and fertility-related disorders is insulin excess, which accompanies insulin resistance, consequently, hyper-insulinaemia may be directly responsible for the development of androgen excess, through its effects in reducing sex hormone-binding globulin synthesis and circulating concentrations, and in stimulating ovarian androgen production rates, which in turn, represents one of the major factors leading to altered ovarian physiology and associated Ovulatory disturbances. In addition, obesity-associated hyperleptinaemia may represent an additional factor involved in anovulation, not only through the induction of insulin resistance, but also through a direct impairment of ovarian function.

Unfortunately, the findings of this research don't support that cigarette smoking to be a predictor variable that might affect female fertility and there is no clear understanding of this contradiction. However, this is may be due to the minority of the sample were smokers. This finding is contradictory with the data of the study of Deleon (2011), who reported that, women who smoke are three times likelier to have difficulty conceiving. Also, added that, tobacco smoke lead to diminished oviductal functioning in women which could impair fertilization. Also, this finding is in contrast to data from Zosia (2011) who found that, smoking can reduce female fertility by affecting hormonal function within the ovary, and also can reduce the number and quality of eggs.

Findings of this research indicated that obstetrical factors as age at marriage, menstrual irregularities, menstrual abnormalities, mode of previous delivery, and use of contraceptive methods are predictor variables that might affect female fertility while, age at menarche, didn't affect the female infertility. Age at marriage, menstrual irregularities, menstrual abnormalities, mode of previous delivery, and use of contraceptive methods play a fundamental role in declining the female fertility. Findings of this research indicated that slightly less than third of the sample married at early age and more than third of them married at old age. This finding is matched with the data in the study of Yang, Shen, Chen, and Chen (2011) who reported that, the prevalence rate of infertility was increased in the women whose marriage age were younger than 20 years or elder than 29 years old. Also, this finding is similar to the data of the study of Vahidi, & Adalan (2009) who found that, age at marriage had a negative association with decreased female fertility.

In addition, this is in agreement with Orshan,(2008) who reported that women waiting until after age 35 to have children may having trouble getting pregnant. Also, this finding is matching with study findings of Madara (2008), reported that, women who married at elder age may have a 50% decrease in their fertility rate.

Moreover, slightly less than two-thirds of the sample had menstrual irregularities and more than one-third of them had menstrual abnormalities as oligomenorrhea, menorrhagia, hypermenorrhea, and polymenorrhea. So, there is an association between menstrual irregularity, menstrual abnormalities, and the declining of female fertility which in turn reduce chances of achieving pregnancy. These findings are supported by Small (2011), who reported that, women with irregular menstruation had reduced probability of pregnancy compared with regular menstruation. Also, the findings is in agreement with the data of Sallmen, (2006) who demonstrate that, ovulation problems and menstrual irregularities are experienced by women diagnosed with polycystic ovarian syndrome, endometriosis, uterine fibroid (Hoeger, 2006). This may be due to that those previously mentioned problems may blocked fallopian tubes, disturbed the reproductive hormones which are positively linked with increased incidence of female infertility. Moreover, Boyles, (2007) who found that, endometriosis can affect fertility because the endometrium can scar and cause blockages within the ovaries or fallopian tubes, and women may have very heavy periods. Also, Pasquali, Patton, and Gambineri, (2007) reported that, about 30% to 50% of women with endometriosis are infertile, making it one of the top three causes for female infertility.

Using of contraceptive methods especially Intrauterine Devices (IUDs) is a fundamental indicator of the female infertility. Almost half among those who used contraceptive methods utilized IUD. Corcoran, (2008) reported that, the most profound complications of IUDs are infection, pelvic inflammatory diseases, and infertility. Also, added that, the serious complications due to infection associated with an IUD may prevent women from being able to become pregnant in the future. This infection may be related to that while inserting IUD into uterus it is possible that bacteria will hitch a ride on the IUD device, enter the uterus causing it to become infected and damaged which can lead to infertility. Moreover, Epstein, (2010) added that, with the progesterone-releasing IUD, 70% of women notice gradual lessening of menstrual bleeding after two years of use and 30% may notice a complete cessation of menses, this is may be due to that progesterone hormone can cause thinning of the lining of the uterus, and in some women,

pharmaceutical contraception has been shown to adversely affect or destroy the cervical fluid needed for conception, so, indicated to female infertility. In contrast, with the data of Delborge et.al.,(2002) who demonstrated that, the use of IUD doesn't affect future fertility of women wishing to become pregnant following removal of IUD.

Regarding to the Gynecological factors, Results revealed that polycystic ovarian syndrome (PCOs) and cervicitis are predictor variables that might affect the female fertility. PCOs had a strong link with female infertility. Findings of this research indicated that more than one-third of those women who had gynecological problems complained from PCOs, and more than one-third of them complained from cervicitis. This finding is in agreement with the study data of Robert & David, (2009) who reported that, polycystic syndrome is linked to women's hormonal imbalances which include symptoms like irregular periods, repeat miscarriages, male-pattern hair loss, male-type facial and body hair, acne, and obesity, and those symptoms are associated with increased incidence of infertility. In addition, up to 40% of women with PCOS have insulin resistance, and up to 10% get type 2 diabetes by the time reach age 40 and high insulin level can increase the production of male hormones and make PCOS worse and ultimately infertility (Robert & David, 2009).

Moreover, Cervicitis also, is a predictor variable that might affect the incidence of infertility type. This finding is in agreement with Grueva and Borisov (2006) who reported that, infection (cervicitis) in the cervical canal was a sensitive indicator to female infertility which in turn cause weak in the ability of the sperm motility; abnormal changes in PH which kill sperms and thicken cervical secretion plug cervical canal and affect the penetration ability of the sperm.

On the other hand, pelvic inflammatory disease (PID), and vaginitis are not predictor variables that might affect female fertility. This is may be due to that less than one-third of the sample had vaginitis which may not affect female fertility while, the minority of them had PID. In contrast, Bosky (2007) reported that, PID is known to be long-term consequences of sexually transmitted diseases as well as of vaginitis (bacterial vaginosis), pelvic surgery, and other gynecologic procedures that cross the cervix. Also, the findings are not supported by Morse, (2010), who reported that, women who are not treated for PID right away can experience serious complications ranging from infertility to ectopic pregnancy to chronic pelvic pain.

Furthermore, Sexual factors such as frequency of sexual intercourse per week is a predictor variable that might affect the female

fertility while, use of chemicals lubricants for intercourse and use of antiseptic douches immediately after intercourse didn't affect female fertility.

Frequency of sexual intercourse per week is linked with the female infertility. The findings of the study revealed that tenth of the sample had sexual intercourse more than four times per week, more than half of sample had sexual intercourse from 3-4 times/week and, more than one-third of them had sexual intercourse less than three times/week. This is may be related to frequency of sexual intercourse too many (>4 times/week) is linked with premature sperms, while, too less sexual intercourse (<3 times/week) is linked with aging sperm. In spite of frequency of sexual intercourse is from 3-4 times/week is considered within normal (by review) but may be occur at wrong time (not around ovulation period). This finding is in agreement with Stanford, and Dunson (2007) who mentioned that, frequency and timing intercourse can impact on declining fertility rate, especially with low frequency intercourse. In addition, Robinson, and Ellis (2007) reported that, failure to conceive was appeared to be related to mistiming of intercourse. Moreover, Marshburn, Alanis, and Matthews (2009) indicated that timing intercourse is crucial in increasing women chances of conception which increases with the frequency of intercourse around the fertility days although the sperm concentration might be decreases slightly with higher frequency of intercourse.

Unfortunately, use of chemicals lubricants for intercourse, antiseptic douches immediately after intercourse and dyspareunia are not a predictor variable that might affect incidence of female infertility. This is might be due to the minority of the sample (1.3%) using chemicals lubricants for intercourse, Less than one-tenth of them using antiseptic douches immediately after intercourse, and more than tenth had dyspareunia. Agarwal et al, (2008) found that, using of vaginal lubricants during intercourse is not recommended which consequently decreased sperm motility and viability. Also, they added that careful selection of vaginal lubricants is required for women with vaginal dryness to avoid decreasing in sperm motility and viability.

In addition, contradicting finding with the data of Cottrell (2010) who reported that, frequent vaginal douching is associated with adverse reproductive health outcomes as increased the risk of pelvic inflammatory disease, secondary infertility, and ectopic pregnancy. Also, he added that, douching may impact on health because it disturbs the chemical and microbial balance of the vagina and possibly leading to bacterial vaginosis, dyspareunia and other bacterial infections. Moreover, douching may force

pathogens up through the cervix causing uterine infections where organisms are more likely to cause pelvic inflammatory disease, an infection linked with infertility (Boskey, 2007). In the same context, Cottrell (2006) in his study reported that, women who douched monthly were 2.5 times more likely to have a history of bacterial vaginosis than women who did not douche ($p < .001$), and women who douched weekly were 2.75 times more likely to have bacterial vaginosis ($p = .004$). And it concluded that there is an association between vaginal douching and bacterial vaginosis and that is a predispose factor in reducing fertility.

The study concluded that, women with the following profile: older age at marriage, overweight and obese, depending on fatty saturated diet, eat snacks, had history of polycystic ovarian syndromes, had cervicitis, long use of contraceptive methods, and might be at risk for the occurrence of infertility.

Recommendations, based on the findings of the present research, the following recommendations are suggested:

- 1- Raise women's awareness regarding to adopting healthy life style as follow dietary program, and practice exercising.
- 2- Proper treating of underlying medical problems that can impact female fertility.
- 3- Proper timing and frequency of intercourse to maximize achieving pregnancy.
- 4- Further studies are recommended regarding to the following issues:

- The relation between infertility and underweight.

The relation between infertility and chemical douching.

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Extra Signal Fluorescence in Situ Hybridization for Detection of Typical and Atypical BCR/ABL Gene Rearrangements in Egyptian Chronic Myeloid Leukemia Patients

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Abstract: Background: For many years, conventional karyotyping has been used as the golden diagnostic tool for t(9; 22) (BCR/ABL) in chronic myeloid leukemia (CML). Recently, there have been an emerging generation of complex translocations and submicroscopic deletions involving BCR & ABL genes in addition to the classic t(9;22), which have a prognostic impact on the course of the disease, and require sensitive and specific molecular techniques for their detection. Objective: The present study aimed to explore the utility of extra signal fluorescence in situ hybridization (ES-FISH) compared to double fusion FISH(DF-FISH) and conventional karyotyping (CK); for detecting the incidence of typical and atypical patterns of BCR/ABL gene rearrangements and clarify their prognostic significance in CML. Subject and Methods: A series of 64 consecutive BCR/ABL⁺ Egyptian CML patients (42 chronic phase, 9 accelerated phase, 13 blastic crisis), were investigated for typical and atypical BCR/ABL rearrangements using extra signal and double fusion FISH probes. Results: ES-FISH and DF-FISH showed higher sensitivity for detection of Philadelphia chromosome (Ph) as a sole anomaly when compared to karyotyping in all phases of CML. ES-FISH was the most sensitive method for detection of ABL deletion (14.2% in chronic phase, 33.3% in accelerated phase, 30.8% in blastic crisis) when compared to DF-FISH and karyotyping. Interestingly, ES-FISH, was the only method capable for detection of minor BCR/ABL rearrangement in 1 patient in blastic crisis phase. On the other hand, DF-FISH showed superiority for detection of BCR deletion. Both DF-FISH and karyotyping were capable of detection of trisomy 9 and variant translocation, while ES-FISH yielded confusing atypical signals regarding them. There was a moderate agreement between D-FISH & ES-FISH (P<0.01), a strong agreement between D-FISH and CK, while no agreement was found between the results of ES-FISH and CK and (P>0.05). In conclusion, karyotyping is mandatory to be applied at diagnosis of CML. ES-FISH is the method of choice for detection of ABL deletions, despite it cannot detect neither BCR deletions nor variant translocations. Karyotyping coupled with ES-FISH are adequate for the diagnosis and therapeutic monitoring of CML with the classical t(9;22) and for cases with ABL deletion.

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Keywords: Chronic myeloid leukemia, ES-FISH, D-FISH, BCR/ABL gene.

1. Introduction:

For many years, conventional karyotyping has been used as the sole diagnostic tool for t(9;22) (BCR/ABL). However, it has several limitations that may lead to failure for detecting BCR/ABL gene rearrangements in around 5% of all chronic myeloid leukemia (CML) patients (Deininger et al., 2000). In addition, about 5% of CML cases carry 'masked' translocations that can only be detected by molecular techniques such as fluorescence in situ hybridization (FISH) or reverse transcriptase polymerase chain reaction (RT-PCR) (Druker and Lee, 2005).

The first generation of BCR/ABL single fusion FISH probes detected the fusion gene with high specificity but with a low sensitivity, with a cut off value 6%. A new generation of FISH probes has

been developed known as double fusion (DF-FISH). The developed probe is characterized by high sensitivity and specificity with a cut off value 1.3%. The probe is characterized by spanning wide area, about 450 kb proximal to the ABL gene on 9q34 and in some probes also with distant coverage on 22q (covering both major and minor breakpoint region) (Primo et al., 2003). Despite that, the double fusion FISH probe design does not distinguish between major and minor break point region. Therefore, unable to differentiate between de novo acute lymphoblastic leukemia (ALL) and ALL on top of CML, necessitating the application of polymerase chain reaction (PCR) to overcome this defect (Hirose et al., 2002).

More recently, an extra signal locus specific identifier (LSI) probe was developed to confirm the location of *BCR/ABL* other than 22q1 and to detect both typical and atypical *BCR/ABL* rearrangement, being capable of distinguishing between major (M) and minor (m) break point cluster region. This probe mixture contained directly labeled Spectrum Orange probe that spanned the *ABL* locus at 9q34 and directly labeled spectrum green probe that spanned the *BCR*

locus at 22q11.2. The most frequently detected patterns with the extra signal probe corresponded to typical *BCR/ABL* gene rearrangements involving the *MBCR* (one fusion, one green (*BCR* probe) and two red (*ABL* probe) signals) and the *mBCR* (two fusion, one green and one red signals). The extra signal LSI probe can also detect other atypical interphase FISH (iFISH) patterns as supernumerary Philadelphia (Ph), gain or loss of chromosomes 9 and 22, as well as deletions of 9q and 22q that can occur in *BCR/ABL*⁺ CML, ALL and acute myeloid leukemia (AML) cases (Huntly *et al.*, 2001, Manisha *et al.*, 2010).

This work aimed to explore the utility of extra signal fluorescence in situ hybridization (ES-FISH) compared to double fusion FISH and conventional karyotyping (CK); for detecting the incidence of typical and atypical patterns of *BCR/ABL* gene rearrangements and clarify their prognostic significance in CML.

2. Materials and Methods:

Subjects and Methods

The study was approved by the committee of Medical Research Ethics, Medical School, Ain Shams University; an informed written consent was obtained from all studied subjects. This study was carried out on 64 CML patients who were attending the Hematology Oncology Clinics of Ain Shams University Hospitals.

The patients were classified according to the clinical phase at presentation into three groups:

Group I:

It comprised 42 patients in chronic phase (CP); they were 22 males and 20 females with male to female ratio of 1.1:1. Their ages ranged from 20 - 75 years, with mean age of 49.5 ± 16.2 years.

Group II:

It comprised 9 patients in accelerated phase (AP), they were 5 males and 4 females with male to female ratio of 1.2:1. Their ages ranged from 38 - 61 years, with mean age of 47.6 ± 6.9 years.

Group III:

It comprised 13 patients in blastic crisis (BC) acute myeloid leukemia, they were 5 males and 8 females with male to female ratio of 0.6:1. Their ages

ranged from 28 - 51 years, with mean age of 41.2 ± 8.1 years.

Follow up for the patients was done over a period of 12 months. The patients' outcome was expressed according to The Italian Cooperative Study Group on Chronic Myeloid Leukemia (1994). Good prognosis was identified by complete hematological remission, complete cytogenetic remission and molecular remission. While good response in blastic crisis phase was identified by disappearance of all signs and symptoms of leukemia, bone marrow blast cells <5% and absence of abnormal cells in peripheral blood and cerebrospinal fluid (American Cancer Society, 2009).

Methods:

I. Samples:

One mL of bone marrow (BM) aspirate and 4 mL of venous blood were collected from each patient before initiation of treatment under complete aseptic conditions. Samples were divided as follows:

Two ml PB were collected in a tube containing ethylene diamine tetra acetic acid (EDTA) solution used for complete blood count (CBC) and Leishman stain (done for all cases), and myeloperoxidase stain (applied in BC only). One mL BM and/or 2 mL PB were collected in sterile Lithium heparin coated vacutainer tube for cytogenetic analysis, D-FISH and ES-FISH. Fresh drop of PB was used to prepare PB smear for Neutrophil Alkaline Phosphatase (NAP) score.

II. Conventional Karyotyping (CK):

The steps of conventional karyotyping were performed as previously described (Eberhard, 2001). Most of available metaphases were counted (at least 20), analyzed and karyotyped using Chromoscan Applied Imaging Cytovision 2.7. The banded chromosomes were interpreted according to ISCN 2009.

III. Fluorescent In Situ Hybridization (FISH):

Ø The used probes were:

A) LSI (dual color, dual fusion) probe for t(9;22) (q34;q11) supplied in 20 μ L (vial) (Vysis).

B) LSI dual color *BCR/ABL* ES probe for t(9;22) (q34;q11) supplied in 20 μ L (vial) (Vysis).

The steps and interpretation were performed according to Primo *et al.*, 2003

Cut off value for diagnosis of positive result was 1.3% for D-FISH and 3% for ES-FISH.

IV. Statistical analysis

Data were expressed as mean \pm standard deviation (SD) (range) or as number (%) of cases. Comparison of proportions and means between two

groups was made by using the 2 test and independent t-test, respectively. The Fisher's exact test was used when applicable. Analysis was performed by using the Statistical Package for the Social Sciences (SPSS, version15). The level $P < 0.05$ was considered the cut-off value for significance.

Unpaired (student's) t test was used to test the difference about mean values of lab parameters, results were presented as mean and SD, non parametric data were analyzed using Mann-Whitney test (data presented as median and inter quartile range [IQR])

Kappa test: to measure the agreement between two observers. Strength of agreement (if present) is established according to k value as:

Mild agreement: k value is 0.2 – 0.4, Moderate agreement: k value is >0.4 – 0.6, Strong agreement: k value is >0.6 and <1, and Perfect agreement: k value is 1.

3. Results:

Cytogenetic analysis

Group I (Chronic phase)

Karyotyping was successful in 33/42 patients (78.5%), Out of them, Ph as a sole anomaly was detected in 26/33 (78.7%) patients, while it was associated with additional chromosomal aberrations in 7/33 patients (21.3%), in the form of Ph associated with +8 in 2 patients (6.1%), Ph associated with +9 in 3 patients (9.1%) and Ph associated with del 9q in 2 patients (6.1%). Re-analysis by *ES-FISH* showed Philadelphia chromosome as a sole anomaly in 36/42 (85.8%)(photos 1,2), while associated with ABL deletion in 6/42 patients (14.2%)(photo 3). Interphase FISH signals were atypical and confusing regarding detection of +9 and variant translocations. BCR deletion was not detected in any case. Using *D-FISH*, Ph was detected as a sole anomaly in 36/42 (85.8%), while it was associated with ABL deletion in 3/42 patients (7.1%)(photo 4), out of them both ABL and BCR deletions were detected in 2/42 patients (4.8%), +9 was detected in 3 patients (7.1%). No variant translocations were detected (Tables 2,3)

Group II (Acceleated phase)

Karyotyping was successfully encountered in 7/9 cases (77.8%), of which, Ph as a sole anomaly was present in 4/7 patients (57.1%), and as complex aberration in the remaining 3/7 (42.9%); as Ph associated with 9q deletion in 1 patient (14.3%), Ph associated with +8 in 1 patient (14.3%) and Ph associated with +9 in 1 patient (14.3%). Re-evaluation by *ES-FISH* detected Ph chromosome as a sole anomaly in 6/9 (66.7%) patients. Ph associated with ABL deletion was detected in 3/9 patients (33.3%). No BCR deletion or variant translocations were detected. using *D-FISH* revealed the presence of Ph in 7 /9 (77.8%) patients. Ph associated with +9 was detected in 1/9 patient (11.1%) and associated with both ABL and BCR deletions in the remaining patient (11.1%). No variant translocations were detected (Tables 2,3)

Group III (Blastic crisis)

Out of the 13 patients, 9 (69.2%) showed successful mitosis, in which Ph chromosome was detected as the sole anomaly in 5/9 cases (55.6%), while complex aberrations were detected in the form of complex translocation t(3;9;22) in 1 case (11.1%), Ph associated with +9 in 1 case (11.1%), Ph associated with del 9q in 1 case (11.1%) and Ph associated with +8 in 1 case (11.1%). *ES-FISH* showed the presence of Ph chromosome as the sole anomaly in 8/13 cases (61.5%) (one of them showed minor BCR/ABL) (Photo....). Ph chromosome associated with ABL deletion was detected in 4/13 patients (30.8%) and in the remaining patient double Ph was detected (7.7%). No BCR deletion no variant translocations were detected. Re-evaluation using *D-FISH* detected Ph chromosome as the sole anomaly in 8/13 cases (61.5%). Ph was associated with additional anomalies in the form of Ph associated +9 was detected in 1 patient (7.7%), with ABL deletion in 2 patients (15.4%)(1 out of them showed combined ABL and BCR deletions [7.7%]), double Ph in 1 patient (7.7%) and variant translocation in 1 patient (7.7) (Tables 2,3).

The demographic, clinical features, prognosis and cytogenetic profile of all the studied groups are shown in table 1.

Table (1) Demographic, clinical features, cytogenetic profile and prognosis of all the studied groups

	Chronic (42)		Accel (9)		Blastic (13)		Total (64)	
	N	%	N	%	N	%	N	%
Sex								
Male	22	52.4	5	55.6	5	38.5	32	50.0
Female	20	47.6	4	44.4	8	61.5	32	50.0
Splenomegaly								
Mild, moderate	34	81.0	4	44.4	7	53.8	45	70.3
Huge	8	19.0	5	55.6	6	46.2	19	29.7
CCA								
Ph alone	26	61.9	4	44.4	5	38.5	35	54.7

Complex aberration	7	16.7	3	33.3	4	30.8	14	21.9
Failed	9	21.4	2	22.2	4	30.8	15	23.4
ES FISH								
Ph alone	36	85.7	6	66.7	8	61.5	50	78.1
Complex aberration	6	14.3	3	33.3	5	38.5	14	21.9
D-FISH								
Ph alone	39	92.9	7	77.8	8	61.5	54	84.4
Complex aberration	3	7.1	2	22.2	5	38.5	10	15.6
Prognosis								
Good	33	78.6	5	55.6	4	30.8	42	65.6
Poor	9	21.4	4	44.4	9	69.2	22	34.4

Table (2) Karyotypic profile compared to ES-FISH and D-FISH in all patients

	Ph sole	ABL del 9q	BCR deletion	ABL/BCR deletion	+8	+9	Double Ph	Others
CCA	35	4	0	0	4	5	0	1: complex [t(8;9;22)]
ES FISH	50**	13	0	0	0	0	1	0
D-FISH	51	2	0	4	0	5	1	1: variant translocation

** One of them was presented as minor (mBCR)

Table (3): Statistical comparison between CCA, ES-FISH and D-FISH in the three phases

	Chronic (42)		Accel (9)		Blastic (13)		Total (64)		z	P	Sig
	N	%	N	%	N	%	N	%			
CCA											
Ph alone	26	61.9%	4	44.4%	5	38.5%	35	54.7%	1.66	0.20	NS
Complex	7	16.7%	3	33.3%	4	30.8%	14	21.9%			
Failed	9	21.4%	2	22.2%	4	30.8%	15	23.4%			
ES FISH											
Ph alone	36	85.8%	6	66.7%	8	61.5%	50	78.1%	3.93	0.05	S
Complex	6	14.2%	3	33.3%	5	38.5%	14	21.9%			
D-FISH											
Ph alone	36	85.8	7	77.8%	8	61.5%	54	84.4%	7.61	0.006	S
Complex	6	14.2	2	22.2%	5	38.5%	10	15.6%			

Patients in blastic phase showed significant increase in percentages of complex aberrations by ES-FISH (P= 0.05) and highly significant increase by D-FISH (P<0.01) in comparison to other phases.

Table (4): Agreement between CCA, ES-FISH and D-FISH using Kappa test

	CCA				K	P	Sig
	Ph alone (35)		Complex aberration (14)				
	N	%	N	%			
ES FISH							
Ph alone (38)	29	59.2%	9	18.4%	0.20	0.16	NS
Complex aberration (11)	6	12.2%	5	10.2%			
D-FISH							
Ph alone (40)	33	67.3%	4	8.2%	0.69	<0.01	HS
Complex aberration (9)	2	4.1%	10	20.4%			

ES FISH: There was no agreement between CCA and ES-FISH (P>0.05)

D-FISH showed strong agreement with CCA; there was an agreement in 33 sole anomaly and 10 complex (88%) and disagreement 6 cases complex (12%), 2 cases diagnosed as complex by D-FISH but not by CCA ;1 Ph with ABL&BCR, and 1 double Ph. And 4 by CCA (as Ph with +8) not by D-FISH. Exclusion of 15 failed cases by Karyotyping; 9 in chronic phase, 4 in accelerated and 2 in blastic phase (Total 49/64 cases).

Table (5): Agreement between ES-FISH and D-FISH in the whole studied group using kappa test

	ES FISH				k	P	Sig.
	Ph alone (50)		Complex aberration (14)				
	N	%	N	%			
D-FISH							
Ph alone (51)	45	70.3%	6	9.4%	0.48	<0.01	HS
Complex aberration (13)	5	7.8%	8	12.5%			

D-FISH showed moderate agreement with ES FISH; there was an agreement in 45 sole anomaly and 8 complex (83%) and disagreement in 11 cases (17%); 5 cases diagnosed as complex by D-FISH (Ph with +9) but missed by ES-FISH and 6 by ES-FISH (as Ph with ABL) but missed by D-FISH.

Table (6): Prognostic significance of Ph as sole anomaly and of complex aberrations (detected by CCA, ES-FISH and D-FISH)

	Prognosis (n)				P	Sig
	Good (42)		Poor (22)			
	N	%	N	%		
CCA						
Ph alone (35)	30	85.7%	5	14.3%	<0.0001	S
Complex aberration (14)	0	0%	14	100.0%		
Failed (15)	12	80.0%	3	20.0%		
ES FISH						
Ph alone (50)	39	78.0%	11	22.0%	<0.0001	S
Complex aberration (14)	3	21.4%	11	78.6%		
D-FISH						
Ph alone (54)	42	77.8%	12	22.2%	<0.0001	S
Complex aberration (10)	0	0%	10	100.0%		

Using Fisher's Exact Test cases showing complex aberrations by CCA, ES-FISH and D-FISH showed highly significant poor prognosis compared to those with Ph alone ($P < 0.0001$)

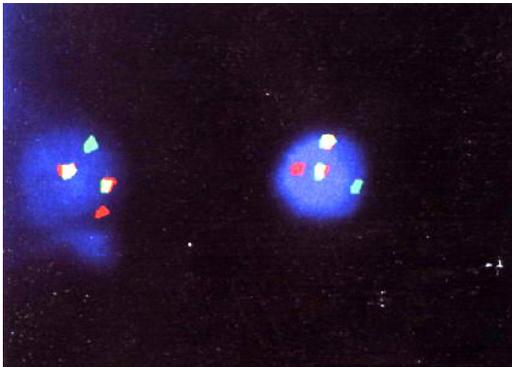


Photo (1): Interphase FISH analysis showing mBCR/ABL by ES-FISH (1R, 1G, 2Y signals)

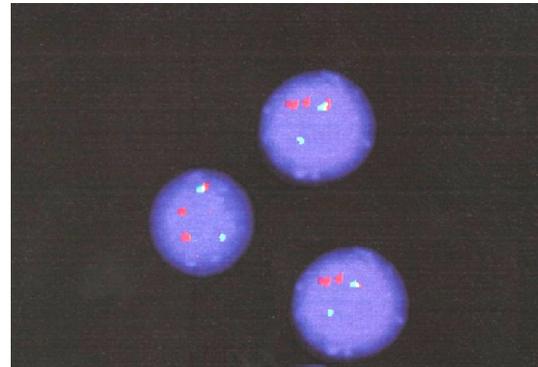


Photo (2): Interphase FISH analysis showing classical MBCR/ABL by ES-FISH (2R, 1G, 1Y signals)

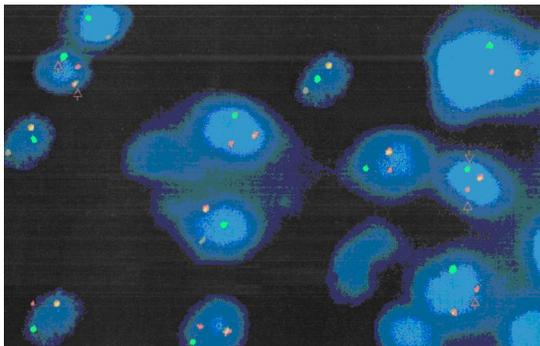


Photo (3): Interphase FISH analysis showing ABL deletion by ES-FISH (1R, 1G, 1Y signals)

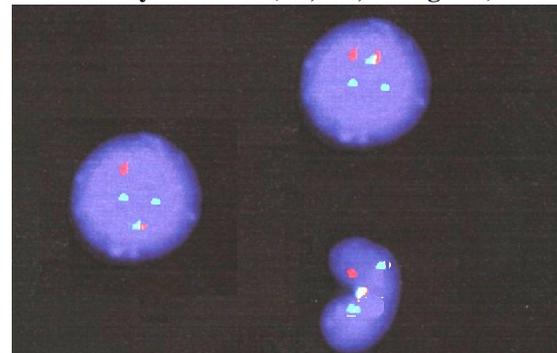


Photo (4): Interphase FISH analysis showing ABL deletion by D-FISH (1R, 2G, 1Y)

4. Discussion:

Several studies have demonstrated that a submicroscopic gene deletion in Ph positive CML is associated with a poor prognosis and reduced response to treatment (Kim *et al.*, 2005). These deletions are proved to be a powerful and independent prognostic factor more potent than the scoring systems of Sokal *et al.* or Hasford *et al.* (Xinh *et al.*, 2006). Molecular techniques are required to demonstrate the presence of these atypical

rearrangements in a sensitive and specific manner (Aoun *et al.*, 2004).

In this work, Ph was detected in all cases with successful mitosis. Ph was detected as a sole anomaly in 35/49 (71.4%) cases, distributed as 26/33 (78.7%) in CP, 4/7 (57.1%) in AP and 5/9 (55.6%) in BP, being highest in CP. The total percentage of Ph chromosome detected as a sole anomaly was midway between that detected by Anoun *et al.*, (2004) and Xinh *et al.*, (2006), where both showed it to be about

83%, and that found by *Reena et al.*, (2006), and *Patel et al.*, (2009), which were 50% and 53.8% respectively. While complex aberration was detected in this study in 14/49 cases (28.6%) as 7/33 (21.3%) in CP, 3/7 (42.9%) in AP and 4/9 (44.4 %) in BP. Complex aberrations detected in the total cases were like that found by *Xinh et al.*, (2006) (20%), but discrepant from that detected by *Anoun et al.*, (2004) and *Reena et al.*, (2006) (11% for both). Having higher percentages of complex aberrations in AP and BP than CP was previously documented by the well established role of additional anomalies in clonal evolution and acceleration of CML (*Reichard et al.*, 2009).

Re-evaluation by ES-FISH improved the ability of detection of genetic aberrations, detecting Ph in 100% of the cases. Ph chromosome was detected as the sole anomaly in 50/64 cases (78.1%), with the peak incidence of 85.7% in CP as expected (36/42 cases). This was consistent with *Moon et al.*, (2007), who found that the incidence of Ph as sole anomaly in CML by ES-FISH is 81%, and close to that found by *Primo et al.*, (2003) (83.3%). This improved ability of detection was evident regarding detection of complex aberrations too, where complex aberrations were detected in 14/64 cases (21.9%), with peaks of incidence in the AP and BP (33.3% and 38.5% respectively). This was consistent with the findings of *Primo et al.*, (2003) and *Moon et al.*, (2007) who found the incidence of complex aberration in the patients of CML studied by ES-FISH to be 16.7% and 19% respectively. This low incidence is due to the minor role of complex aberrations in the pathogenesis of CP of CML, and playing the major role in acceleration and transformation only (*Reichard et al.*, 2009).

The high ability of FISH in detection of specific chromosomal anomalies is that it can be done on interphase nuclei, poorly spread metaphases and well spread metaphases, allowing it to play an important role in such conditions for diagnosis and evaluation of MRD (*Kantarjian et al.*, 1990). Several reports strongly suggest that all FISH data correlate very significantly with chromosome banding data (*Baccarani et al.*, 2008).

The LSI ES-FISH increased this ability by its wide spanning area of 1.5 megabase (*Lim et al.*, 2005). The use of the ES probe reduces the interpretation problems resulting from random juxtapositioning of differently labeled genes producing co-localization signals; and this is the role of the extra signal, it confirms the true positivity of the translocation detected (*Primo et al.*, 2003).

The improved ability of detecting chromosomal anomalies was evident also by using DF-FISH, as Ph chromosome was detected in 100% of cases, as a sole

anomaly in 54/64 cases (84.4%), again with the highest incidence of 92.9% in CP (39/42 cases). The percentage of sole anomaly in our study was the highest detected, despite wide variability among researchers, as the 70% found by *Huntley et al.*, (2001) and *Lim et al.*, (2005), the highly deviant 12.5% by *Loncarevic et al.*, (2002), 81.6% found by *Kim et al.*, (2005) and 77% found by *Siu et al.*, (2009). Complex chromosomal aberrations were detected in 10/64 cases (15.6%), again with the peaks in AP and BP (22.2% and 38.5% respectively). This is matching with the result obtained by *Kim et al.*, (2005) of 18.4%, and with that of *Siu et al.*, (2009) of 22.3%.

Regarding the complex aberrations detected, CCA detected 4/49 (8.2%) cases with ABL deletion (in the form of del9q), ES-FISH detected 13/64 (21.3%), and D-FISH detected 6/64 cases (9.3%) (4 of them were accompanied by BCR deletion). This magnifies the superiority of ES-FISH as a tool for detecting the ABL deletion. In the current work, result of ABL deletion by ES-FISH is midway between the results reported by *Sinclair et al.*, (2000), *Huntly et al.*, (2001) and *Lee et al.*, (2003) (15 - 28.6%).

Primo et al., (2003) stated that ABL deletion is the most common atypical Ph chromosome signal detected, and this agrees with our result, by detecting 13 as ABL deletion from the 14 cases with complex aberration, and is consistent with *Huntly et al.*, (2001), who reported it to be >30% of atypical signals, however, it is much higher than what's found by *Anoun et al.*, (2004) (12%), who found no explanation to this discrepancy from others' results, except the probability of having a relatively low number of cases with an atypical signal in their study.

Results ABL deletion by D-FISH obtained in this work were similar to that found by *Kim et al.*, (2005) and *Siu et al.*, (2009) (6.6 and 9% respectively), higher than that found by *Sinclair et al.*, (2000), *Huntley et al.*, (2001), *Lim et al.*, (2005) (3.6, 2.8, 3.1 respectively), and much less than that found by *Loncarevic et al.*, (2002) (56.2%). This is in agreement with the previously stated wide range of ABL deletion detected. Regarding BCR deletion, D-FISH is the only technique that can detect BCR deletion. In the current study, no BCR deletion alone was detected, as was the situation with *Sinclair et al.*, (2000) and *Kim et al.*, (2005).

Huntley et al., (2001), *Loncarevic et al.*, (2002), *Lim et al.*, (2005) and *Siu et al.*, (2009) reported a wide range of BCR deletion of 0.8, 31.3, 2.1, 3.3 respectively, which were of low values except for the 31.3% reported by *Loncarevic et al.*, (2002), who seem to have a certain form of problem concerning interpretation of the signals, with a high false positive rate, as shown also from the extraordinarily high

value of ABL deletion, which was above the reported range of detection.

ABL and BCR deletions were detected in combination in 4/64 cases (6.2%), which was similar that found by *Kim et al., (2005)* (6.6%), despite the presence of wide range as found by *Sinclair et al., (2000)*, *Huntley et al., (2001)*, *Loncarevic et al., (2002)*, *Lim et al., (2005)* and *Siu et al., (2009)*, whose results were 25, 11.9, Zero, 10.4 and 9% respectively. However, apart from the extreme values of Zero and 25, most of the results were close to that detected in our study.

Trisomy 8 was detected in 4/49 cases (8.2%), and detected by CCA only. This is due to the non directed nature of the CCA, which favors it as the gold standard for the genome wide screen (*Hochhaus et al., 2000*). Trisomy 9 was detected by CCA in 5/49 cases (10.2%), and by D-FISH in 5/64 (7.8%), and they were the same cases. No signal pattern was reported for +9 by D-FISH, but we interpreted the signal in conjunction with the results of CCA.

Supernumerary Ph was detected by ES and D-FISH in 1/64 case (1.5%) and was in BP. This is close to the reported percentage by *Lim et al., (2005)* of 3.1%. They reported one case in AP and one case in BP, which confers to the association made between additional Ph and disease progression, and being one of the major pathways of clonal evolution seen during blast crisis. One case of the 64 cases (1.5%) showed variant translocation by D-FISH, and was detected as complex translocation t(8;9;22) by CCA. However, this issue is not a subject of interest for many researchers at the moment, with well interpreted results obtained only by *Lim et al., (2005)*

Comparing ES-FISH to the CCA and D-FISH, ES-FISH is the only technique that can differentiate MBCR/ABL from mBCR/ABL rearrangements. ES-FISH detected one case (1.5%) of mBCR/ABL. This was compatible with *Primo et al., (2003)* who found mBCR/ABL in 1.5% of CML patients. However, it is important to note that ES-FISH failed to detect variant translocation, the BCR deletions and +9. This is a considerable pitfall of ES-FISH, since these aberrations have a prognostic impact, to be mentioned later.

No agreement was found between the results of CCA and ES-FISH. A strong agreement was found between results of CCA and D-FISH for the results of the overall cases of the study ($P < 0.0001$). This agreement study was done after exclusion of the 15 cases of failed mitosis, and this overestimated the diagnostic power and sensitivity of the CCA, whose main pitfall is the failure of mitosis, and led to the failure of agreement with the ES-FISH. This is consistent with *Patel et al., (2009)* who found a significant and positive correlation between results of

CCA and D-FISH, also, *Baccarani et al., (2008)* stated that several reports strongly suggests that all FISH data correlate very significantly with chromosome banding data (*Schoch et al., 2002*; *Raanani et al., 2004*). There was a moderate agreement between ES-FISH and D-FISH as regards the overall patients ($P < 0.0001$), which simulates the agreements between D-FISH and CCA but with reduced strength, so, despite the lack of direct agreement between CCA and ES-FISH, a trend is noticeable. Results of ABL deletion obtained by D-FISH and ES-FISH showed a moderate highly significant agreement ($P < 0.0001$). This is in favor for ES-FISH in detection of ABL deletions, revealing it as the method of choice for detection of this aberration.

To determine the outcome of the patients, we assessed the hematological, cytogenetic and molecular responses at 1 year after therapy. This is because these responses at 1 year after therapy have been shown to correlate well with survival (*Li et al., 2005*).

As for cytogenetic results, there is an established strong association of major and complete cytogenetic response with improved long term survival with interferon-alpha therapy. These prognostic associations have also been confirmed with imatinib therapy, suggesting that the relationship between response and survival may be independent of the treatment that produced the response (*Kasakyan et al., 2003*). Cases showing complex aberrations by CCA, ES-FISH and D-FISH showed highly significant association with poor prognosis than cases with Ph alone ($P < 0.0001$). This is appropriate with the poor prognostic impact of the chromosomal aberrations mentioned previously.

Detecting such significance by ES-FISH is a good point for it. This is due to the prognostic impact of the ABL deletion, which is the best anomaly detected by ES-FISH, and was the most frequent atypical signal detected in our study. Poor prognosis associated with ABL deletion has been reported by many researches as *Sinclair et al., (2000)*; *Huntly et al., (2001)*; *Lee et al., (2003)* suggested a favorable prognosis.

Regarding mBCR, ES-FISH detected it in case #1 in BP, and it had a moderate prognosis by achieving CHR and MCR, but NMR. Previous studies have shown that mBCR breakpoints develop blast crisis with monocytosis and this agrees with that our single case was in BP, despite failure of judgment by a single case. Adds to the power of ES-FISH is its detection of supernumerary Ph. Detecting supernumerary Ph in BP in our study, and in AP and BP by *Lim et al., (2005)*, confers to the association made between additional Ph and disease progression,

and being one of the major pathways of clonal evolution seen during blast crisis.

Regarding D-FISH, its power is in detecting the BCR deletion, either alone or with ABL deletion. The statistical significance associated between complex aberrations it detected and poor prognosis can be attributed to the combined BCR and ABL deletions, since it was the most frequent atypical signal detected.

The relevance of BCR deletion on prognosis is still a matter of discussion. *Lee et al., 2006 stated that* BCR losses are accompanied by ABL deletion in 70-100% of cases, and might be involved in poor prognosis. Improved survival was once again reported only by *Kreil et al., (2007)*.

Regarding variant translocation, it is inconsistent whether variant translocations confer the same clinical course and outcome as standard ones. Some studies concluded that a variant translocation showed no differences in the disease course of CML and had no effect on prognosis, compared with a standard translocation (*Valencia et al., 2009*). However, some suggested that variant translocations are associated with an adverse outcome (*Loncarevic et al., 2002*). Our study is in favor of the opinion of variant translocation's poor prognosis, despite the low number of cases in our study (one case, #3 in BP), but she was in BP and failed to achieve neither CR nor MR.

In conclusion, karyotyping is mandatory to be applied at diagnosis of CML. ES-FISH is the method of choice for detection of ABL deletions, despite it cannot detect neither BCR deletions nor variant translocations. Karyotyping coupled with ES-FISH are adequate for the diagnosis and therapeutic monitoring of CML with the classical t(9;22) and for cases with ABL deletion

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Rural women and micro-credit programs

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Abstract: Rural women are among those major groups at society who previously were considered less by planners, due to specific reasons in the past. And this problem is more observable at developing countries. While, by looking at women's history of economic and social life, we can find that this great group, continuously have played basic role in forming economic condition of country. This great group consistent with men have had active role at areas of social-economic activities and always have had major part on economic production of society. Nowadays, supporting family supervisor women is adopted by universal society, as politic, economic a social concern and nearly all countries applied related approaches, and however these efforts have resulted in failure, in so many cases . By accessing to wide range of financial tools, families according to their priorities, invest on cases such as costs of education, healthcare, healthy and good nutrition or housing. Applicants for Microfinance resources mostly involved family supervisor women, pensioners, homeless people, frugal workers, small farmers and micro entrepreneurs. Journal of American Science 2011; 7(6):1039-1043]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Micro-credit, rural women

Introduction:

Paying part of cost of life by government or charities , establishing forums to analyze family supervisor women's problems , supplying necessary facilities to grow and improve child's life quality and paying facilities to provide sustainable employment , are among most important approaches to support family supervisor women . Paying credit facilities to access sustainable employment with easy terms at limited time, is one of the most important approaches to support family supervisor women. Because alongside supplying their continues needs, their esteem wouldn't be marred. Currently, this approach is used at many countries and positive results have emerged. (Ghaffari, 2000). From 1970, the waves of thought about micro-credits and run of small activity in villages was one of the suitable way get increased for invest improvement in rural occupations.

The said plan because of special grants such as giving loan with low wage and no interest and with long reimbursement could give farmers this opportunity to don't rely usurers and jobber intermediaries. Indeed giving micro-credits to rural women was more effective. Because along agriculture activities which need more investments, the women with using micro-credits couldn't only show their talent in rural production, but also could improve their economic & social empowerments and they could also participate in social activities. (Chabokru et al, 2005).

Women's self-reliance and independency were the outcome of giving credits to women and in some cases were the obstacle of receiving credits by

women which is necessary to explain about them shortly.

As it mentioned before the traditional culture in villages was the reason for weakening women rights and made them oppressed, it is possible that women's self-reliance & financial independency in villages make some crudities (malformation) in the family and village for a short a short time, but we can't disregard it's positive outcome in the social & cultural occasions in the long time, here we will discuss about some of these outcomes (Goetz and Sengupta, 2003)

One of the raised strategy , in order to accelerate investment process and reinforcing financial foundations , and saving , at deprived and rural areas , has been empowering and eradicating poverty of rural societies through efficiency with emphasize on applying micro-credits (Shahnaj and Sajedur, 2009). Micro-loans as useful tool to fight against poverty and starvation, has proven its capabilities and values to develop these areas. These tools have ability to change and improve human's life, especially poor peoples. Micro loans , saving accounts , and giving various bank services , cause this belief in low income and poor family that , by accessing to these services , their income will increase ,so they can protect themselves against barriers of unexpected problems and their current level of life and also invest on nutrition , housing and their children's education.(Varzgar and azizi, 2001)

Accessing to these conditions is among main goals of third millennium program (i.e. eradicating absolute poverty of human societies).

Nowadays micro-credits and supplying micro financial resources, has changed human's life and

cause to revive different societies at poorest and richest countries of world, so that we can see growth in human's power to access to common financial services. By accessing to wide range of financial tools, families according to their priorities, invest on cases such as costs of education, healthcare, healthy and good nutrition or housing.

Applicants for Microfinance resources mostly involved family supervisor women, pensioners, homeless people, frugal workers, small farmers and micro entrepreneurs. These people are divided into four groups: Poor, very poor, relatively poor and vulnerable poor.

Whenever repayment afford, bond terms and accessing to data, in this classification will change, in order to supply sustainable financial needs of various clients, procedures and operation structures will be developed. (Fami, 2001)

Generally, in most countries, micro finance sources are considered for poor women. By women's access possibility to finance services, they committed to loan and ensure its repayment and preserve their saving accounts and also enjoy insurance cover. Supplying programs for micro financial resources have strong message for families and societies. Most of qualitative and quantitative studies and researches have proven that accessing to financial services; will improve women's conditions in family and society. Women's confidence has increased and they are aware of their abilities. (Banihashem, 1999)

Thus, it has proven that supplying financial services for poor peoples is powerful tool to decrease poverty so that make them able to establish finance, increase income and decrease vulnerability against economic pressures.

1- Preferment of women role and their social place:

Women's financial self-reliance can increase the women's social role & place in the villages. In the new condition some of their assignment roles could change to acquisitive roles. The women should use of all their power & energy for doing their acquisitive roles. Thus they can find active view to different functions. The people & groups could increase their social place in the village with improving their social role. If their role and social place preferment be accompanied with the increasing of social intelligence & knowledge, it can have more effect culturally. (Amiri, 2000)

2- Increasing self-confidence:

Self-reliance in different life aspects can increase people's self-confidence. Rural women who are financially independent can live peacefully. With decreasing their problems in life, their self-confidence will increase. And self-confidence is one

of personality & mentally condition for being success in life.

3- Family consistency:

At the first, it seems that rural women's financial independency is not acceptable by their husband and this causes some gaps in their family's relations. But little by little these problems will be solved by increasing the rural people's knowledge. Usually poverty is one of the reasons which will destroy or decrease family's consistency. Women by working and having income can help their husband & family. (Fakhraee, 1381)

4- Change in family's relation:

The rural women with having a job and financial independency can change the viewpoint of people who live in villages and cities and they will not look at the rural women as a weak and dependent people. But also their title and place will increase among their families. So by changing people's view to the women, gently we can see some changes in their family's relation which will have respect to the women's right. By increasing women's knowledge and by introducing new rural institution which give financial & authority service to the women, their stimulus (motivation) for reaching their social rights will increase and they try more than before (Amiri, 2000).

5- Making patriarchy weak in the family:

Gently, with changing family's relation in the villages and by increasing rural people's knowledge, we can make the men and women's right equal and also we won't have patriarchy in the family, although patriarchy has historic and olden root in our villages but with improving women's position and increasing their cultural and social knowledge we can destroy patriarchy in the rural families. (Chowdhury, 2005).

6- Population and family adjustment:

The practitioner women's view about the number of the children is different; studies show that practitioner women are interested to fewer children to the house keeper women.

By decreasing families in the village and women's financial independency we are more hopeful to adjust family's population in the future because villages have important role in the population increase in Iran. (Shaditalab 75).

The role of micro-credits in rural economy:

The first application of micro-credit was about 20 years ago with the establishment of Grumman Bank in Bangladesh. This bank, providing credit for the poor (particularly women as 94% of its clients are them), has managed to increase income and economic

welfare. Now the program is running in most parts of world especially Asia, Africa and Latin America. One interesting point is that unlike prior perceptions, the poor covered by micro-credit programs has been very successful in paying back their loans.

In the countries that credits are provided in a proper financial manner, not only it has increased production and income but also it has encouraged poor to save a part of their income. These savings can be an important support for the institutes providing micro-credits and can be a financial base for more loans and all these result in institutes' financial dependence.

With the new way of micro-credit payments, in addition to covering poor's financial needs, a combination of other services and facilities are available for them; such as saving accounts, educational services, and cooperation possibilities (Goetz and Sengupta, 2003).

If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live with out dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Conclusion:

Many studies have proven that women's access to mentioned facilities may improve their conditions in family and society; it also helps them feel more self-confident and makes them aware of their own abilities. Thus providing micro-credit services for the poor in society is a powerful tool to reduce poverty and so that they are able to create assets, earn more money and become less vulnerable against the economic pressure. Of about 1.3 billion poor in the world there are 900

million poor women, this obviously shows that poverty has a feminine face. According to UN's development fund, 10% of world's income and less than 10% of world's assets belongs to women. While a majority of them never possess the capital needed for their activities, women still play an important role in the economic development of country. Therefore women draw the micro-credit policy maker's attention more than others. Choosing women as the main target of micro-credit plans is an effective strategy to eradicate poverty; because their income will upgrade the family welfare; furthermore earning money improves their social status. In some countries this choice is influenced by society's attitude and culture (Araghzadeh, 2002).

For instance founder of Grumman Bank of Bangladesh, Mohammad Yunes, has stated that: "women have plans for themselves, their children, and their family life; they always have an overlook while men just look for fun" to explain why 94% of their clients are women.

Women's access to micro-credits have shown that their income benefit to improve their family and provide livelihood. In addition to all these another reason of women being the target of micro-credit plans is that women have higher loan recovery rates. Totally, expanding women's access to micro-credits may lead to many useful results which in economy is mentioned as "virtuous spiral"; because their access to micro-credits results in family welfare and in a broader point it'll improve community's welfare and shall be increased welfare this process is repeated.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive effects on their demand about health care. Fiona Steele and et al (2008) in researches that conducted as called "influences of credits programs on empowering women at Bangladesh", found that women who joined to credits programs, have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash.

Shahnaj and Chaudhury(2009) in research as "credits and its role on empowering women" concluded that there is meaningful relation between attending in credits programs and empowering women, at economical dimensions.

Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability.

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

A study conducted by Chabokru et al (1384) shows the crucial importance of micro-credits for farmers who do

not possess physical financial assets (land, building, livestock, well...) and work in agricultural sector because of environmental conditions (such as living in a village) or because it's their ancestral occupation.

So today, women's participation in sustainable economic, social, and cultural development in rural areas is not optional but an essential matter. Those communities that have not seriously considered the necessity of participation faced failures and delayed community's development, welfare and security process. In any community, village, or social group, broad participation of every women in decision-making and any other matter related to national or local development programs, is a key variable in social sciences and in the last few decades, it has interested many scholars of socio-economic and especially cultural issues, and is considered as one of the most fundamental democratic rights of women in a society. As we know in a popular participation, all people are given the opportunity to participate in planning and decision making for their society and for their own future. When in practice women feel that they can be involved in planning, policy making and deciding or solving problems in the society certainly they'll feel more solidarity and become more interested in social, economic, and cultural development programs.

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Function of micro-credit in increasing rural women's participation

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Abstract: Being high and low of each one is depended on various conditions and terms so it is varied from one society to another society. In Iranian rural societies, cultural and social context is such that, consequences of these phenomena maybe being different and sometimes contradictory. However these actions caused that women stand in good economic condition and also gain self reliance and rely themselves with no help from husbands, but dominant cultural space on villages may create some disorders. At most of villages in Iran, patriarchal with all features dominate and women's financial self reliance may not being pleasant for some human and rural groups. When women gain financial independence in villages, impacts and social and cultural consequences would emerge. Journal of American Science 2011; 7(6):1044-1048]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: micro-credit, participation, rural women

Introduction:

Paying credit facilities to access sustainable employment with easy terms at limited time, is one of the most important approaches to support family supervisor women. Because alongside supplying their continues needs, their esteem wouldn't be marred. Currently, this approach is used at many countries and positive results have emerged. (Ghaffari, 2000). Aforementioned plan, due to containing special advantage such as giving accessible loan with low commission fee and no interest rate and also long-term repayment, could provide chances for many farmers to release from dealers and broker jobbers. In this approach, giving micro-credits to rural women seems more effective. because alongside agricultures activities that needed more investments , women by enjoying of very micro-credits not only could create remarkable creativities in rural productions but also gained worthy economic and social abilities , and even improved their field of social presence , well . (Lahsaeizadeh, 2000).

If rural women can work through receiving credits , loan and others finance facilities at favorite jobs and live through earned income (as it called "self-reliance and independence") , so undoubtedly we would see changes in social, economic and cultural relations of village.

Here, Basic issue is that if changes happened following of these events in villages, have positive aspects or negative? Naturally, every change in institutions and social phenomena has both positive and negative dimensions. (Farghdan, 2001)

Increasing Suffrage, lack of relying on vast patriarchal families, increasing cultural acknowledgment, relation with newer institutions, having intellectual independence, making decision

for marrying, occupation, emigration and etc are those rights that they gain. gaining aforementioned

rights by women in context of cultural and social framework followed some changes that maybe lead to disfunctions and even create disorders and abnormalities at traditional , familial and kinship relations that dominated on villages (Fakhraee 2002)

What that performing credits programs, has made in recent years, was on broad outlook with purpose to access to same results as above findings.

Thus, in one inclusive outlook , it is possible to use micro-credits programs to solve those issues which involved with rural women's economic limitations , so that lead them toward social empowerment, in the context of economic growth(Rahmani andalibi, 2001) .

Micro-loans as useful tool to fight against poverty and starvation, has proven its capabilities and values to develop these areas. These tools have ability to change and improve human's life, especially poor peoples. Micro loans , saving accounts , and giving various bank services , cause this belief in low income and poor family that , by accessing to these services , their income will increase ,so they can protect themselves against barriers of unexpected problems and their current level of life and also invest on nutrition , housing and their children's education.(Varzgar and azizi, 2001)

Accessing to these conditions is among main goals of third millennium program (i.e. eradicating absolute poverty of human societies).

In micro-credits programs other than offering and distributing micro loans, there are also small savings and deposits so that they are designed as form of saving-credit programs. The existing term in phrase "micro-credits" points to two basic concepts that is due to dominant perspective on this approach. First term (i.e. credits) points to rural areas and lack of access for many villagers to formal resources that are one of their major problems. And at system of micro-

credits, are tried to decrease poor families' access barriers to credit sources and also to increase effectiveness of these markets. Second term (i.e. micro) emphasize on deficiency of development, according to classic economist's method. Emphasizing on concept of "micro" means revising recommendations of market economy at rural society's development.

Rural women participation:

As most men leave the village to work in town, women provide much of the agriculture force in the area. In recent years the situation has been more considerable as rural migration to town is getting more. In most Iranian villages women's population is more than men. According to FAO's reports, in some African regions, for 60% of families, women are responsible for supervising family. Even for cases that men are the direct responsible of production affairs, women's role in family economy can't be denied just because they don't get paid. Although these efforts appear to register in none of official statistics, they easily replace some other activities with significant financial value.

Studies by FAO show that more than half of the world's crops are collected by women. According to estimates, 1.3 billion of world's poor are women, thus the slogan "poverty has a feminine face" is spread worldwide.

Given that in many parts of the world, the production potential of women is not used properly, a cost-benefit study by the World Bank shows that investing on women in developing countries will be more profitable than any other investment. In addition to financial benefits of this huge force, its ancillary results will also be useful. The ancillary benefits of women's employment include: lower population growth and children mortality rates (Navab Akbar, 1997).

Rural women are a big part of productive force and in developing countries third to half of them are supervising households; as a result they face numerous problems, such as:

- Lack of access to social and health facilities
- Various daily chores inside and outside the home
- Men's skill and increase of women's responsibility
- Lack of professional to educate women

Around the world and in Iran, the issue related to female employment, especially in rural areas (which is a manifestation of participation), is not unemployment but unpaid employment; because all the unpaid work done by women at home, such as cleaning, washing, nursing, social affairs, agriculture and livestock,... are encountered as non-economical activities; While visible economic sector cannot continue to exist without this invisible sector's goods and services. On the other hand, rise of industrial system and expansion of factory job all over the world, attracted men to these economic systems and this has given men an objective vision; Whereas, the majority of women, due

to working alone at home have got a subjective vision. Now, as women enter labor market and start to participate, they'll become objectified; because the work system will encourage them to think like men. Being more around the house and their local area will help both men and women in terms of subjectivity and objectivity (Arab-Mazar and Jamshidi, 2005).

Thus the issue of women's participation has important effects, including:

- Acceleration of plans implementation
- Realization of people's every day needs with cooperation and consultation
- Increasing efficiency and reducing functional expanses of projects
- Creating opportunities for talent realization and scientific activities
- Creating sense of solidarity and cooperation
- Increase social and personal awareness
- Women, sharing ideas in decision-making and determining their own destiny
- Participation of women as an important factor and a major power to achieve development

Therefore, according to preceding discussions and importance of women's participation in future plans, it's of great importance to study and recognize the factors affecting their participation in social activities of rural area (Fakhraee, 2002).

Major obstacles to women's participation:

Considering society's current conditions and the issues mentioned above, major obstacles which result in women's less participation can be classified as follows.

1- Social and cultural barriers

Sociologically, women in third world countries- especially in rural areas- believe to be dependent on men.

The thought is deeply attached to their historical beliefs. Thereupon they never share ideas while decision-making or planning. As some sociology and politic experts stated, it's the reason they have developed "the silence culture" and they never let themselves to comment on, or participate in planning.

In addition, customs and prejudices that they have been trained with, indirectly affects women's participation. Such ideology of knowing a sex to be lower than the other is a crippling disease that causes a big part of mental and power sources of community remain disadvantaged. These are all prejudice emphasizing on men's value and denying those of women (Changizi Ashtiani, 2003).

2- Economical barriers

One of the factors indicating development progress is how and how much different classes of society participate in vital activities. Although importance of women's participation has always been completely apparent, the appropriate balance between men and women in different fields is not yet established in our country. As women can only possess a limited sort of jobs and also they always have the smaller share of each job opportunity, they are not able to compete in labor market. What's more, mostly they do not own the capital needed for economical participation, so providing personal credits can solve their problem in some extent.

3- Structural barriers

In fact, in most countries, governing power, marketing and production conditions and some values related to them, create serious structural barriers to women's participation. According to United Nations' research institute of second development program, these structures are anti-participation; because they lead to unequal access to the control of wealth and social status. They cause failure of many national-regional innovations encouraging participation, and finally make a small group be responsible for everything and we won't have the beneficial results associated with women's participation. The structure determines the conditions of participation and reacts strongly to any renovation. Its objective is to keep women in their position as a labor. Labor market divides the jobs in workshops and factories in a way that some occupational fields are only for women and some other only for men. Men are chosen to be the administrator in all professions and it's assumed that women are not interested in or not able to handle these positions. Thus, in practice the world of production and work is subject to gender discrimination.

4- Educational barriers

Apparently, one essential factor for development is education. Studies indicate that compared with men and boys women and girls do not have sufficient access to education. Some of the factors effecting women's access to education are:

1. Great need of parents to their daughters as labor force
2. Lack of access to educational experts and planners
3. Lack of schools or proper places for girl's education

4. Mixed classes for boys and girls and rural bias on this issue
5. Education expenses
6. Lack of attention to the importance of girls' roles
7. Social, cultural and traditional beliefs about girls
8. Early marriage

Report by UNICEF, claims that literacy rate of women in developing countries is two third of men's, and of about 860 million illiterate adult worldwide, 640 million are women who never had the possibility to go to school or have left school unfinished (Bakhshoodeh and Salami, 2005).

5- Political and organizational barriers

In third world countries, women face with many obstacles for participation in decision making, planning, implementation, and evaluation of projects related to country's developing plans. Although, the structure of the country play an important role in making suitable conditions for participation in different areas, but because they have focused plans and such decisions are made by public organizations and official systems, usually the potential force of participation in society will be palled and in practice, participation will face serious obstacles and problems. A focused government always encourages focused official structures. Such a structure is a major barrier to women's participation. They control structures and systems resource allocation and information and knowledge people need to participate in social activities, besides they never let people and especially women control all these. So it's apparent that such programs are either not comprehensive or it's facing problems because designers are not aware of the realities in their community.

6- Barriers related to wife-mother role

UNICEF reports indicate that women's work hours is 25% longer than men's; because a large number of them work at home to produce livelihood products without payment.

The main role of all women in each society is the role of mother and wife; therefore every other matter such as their employment is subject to these roles. Possibility of finding a job (as administrator or in a lower rank) for a girl is affected by various factors including educational level and their socialization method as a child. They have always been thought that they are not

identical to boys in terms of social privileges or social status. Emphasize on the roles of mother and wife may make women think there is no need to promote their social status and in the other hand society will not provide necessary facilities for their development. In this situation they are prevented from studying and schooling. This issue will still be a problem after they are married. It should be noted that with women getting paid, total household's welfare improves; because field studies claim that all women earning money, spend their income on their family and particularly children's needs.

So we should mention that not only participation is a woman's civil right but also it will make her more autonomic, and she'll become more creative and innovative.

Discussion and results:

Women's access to micro-credits have shown that their income benefit to improve their family and provide livelihood. In addition to all these another reason of women being the target of micro-credit plans is that women have higher loan recovery rates. Totally, expanding women's access to micro-credits may lead to many useful results which in economy is mentioned as "virtuous spiral"; because their access to micro-credits results in family welfare and in a broader point it'll improve community's welfare and shall be increased welfare this process is repeated.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive effects on their demand about health care. Fiona Steele and et al (2008) in researches that conducted as called "influences of credits programs on empowering women at Bangladesh", found that women who joined to credits programs, have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash.

Shahnaj and Chaudhury (2009) in research as "credits and its role on empowering women" concluded that there is meaningful relation between attending in credits programs and empowering women, at economical dimensions.

Maybe the main challenges that threaten credits associations, is lack of necessary emphasizes on social dimensions and on reinforcing their basics, that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution.

Fiona Steele and et al (2008) in researches that conducted as called "influences of credits programs on empowering women at Bangladesh", found that women who joined to credits programs, have participated in more educational programs and have married with more

educated men and also they have saved more and they had more cash.

Ellen and her Colleagues (2009) used approach called it "credits and education at Bolivia, Ghana, Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Ruhal Amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't.

Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability.

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

A study conducted by Chabokru et al (1384) shows the crucial importance of micro-credits for farmers who do not possess physical financial assets (land, building, livestock, well...) and work in agricultural sector because of environmental conditions (such as living in a village) or because it's their ancestral occupation.

So today, women's participation in sustainable economic, social, and cultural development in rural areas is not optional but an essential matter. Those communities that have not seriously considered the necessity of participation faced failures and delayed community's development, welfare and security process. In any community, village, or social group, broad participation of every women in decision-making and any other matter related to national or local development programs, is a key variable in social sciences and in the last few decades, it has interested many scholars of socio-economic and especially cultural issues, and is considered as one of the most fundamental democratic rights of women in a society. As we know in a popular participation, all people are given the opportunity to participate in planning and decision making for their society and for their own future. When in practice women feel that they can be involved in planning, policy making and deciding or solving problems in the society certainly they'll feel more solidarity and become more interested in social, economic, and cultural development programs.

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Workplace Violence - A Survey of Diagnostic Radiographers in Ismailia Governorate Hospitals, Egypt

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Abstract: Violence in hospitals is becoming more frequent and more aggressive worldwide. Radiographers, as members of the frontline hospital personnel are at increased risk of workplace violence. So, this study aimed to determine the magnitude and the nature of workplace violence towards radiographers in hospitals, to identify its risk factors, and to study its impact on victims. All diagnostic radiographers in Ismailia Governorate Hospitals (n=123), except those who were on extended leaves or who had less than one year clinical experience (n=22), were invited to complete a standardized questionnaire designed specifically to study workplace violence in the health sector. Out of 101 radiographers, 94 agreed to participate in this study (response rate = 93.1%). The majority of the participants (79.8%) had experienced workplace violence of any kind. Verbal abuse was the most common type. Patients' relatives were the main perpetrators. Most of violent incidents were not reported. Easy public access, crowding and noise, understaffing, and long waiting times, were the potential factors contributing to hospital violence. Many negative consequences on the victims' psychological status and work performance have been revealed. It could be concluded that workplace violence towards diagnostic radiographers is a significant problem in hospitals; thus, effective preventive strategies should be designed and implemented.

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Keywords: Workplace violence; diagnostic radiographers; health sector.

1. Introduction:

Workplace violence has become an alarming phenomenon worldwide. It is a major contributor to death and injury in many parts of the world (Merecz *et al.*, 2006). In the United States, homicide is the third leading cause of death in the workplace. In the European Union, 2% of the labor force has been subjected to physical violence at work. However, recent surveys all over the world showed that current figures represent only the tip of the iceberg. So, many international organizations have made efforts to recognize workplace violence in various service sector industries and establish guidelines for its prevention (ILO, ICN, WHO & PSI, 2003 and Chappell & Di Martino, 2006).

Workplace violence affects many occupational groups, especially those in the health industry where violence is becoming a feature of everyday clinical practice (Warshaw & Messite, 1996; Jones & Lyneham, 2000; Lyneham, 2001 and ILO, 2003_a). Frontline hospital personnel such as nurses and radiographers are particularly at higher risk; where patients, patients' relatives, employers, supervisors, or coworkers are usually the possible sources of violence. Poorly designed working environment and long waiting times can trigger violence (Kwok *et al.*, 2006; Kris *et al.*, 2009 and MFL Occupational Health Centre, 2009).

Workplace violence at the health sector can be in the form of physical assault, homicide, verbal abuse, bullying/mobbing, sexual and racial harassment, and psychological stress. It can occur as one single incident or repeated small incidents which together create severe harm including immediate and long-term disruption to interpersonal relationships and to the whole working environment (ILO, ICN, WHO & PSI, 2003).

The global cost of workplace violence is enormous due to causes including; illness, disability and death, absenteeism and sick leaves, accidents, turnover of staff, and reduced work performance (Chappell & Di Martino, 2006).

Although interest in workplace violence in the health sector has grown considerably within the developed world, it still appears to be a "hidden and tertiary issue" in many developing countries (Kamchuchat *et al.*, 2008). Moreover, most hospital surveys have been conducted to determine the magnitude of the problem among nursing staff (Jones & Lyneham, 2000; Kwok *et al.*, 2006 and Abbas *et al.*, 2010). Unfortunately, workplace violence directed at radiographers and other frontline health sector personnel has rarely been researched in developing countries including Egypt, thus the real size of the problem in the health sector is largely unknown till now. So, this study was conducted to

determine the prevalence, nature, and sources of workplace violence among radiographers in Ismailia Governorate hospitals, to identify risk factors contributing to violent incidents, and to study their negative impact on victims in order to suggest appropriate preventive strategies.

2. Methods:

Study design and setting:

This cross-sectional study was conducted throughout the period from November 2010 to February 2011 in all Ismailia Governorate Hospitals (n=11) including; Ministry of Health (n=8), Health Insurance, Suez Canal University, and Suez Canal Authority Hospitals.

Study population:

The total number of diagnostic radiographers in Ismailia Governorate Hospitals at the time of the study was 123, out of them 18 were on extended leaves and 4 were excluded as they had less than one year clinical experience. Thus, 101 radiographers were invited personally to participate in this study.

Ethical issues:

Consent from the Ethical Committee of Scientific Researches in Zagazig Faculty of Medicine was obtained. Also, permissions were obtained from the managers of the hospitals before conducting the study. Moreover, informed consents were obtained from all the participants while interviewing them.

Tools of the study:

All participants were personally interviewed using a questionnaire based mainly on "workplace violence in the health sector - country case study – questionnaire" (ILO, ICN, WHO & PSI, 2003) and other relevant questionnaires (Anderson, 2002 and IAPA, 2007). The questionnaire was translated into Arabic after being modified according to the Egyptian culture, nature of work of diagnostic radiographers, and working conditions in the Egyptian health sector. This questionnaire composed of five main parts;

Part one: included demographic data of the participants such as; age, sex, marital status, current workplace, common work location, clinical experience years, work shift, and staff number present in the same work setting during most of work time.

Part two: included hospital violence description such as; types and common sources of violence as well as victims' responses to violent incidents.

For the purpose of this study, workplace violence was defined as any act in which a person is abused, threatened, intimidated or assaulted during

work, including commuting to and from work, involving an explicit or implicit challenge to safety, well-being or health. Moreover, four types of violence experienced within the health sector were categorized (ILO, ICN, WHO & PSI, 2003; Winstanley & Whittington, 2004; Caruana, 2005; Kris *et al.*, 2009 and MFL Occupational Health Centre, 2009);

- 1) Physical assault: the use of physical force against an individual involving physical contact, such as beating, kicking, slapping, stabbing, shooting, pushing, biting, pinching, and sexual assault, regardless of whether or not an injury was sustained.
- 2) Verbal abuse: the use of words which are personally insulting, such as generally abusive spoken obscenities and foul language, or indicating a lack of respect for the dignity and worth of an individual.
- 3) Threatening behavior: any action that involves signs of violence indicating intention to harm, such as the intention to throw a chair, cause a fight or to verbally threaten an individual.
- 4) Sexual harassment: any unwanted behavior of a sexual nature, including verbal or physical, which is offensive to an individual or for the perpetrator's own sexual gratification.

Part three: included data about participants' knowledge, opinion, and satisfaction regarding workplace violence prevention and reporting procedures.

Part four: included data about factors contributing to hospital violence such as; security measures defects (insufficient security guards and lack of panic alarms), hospital environment and workplace design defects (obstructed escape routes, easy public access, insufficient lightning, noise, and crowding), work organization and training defects (understaffing in work shifts, long waiting times, long working hours and work overload, poor communication, and insufficient training of staff regarding predicting and confronting workplace violence), and factors related to hospitals' location and patients' characteristics (prevalent violence and crimes in the region and alcohol drinking and addiction).

Part five: included data about the negative impact of violent incidents on victims including manifestations and consequences of post-traumatic stress disorder such as; repeated disturbing memories, sleeping difficulties, concentration difficulties, repeated headache, frustration/depression, aggression/anxiety, job dissatisfaction, lack of willingness to work, increased sick leaves, disturbed social relations, need for psychic counseling, alcohol

consumption/addiction, and suicide attempts (Bisson, 2007).

Data management:

Data were computerized and statistically analyzed using SPSS version 19 (IBM, 2010). Chi-squared and Fisher exact tests were used for categorical qualitative variables. Odds ratios (OR) with 95% confidence intervals (CI) were also estimated.

3. Results:

Prevalence and demographic risk factors of workplace violence

Ninety four out of 101 radiographers agreed to participate in this study with a response rate of 93.1%. They were distributed in Ismailia Governorate hospitals as follow; 60.6% in the ministry of health, 21.3% in the Suez Canal University, 12.8% in the Suez Canal Authority, and 5.3% in the Health Insurance. The common work location for all of them was the Radiology Department. The majority of the participants (79.8%) had experienced workplace violence of any kind. Moreover, the present study revealed that young age (< 45 years), male sex, low clinical experience (< 10 years), and rotating work shifts were not significantly associated with workplace violence. Alternatively, married radiographers and those who were working most of their times with staff number ≤ 5 were significantly at higher risk for workplace violence compared to single radiographers and those who were working with > 5 staff members [OR (95% CI) = 10.2 (2.35-45.83) and 6.34 (1.17-35.3), respectively] (Table 1).

Workplace violence description and victims' responses

Respondents who had experienced violence (n=75) were allowed to choose multiple types of workplace violence, verbal abuse was the most common type (98.7%), followed by threatening behavior (46.7%), and physical assault (38.7%); while, sexual harassment was rare (1.3%) (Figure 1).

Violence victims were allowed to choose multiple workplace violence sources, patients' relatives were the main source (100%), followed by patients themselves (50.7%); while, minority of victimized respondents had suffered violence from managers/supervisors/heads of departments as well as from their colleagues (8% and 2.7%, respectively) (Figure 2).

Victimized respondents were allowed to indicate multiple responses on this issue; where it

was revealed that the majority of them reported the incidents to senior staff/head of department/manager, called security/police, or tried to warn the attacker (85.3%, 77.3%, and 58.7%, respectively); while, minority of them tried to defend themselves verbally or physically, completed an incident form, or asked help from colleagues (14.7%, 5.3%, 2.7%, and 1.3%, respectively). On the other hand, none of them ignored the incident, pursued prosecution, or completed a compensation claim (Table 2).

Participants' knowledge, opinion, and satisfaction

The majority of respondents (97.9%) considered most of violent incidents are preventable. Moreover, 93.6% of them knew about the existence of hospital violence reporting procedures. However, 60% of respondents with occupational violence experience were not satisfied about the existing reporting and investigation procedures (Table 3).

Factors contributing to workplace violence

Respondents were allowed to choose multiple risk factors of hospital violence, the majority of them (92.6%, 81.9%, 72.3%, 71.3%, and 67%, respectively) considered easy public access, crowding and noise, understaffing, insufficient security staff, and long waiting times as major risk factors. However, lower proportions (47.9%, 44.7%, and 37.2%, respectively) considered that prevalent violence and crimes in the region, insufficient staff training, alcohol drinking and addiction, and long working hours/work overload as important risk factors. Other factors such as, insufficient lightning, lack of/obstructed escape routes, poor communication, and lack of panic alarm/cell phones were not considered to be major contributing factors for hospital violence (Table 4).

Impact of workplace violence on victims

Violence victims (n=75) were allowed to choose multiple manifestations and consequences of post-traumatic stress disorder; where the majority of them complained of lack of willing to work, repeated headache, job dissatisfaction, and concentration difficulties (78.7%, 73.3%, 66.7%, and 50.7%, respectively); while, lower proportions reported aggression/anxiety, frustration/depression, increased sick leaves, repeated disturbing memories, disturbed social relations, and sleeping difficulties (49.3%, 32%, 24%, 21.3%, 16%, and 12%, respectively). While, none of them reported psychic counseling need, alcohol consumption/addiction, or suicide attempts (Table 5).

Table (1): Prevalence and demographic risk factors of workplace violence towards the studied diagnostic radiographers.

<i>Variables</i>	<i>Total participants (n = 94)</i>	<i>Experienced violence (n = 75)</i>	<i>OR (95% CI)</i>
Age (years)			
< 45	72 (76.6%)	59 (81.9%)	1.7
≥ 45	22 (23.4%)	16 (72.7%)	(0.45 – 5.76)
Sex			
Male	73 (77.7%)	60 (82.2%)	1.85
Female	21 (22.3%)	15 (71.4%)	(0.49 – 6.31)
Marital status			
Married	81 (86.2%)	70 (86.4%)	10.2
Single	13 (13.8%)	5 (38.5%)	(2.35 – 45.83)*
Experience years			
< 10	44 (46.8%)	36 (81.8%)	1.27
≥ 10	50 (53.2%)	39 (78%)	(0.41 – 3.95)
Work shift			
Rotating	59 (62.8%)	49 (83.1%)	1.7
Morning	35 (37.2%)	26 (74.3%)	(0.55 – 5.26)
Staff number			
≤ 5	85 (90.4%)	71 (83.5%)	6.34
> 5	9 (9.6%)	4 (44.4%)	(1.17 – 35.3)*

NB. * Statistically significant result.

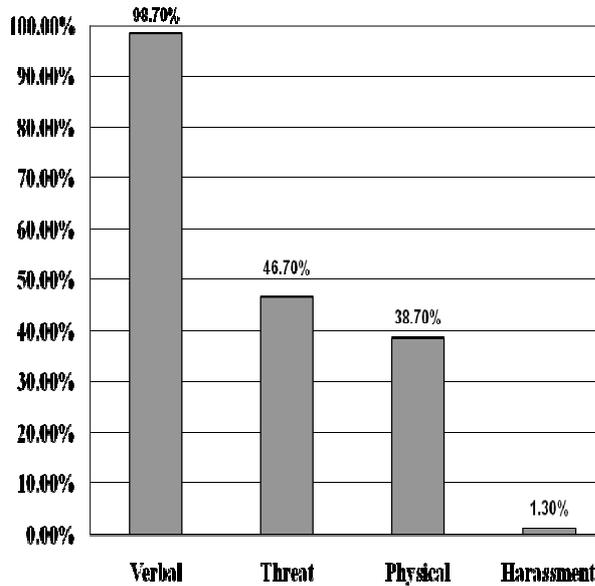


Figure (1): Frequency distribution of victims according to the reported types of workplace violence.

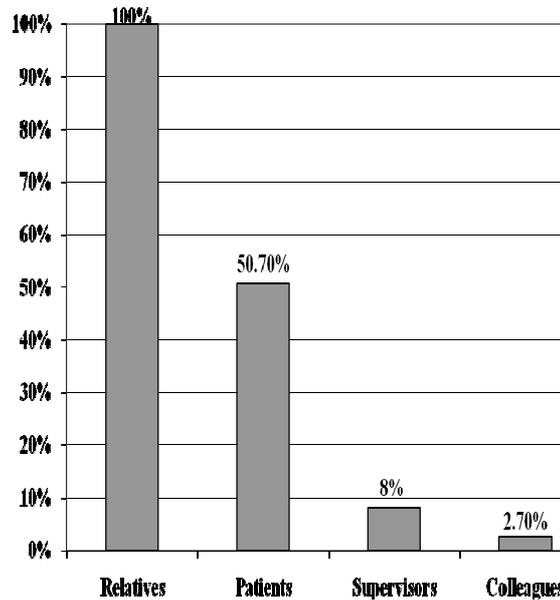


Figure (2): Frequency distribution of victims according to the reported sources of workplace violence.

Table (2): Victims' responses to workplace violence

<i>Responses</i>	<i>Violence victims (n =75)</i>
Reported to senior staff/head of department/manger	64 (85.3%)
Called security/police	58 (77.3%)
Tried to warn the attacker	44 (58.7%)
Tried to defend verbally	11 (14.7%)
Tried to defend physically	4 (5.3%)
Completed an incident form	2 (2.7%)
Asked help from colleagues	1 (1.3%)

Table (3): Participants' knowledge, opinion, and satisfaction regarding workplace violence prevention and reporting procedures.

<i>Knowledge and opinion</i>	<i>Total participants (n = 94)</i>
Considering violent incidents are preventable	92 (97.9%)
Knowing of existing workplace violence reporting procedures	88 (93.6%)
<i>Satisfaction level</i>	<i>Violence victims (n = 75)</i>
Not satisfied	45 (60%)
Satisfied to some extent	29 (38.7%)
Very satisfied	1 (1.3%)

Table (4): Factors contributing to workplace violence.

<i>Contributing factors</i>	<i>Total participants (n = 94)</i>
Easy public access	87 (92.6%)
Crowding and noise	77 (81.9%)
Understaffing	68 (72.3%)
Insufficient security staff number	67 (71.3%)
Long waiting times	63 (67%)
Prevalent violence and crimes in the region	45 (47.9%)
Insufficient staff training	42 (44.7%)
Alcohol drinking and addiction	35 (37.2%)
Long working hours/work overload	35 (37.2%)
Insufficient light (inside/outside)	25 (26.6%)
Lack of/obstructed escape routes	18 (19.1%)
Poor communication	16 (17%)
Lack of panic alarm/cell phone	10 (10.6%)

Table (5): Impact of workplace violence on victims.

<i>Negative impact</i>	<i>Violence victims (n =75)</i>
Lack of willing to work	59 (78.7%)
Repeated headache	55 (73.3%)
Job dissatisfaction	50 (66.7%)
Concentration difficulties	38 (50.7%)
Aggression/anxiety	37 (49.3%)
Frustration/depression	24 (32%)
Increased sick leaves	18 (24%)
Repeated disturbing memories	16 (21.3%)
Disturbed social relations	12 (16%)
Sleeping difficulties	9 (12%)

4. Discussion:

The present study showed that the majority of the studied radiographers (79.8%) had experienced workplace violence of any kind. Closely similar results were revealed by many international studies, where more than 50% and even up to 100% of health care providers in hospitals experienced violent incidents (Lyneham, 2001; May & Grubbs, 2002; Wells & Bowers, 2002; Hegney *et al.*, 2003; Uzun, 2003; Mayhew & Chappell, 2005; Kwok *et al.*, 2006 and Ryan & Maguire, 2006). Moreover, the result of the present study confirms those of previous similar studies conducted on radiographers in Ireland (Healy *et al.*, 2002) and Hong Kong (Kris *et al.*, 2009), however in those studies slightly lower proportions of the respondents reported experience of workplace violence (63% and 61%, respectively). On the contrary to our results, much lower prevalence of workplace violence (27.7%) was reported by two Arabian studies conducted on nurses in Ismailia Governorate hospitals and primary health care centers, Egypt (Abbas *et al.*, 2010) and on primary health care workers in Al-Hassa, Saudi Arabia (El-Gilany *et al.*, 2010). These discrepancies in the results could be attributed to the differences between countries, health service level, health care professions, and patients' characteristics. Moreover, hospitals' characteristics including their geographical distribution, size, and the number of population being served have a major role in determining the magnitude of workplace violence; where the lower the education level and socioeconomic status of the population as well as the larger the hospital and the greater the number of patients being served with very high levels in services such as Accident and Emergency and Psychiatry the higher the incidence of workplace violence (Hesketh *et al.*, 2003; Ryan & Maguire, 2006; Gascón *et al.*, 2009 and Kris *et al.*, 2009). Furthermore, most of these studies varied in their definition of workplace violence and the recall period (Kwok *et al.*, 2006).

The present study revealed that young age (< 45 years), male sex, low clinical experience (< 10 years), and rotating work shifts were not significantly associated with workplace violence. Alternatively, married radiographers and those who were working most of their times with staff number ≤ 5 were significantly at higher risk for workplace violence compared to single radiographers and those who were working with > 5 staff members [OR (95% CI) = 10.2 (2.35-45.83) and 6.34 (1.17-35.3), respectively]. The result of the present study agrees with those of other studies, where it was suggested that the role relationship with patients, not the gender was the predictor of violence (Binder & McNeil, 1994; Healy *et al.*, 2002 and Kris *et al.*, 2009). Moreover, our

result confirms that of another study conducted on radiographers in Hong Kong where low experience didn't increase the risk of workplace violence (Kris *et al.*, 2009). On the contrary to our results, young age and shorter duration of employment were revealed to be the determinants of violence towards radiographers (Healy *et al.*, 2002) and nurses (Chou *et al.*, 2002 and Chen *et al.*, 2009). Regarding shift work, the finding of the current study is consistent with that of a previous similar one, which revealed that violent incidents may occur at any time thus hospitals should allocate at least one experienced radiographer in each shift (Kris *et al.*, 2009). Alternatively, other studies found that night shifts pose more risks than other time periods and have recommended that more experienced staff should work during these periods (Ayranci, 2005 and Caruana, 2005). Moreover, the results of the present study disagree with those of an Egyptian study conducted on nursing staff, where males, those who were commonly working in night shifts, and those in a place crowded with colleagues were significantly more exposed to violence. Moreover, being single posed no higher risk of exposure to violence than being married (Abbas *et al.*, 2010). These discrepancies may be due to the variations between those studies and the present one regarding the cut off point of the experience years and the age of the participants as well as the differences between nurses and radiographers regarding educational and training years and job tasks. Furthermore, marriage can lead to increased risk of violence, where it has been suggested that accumulation of stress and tension from familial and societal problems in demanding health occupations can contribute to emerging violence (ILO, 2003_b).

In the present study, verbal abuse was the most common type of violence (98.7%), followed by threatening behavior (46.7%), and physical assault (38.7%); while, sexual harassment was rare (1.3%). These findings are closely similar to those of the Hong Kong study, where verbal abuse was the most common type of violence (96.7%), followed by threatening behavior (34.1%) and physical assault (20.9%); while sexual harassment was also rare (3.2%) (Kris *et al.*, 2009). Similarly, an Australian survey involving radiographers revealed that the most frequent violence categories were verbal abuse, followed by threats of physical violence [Caruana, 2005]. Moreover, different research studies conducted in Israel, Hong Kong, Turkey, England, Spain, and Egypt found that verbal abuse ranged from 43% to 91% ; while physical violence ranged from 5.3% to 33% (Carmi-Iluz *et al.*, 2005; Kwok *et al.*, 2006; Celil *et al.*, 2007; Whittington & Shuttleworth, 2008; Gascón *et al.*, 2009 and Abbas *et*

al., 2010). Thus, it was suggested that despite the variable range of the reported workplace violence there is a consensus that the most commonly encountered type is verbal abuse (Atawneh *et al.*, 2003; Uzun, 2003 and Mayhew & Chappell, 2005).

The present study revealed that in all violent incidents patients' relatives were the main perpetrators. Moreover, a significant portion of violence and abuse was committed by patients (50.7%); while, managers/heads of departments/supervisors as well as colleagues represented minor sources for workplace violence (8% and 2.7%, respectively). The findings of the present study partially agree with those of other studies, where patients followed by their relatives were the major sources of workplace violence towards nurses and radiographers. Moreover, colleagues, seniors, managers, and doctors were not the sole perpetrators of workplace violence (Hesketh *et al.*, 2003; Kwok *et al.*, 2006; Kris *et al.*, 2009 and Abbas *et al.*, 2010). Our findings could be attributed to the easy hospital access of patients' relatives as well as to the job tasks of diagnostic radiographers in most hospitals that requires not only close contact with patients, as in positioning, but also dealing with their upset and worried relatives as described by another similar study (Kris *et al.*, 2009). Moreover, it was reported that patients may be a source of violence due to an emotive state such as anxiety, frustration, and anger due to restriction from usual activity, unrealistic expectation of the service, or being in pain (Caruana, 2005). Also, our results agree with those of another study, where it was suggested that internal violence shouldn't be overlooked as it may contribute to some incidents (Lee, 2006).

Regarding victims' responses towards workplace violence, the majority of them reported the incidents to senior staff/head of department/manager, called security/police, or tried to warn the attacker (85.3%, 77.3%, and 58.7%, respectively); while, minority of them tried to defend themselves verbally or physically, completed an incident form, or asked help from colleagues (14.7%, 5.3%, 2.7%, and 1.3%, respectively). On the other hand, none of them ignored the incident, pursued prosecution, or completed a compensation claim. Health care providers' responses towards violence partially differed in other studies, where the most common response was taking no action; the next common response was either to get help from co-workers/security or trying to defend themselves verbally; then warning the attacker; followed by reporting to senior staff. While, in those studies and ours, only a minority of the victims completed an incident form. The researchers of those studies suggested some factors that may contribute to such

response including; being afraid of what others would think of them, perceiving violence as part of their jobs, believing that reporting is not helpful, or insufficient training not only in recognizing signs of violence, but also in managing violent situations (Hesketh *et al.*, 2003; Ayranci, 2005; Caruana, 2005 and Kris *et al.*, 2009). The current study revealed a surprising result regarding this issue, where the majority of violence victims responded in a more correct way and a minority of them had self-defeating attitudes compared to those in the previously mentioned international studies. Our finding could be attributed to the higher prevalence of workplace violence towards the studied group that helps them in gaining better experience in predicting and confronting violent incidents.

In this study, the majority of respondents (97.9%) considered most of violent incidents are preventable. Moreover, 93.6% of respondents knew about the existence of hospital violence reporting procedures. However, 60% of violence victims were not satisfied about the existing reporting and investigation procedures. These findings partially agree with those of another study, where over half the respondents (56%) considered violence to be preventable; while, only 40% of them knew of existing guidelines on violence in their own hospitals and a minority (23.3%) found the support from their department was adequate (Kris *et al.*, 2009). Moreover, in an Egyptian study, over half the exposed nurses (55.8%) thought that violence events were preventable (Abbas *et al.*, 2010). The findings of the present study were also supported by those of a previous survey study, where most radiographers were not satisfied with the management procedures as they felt that the management impress that the patients have rights, but this does not extend to the staff (Caruana, 2005).

Many environmental and patients-related risk factors of workplace violence were largely explored in many studies (Chen *et al.*, 2009). Moreover, the results of several studies revealed that violence in the health sector is influenced by underlying structural and situational risk factors (Viitasara & Menckel, 2002). Regarding this issue, the results of the current study revealed that the majority of the respondents (92.6%, 81.9%, 72.3%, 71.3%, and 67%, respectively) considered easy public access, crowding and noise, understaffing, insufficient security staff, and long waiting times as major risk factors. However, lower proportions (47.9%, 44.7%, and 37.2%, respectively) considered that prevalent violence and crimes in the region, insufficient staff training, alcohol drinking and addiction, and long working hours/work overload as important risk factors. Other factors such as, insufficient lightning,

lack of/obstructed escape routes, poor communication, and lack of panic alarm/cell phones were not considered to be major contributing factors for hospital violence. These findings partially agree with those of other studies, where long waiting hours, crowding, poor security, poor communication, understaffing, alcohol and other substance abuse (Tiihonen *et al.*, 1997 and Wallace *et al.*, 1998), patients with psychological problems (Nijman *et al.*, 2002), and work overload and long working hours were considered as potential provoking factors for violent events (Healy *et al.*, 2002; Di Martino, 2003; Ayranci, 2005; Caruana, 2005 and Kris *et al.*, 2009). So, the findings of the current study highlighted some important defects in hospitals' environment and work design, work organization, and security measures as potential factors contributing to workplace violence.

Although, recognizing the severity of workplace violence problem is essential, further investigation of the impact of such violence can benefit the whole profession (Kwok *et al.*, 2006). Thus, the present study investigated this issue and revealed that considerable proportions of violence victims had reported one or more of post-traumatic stress manifestations and consequences such as; lack of willing to work, repeated headache, job dissatisfaction, concentration difficulties, aggression/anxiety, frustration/depression, increased sick leaves, repeated disturbing memories, disturbed social relations, and sleeping difficulties. While, none of them reported psychic counseling need, alcohol consumption/addiction, or suicide attempts. These findings support those of other studies, where it was revealed that violence at work can trigger a range of psychological and emotional outcomes in victims such as anxiety, anger, fear, depression, increased stress, and sleep disturbances (Di Martino, 2003; ILO, 2003; Winstanley & Whittington, 2004 and Kris *et al.*, 2009). Moreover, many studies reported the negative impact of workplace violence on job satisfaction, willingness to work, eagerness in the profession, and work performance which in turn directly had negative impact on patient care and consequently the effectiveness of the health care system (Arnetz & Arnetz, 2001; Hesketh *et al.*, 2003 and Kris *et al.*, 2009).

5. Limitations of the study:

The present study is a cross-sectional one that aimed to obtain a generalized overview about workplace violence towards diagnostic radiographers in hospitals throughout the whole years of their clinical profession, thus it would have been subjected to recall bias. Moreover, despite of using standardized and clear definitions for different types

of workplace violence, the feeling of being abused is very subjective.

6. Conclusions and recommendations:

Findings of this study revealed that diagnostic radiographers in hospitals are at high risk of workplace violence. The most common type of violence was verbal abuse. However, threatening behavior and physical assault were not uncommon. Patients' relatives were the main perpetrators in all violent incidents. Although, the majority of respondents knew about the existence of hospital violence reporting procedures, most of violent incidents were not reported as most of victims were not satisfied about the existing reporting and investigation procedures. Hospital environment and work design defects, poor work organization, and insufficient security measures were the potential factors contributing to workplace violence. Many negative consequences of workplace violence on the victims' psychological status and work performance have been revealed.

So, there is an urgent need to control workplace violence in hospitals, which requires active collaboration between managers and health care providers in identifying and assessing the risk for violence and developing a workplace violence prevention policy and program in consultation with the hospital health and safety committee. The policy should outline reporting and incident investigation as well as ways for eliminating or mitigating the risk of violence including; improving working environment, workplace design, work organization, and styles of management; providing greater opportunities for training of radiographers to address workplace violence; and providing victims with counseling and employees assistance programs. Moreover, continuous research efforts must be supported to improve the safety of health personnel worldwide.

Competing interests:

The authors declare that there are no competing interests. Moreover, this research paper was financed by the authors of the study.

Authors' contributions:

Reem A Abbas; designed the study, modified the questionnaire, analyzed the data statistically, and wrote and revised the manuscript. Selim F Selim; interviewed the participants, collected the data, and revised the manuscript.

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Smoking Behavior, Knowledge and attitudes among Medical Workers in the National Cancer Institute, Cairo University

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Abstract: The aim of this study was to assess smoking behavior of medical workers in the National Cancer Institute (NCI), their knowledge and attitude towards smoking. This is a cross-sectional survey with anonymous self-administered questionnaires for physicians and nurses. It included three sections; 1) demographic data, 2) questions about knowledge of smoking hazards, religious and lawful aspects and 3) questions regarding smoking status and attitude towards quitting and prohibiting smoking in work and public places. Participants were 246; 185 responded (75.2%). Smokers constituted 25.4% of the sample. Responding current smokers were 37. The majority of smokers reported previous trials to quit, mainly due to health concern (73.3%). All workers know that smoking is harmful to health, the majority were positive about the hazard of passive smoking as well. Ever-smokers showed a negative attitude towards total prevention of smoking at workplace; however, current smokers react positively to smoking restriction in work and public places, about 2/3 stop immediately when confronted by a stop smoking sign. Twenty-seven workers (73%) reported less smoking in response to restriction. A large percent (73%) smoke in presence of nonsmokers, however nearly 92% respond to a colleague's demand to stop smoking. It is concluded that smoking remains a common habit among medical works in the NCI in spite of having a good knowledge about its hazards and direct contact with smoking victims. We should search for the suitable approach for this category of smokers to motivate them to quit other than talking about health hazards. [Manar M. Moneer, Nargis A. Labib and Maissa K. Noaman. **Smoking behavior, knowledge and attitudes among medical workers in the national cancer institute, Cairo University.** Journal of American Science, 2011;7(6):1059-1064]. (ISSN:1545-0740). <http://www.americanscience.org>

Keywords: Smoking, Knowledge, attitude, medical workers.

1. Introduction

Smoking and the use of other tobacco products has been linked to a wide range of detrimental health outcomes including cancer, cardiovascular disease and respiratory illness (WHO, 2008). The risks affect not only smokers themselves but other individuals who are exposed to second-hand tobacco smoke or "environmental" tobacco smoke (ETS); the latter has been shown to contribute to a number of adverse health effects including increased risk of respiratory and cardiovascular illnesses (WHO, 2007). The Egypt Demographic and Health Survey (EDHS) 2008 (El-Zanaty & Way, 2009) reported a prevalence of use of tobacco products of more than 40 percent of men and less than 1 percent in women. Among men, 35 percent reported smoking cigarettes only while 9 percent said they used other forms of tobacco, in some cases in addition to cigarettes.

It is widely recognized that most smokers attempt to quit smoking many times, but the struggle against the smoking addiction is very difficult and the odds in favor of a successful attempt to quit smoking do not exceed 5% (Hughes et al., 2004).

In their workplace, workers in the National Cancer Institute (NCI), Cairo University are

confronted by a substantial number of patients suffering from oncological conditions directly linked to smoking. This may put a higher burden on these workers more than others working outside the institute concerning smoking habit. This study adopted a questionnaire method to assess the smoking behavior among medical workers in the NCI and to determine their knowledge and attitude towards smoking.

2. Participants and Method

This study involved all medical workers attending the day of interview and accepting participation in the study in all medical departments of the NCI during the year 2008. Anonymous self-administered questionnaires were handed to workers in these departments involving physicians and nurses. A pilot study was conducted on 20 workers to assess the questionnaire (clarity, time consumption and different responses) and it was modified accordingly. The questionnaire includes the following sections; the first part of the questionnaire concerned demographic data and the second part included questions about knowledge about smoking hazards, religious and lawful aspects.

The third part was directed towards current smokers and ex-smokers. It involved questions regarding the number of smoked cigarettes, the date of starting smoking cigarettes, smoking cessation attempts, smoking in work place and smoking in the presence of non-smokers and in the presence of children. The following part was concerned with attitude and behavior towards smoking and restrictions at public and work places. Nicotine dependence was assessed using the heaviness of smoking index which is a short form of Fagerstorm test for nicotine dependence (Heatherton et al., 1989).

Statistical analysis:

Data was analyzed using SPSSwin statistical package version 15. Chi-square test (or Fisher's exact test) was used to examine the relation between qualitative variables. For quantitative data, comparison between two groups was done using student t-test. All tests were two-tailed. A p-value < 0.05 was considered significant.

3. Results

Number of participants was 246; 185 of them responded to the questionnaire (75.2%). Of the respondents, 54.6% were men, 41.6% younger than 30 years. One of the respondents did not complete the questionnaire. Table (1) summarizes the characteristics of respondents. Ever-smokers constituted 25.4% of the sample (n = 47). Current smokers (n = 38) included 2 "Shisha" smokers in addition to the 36 cigarette smokers, and similarly 5 of the 9 former smokers were using "Shisha". Table (2) compares ever-smokers and nonsmokers. It is worth to mention here that the nursing staff interviewed were mainly males (n = 23). Ever-smokers were mainly males (91.5%). Twenty percent of ever-smoker physicians were surgeons.

One of the smokers did not proceed after the questions of current smoking status. Thus, tables (3) and the following show the results obtained from 37 smokers. Age at starting smoking was rather young (19.7 ± 4.3 yrs). Engaging in a new friendship was a trigger to start smoking in nearly 60 percent of smokers.

The majority of smokers reported previous trials to quit smoking, several times in one third of cases. Health concern was the main motive to try to quit smoking habit (73.3%), to improve health or physical activity or as medical advice. The main cause of failure to quit is lacking a solid will (Table 4). Health concern was also the main motive to quit smoking in 7 of the 9 former smokers (77.8%).

All workers know that smoking is harmful to health, the majority were well-acquainted about the hazard of passive smoking as well. There was no

significant difference between ever-smokers and non-smokers concerning health, religious and lawful issues of smoking (Table 5).

As other public places, NCI is considered by law a smoking-free place. Ever-smokers showed negative attitude towards the restriction principle and punishment of outlaws. They encourage assigning special places for smoking in the hospital (Table 6).

Current smokers react positively to smoking restriction in work and public places, about 2/3 stop immediately when confronted by a stop smoking sign. Twenty-seven workers (73%) reported less smoking in response to restriction. A large percent (73%) smoke in presence of nonsmokers, however nearly 92% respond to a colleague's demand to stop smoking (Table 7).

Table 1: Characteristics of Respondents (n = 185)

Age, years (Mean±SD)	34.8±11.1
20-30	77 (41.6%)
31-40	63 (34.1%)
41-50	14 (7.6%)
>50	31 (16.8%)
Gender (Male/Female)	101/84
Marital Status	
Married	125 (67.6%)
Not Married	60 (32.4%)
Work	
Physicians	152 (82.2%)
Nurses	33 (17.8%)
Smoking status	
Current smoker	38 (20.5%)
Former smoker	9 (4.9%)
Never smoker	138 (74.6%)

4. Discussion

The current study revealed that proportion of smoking among medical workers in the National Cancer Institute (NCI) was 25.4%. This is lower than figures reported in the general population (40%) (El-Zanaty & Way, 2009). In 2002, smoking prevalence in Egypt ranged from 18.3% (35% in males), as reported by WHO, to 27.2% (48.5% in males) (Youssef et al., 2002). In 1993, an Egyptian study performed in Ismailia reported a 34.4% prevalence of smoking among physicians (Riskalla et al., 1993). Prevalence in males (42.6%) was comparable while in females (4.8%) was very much higher than the prevalence in general population (< 1%). In the current study, there was a very high proportion of smokers (66.7%) among nursing staff. Those smoking nurses were mainly males, just one female was smoker.

Table 2: Comparison between ever-smokers and nonsmokers concerning demographic characteristics

	Ever Smokers (n = 47)	Non Smokers (n = 138)	p value
Gender			
Male	43 (42.6%)	58 (57.4%)	
Female	4 (4.8%)	80 (95.2%)	< 0.001*
Age, years (Mean±SD)	34.9±12.7	34.7±10.4	0.919
Work			
Physicians	25 (16.4%)	127 (83.6%)	< 0.001*
Nurses	22 (66.7%)	11 (33.3%)	
Marital Status			
Married	35 (28.0%)	90 (72.0%)	
Not Married	12 (20.0%)	48 (80.0%)	0.242

* Statistically significant difference

Table 3: Smoking characteristics in current smokers (n = 37)*

Regularity of smoking	
Daily smoking	34 (92.1%)
Occasional	3 (7.9%)
Age at starting smoking	19.7±4.3 yrs
Trigger	
New Friends	23 (59.5%)
Other triggers	14 (34.2%)
Motive to smoke now	
Stress	15 (35.1%)
To be calm	11 (24.3%)
Concentration	11 (27.0%)
Nicotine dependence of cigarette smokers (n = 36)	
Light	19 (52.8%)
Moderate	15 (41.7%)
Heavy	2 (5.6%)
First cigarette after waking by:	
< 5 min.	6 (16.2%)
6-30 min	11 (29.7%)
31-60 min	8 (21.6%)
>60 min	12 (32.4%)
The habit change by time	
Increased	9 (24.3%)
Decreased	11 (29.7%)
No change	17 (45.9%)
Smoking when ill	12 (32.4%)
Smoking in bed	14 (37.8%)
Smoking in front of children	6 (24.0%)
Caring for warning signs	17 (43.2%)
Cost per month, LE, Median (Range)	100 (10-450)
Having Smoking-related Health Problems	12 (32.4%)

* One participant did not complete the questionnaire

Table 4: Trials of Quitting Smoking in current smokers

Trying to Quit Previously	30/37 (81.1%)
Motive to Try	
Health issues	22 (73.3%)
Others	8 (26.7%)
Number of quit attempts	
Once	6 (20.0%)
Twice	9 (30.0%)
3 times	5 (15.7%)
>3 times	10 (33.3%)
Longest time of successful quitting	
< 1 day	4 (13.3%)
A week	4 (13.3%)
A month	12 (40.0%)
A year	7 (21.2%)
> 1 year	3 (7.9%)
Cause of Failure	
Weak will	9 (30.0%)
Loss of concentration	7 (23.3%)
Headache, irritability	4 (13.3%)
Others	10 (33.3%)

Table 5: Knowledge of smoking habit among medical workers in the NCI

Statements	Ever Smokers (n = 46), No. (%)	Non Smokers (n = 138), No. (%)	p value
Smoking is harmful to health	47 (100)	138 (100)	1.000
Passive smoking is harmful to health	44 (93.6)	136 (98.6)	0.105
Maternal smoking during pregnancy increases the risk of pregnancy-related diseases and congenital anomalies	46 (97.7)	132 (95.7)	0.250
Passive smoking increases the risk of lung disease in smokers' children	43 (91.5)	131 (94.9)	0.276
Knowing about religious "Fatwa" about smoking	39 (83.0)	170 (91.9)	0.101
Knowing about the Law prohibiting smoking in health facilities	40 (85.1)	103 (74.6)	0.139

Table 6: Opinion of medical workers in the NCI about smoking restriction in workplace

	Ever Smokers (n = 46), No. (%)	Non Smokers (n = 138), No. (%)	p value
The presence of special places for smoking	22 (46.8%)	32 (23.2%)	0.002
Smoking during rest hours in a special place	11 (23.4%)	14 (10.1%)	0.022
Total prevention of smoking at work place	8 (17.0%)	66 (47.8%)	< 0.001
Setting up smoking regulations with punishment	6 (12.8%)	56 (40.6%)	< 0.001
There should be no smoking restrictions at work	6 (12.8%)	1 (0.7%)	< 0.001

Table 7: Attitude of current smokers towards smoking restriction in work and public place (n = 37)

Reaction to "No Smoking" sign while smoking	
Stop immediately	25 (67.6%)
Move to another place to smoke	8 (21.6%)
Continue to smoke	3 (8.1%)
Wait to be asked to stop	1 (2.7%)
Smoking in the presence of non-smokers	27 (73.0%)
Smoking at work-place	29 (78.4%)
Reaction to smoking restriction	
Smoke less	27 (73.0%)
Try to Quit	3 (8.1%)
No change	7 (18.9%)
Response to a colleague's demand not to smoke	
Respond	34 (91.9%)
Ignore	3 (8.1%)
Reaction to institute support to quit smoking (n = 36)	
Respond	32 (88.9%)
Ignore	4 (11.1%)

Effect of working with cancer patients, with a considerable percentage suffering from smoking-related fatal diseases, was not an enough motive to lower the prevalence of smoking to a minimum. Very high percentage of nurses (66.7%) and female physicians (4.8%), relative to the general population, still stick to this habit. Nevertheless, the main motive to quit smoking in former smokers and to try to quit among current smokers is health concern (73.3%). We hope more of the current shift to the former side in future.

This hope is supported by high frequency of quitting trials (81.1%). The main obstacle is lack of dominant will to stop. Impression of loss of concentration, headache and irritability were reported as causes of failure (36.7%) despite the fact that nicotine dependence is mostly light to moderate (94.5%).

Twenty percent of ever-smoker physicians in the current study were surgeons. A Chinese study reported a high smoking prevalence (45.2%) among male surgeons (Yao et al., 2009). Another study in China (Zhou et al., 2010) reported smoking rate (26%) among physicians of all specialties comparable to ours and other studies in this country (Jiang et al., 2007; Cui et al., 2007). A polish study, on the contrary reported lower prevalence of 11.3% (Czajkowska-Malinowska et al., 2008). They reported that 25.1% of physicians were ex-smokers. A Greek study showed an overall prevalence of smoking of 38.6% among physicians (Sotiropoulos et al., 2007).

Health professionals in Bosnia and Herzegovina had a high rate of smoking among physicians (40%) and nurses (51%), compared to other European countries (Hodgetts et al., 2004). Italian general practitioners in 2000 recorded smoking rate of 28.3% (Pizzo et al., 2003). In the Netherlands, smoking

prevalence was 25% in physicians and 44% in nurses (WHO, 1997). In the United States, while nurses had a smoking prevalence of 18% in 1991, physicians had a low prevalence of 3.3% (Nelson et al., 1994).

A postal survey of smoking habits among 1,623 Finnish physicians revealed a prevalence of regular smoking of 10% in males and 6%. This study showed a decrease of daily smoking from 24% in males and 17% in females along 2 decades (Jormanainen et al. 1997).

The current study proved the expected fact that the majority of medical workers were well oriented about the health hazards of active and passive smoking on the smoker and his family. Also, religious opinion that smoking is prohibited was a clear fact for 83% of smokers, as was the law restricting smoking in health facilities. Although physicians and nurses do not lack necessary knowledge to refuse smoking habit, but unfortunately this was not enough. This was reflected in their opinion about smoking restriction in workplace; 17% of ever-smokers refuse total smoking prevention.

However, the attitude towards smoking restriction in work and public places is rather encouraging. The majority of current smokers stops immediately in response to a "No Smoking" sign (67.6%) or move to other place (21.6%). Smoking restriction drives 73% of smokers to smoke less. Most of smokers submit to colleagues' demand to stop smoking. These chasing efforts have to continue to fruit more trend towards quitting. Tough efforts are needed as a majority still did not mind to smoke in presence of nonsmokers (73%) and in workplaces (78.4%).

Physicians should be influential role-models to the general population. The high smoking prevalence provides an unhealthy role-model for patients. Near

90% of medical workers were ready to respond to the institutional support to quit smoking.

Constraints: a large number of smokers especially females did not easily accept participation. Most of the non-respondents were smoking physicians.

In conclusion, smoking is still a common habit among physicians and nurses working in the NCI in spite of having a good knowledge about its hazards and direct contact with smoking victims. We should search for the suitable approach for this category of smokers to motivate them to quit other than talking about health hazards.

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Genetic alterations and gene expression profile in male Balb/c mice treated with carbon tetrachloride with or without carboxymethyl chitosan

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Abstract: Carboxymethyl chitosan (CMC), which is a water-soluble derivative of chitosan, it has attracted much attention as a new biomedical material. **The aim** of the current study was to evaluate the chemopreventive effects of CMC against Carbon tetrachloride (CCl₄)-induced genotoxicity and alterations in gene expression in male Balb/c mice. **Materials and Methods:** Sixty male Balb/c mice were divided into six groups included the control group; the group treated orally with CCl₄ (0.5 ml/kg b.w) for three doses at 48 h intervals and the groups treated orally with CMC (140 and 280 mg/kg b.w.) alone for three weeks or in combination with CCl₄. **The results** indicated that treatment with CCl₄ resulted in increased caspase-3 activities, induction of micronucleus (MnPCEs), frequencies of sister chromatid exchanges (SCE's), total chromosomal aberrations in bone marrow, DNA fragmentation percentage in liver, comet formation in liver and bone marrow, over expression in *bax* and down expression in *Bcl-2*. CMC at the two tested doses succeeded to induce a significant improvement in all tested parameters in a dose dependent fashion. Moreover, CMC itself was safe at the tested doses. It could be concluded that CMC is a promise candidate against genotoxicity.

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Key words: genotoxicity, Carboxymethyl chitosan

1. Introduction

Chitosan (COS) is a modified, natural carbohydrate polymer derived by deacetylation of chitin [poly- β -(1 \rightarrow 4)-N-acetyl-D glucosamine], a major component of the shells of crustacean such as crab; shrimp; crawfish and the 2nd most abundant natural biopolymer after cellulose (No and Meyers 1995). During the past several decades, COS has received increased attention for its commercial applications in the biomedical, food, and chemical industries (Li *et al.*, 1992). In 2005, shrimp-derived COS was approved as GRAS (generally recognized as safe) by USFDA based on the scientific procedures for use in foods in general, including meat and poultry, for multiple technical effects (No *et al.*, 2007). COS has been approved as a food additive in Korea and Japan since 1995 and 1983, respectively (Weiner 1992; KFSA 1995). COS has attracted notable interest due to its biological activities such as antimicrobial (No *et al.*, 2002; Zheng and Zhu, 2003), antifungal (Roller and Covill, 1999), antitumor (Qin *et al.*, 2002), and hypocholesterolemic functions (Sugano *et al.*, 1992). The antimicrobial activity of COS against a range of food borne filamentous fungi, yeast, and bacteria has attracted attention as a potential food preservative of natural origin (Sagoo *et al.*, 2002).

COS also protect normal cells from apoptosis challenged by exogenous stimuli (Chen *et al.*, 2006), and apoptosis induced by serum starvation in human astrocytes (Koo *et al.*, 2002). Moreover, COS are known to exert good anti-oxidative activities in either cellular studies or cell-free assay (Je *et al.*, 2004; Mendis *et al.*, 2007) and many COS derivatives were synthesized and their antioxidant activity was assessed accordingly (Esumi *et al.*, 2003; Sun *et al.*, 2004; Xing *et al.*, 2005). Although the effectiveness of COS for its ability to

enhance quality and shelf life of foods has been reported by numerous workers, the information about the chemoprotective effects is still limited. Therefore, the aims of the current study were to evaluate the protective role of carboxymethyl chitosan (CMC) against the development of comet images during apoptosis induced by CCl₄ and to establish a correlation between induction of apoptosis and comet formation through the measurements of several assays such as activation of caspase 3, and expressions of apoptosis related genes such as bcl-2 and bax, micronucleus formation, DNA fragmentation and cytogenetic analysis.

2. Material and Methods

2.1. Materials:

2.1.1. Chemicals

Pharmaceutical grade chitosan (90 % deacetylated) was obtained from the Naval Research Laboratory (Washington DC, USA). Carbon tetrachloride (CCl₄) was purchased from Merck/Schuchardt (Darmstadt, Germany). A protease inhibitor cocktail was purchased from Roche (Mannheim, Germany), Trizol, fluorogenic substrates (7-amino-4-methylcoumarin N-acetyl-L-aspartyl-L-glutamyl- L-valyl-L-aspartic acid amide [Ac-DEVD-AMC], Bcl-2, Bax and β -Actin were obtained from Life Technologies (Grand Island, NY, USA). Superscript II reverse transcriptase Fermentas kits, Bromodeoxyuridine, propidium iodine, Dimethyl sulfoxide (DMSO), fetal calf serum, normal melting point agarose, low melting point agarose, ethidium bromide and Triton X-100 were purchased from Sigma Chemical Co. (St. Louis, MO, USA). All other chemicals and reagents used were analytical grade.

Synthesis of Carboxymethyl Chitosan (CMC):

Chitosan (2 g) was alkalinized in NaOH (8 g) for 12 h in a 50-50 mixture of deionized water and isopropanol (20 ml). After heating the mixture to 60 °C, monochloroacetic acid (8 g) was dissolved in isopropanol (2 ml) and slowly added to the solution over 30 min. After 6 h the reaction was quenched by adding ethanol (50 ml) to the solution. The resulting CMC was repeatedly rinsed in ethanol and vacuum-dried until the pH of the filtered solution was neutral. The products were dissolved in water and centrifuged to separate the unreacted chitosan; the water soluble portion of the sample was removed, precipitated in ethanol and vacuum-dried. The sample was then placed in an oven at 50 °C to dry.

2.1.2. Experimental animals:

Eight-week-old male Balb/c mice (25 \pm 3 g) were obtained from the Animal House Colony, Giza, Egypt and were maintained *ad libitum* on standard lab diet (protein: 160.4; fat: 36.3; fiber: 41 g/kg and metabolizable energy 12.08 MJ) purchased from Meladco Feed Co. (Aubor City, Cairo, Egypt). Animals were housed in a room free from any source of chemical contamination, artificially illuminated and thermally controlled, at the Animal House Lab.,

National Research Centre, Dokki, Cairo, Egypt. After an acclimatization period of one week, the animals were divided into six groups (10 mice/group) and housed in filter-top polycarbonate cages. All animals were received humane care in compliance with the guidelines of the Animal Care and Use Committee of the National Research Centre, Dokki, Cairo, Egypt.

2.2. Methods:

2.2.1. Experimental design

Animals within different treatment groups were maintained on their respective diets for 3 weeks as follows: group 1, untreated control; groups 2 and 3 treated orally with CMC at 140 and 280 mg/kg b.w. respectively for three weeks; group 4, treated orally with CCl₄ (0.5 ml/kg) for three doses at 48 h intervals; groups 5 and 6, treated orally with the two tested doses of CMC plus CCl₄. At the end of the treatment period (day 22), the animals were kept fasting over night and sacrificed then the bone marrow and liver samples of each animal were removed for the genetic alteration and apoptotic gene expressions studies.

2.2.2. Caspase-3

Lysates were prepared by homogenizing liver tissue in 0.25 mM sucrose, 1 mM EDTA, 10 mM Tris, and a protease inhibitor cocktail. The lysates were then centrifuged at 14,000 g for 10 min at 48 °C and supernatants (50 μ g of protein) were incubated for 1 h at 37 °C in HEPES buffer containing 100 μ M concentrations of the specific fluorogenic substrates (7-amino-4-methylcoumarin N-acetyl- L-aspartyl- L-glutamyl- L-valyl-L-aspartic acid amide, Ac-DEVD-AMC). Cleavage of the caspase substrates was monitored using a spectrofluorimeter (Hitachi F-2000 fluorimeter; Hitachi LTD, Tokyo, Japan) at excitation/emission wavelengths of 380/460 nm. Activity was expressed as fluorescence units per milligram of protein per minute of incubation (UAF/min/mg protein).

2.2.3. RNA extraction and RT-PCR

Liver samples (200 mg) were quickly thawed and homogenized in 2 ml of Trizol and total RNA was isolated according to the manufacturer's directions. RNA was resuspended in RNase-free water, quantitated using UV spectrophotometer, and

stored at -80°C . The quality of the isolated RNA was assessed by measuring the absorbance at 260 nm, analyzing the A260/A280 ratio (1.7-2).

For cDNA synthesis, 3 μg of total RNA were heated to 70°C for 10 min then placed immediately on ice for 10 min. To each sample, 4 μl of 5x first strand buffer, 2 μl of 0.1 mol/l DTT, 4 AL of 2 mmol/l each deoxynucleotide triphosphate mix,

1 μl of oligo (dT) primer and 1 μl of Superscript II reverse transcriptase were added. Reverse transcription was then carried out at 42°C for 50 min, followed by heating to 70°C for 15 min and cDNA samples were stored at -20°C until assayed. cDNAs were amplified using specific primers for mouse Bcl-2 and *bax* **Table (1)**.

Table (1): Sequences of primers used for amplification

Gene	Sense and antisense	PCR product (bp)	Ref.
Bcl-2	Sense 5-TTGTGGCCTTCTTTGAGTTCG-3 antisense 5-TACTGCTTTAGTGAACCTTTT-3	332	Agarwal et al. (1999)
Bax	Sense 5-ACCAGCTCTGAGCAGATCATG-3 antisense 5-GGGATTGATCAGACACGTAAG-3	626	Zhang et al. (2006)
β -Actin	Sense 5'-CGTGACATCAAAGAGAAGCTGTGC-3', antisense 5'-CTCAGGAGGAGCAATGATCTTGAT-3'.	376	Baek et al. (2007)

Gene expression was assayed according to the manufacturer's instruction. The PCR program cycles were set as follows: initial denaturing at 95°C for 20 s, followed by 40 cycles (95°C for 3 s, 60°C for 30 s). β -actin mRNA was used as an internal standard. Bcl-2 and *bax* mRNA expressions were determined by quantitative reverse transcription-PCR (RT-PCR) and normalized against β -actin mRNA levels. The PCR product was run on a 2% agarose gel in Tris-borate-EDTA buffer and visualized over a UV Trans-illuminator. The ethidium bromide-stained gel bands were scanned and the signal intensities were quantified by the computerized Gel-Pro (version 3.1 for window 3). The ratio between the levels of the target gene amplification product and the β -actin (internal control) was calculated to normalize for initial variation in sample concentration as a control for reaction efficiency (Raben *et al.*, 1996).

2.2.4. Micronucleus test:

Micronucleus assay was carried out on bone marrow according to the method described by Schmid (1975). The femurs were dissected out and the bone marrow was flushed out, vortexed and centrifuged. The pellet was resuspended in a few drops of fetal calf serum. Smears were made on pre-cleaned dry slides, air dried and fixed in absolute methanol and the slides were stained with Giemsa stain. At least 2000 erythrocytes were observed and the numbers of polychromatic erythrocytes were

counted. The micronuclei were recorded and micronuclei per 1000 cells were calculated.

2.2.5. DNA Fragmentation Assay

2.2.5.1. DNA extraction

DNA fragmentation was used as a measure of apoptotic. The presence of DNA ladder was determined according to Sambrook *et al.*, (1989) and the modifications described by Xu *et al.*, (1996). The absorbance of the DNA solution was read spectrophotometrically at absorbances of 260 and 280 nm. Equal amounts of DNA were taken after spectrophotometric analysis as described by Kamalay *et al.*, (1990).

2.2.5.2. Agarose gel electrophoresis

A gel was prepared with 2% agarose containing 0.1% ethidium bromide. The gel was electrophoresed using the submarine gel electrophoresis machine. The DNA was visualized and photographed with illumination under UV light.

2.2.6. Comet assay (Single Cell Gel Electrophoresis)

DNA damage was measured using the comet assay under alkaline conditions and dim indirect light according to the method described by Singh *et al.*, (1988) with a few modifications. Briefly, 120 μl of 0.5% normal melting point agarose in Ca^{+2} and Mg^{+2} -free phosphate buffer at 56°C were quickly layered onto a fully frosted slide and immediately covered with a cover-slip. The slides

were kept at 4°C to allow the agarose to solidify. After gently removing the cover-slip a 50 µl aliquot of cell suspensions of either bone marrow or liver were mixed with an equal volume of 1% low melting point agarose at 37°C and quickly pipetted onto the first agarose layer in the same manner. Finally, 70 µl of 0.5% LMP agarose were added to cover the cell layer. The slide sandwiched without cover-slips and were immersed in freshly prepared, cold lysing buffer (2.5 mol/l NaCl, 100 mmol/l Na₂ EDTA, 10 mmol/l Tris, 1% *N*-Lauroyl sarcosine sodium salt, pH 10, with 1% Triton X-100 added just before use) and kept at 4°C for 45 min to 1 h. The slides were placed on a horizontal gel electrophoresis platform and were covered with cold alkaline buffer (300 mmol/l NaOH, and 1 mmol/l Na₂ EDTA) for 8 to 20 min in the dark at 4°C to allow DNA unwinding and expression of the alkali-labile sites. The timing for lysis and unwinding was determined empirically for each cell line. Electrophoresis was conducted at 4°C in the dark for 20 min at 25 V and 300 mA. The slides were then rinsed gently twice with neutralizing buffer (0.4 mol/l Tris, pH 7.5). Each slide was stained with 120 µl of propidium iodide at a concentration of 5 µg/ml and covered with a cover-slip. Comet tail lengths were quantified as the distance from the centrum of the cell nucleus to the tip of the tail in pixel units, with the mean tail length being determined as the mean length of twelve tails.

2.2.7. Sister chromatid exchanges (SCE's) and chromosomal abnormalities in bone marrow:

2.2.7.1. Sister chromatid exchanges:

The method described by Allen (1982), for conducting *in vivo* SCE's induction analysis in mice was applied with some modifications. Approximately 55 mg 5'-Bromodeoxyuridine tablets were inserted in mice subcutaneously (s.c.) 21-23 hrs before sacrifice. Mice were injected intraperitoneally with colchicine at a final concentration of 3 mg/kg b.w 2 h before sacrifice. Bone-marrow cells from both femurs were collected and the fluorescence-photolysis Giemsa technique was used (Perry and Wolff, 1974). Forty well spread metaphases were analyzed per mouse to determine the frequency of SCE's/cell.

2.2.7.2. Chromosome abnormalities:

For cells preparations, animals within different groups were injected i.p. with colchicines, 2 hrs before sacrifice. Chromosome preparations from bone marrow cells were carried out according to the method described by Yosida and Amano (1965). One hundred well spread metaphases were analyzed per mouse. Metaphases with gaps, chromosome or

chromatid breakage, fragments and deletions were recorded.

2.2.8. Statistical analysis

Data were analyzed statistically by "Analysis of Variance" (ANOVA) and groups were compared by Duncan's Multiple Range Test (DMRT). *p* values ≤ 0.05 were considered as significant. The significance of the results from the control data was calculated using (t- test) for SCE's and chromosome abnormalities.

3. Results

3.1. The levels of caspase-3 activities:

The levels of caspase-3 activities showed high apoptotic rate in mice treated with CCl₄ compared to the control group. Animals treated with CMC at the two tested doses show no significant increase comparable to the control. The apoptotic rate was significantly reduced when CMC co-administrated with CCl₄. The high dose of CMC was more effective than the low dose to reduce apoptotic rate (Fig. 1) since these treatments decline the caspase-3 activities and resulted in inhibition reduced from 89.4 in CCl₄ to 65.2 in CMC1 and 54.1% in CMC2. Moreover, the activation of caspase 3 also showed a good correlation with comet tail formation.

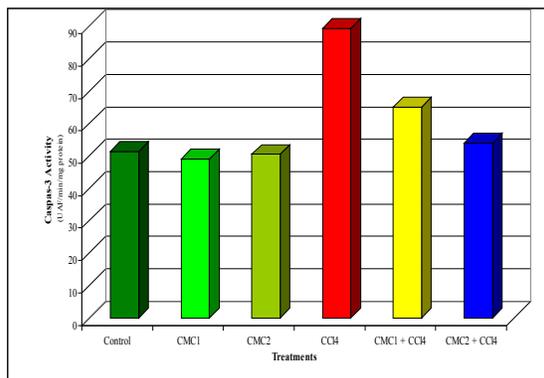


Fig. 1 Alterations of caspase 3 activity in mice treated with CCl₄ alone or in combination with CMC

3.2. Evaluation of genes expressions

The ratio between *bax*/ β -actin indicate an over expression in *bax* compared to the ratio between control/ β -actin (Fig. 2 & 3) which increased to reach 2 in the animals treated CCl₄ while in control it was 0.87. On the other hand, the ratio of Bcl-2/ β -actin was decreased compared to control/ β -actin ratio in mice treated with CCl₄ which decreased from 1.71 to 0.91 (Fig. 2 & 4). Treatment with CMC at the low dose reduced the ratio of expression of mRNA *bax* compared with CCl₄-treated group from 2 to 1.38.

While treatment with CMC at the high dose resulted in a further reduction in the ratio expression of mRNA *bax* to reach 1.01. Moreover, treatment with CMC at the two tested doses increased the expression of mRNA *Bcl-2* ratio in a dose dependent fashion from 0.91 in CCl_4 group to reach 1.28 in the group treated with CCl_4 plus CMC at low concentration and increase the ratio to reach 1.46 in the group treated with CCl_4 plus CMC2 as shown from the results of image analysis

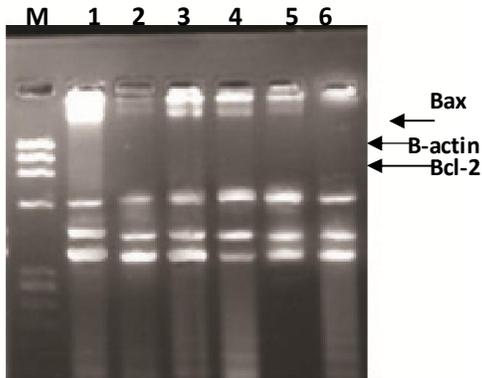


Fig.2. Effect of CCl_4 and CMC on expression pattern of *bax* mRNA level in liver. The 626 and 376, 332 bp fragments represent *bax* transcript, β -actin as internal standard and *Bcl-2* respectively; lane M: molecular marker (Φ x174 DNA HaeIII digest). Lane 1: control, lane 2: CMC1, lane 3: CMC2, lane 4: CCl_4 , lane 5: CMC1 + CCl_4 and lane 6: CMC2 + CCl_4 .

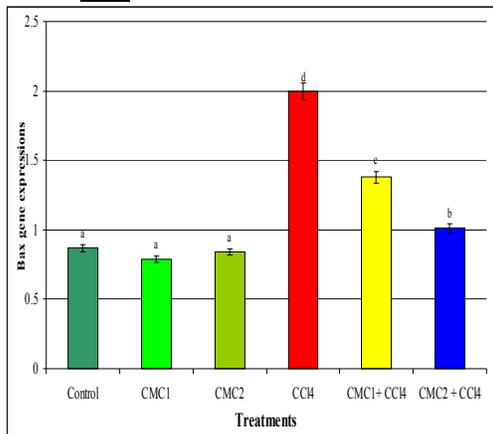


Fig 3. The ratio between *bax*/ β -actin in mice treated with CCl_4 alone or in combination with CMC1 and CMC2. Values represent mean \pm S.E. for each group of mice.

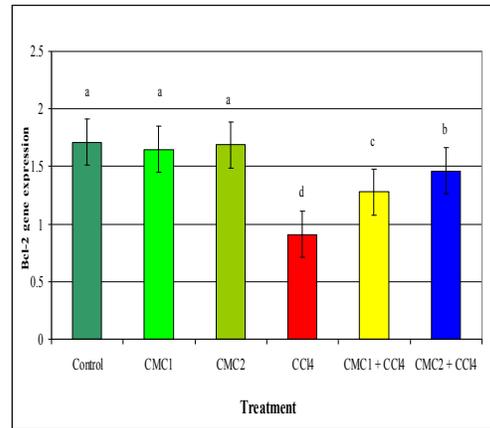


Fig 4. The ratio between *Bcl-2*/ β -actin in mice treated with CCl_4 alone or in combination with CMC1 and CMC2. Values represent mean \pm S.E. for each group of mice.

3.3. Micronucleus

The results of MnPCEs are presented in **Table (2)** and indicated that mice treated with CCl_4 alone showed a high frequency of MnPCEs compared to the control group. However, animals treated with CCl_4 and CMC at the two tested doses showed a significant reduction in the mean of MnPCEs which reached 31.2 in CCl_4 -treated group to 18.6 in CCl_4 plus CMC1 group meanwhile; the mean MnPCEs in CCl_4 plus CMC2-treated group reduced to reach 10.4. Moreover, CMC alone did not induce any significant differences in the frequency of MnPCEs compared to control group.

3.4. Percentages of DNA fragmentation in the liver tissue

The current results showed that CCl_4 induced apoptotic DNA fragmentation in mice liver on agarose gel (**Fig 5**). Animals treated with CCl_4 revealed necrosis where the DNA breakdown was random and led to irregular-length DNA fragments with an indistinct pattern on gel electrophoresis (lanes 3&4). No apoptotic bands were observed in animals given the combined treatments of CCl_4 and CMC (lanes 6 and 7). Moreover, the administration of CMC at the two doses did not induce any differences from the control group (lanes 2 & 5). On the other hand, the results of DNA fragmentation in CCl_4 -induced apoptotic changes in the liver are presented in **Table (3)** and indicated that the percentage of DNA fragmentation

Table (2): Micronucleus test and comet assay in bone marrow of mice treated with CCl₄ alone or in combination with CMC

Treatments	PCEs %	No. Mn-PCEs	Mn-PCEs Mean ± S.E.	% of cells showing comet tails	Comet tail length M ± SE
Control	52.2	21	4.2 ± 0.8 ^d	1.4	1.52 ± 0.22 ^d
CMC1	53.1	19	3.8 ± 0.66 ^d	0.8	1.06 ± 0.05 ^d
CMC2	55.4	23	4.3 ± 0.37 ^d	1.0	0.98 ± 0.04 ^d
CCl ₄	41.4	156	31.2 ± 1.77 ^a	15.0	6.9 ± 0.28 ^a
CMC1 + CCl ₄	48.0	93	18.6 ± 1.63 ^b	9.2	3.95 ± 0.2 ^b
CMC2 + CCl ₄	50.0	52	10.4 ± 1.6 ^c	6.2	2.49 ± 0.20 ^c

Five mice were used in each group. Means with different superscripts (a, b, c, d) between groups in the same column are significantly different at P<0.05.

significantly increased in the group treated with CCl₄ compared to the control group. Treatment with either CMC1 or CMC2 showed a decrease in the percentage of DNA fragmentation. However, mice treated with CCl₄ and received either CMC1 or CMC2 showed a significant improvement in the percentage of DNA fragmentation towards the control values

3.5. Comet assay

DNA damage assayed using fluorescence microscopy in individual cells in the animals treated with CCl₄ showed the comet tail which indicated that cellular DNA was fragmented due to apoptotic change. The percentages of the tailing cells calculated in each tested group for bone marrow cells and hepatocytes are presented in **Tables (2 & 3)**. It is clear that CCl₄ increased the percentage of cells with comet tail to 15% and the mean tail length to 6.9 ± 0.28 in bone marrow cells **Table (2)**. However, in hepatocytes, the percentage of cells with comet tail was increased to 23.4% and the mean tail length was also increased to 9.87 ± 0.38 in hepatocytes **Table (3)**. The percentage of cells with comet tail and the mean of tail length in the groups treated with CMC at the two tested doses were comparable to the control group. On the other hand, animals treated with CCl₄ and CMC1 showed a decrease in the percentage of cells with comet tail to 9.2% and 12.4% and the mean of tail length to 3.95 ± 0.2 and 6.54 ± 0.21 for

bone marrow and hepatocytes respectively. It is of interest to mention that a further reduction was observed in the percentage of cells with comet tail and the mean of tail length in the group treated with CCl₄ and CMC2 in both bone marrow and hepatocytes since these values recorded 6.2% for cells with comet tail and 2.49 ± 0.20 for the mean of tail length in bone marrow however; the percentage of cells with comet tail recorded 5.4% and the mean of tail length recorded 3.17 ± 0.22 in the hepatocytes.

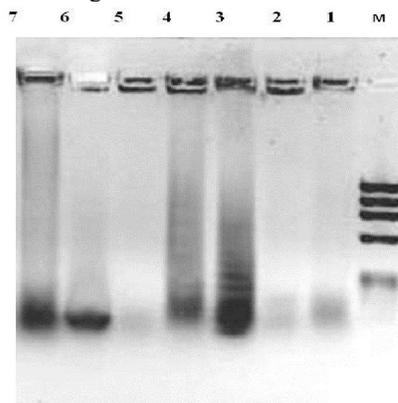


Fig 5. Agarose gel electrophoresis of DNA extracted from liver of mice after treatment, lane M: molecular marker (Φ x174 DNA HaeIII digest), lane 1: control, lane 2: CMC1, lanes 3 & 4: CCl₄, lane 5: CMC2, lane 6: CMC2 + CCl₄ and lane 7: CMC1+CCl₄

Table (3) DNA fragmentation and Comet assay in liver of mice treated with CCl₄ alone or in combination with CMC

Treatments	DNA fragmentation %	% of changes	% of cells showing comet tails	Comet tail length M ± SE
Control	6.4	0	1.6	0.94 ± 0.08 ^d
CMC1	5.8	- 0.6	0.8	0.84 ± 0.03 ^d
CMC2	6.0	- 0.4	0.8	0.82 ± 0.04 ^d
CCl ₄	39.7	+ 33.3	23.4	9.87 ± 0.38 ^a
CMC1 +CCl ₄	26.3	+ 19.9	12.4	6.54 ± 0.21 ^b
CMC2 +CCl ₄	12.9	+ 6.5	5.4	3.17 ± 0.22 ^c

Five mice were used in each group. Means with different superscripts (a, b, c, d) between groups in the same column are significantly different at P<0.05.

Table (4): Number and percentage of the different types of chromosomal aberrations and frequency of sister chromatid exchanges in mouse bone marrow cells after treatment with CCl₄ plus CMC

Treatments	No. and (%) of metaphases with				Total chromosomal aberrations		No. of abnormal metaphases ^a	Inhibition %	No. and % () of different types of SCE's/chromosome				Total No. of SCE's ^b	SCE's/cells ^c Mean ± S.E.	Inhibition %
	Gap	Frag.	Break	Del.	Including gaps Mean ± S.E.	Excluding gaps Mean ± S.E.			Single	Double	Triple	Quadruple			
Control	10 (2.0)	9 (1.8)	4 (0.8)	0	4.6 ± 0.4	2.6 ± 0.2	23	--	766 (9.5)	48 (0.6)	1 (0.01)	-	865	4.32 ± 0.25	
CMC1	12 (2.4)	8 (1.6)	2 (0.4)	0	4.4 ± 0.4	2.0 ± 0.3	22	--	855 (10.6)	48 (0.6)	1 (0.01)	-	954	4.77 ± 0.46	
CMC2	9 (1.8)	10 (2.0)	2 (0.4)	0	4.2 ± 0.2	2.4 ± 0.2	21	--	759 (9.4)	43 (0.5)	3 (0.03)	-	854	4.27 ± 0.23	
CCl ₄	31 (6.2)	68 (13.6)	15 (3.0)	3 (0.6)	23.4 ± 0.7**	17.2 ± 0.6**	117	--	1657 (20.7)	271 (3.3)	26 (0.3)	9 (0.11)	2313	11.56 ± 0.44**	
CMC1+ CCl ₄	28 (5.6)	40 (8.0)	9 (1.8)	2 (0.4)	15.8 ± 0.66♦♦	10.2 ± 0.5♦♦	79	40.6	1138 (14.2)	124 (1.55)	9 (0.11)	2 (0.02)	1421	7.1 ± 0.3♦♦	38.58
CMC2 + CCl ₄	19 (3.8)	29 (5.8)	7 (1.4)	0	11.0 ± 0.86♦♦	7.2 ± 0.4♦♦	55	58.1	967 (12.0)	60 (0.75)	6 (0.07)	-	1105	5.52 ± 0.24♦♦	52.24

a. The total number of scored metaphases is 500 (5 animals / group). Frag. = fragment, Del. = deletion

** Significant at 0.01 level (t-test) comparing to control (non-treated). ♦♦ Significant ♦♦ Significant at 0.01 level (t-test) comparing to treatment b. The total number of chromosomes is 8000 c. The total number of scored metaphases is 200 (5 animals / group)

3.6. Chromosomal aberrations and sister chromatid exchanges (SCE's) in bone marrow cells

The frequencies of SCE's/cell induced by CMC were not significantly different compared to the control group. Animals treated with CMC three weeks prior to CCl₄ showed a significant decrease in the mean percentage of SCE's/cell induced by CCl₄ alone and recorded 11.56 ± 0.44 in CCl₄-treated group and 7.1 ± 0.3 and 5.52 ± 0.24 in the groups pre-treated with CMC at the two tested doses respectively **Table (4)**. Furthermore, the percentage of inhibitory index increased from 38.58% with low dose to 52.24% with the high dose of CMC **Table (4)** and **Fig (6)**. Data presented in **Table (4)** showed the number and percentage of different

chromosomal aberrations induced in different groups. These data revealed that both the low and high doses of CMC significantly (p<0.01) reduce the percentages of aberrant cells compared to the control group in a dose dependent manner. Moreover, CMC succeeded to block the chromosomal aberrations induced by CCl₄ and the percentage of reduction reached 40.6 and 58.1% after treatment with CMC1 and CMC2 respectively

4. Discussion

In the current study, we evaluated the protective role of CMC against CCl₄-induced apoptosis and genetic alterations via the determination of caspas-3, expressions of apoptosis related genes such as bcl-2 and bax, DNA fragmentation, comet formation, sister chromatid exchanges and chromosomal aberrations in mice.

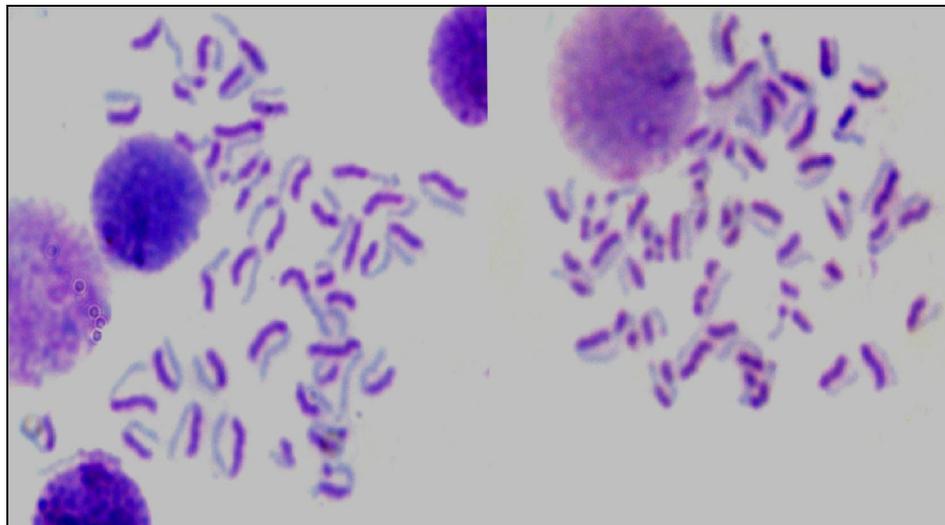


Fig. (6). Sister Chromatid exchanges in bone marrow cells of mouse treated with CCl₄ (right) or CCl₄ plus CMC (left).

The selective dose of CCl₄ and CMC were literature based (Singab et al., 2005; and Khodaghali et al., 2010). It is well documented that the toxicity of CCl₄ is thought to involve two phases; first, CCl₄ metabolism by cytochrome P450 in the hepatocytes produces the highly reactive CCl₃-radical, which leads to lipid peroxidation and membrane damage. The second step is a Kupffer cell mainly related inflammatory response. Kupffer cells are activated by free radicals and secrete cytokines that attract and activate neutrophils. Neutrophils themselves release reactive oxygen intermediates (ROIs), thereby enhancing the liver injury (Louis et al., 1998). Excess ROI, a condition referred to as oxidative stress, is considered to be a major contributor to cell injury, although many studies have shown that higher levels of ROIs can also activate specific genetic programs in various cells (Fredovich, 1978; McCord and Fredovich, 1978; Bartosz, 2009). In the current study, CCl₄ significantly increased caspase 3 activity and a pro-apoptotic gene (bax) expression as well as decreased anti-apoptotic gene (Bcl-2) gene expression. The significant high level of bax expression found in liver of CCl₄-treated mice indicated that these cells are susceptible to apoptosis. In this concern, Masson et al., (2000) reported that the proapoptotic proteins Bad and Bax were significantly higher in liver cirrhosis induced by CCl₄ and apoptosis takes place in liver during CCl₄-induced cirrhosis. The results revealed that treatment with CCl₄ resulted in a significant increase in

micronucleus (MN) formation in bone marrow cells which represents fragments of the chromosome or whole chromosomes resulting from clastogenic or aneugenic events (Savage, 1989; Fenech and Morley, 1989) since micronucleus formation is the very early steps of chromatin condensation due to apoptosis (Melntleres et al., 2001).

Apoptosis lead to DNA damage as indicated by DNA fragmentation and comet formation reported in the current study since a 39.7 % enhancement of DNA fragmentation in liver of mice treated with CCl₄ compared to the control group. Similar result were observed by Lee et al., (2010) who reported that CCl₄ induced hepatocyte DNA fragmentation and cytosolic caspase-3 and caspase-8 activity in rats. Moreover, CCl₄ induced DNA strand breaks in hepatocytes and in bone marrow cells measured by single cell gel electrophoresis through the increase in comet tail length in CCl₄-treated group compared to control group. Similar result noticed by Vanitha et al., (2007) who reported that CCl₄ induced toxicity by comet formation in rats. Moreover, CCl₄ increased chromosomal aberrations and SCE's in bone marrow which arise from DNA breaks and reversion of broken fragments at almost homologous loci after their exchange between the two sister chromatids of the same chromosome (Latt et al., 1981) and hence their formation is dependent on the S-phase of the cell cycle (Kato, 1977) or on DNA replication processes (Painter, 1980; Lasne et al., 1984). SEC's is widely used as a reliable and

sensitive indicator of chromosome (DNA) instability, since the SCE patterns can reveal general genome instability (Wilcoskey and Rynard, 1990; Kang et al., 1997). The present results demonstrated a significant elevation of SCE's/cell in CCl₄-treated mice compared to control group. The *in vivo* chromosomal aberration is one of the most important bioassays for monitoring the genotoxicity of environmental chemicals (Tucker and Preston, 1996). Previous reports indicated that CCl₄ induced SCE's and chromosomal aberrations in peripheral lymphocytes of sheep (Dianovsky and Ivikova, 2001) and bone marrow of mice (Abou Gabal et al., 2007) which clarifies that CCl₄ has the ability to induce chromosomal aberrations in bone marrow cells.

CMC is a way for conversion of COS into a water-soluble form. CMC has many unique chemical, physical and biological properties such as low toxicity, biocompatibility and good ability to form films, fibres and hydrogels (Muzzarelli, 1988; Sun et al., 2008). Consequently, it has been extensively used in many biomedical fields such as a moisture-retention agent, a bactericide, in wound dressings, as artificial bone and skin, in blood anticoagulants and as a component in the drug delivery matrices (Janvikul and Thavornnyutikarn, 2003; Liu et al., 2007).

Several molecular weight (MW) COS were tested as a dietary supplement (Gades and Stern, 2005; Kaats et al., 2006). High MW COS would be expected to inhibit the absorption of certain lipids and bile acids. However, low MW COS would be predicted to absorb such substances, but would also be expected to show increased antioxidant effects. Anraku et al., (2009) showed that the administration of low MW COS to human volunteers strongly inhibited the oxidation of human serum albumin (HSA) *in vivo*. The antioxidant properties of low MW COS are substantial, whereas high MW COS was found to be much less effective in terms of antioxidant properties (Tomida et al., 2009).

According to Xue et al., (1998) and Chiang et al., (2000), low MW chitosan can be absorbed from the intestinal tract and subsequently shows a number of additional bioactivities such as antitumor, cholesterol-lowering, immunostimulating, antidiabetic, antimicrobial, and antioxidant effects, etc., in both the systemic circulation and the intestinal tract. During these biological events, the property of particular interest for this study is the antioxidant activity of COS (Xue et al., 1998; Chiang et al., 2000). In the current study, CMC was found to improve liver injury, prevent apoptosis and protect cells from damaging effects of oxygen radicals.

Moreover, CMC did not only prevent oxidative injury in bone marrow and liver cells, but also potentially interfere with apoptosis and genotoxicity due to attenuated exogenous oxidative stress. Similar results were reported by Koo et al., (2002) who indicated that COS able to protect against apoptosis in human astrocytoma cells (CCF-STTG1) induced by serum starvation. Moreover, Liu et al., (2010) stated that COS is not only reversed the decrease of cell viability and proliferation activity, but ameliorated nuclear chromatin damage in H₂O₂-induced HUVECs.

In the present study, treatment with CMC resulted in a significant reduction in all tested parameters which increased as a results of free radicals generation produced by CCl₄ including caspase-3 activities, DNA fragmentation in liver, comet formation in liver and bone marrow, micronucleus (MnPCes), frequencies of SCE's, total chromosomal aberrations in bone marrow, over expression in bax and down expression in Bcl-2. Several reports indicated that COS enhanced the resistance to the effects of oxidative stress and increased the plasma total antioxidant radical trapping capacity (Wayner et al., 1987). Moreover, Anraku et al. (2011) reported that COS reduces the levels of pro-oxidants such as cholesterol and uremic toxins in the gastrointestinal tract, thereby inhibiting the subsequent development of oxidative stress in the systemic circulation. Thus, CMC has the potential ability to act as a protein antioxidant, since oxidative stress is an important pathogenic factor in CCl₄ toxicity. Moreover, the reducing power properties of CMC are generally associated with the presence of reductions, which have been shown to exert antioxidant action by breaking the free radicals' chain by donating a hydrogen atom (Duh et al., 1999) and/or radical scavenging mechanisms of substituting carboxymethyl group (Sun et al., 2008).

In conclusion

The current work revealed a significant correlation between caspase-3 activities and the expression of bax. Meanwhile CMC decreased caspase-3 activities and bax gene expression induced by CCl₄. This may be indicated that bax may participate in the apoptosis by regulating caspase-3 and may indicate a close relationship between these two proteins in apoptosis. On the other hand, CMC increased Bcl-2 expression and indicated that Bcl-2 may play a pivotal role in the regulation of hepatic cell apoptosis and indicated that CMC treatment substantially prevents CCl₄-induced genotoxicity and apoptosis in the bone marrow and liver of mice.

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STRUCTURAL AND ULTRASTRUCTURAL ALTERATIONS IN MAMMALIAN ADRENAL CORTEX UNDER INFLUENCE OF STEROIDOGENESIS INHIBITOR DRUG**Waslat W. Elshennawy* and Hanaa R. Aboelwafa**

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Abstract: The risk of adverse human health effects due to endocrine-disrupting chemicals is of growing concern. In recent years, ketoconazole, an imidazole derivative has been developed and currently used in the medical fields as an anti-fungal and steroidogenesis inhibitor drug. The present study aimed to investigate the influence of ketoconazole in the structural and ultrastructural characteristics of albino rat adrenal cortex. Twenty adult male rats weighing 150-200 g. were divided into two even groups; group I were *i.p.* injected with 10mg/100g.b.wt. of ketoconazole dissolved in 1ml physiological saline solution in a daily manner at 9am for 15 days. Whereas, group II were injected with 1ml saline solution in the same manner. *Histologically*, adrenal cortex of treated rat displayed hypertrophy. Glomerulosa, fasciculata and reticularis cells were loaded with lipid droplets of variable sizes, occupying almost the cytoplasm thus displacing the nuclei eccentrically, which showed signs of pyknosis, karyorrhexis and karyolysis. *Ultrastructurally*, the three cortical zones displayed the presence of hypertrophied mitochondria filled with tightly packed tubular cristae, whereas the others having cavitation results in a complete loss of cristae, and mitochondria are identified by the remainder cristae adjacent to the inner boundaries of the limiting membrane, in addition to extensive accumulation of variable sized lipid droplets and nuclei showing pyknosis and karyolysis. In conclusion, it is noticed that the destructive impacts of ketoconazole on the adrenocortical cells reflected on their functions leading to much deficiency in their performance. So, it should be taken in consideration and great concern that this drug must be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

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Key words: adrenal cortex, histology, imidazole, ketoconazole, rat, steroidogenesis, ultrastructure.

1. Introduction:

The risk of adverse human health effects due to endocrine-disrupting chemicals is of growing concern. Despite that, the adrenal gland is an important organ yet it is neglectable in relation to effects of endocrine disruptors (Harvey *et al.*, 2007; Diamanti-Kandarakis *et al.*, 2009). This importance is being out from the fact that the adrenocortical zones synthesize and secrete steroid hormones, which fall into three major categories; mineralcorticoid, exemplified by aldosterone which is secreted by zona glomerulosa. Aldosterone is an important regulator of salt homeostasis and fluid balance and it is a major control unit of acid/base balance (Bielohuby *et al.*, 2007). While, zona fasciculata secretes gluco-corticoid, exemplified by cortisol, which is essential for life since it has a major role in responding to environmental stimuli; it decreases protein synthesis, thereby increasing the circulating level of amino acids; it elevates blood glucose by stimulating the enzymes involved in gluconeogenesis in the liver and it mobilizes fatty acids and glycerol from adipose cells. It has also anti-inflammatory effects (Fawcett and Jensch, 2002; Campbell, 2005). By zona reticularis, small amounts of androgens are secreted.

The two principal adrenal androgens are; androstenedione and dehydroepi-androsterone, which is far less potent than testosterone and has little physiological significance. Both hormones can serve as substrates for the conversion into testosterone and estradiol (Fawcett and Jensch, 2002; Keegan and Hammer, 2002). The hormone secretions of the adrenal cortex is dependent on steroidogenic cytochrome P450 (CYP) enzymes which possibly can be the target of endocrine-disrupting chemicals affecting them (Ohlsson *et al.*, 2010).

One of the groups that effects CYPs is the imidazoles, which are medically used as antifungal treatment. Of the imidazoles in current clinical use, ketoconazole which is a broad-spectrum anti-fungal and steroid hormones biosynthesis inhibitor drug (Marty *et al.*, 2001; Schimmer and Parcker, 2006). It has great activity against a variety of yeast, dimorphic fungal, fungal infections of the gastrointestinal tract, dermatophytic infections of the skin and has been widely used in immunocompromised patients such as those with AIDS or those on chemotherapy (Vertzoni *et al.*, 2006). Also, it has anti-inflammatory activity, it may prevent the development of acute respiratory distress syndrome

and acute lung injury in critically ill patients (Wiedemann *et al.*, 2000).

Ketoconazole is an effective inhibitor of adrenal and gonadal steroidogenesis, primarily because of its inhibition of the activity of CYP17. At even higher doses, it also inhibits CYP11A1, effectively blocking steroidogenesis in all primary steroidogenic tissues (Cohen *et al.*, 2000; Schimmer and Parcker, 2006).

In the field of medicine, the great ability of ketoconazole to inhibit mineralocorticoid synthesis is used for palliative treatment of primary hyperaldosteronism (Lionakis *et al.*, 2008). Also, in a treatment strategy of resistant and hyper-cortisolemic depressive patients as an inhibitor of glucocorticoid synthesis (Brown *et al.*, 2001; Dvorak, 2011). As well as, in treatment of ACTH-secreting adenomas, palliative treatment of Cushing disease, adrenal tumors, adrenocortical carcinoma and ectopic corticotrophin production by small-cell lung carcinoma or carcinoid tumors (Gordon, 2007; Lionakis *et al.*, 2008).

Ketoconazole as inhibitor of androgen has been used for treatment of prostate cancer with promising results (Peehl *et al.*, 2001; Kinobe *et al.*, 2006; Liebertz and Fox, 2006).

Also, physicians use high-dose ketoconazole in women with advanced breast cancer resistant to conventional chemotherapy and for ovarian hyperandrogenism syndrome, including polycystic ovarian syndrome and hyperthecosis with considerable improvement in acne, hirsutism, and amenorrhea (Lionakis *et al.*, 2008).

In experimental animals, impact of ketoconazole has been studied in some biological aspects on different body organs rather than the adrenal gland (Rodriguez and Buckholz, 2003; Braddock, 2003; Amin and Hamza, 2005; Furukawa *et al.*, 2008).

It is clearly noticed from the previous literature, that ketoconazole has been widely utilized in the medical fields for the treatment of different types of diseases. But, unfortunately there is no attention for the influence of its administration on the adrenal cortex which is responsible for synthesis and secretion of different steroid hormones. Thus, the present study aimed to throw light on the influence of ketoconazole on adrenal cortical tissues from the histological and ultrastructural point of view

2. Materials and Methods:

2.1. Experimental animals

Twenty male Swiss albino rats (*Rattus norvegicus*) ranging in weight from 150-200g., acquired from Schistosoma Biological Supply Program (SBSP) Theodor Bilharz Research Institute,

were housed in clear plastic cages (2 animals/cage) with wood chips as bedding and given pellet rodent diet, in addition of milk and water *ad-libitum*. They were kept under controlled environmental conditions, including a temperature of 25°C and a 12-h light/darkness cycle.

2.2. Drug used

Ketoconazole is a synthetic imidazole of oral broad-spectrum antifungal agent (Vertzoni *et al.*, 2006; Dantas *et al.*, 2010). It is sold under trade name; Nizoral® as a tablet of 200 mg Ketoconazole which is manufactured by JANSSEN-CILAG Pharmaceutica N.V., Turnhoutseweg 30, B-2340 Beerse, Belgium.

2.3. Experimental design

The rats were randomly divided into two even groups; group I, were *i.p.* injected with 10mg/100g.b.wt. of *ketoconazole* dissolved in 1 ml of physiological saline solution in a daily manner for 15 days. Whereas, group II was kept as a control group and were injected with 1ml of physiological saline solution in the same manner.

This selected dose of ketoconazole and the route of administration have been previously used in different researches (O'Connor *et al.*, 2002; Amin and Hamza, 2005; Amin, 2008).

2.4. Histological preparations

The excised adrenal glands were fixed in Bouin's fluid for 24 hours, then subjected to the normal procedures for paraffin sectioning. Sections, of 4-6 µm were stained with haematoxylin & Eosin, dehydrated, cleared in xylene and mounted in DPX. The stained sections were examined and photographed by light microscopy (BX-40 Olympus), fitted with 4x - 40x objective lenses with an adjustable numerical aperture (3.3). Images were captured using camera (Panasonic CD-220).

2.5. Ultrastructural preparations

For ultrastructural evaluation by transmission electron microscopy as described previously by Dykstra *et al.* (2002), freshly excised adrenal glands were cut into small blocks (1×1mm³), fixed directly in cold 4F1G (i.e. 4% formalin + 1% glutaraldehyde adjusted at pH 2.2) for 24 hours, then were post fixed in 1% osmium tetroxide in 0.1M phosphate buffer (pH 7.3), dehydrated in an ethanolic series culminating in 100% acetone, and infiltrated with epoxide resin. After polymerization overnight at 60°C, semithin sections (0.5 µm) were stained with 1% toluidine blue in 1% sodium borate and examined with light microscope. Areas of cortical cells were selected and the blocks trimmed accordingly. Ultrathin sections (80-90 nm) were cut, mounted on

200 mesh copper grids, and stained with uranyl acetate and lead citrate. The stained grids were examined and photographed by JEOL.JEM-1400-EX-ELECTRON MICROSCOPE at the Central Laboratory of Faculty of Science, Ain Shams University. The photographs were printed on KODABROMIDE F5s GLOSSY Black and White-Schwarzweib- Kodak.

3. Results:

3.1. Histological studies (Haematoxylin and eosin preparations)

3.1.1. Control adrenal cortex

Figure (1) showing the three zones of adrenal cortex; zona glomerulosa, fasciculata and reticularis, respectively. As shown in figure (2), the adrenal gland is surrounded by a fibrous connective tissue capsule. Zona glomerulosa is formed of columnar or rather pyramidal cells arranged in glomeruli-like structure, which are separated by delicate trabeculae extending from the capsule. Its cells contain acidophilic cytoplasm with fairly large rounded to oval basophilic nuclei having distinct nucleoli (Fig. 2).

Zona fasciculata is composed of polyhedral or columnar cells arranged in one or two cell thick in long radial cords or fasciculae and they are separated by narrowed blood capillaries lined with endothelial cells. The cells have granulated eosinophilic cytoplasm embodying spherical basophilic nuclei showing distinct nucleoli. Binucleate cells are seen frequently (Fig. 3).

Zona reticularis is characterized by an irregular anastomosing network of intermingled cords separated by numerous wide blood sinusoids lined with endothelial cells. The cells of these cords are columnar cells having moderately eosinophilic cytoplasm, containing certain discrete granules and have rounded basophilic nuclei possessing centrally located nucleoli (Fig. 4).

3.1.2. Ketoconazole-treated adrenal cortex

Generally, the adrenal gland showed enlargement in size with its outer cortex showing hypertrophy as seen in figure (5). The fibrous connective tissue capsule being thickened with increased fibrous elements (Fig. 6).

Glomerulosa, fasciculata and reticularis cells exhibiting hypertrophy with accumulated variable sized lipid droplets in their cytoplasm. Some of these lipid droplets fused together and occupied almost the entire cytoplasm, thus displacing the nuclei eccentrically which showing clear signs of pyknosis, karyorrhexis and karyolysis as clearly observed in figures (6-8).

3.2. Ultrastructural Studies

3.2.1. Control adrenal cortex

Fine structure of zona glomerulosa cells reveal different mitochondrial configuration varying from oval to spherical shapes with a specific tubulo-saccular cristae. In addition, a fair amount of smooth endoplasmic reticulum, small Golgi vesicles and abundant number of lipid droplets are evident. The nuclei of these cells are rounded or oval in shape; sometimes wavy in appearance ensheathed by double nuclear envelopes and possessing nucleoli, peripheral dense heterochromatin and homogenous euchromatin material (Figs. 9-11).

Figures (12-14) exhibit the fine characteristic features of fasciculata cells including; abundance of rounded mitochondria with obvious tubular cristae, smooth endoplasmic reticulum in the form of branching tubules, scanty rough endoplasmic reticulum, fair amount of lysosomes and richness of lipid droplets. The nuclei are large, rounded, possessing prominent nucleoli, dense peripheral heterochromatin, lightly stained euchromatin and surrounded by double nuclear membranes. Blood capillaries lined with endothelial cells are noticed between these fasciculata cells (Fig. 12).

Zona reticularis cells are distinguished by their richness of rounded mitochondria with intensely tubular cristae, smooth endoplasmic reticulum, lysosomes and lipid droplets with varying sizes. Their nuclei are spherical or ovoid in shape contained condensed heterochromatin, euchromatin and prominent nucleoli (Figs. 15-17). Widened and clear blood sinusoids lined with endothelial cells are manifested in figure (15).

3.2.2. Ketoconazole- treated adrenal cortex

Marked ultrastructural changes of zona glomerulosa cells are illustrated in figures (18-20); their cytoplasm contain hypertrophied mitochondria with more electron dense matrices and some of them possessing small vacuolar degenerations, in addition to lysosomes and lipid droplets of variable sizes. The nuclei being electron dense, showing shrinkage, and signs of pyknosis. They are surrounded by irregular nuclear envelopes and containing electron dense nucleoli, heterochromatin and euchromatin.

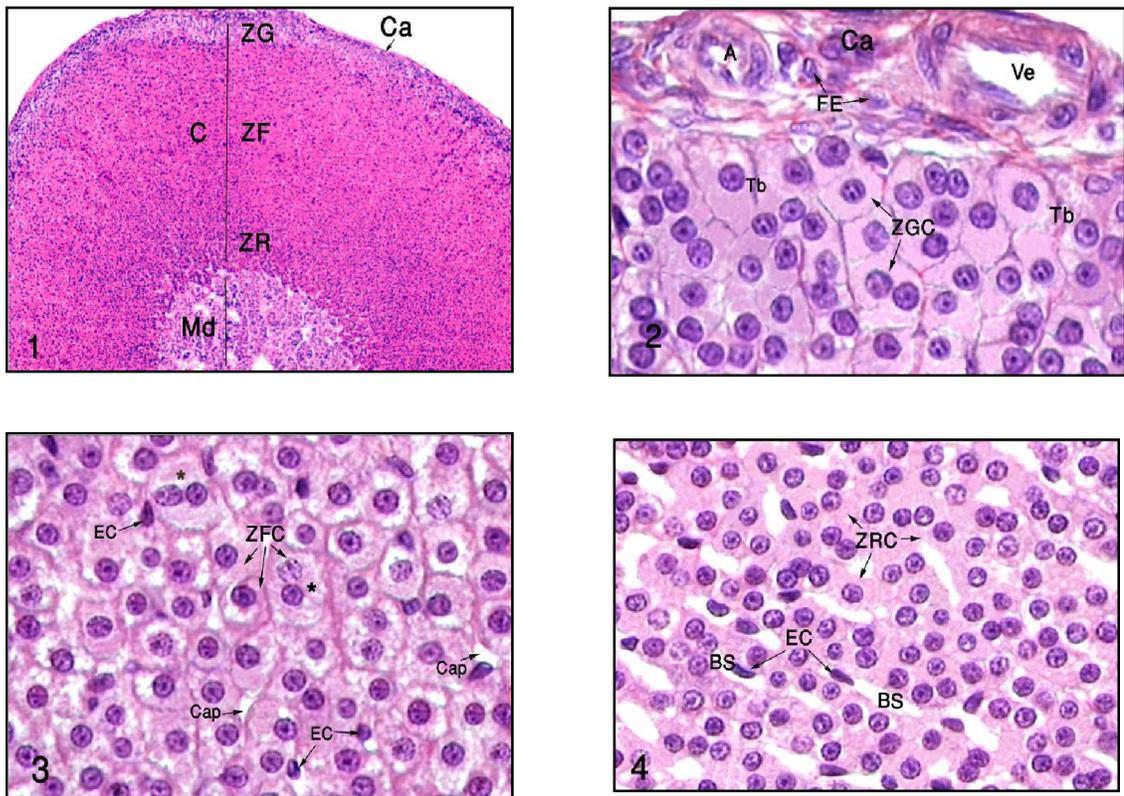
Zona fasciculata cells showing hypertrophied mitochondria filled with tightly packed tubular cristae, some of them having cavitation and finally these mitochondria are identified only by the remainder cristae adjacent to the inner boundaries of the limiting membrane. Extensive accumulation of various sized lipid droplets, some of them became so large thus occupying almost the entire cytoplasm, masking the organelles and distending the cells. Fair amounts of lysosomes are seen, beside, the nuclei which displayed signs of pyknosis and karyolysis. Some

blood cells are shown in between fasciculata cells (Figs. 21-23).

Similarly, zona reticularis cells having hypertrophied mitochondria with some of them showing ruptured mitochondrial membrane, degenerated cristae and cavitation, in addition to accumulated lipid droplets of different sizes, and pyknotic nuclei surrounded by irregular nuclear membrane and containing electron dense heterochromatin and euchromatin. As well as, blood sinusoids containing stagnant blood cells are observed (Figs. 24-26).

It is worthy to mention that smooth endoplasmic reticulum, was scanty, sometimes almost absent in all examined cells of the adrenocortical zones, suggesting that it may be disintegrated under the influence of ketoconazole.

An interesting observation is seen in the resulted electron micrographs, that there are dense particles participated all over the cells of these three zones, which may have occurred as a result of a chemical reaction between ketoconazole and the chemical components of the cells.



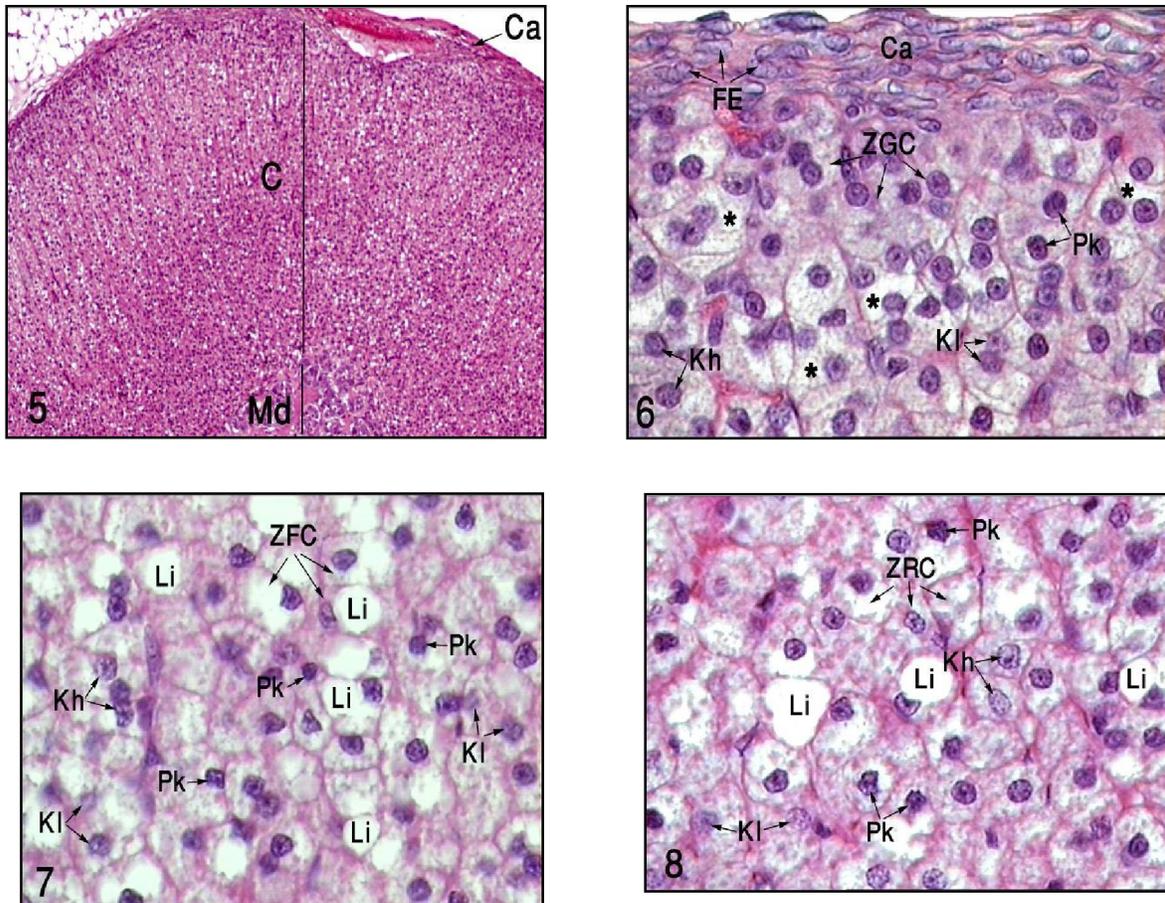
Figures 1-4: Light micrographs of H&E stained sections of control adrenal gland.

Figure 1: General structure of adrenal gland illustrating the capsule (Ca), the cortex (C) which is differentiated into zona glomerulosa (ZG), zona fasciculata (ZF) and zona reticularis (ZR), and the medulla (Md) (x132).

Figure 2: Glomerular organization of zona glomerulosa cells (ZGC), being separated by trabeculae (Tb) extended from the capsule (Ca), which is formed of fibrous elements (FE), an arteriole (A) and a veinule (Ve) (x1320).

Figure 3: Zona fasciculata cells (ZFC) arranged in long radial cords, separated by narrowed blood capillaries (Cap) lined with endothelial cells (EC). Binucleate cells (*) are also seen (x1320).

Figure 4: Zona reticularis cells (ZRC) arranged in irregular network of intermingled cords, separated by numerous wide blood sinusoids (BS) lined with endothelial cells (EC) (x1320).



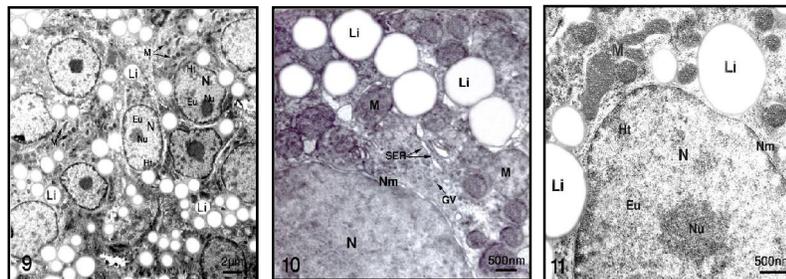
Figures 5-8 Light micrographs of H&E stained sections of ketoconazole-treated adrenal gland.

Figure 5: Adrenal gland with an enlarged outer cortex (C), an inner medulla (Md) and a thick fibrous capsule (Ca) (x132).

Figure 6: Hypertrophied glomerulosa cells (ZGC), containing lipid droplets (*) and their nuclei showing signs of pyknosis (Pk), karyorrhexis (Kh) and karyolysis (Ki), in addition to part of thickened capsule (Ca) with increased fibrous elements (FE) (x1320).

Figure 7: Hypertrophied fasciculata cells (ZFC), overloaded with lipid droplets (Li) of variable size and possessing necrotic nuclei revealing signs of pyknosis (Pk), karyorrhexis (Kh) and karyolysis (Ki) (x1320).

Figure 8: Enlarged reticularis cells (ZRC) containing lipid droplets (Li) with different sizes and necrotic nuclei revealing pyknosis (Pk), karyorrhexis (Kh) and karyolysis (Ki) (x1320).

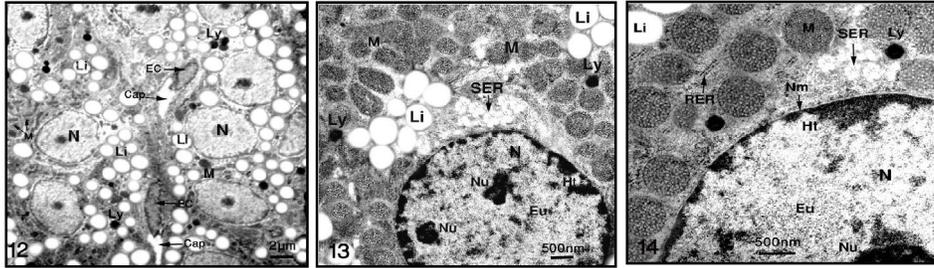


Figures 9-11: Transmission electron micrographs of control zona glomerulosa.

Figure 9: Zona glomerulosa cells displaying numerous lipid droplets (Li), mitochondria (M) and oval or round shaped nuclei (N) (x2000).

Figure 10: Glomerulosa cell having mitochondria (M) with tubulo-saccular cristae, smooth endoplasmic reticulum (SER), small Golgi vesicles (GV), lipid droplets (Li) and part of the nucleus (N) ensheathed by a double nuclear envelope (x10,000).

Figure 11: Another glomerulosa cell possessing mitochondria (M) with tubulo-saccular cristae, lipid droplets (Li) and part of the nucleus (N) ensheathed by a double nuclear envelope and involving nucleolus (Nu), marginated dense clumps of heterochromatin (Ht) and homogenous euchromatin (Eu) (x12,000).

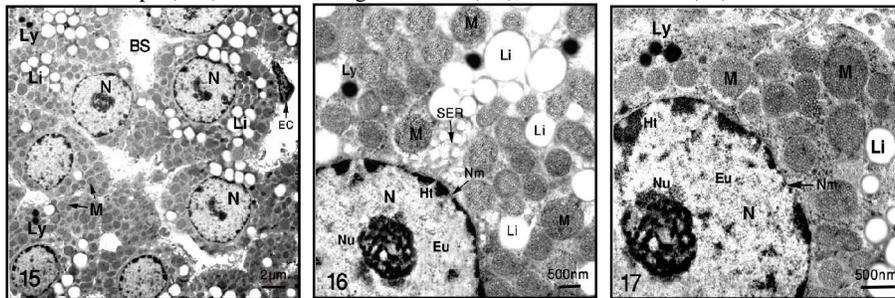


Figures 12-14: Transmission electron micrographs of control zona fasciculata.

Figure 12: Zona fasciculata cells loaded with lipid droplets (Li), mitochondria (M), lysosomes (Ly), and possessing oval to rounded nuclei (N). In between them, narrowed blood capillaries (Cap) lined with endothelial cells (EC) are noticed (x2000).

Figure 13: Fasciculata cell containing mitochondria (M) with tubular cristae, smooth endoplasmic reticulum (SER), lysosomes (Ly), lipid droplets (Li), rounded nucleus (N) containing nucleoli (Nu), peripheral heterochromatin (Ht) and euchromatin (Eu) (x10,000).

Figure 14: Another part of fasciculata cell revealing rounded mitochondria (M) with tubular cristae, smooth endoplasmic reticulum (SER), rough endoplasmic reticulum (RER), lysosomes (Ly), lipid droplets (Li), nucleus (N) surrounded by double nuclear envelope (Nm) and containing nucleolus (Nu), heterochromatin (Ht) and euchromatin (Eu) (x12,000).

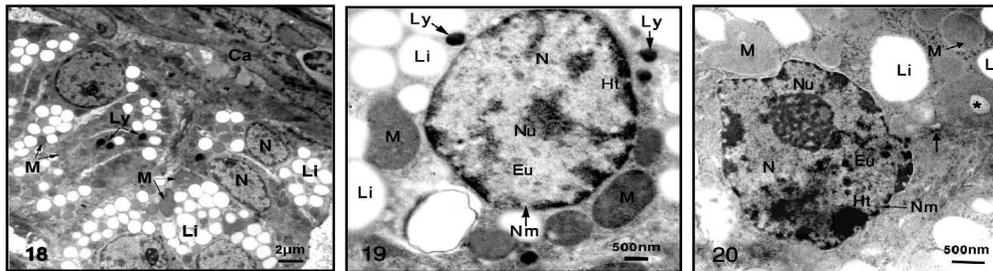


Figures 15-17: Transmission electron micrographs of control zona reticularis.

Figure 15: Reticularis cells containing numerous mitochondria (M), lipid droplets (Li) and spherical or ovoid nuclei (N). Widened blood sinusoids (BS) lined with endothelial cell (EC) are obviously seen (x2000).

Figure 16: Reticularis cell having mitochondria (M), smooth endoplasmic reticulum (SER), lysosomes (Ly), lipid droplets (Li) and nucleus (N) which is surrounded by nuclear membrane (Nm) and possessing distinct nucleolus (Nu), peripheral heterochromatin (Ht) and euchromatin (Eu) (x10,000).

Figure 17: Another reticularis cell possessing nucleus (N) containing distinct nucleolus (Nu), peripheral heterochromatin (Ht) and euchromatin (Eu) and is surrounded by nuclear envelope (Nm), in addition to numerous rounded mitochondria (M), aggregation of three lysosomes (Ly) and lipid droplets (Li) (x12,000).

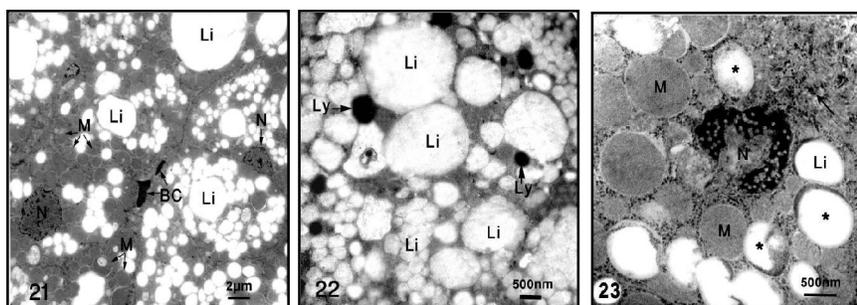


Figures 18-20: Transmission electron micrographs of ketoconazole-treated zona glomerulosa.

Figure 18: Zona glomerulosa cells having mitochondria (M), lipid droplets (Li), lysosomes (Ly) and deformed nuclei (N), in addition to deformed capsule (Ca) (x2000).

Figure 19: Glomerulosa cell illustrating electron dense hypertrophied mitochondria (M), lysosomes (Ly), lipid droplets (Li) and nucleus (N) surrounded by nuclear membrane (Nm) and containing electron dense peripheral heterochromatin (Ht) and euchromatin (Eu) (x10,000).

Figure 20: Another glomerulosa cell exhibiting hypertrophied mitochondria (M), some of them having vacuolar degeneration (*), lipid droplets (Li), dense particles participate (arrow) through the matrix and pyknotic nucleus (N), being shrunken ensheathed by irregular nuclear membrane (Nm) and having electron dense heterochromatin (Ht) and euchromatin (Eu) (12,000).

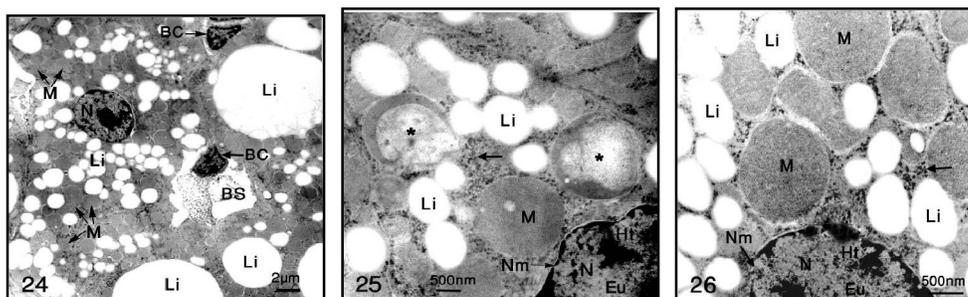


Figures 21-23: Transmission electron micrographs of ketoconazole-treated zona fasciculata.

Figure 21: Zona fasciculata cells overloaded with lipid droplets (Li) of variable sizes, in addition to deformed mitochondria (M) and pyknotic nuclei (N). Blood cell (BC) are seen (x2000).

Figure 22: Fasciculata cell exhibiting progressive accumulation of various sized lipid droplets (Li), in addition to numerous lysosomes (Ly) (x10,000).

Figure 23: Another fasciculata cell revealing hypertrophied mitochondria (M), some of them possessing cavitation with progressive loss of their cristae (*), in addition to lipid droplets (Li), dense particles participate (arrow) through the matrix and nucleus (N) with signs of karyolysis (X12,000).



Figures 24-26: Transmission electron micrographs of ketoconazole-treated zona reticularis.

Figure 24: Zona reticularis cells having deformed mitochondria (M), lipid droplets (Li) of different sizes and deformed nuclei (N), in addition to blood sinusoids (BS) containing blood cell (BC) (x2000).

Figure 25: Reticularis cell containing hypertrophied mitochondria (M), some of them showing cavitation with ruptured limiting membranes and degenerated cristae (*), in addition to several lipid droplets (Li), dense particles participate (arrow) through the matrix and part of the nucleus (N) surrounded by nuclear membrane (Nm) and containing electron dense heterochromatin (Ht) and euchromatin (Eu) (x10,000).

Figure 26: Another reticularis cell having extensive accumulation of hypertrophied mitochondria (M) and lipid droplets (Li), in addition to dense particles participate (arrow) through the matrix and nucleus (N) possessing electron dense heterochromatin (Ht) and euchromatin (Eu) and surrounded by nuclear envelope (Nm) (X12,000).

4. Discussion

There is increasing evidence that various chemicals introduced into the environment have the potential to disrupt the endocrine system in humans and wildlife. Increasingly, the enzymes involved in the steroid biosynthesis pathway are being recognized as important targets for the actions of the endocrine-disrupting chemicals. Steroidogenic enzymes are responsible for the biosynthesis from cholesterol of various steroid hormones including glucocorticoids, mineralcorticoids, androgens, and estrogens. They consist of several specific cytochrome P450 enzymes (CYPs), hydroxysteroid dehydrogenases (HSDs), and steroid reductases (Sanderson, 2006).

In recent years, a number of imidazole derivatives have been developed and used as an anti-

fungal agents. Ketoconazole is one of the imidazole derivatives currently used in the clinical fields. It is an effective inhibitor of adrenal and gonadal steroidogenesis (Schimmer and Parker, 2006). For this property, it has been used for the treatment of different types of diseases including; Cushing disease, hyper-cortisolemic depressive patients, adrenal tumors, adrenocortical carcinoma, adrenal adenomas, prostate cancer, advanced breast cancer and various cancer cell lines such as hepatic metastasis and pulmonary metastasis (Lionakis *et al.*, 2008).

The majority of severe degenerative changes induced in the adrenal gland following pathological disorders are often judged by the physiological tools. Steroidogenesis inhibition of ketoconazole has also been studied in experimental animals by O'Connor

et al., (2002), which evaluated a 15-days screening assay using intact male rats for identifying physiologically steroid biosynthesis inhibition of ketoconazole, also Shin *et al.* (2006) elucidated a 28-days repeated dose toxicity study of ketoconazole in rats. These authors reported in their interesting researches that ketoconazole caused increase of adrenal's weights, reflecting on the level of these hormones; decrease of testosterone, increase of estradiol, luteinizing hormone (LH) and follicular stimulating hormone (FSH). They suggested that ketoconazole should be identified as an impairment of endocrine-related compound.

The adrenal gland is the most important steroidogenic tissue in the human body and essential for survival. All steroidogenic processes take place in the adrenal cortex (Bielohuby *et al.*, 2007). The adrenal cortex, and in particular zona fasciculata has been reported by Rosol *et al.* (2001) to be among the most common site lesions in the endocrine system. The factors which predispose this organ to such lesions include: its disproportionately large blood supply per unit mass; its high content of lipids and the susceptibility of its unsaturated fatty acids to peroxidation damage; and its high levels of cytochrome P450 which metabolize xenobiotics to reactive intermediates. In addition, the adrenal expresses several of the pathways for steroid production present in the testes and ovaries. Therefore, toxic chemicals can affect the adrenal or its axis directly or indirectly in a manner similar to the testes and ovaries.

The present study throws the light on the impact of ketoconazole on adrenal cortex from the histological and ultrastructural point of view, because these types of studies did not receive marked attention in spite of its importance to characterize lesions that may suppress the function of the adrenocortical cells.

In the present investigation, ketoconazole is found to have destructive structural and ultrastructural alterations in rat adrenal cortex. The most striking change is the enlargement and extensive accumulation of lipid droplets throughout the cytoplasm of the three zones cells. This alteration was also reported in the influence of chronic treatment with aminoglutethimide, an inhibitor of the cholesterol enzyme P450_{scc} (Szabo *et al.*, 1996), congenital lipoid adrenal hyperplasia in humans and mice, a disorder caused by hereditary deficiency of the StAR protein (Miller and Strauss, 1999), hormone-sensitive lipase (HSL) deficiency in mice (Li *et al.*, 2002) and after chemotherapy administration (Hermenean *et al.*, 2008).

In this work, distinct alterations are evidenced in the mitochondria displayed by hypertrophy with

degeneration of the cristae resulting in cavitation of their matrix. These lesions are not reported previously in rat adrenal cortex. In our opinion this hypertrophy and cavitations in mitochondria probably resulted from inhibition of the conversion of cholesterol to pregnenolone, cholesterol may accumulate within the mitochondria. Consequently, it undergo considerable hypertrophy and vacuolation. Also, similar results were observed by Ishihara *et al.* (1974) in human adrenal cortex in Cushing's syndrome. They explained that the intra-mitochondrial vacuoles might be associated with the deposition of steroids or their related compounds in the cristae.

The profound lesions observed in mitochondria and smooth endoplasmic reticulum might be sufficient to cause impairment of steroid synthesis in accordance with Guerrero *et al.* (2010), who reported that these organelles play a great role in steroidogenesis within the cortex, though, they involve in the coordinated actions of cytochrome P450 and the enzyme 3-hydroxysteroid dehydrogenase (3 HSD), which are distributed between the mitochondria and the smooth endoplasmic reticulum. The rate-limiting step in steroid hormone biosynthesis is the translocation of substrate cholesterol from the outer mitochondrial membrane to cholesterol side-chain cleavage enzyme (CYP11A), the first enzyme in the steroidogenic pathway, which is located inside the mitochondria as Rainey *et al.* (2004) and Isola *et al.* (2010) elucidated in their interesting studies.

It is well known that, adrenocortical cells require constant supply of cholesterol as a precursor for the conversion of steroid hormones. Cholesterol delivery in the adrenal glands involves three major processes: uptake of lipoprotein-derived cholesterol via low density lipoprotein receptor (LDLR) mediated endocytic pathways and scavenger receptor class B member 1 (SCARB1)-mediated "selective" uptake pathways; endogenous cholesterol biosynthesis in endoplasmic reticulum; and cholesterol mobilization from intracellular cholesterol esters (CEs) stored in lipid droplets (Kraemer, 2007). The delivered CEs should be hydrolyzed to be utilized for steroidogenesis by non-lysosomal neutral lipases. Therefore, CE hydrolysis plays a pivotal role not only in the break down of stored lipids but also in the lipoprotein uptake and utilization. The resultant unesterified cholesterol is transported to mitochondria by the steroidogenic acute regulatory protein (StAR), where it is converted into the different steroid hormones by a battery of oxidative enzymes (Miller, 2007).

Ketoconazole was found to inhibit cholesterol synthesis in a dose-dependent fashion by blocking

conversion of lanosterol to cholesterol. Other lipid-modifying properties of ketoconazole include decreasing of lipoprotein lipase and 3-hydroxy-3-methylglutaryl coenzyme A reductase activities, inhibition of intestinal cholesterol absorption and bile acid synthesis, and upregulation of LDL-C receptor activity (Lionakis *et al.*, 2008).

Ultimately, It seems, that the impaired steroidogenesis is an important mechanism of toxicity in the adrenal cortex. It may have occurred due to disruption of cytochrome P450 enzymes, accordingly the cholesterol biosynthesis will be suppressed. This will lead to the accumulation of lipid droplets that seen in the electron micrographs, indicating that the target organ of ketoconazole on adrenocortical cells are mitochondria since the treated animals had destructive mitochondria on which cytochrome P450 enzymes are enclosed.

In conclusion, it is noticed now that the destructive impacts of ketoconazole on the adrenocortical cells reflected on their functions leading to much deficiency in their performance. So, it should be taken in consideration and great concern that this drug must be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

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Cytopathic effect of coccoid forms of *Helicobacter pylori* in Albino rats and Swiss mice**Rajaa M. Milyani**

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ABSTRACT: The effect of coccoid forms of a vaculating cytotoxin A positive *Helicobacter pylori* strain on *Mus musculus* (Swiss mice) and *Rattus norvegicus* (Albino rats) was studied. Two groups of Swiss mice and Albino rats were used. The first group of mice and rats was orally inoculated with coccoid forms of *Helicobacter pylori*, whereas, the second group of mice and rats were untreated and used as a control. The animals that had been orally inoculated with a total count of 7.0×10^5 bacterial cell / ml died after 5-7 days of inoculation (mice), whereas, rats died after 7-9 days. Symptoms of mouth ulcers, darkening of the ventral part and peripheries and loss of weight were apparent, in addition to slow movement and general weakness compared to the control group. Histological examination of the stomach of the inoculated animals showed marked degeneration of the epithelial lining membrane and dark dense bodies - most probably - coccoid forms inside gastric glands. In addition dilated blood vessel, degenerated, vacuolated fused cells with coccoid forms and intravascular haemolysis were observed. These findings may indicate the toxicity of coccoid forms of *Helicobacter pylori* and hence their possible pathogenic role in humans.

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Key words: *Helicobacter pylori*, Albino rats, Swiss mice, coccoid forms, toxicity, cytopathic effect.

1. Introduction:

Helicobacter pylori (*H. pylori*) is a microaerophilic, Gram negative, motile bacterium that is known to exist in two morphological forms: the helical and the coccoid form. It has been reported that spiral forms may transform to the coccoid shape after two hours of exposure to oxygen (Borriello, *et al.* 2005). However, other researchers found that it converts into the coccoid form when it is exposed to detrimental environmental conditions (Andersen and Wadstrom, 2001; Nilsson, *et al.* 2002). The role of *H. pylori* spiral forms in many types of gastritis, gastric and duodenal ulcers, gastric carcinoma and MALT lymphoma have been documented (Uemura, *et al.* 2001; Blaser and Atherton, (2004). Furthermore, its implication in the development of cardiovascular, dermatological diseases and lately in the development of Parkinson's disease has been suggested, Wedi and Kapp (2002); Aceti, *et al.* (2004). Hernando-Harder, *et al.* (2009); Testerman, *et al.*, (2011). Above all, Scientists estimated that more than 50% of the world's population harbor *H. pylori* in their stomach, Talarico, *et al.*, (2009) that can persist for life.

Interestingly, what makes infection of this bacterium a complicated dilemma, is that treatment with antibiotics induces the transformation of some spiral forms into the coccoid forms which consequently leads to failure of treatment, Kusters, *et al.*, (1997); Brenciaglia, *et al.* (2000).

Although many authorities in the field used to believe that coccoid forms are manifestation of bacterial cell death, Kusters, *et al.*, (1997), yet many recent researchers started to prove the opposite of this concept, Mizoguchi, *et al.* (1999); Azevedo, *et al.*, (2007). In fact, different reports recorded the ability of coccoid forms to cause gastritis in experimental mice and to convert in-vivo into the spiral form Wang, *et al.*, (1997); She, *et al.*, (2003). Moreover, documented research proved that coccoid forms coexist with spiral forms in the stomach, and by semi-quantitative analysis the number of coccoid forms was found to be significantly greater in adenocarcinoma than that in benign peptic ulcers and were observed in more severely damaged regions of the gastric mucosa, Chan, *et al.*, (1994); Saito, *et al.*, (2003). The fact that –so far- coccoid forms are said to be unculturable, Azevedo, *et al.*, (2007), does not exclude their ability to cause disease or in transmitting infection, since an increasing number of studies support the potential role of coccoid forms in *H. pylori* diseases, Figueroa, *et al.*, (2002).

The aim of the present study was to investigate the ability of *H. pylori* coccoid forms to cause pathological changes in laboratory animals and hence their possible role in the transmission of infection.

2. Materials and Methods:

2.1. Materials:

2.1.1. Bacterial strain:

H. pylori was isolated from a gastric biopsy of a patient complaining of chronic superficial gastritis, the clinical specimen was provided by the Gastroenterology department at King Khalid National Guard Hospital, Jeddah City, Saudi Arabia.

2.1.2. Laboratory animals:

20 healthy male *Mus musculus* strain MF1 (Swiss mice) and 20 healthy male *Rattus norvegicus* (Albino rats) aged three months and weighing 33-35 g and 230-250 g respectively were obtained from King Fahad research centre, King Abdul Aziz University (KAU). Each group of both mice and rats was divided into three subgroups: the first contained 5 inoculated animals with 1 ml of 7.0×10^6 Bacterial cell /ml, the second contained 10 inoculated animals with 1 ml of 7.0×10^5 Bacterial cell /ml and the third was five untreated animals as a control. The mentioned inoculum (infectious dose) was given as one dose/ day.

Each animal was housed in a separate stainless steel cage containing soft wood chips. A basal diet composed of 60% ground corn meal, 15% ground beans, 10% wheat bran, 10% corn oil, 30% casein, and 1% minerals mixture was given. Water was supplied daily. Ghanem, and Aly, (2003). Animals were kept at 21°C air-conditioned room.

2.1.3. Oral inoculation of animals:

The treated animals (15 mice and 15 rats) were mildly anaesthetized –only before inoculation - using chloroform saturated cotton which was placed in the middle of each cage. For daily inoculation, the mouse or rat was held firmly by the scruff of the neck in a vertical position (Lee and Megraud, 1996) and orally inoculated using a disposable sterile 1 ml syringe (JMC, Korea) for five days (mice) and seven days (rats). The control group of animals was untreated.

2.2. Methods:

2.2.1. Culture and Identification:

Gastric biopsy was cultured on Blood and Chocolate agar using the rubbing technique and the plates were incubated under microaerophilic conditions at 37°C for five days (Milyani and Barhameen, 2004). Identification was by morphological studies, urease, catalase and oxidase tests in addition to motility (Lee and Megraud, 1996). The colonies were subcultured on five blood agar plates and after five days incubation, the harvested colonies from each plate were transferred to a separate Cryovile filled with 0.5 ml Thioglycolate broth with 15% glucose (five Cryovile), and stored at - 20°C as stock culture for further studies. Five years later, a 10

µl diameter sterile disposable loop (Sara Med. Saudi Arabia) was dipped in the stock culture and a loopfull was streaked on both Blood and Chocolate agar and incubated under the appropriate conditions as mentioned above.

Molecular identification for the isolated strain, using 16S rRNA and VacA genes, was carried out by Professor Osama El Sayed (National Research Centre, Cairo, Egypt).

2.1.2. Preparation of the inoculums:

Two inocula were prepared from the stock culture (a total count of 7.0×10^6 and 7.0×10^5 Bacterial cell /ml) by using counting chamber; in addition, a drop of each inoculum was examined by phase contrast microscope.

2.1.3. Preparation of histological sections:

Treated and untreated mice and rats were dissected and the stomach was removed and preserved in Boin's solution for histological studies. Cross sections were done and stained with haematoxylin and eosin dyes as described by Lee and Megraud, 1996 at King Fahad research centre (KAU).

3. Results:

3.1. Culture and Identification:

Culture of gastric biopsy revealed typical morphology of *H. pylori* colonies, proven by positive urease, catalase and oxidase tests. Gram stain also showed Gram negative S-shaped bacteria, in addition, using phase contrast microscope, the well recognized motility of *H. pylori* was recorded. However, culturing from the stock culture after five years gave undetectable viable counts, though, examining drops of both inocula using phase contrast microscope showed complete conversion to coccoid forms some of which appeared motile.

3.2. Identification of 16S rRNA gene and VacA gene:

PCR amplifications of the *H. pylori* isolate revealed the fragments with expected sizes of 163 bp that represented the 16S rRNA gene and 750 bp that represented the VacA gene.

3.3. Laboratory animals:

The animals in the preliminary study that were orally inoculated with 7.0×10^6 bacterial cell/ml, died after 24 hours. On the other hand, both orally inoculated mice and rats with 7.0×10^5 *H. pylori* cell/ml, showed different abnormalities and pathological manifestations. Symptoms started to appear from the third day of inoculation as ulcers around the mouth, general weakness with slow movement, loss of appetite, darkening of the ventral part and terminals with some atrophy and loss of weight (fig. 1 and fig. 2).

The group of mice died after 5-7 days whereas, the group of rats died after 7-9 days, and the final average weight was decreased to 17.2 g for mice and 215 g for rats. No pathological changes were obtained in the control group that only drank sterile tap water.

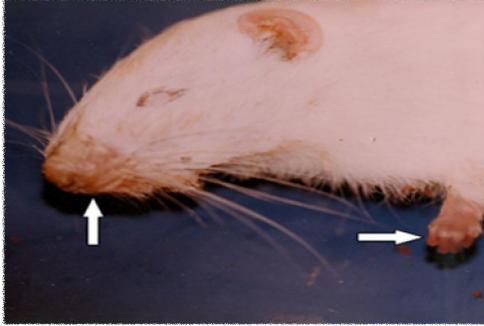


Fig.1 Albino rat after oral ingestion with coccoid forms of *Helicobacter pylori* showing ulcer of the mouth and dark atrophied terminals.

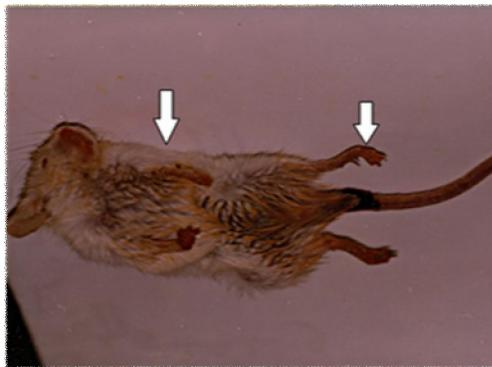


Fig.2 Swiss mouse after oral ingestion with coccoid forms of *Helicobacter pylori* showing ulcer of the mouth, dark ventral part and atrophied terminals.

3.4. Histological sections:

Figures 3 – 5 show different Sections of mucosal layer of Albino rat's stomach that were orally inoculated with *H. pylori* coccoid forms. Degeneration of the epithelial lining membrane and dark dense bodies- most probably- coccoid forms inside gastric glands were apparent in fig. 3 (A) compared to the normal section of control rat fig. 3 (B). In addition fig. 4 (A) shows degeneration of epithelial lining membrane with no goblet cells and many vacuolated cells, while fig. (B) shows dilated blood vessel, degenerated, vacuolated fused cells with dark dense bodies. Moreover, in Fig. 5, intravascular haemolysis was seen.

On the other hand, figures 6 -7- show different Sections of mucosal layer of Swiss mice stomach that were orally inoculated with *H. pylori* coccoid forms in which fig. 6 shows highly damaged epithelial lining membrane with degenerated cells in the inner layers and many scattered dark dense bodies (coccoid forms), in contrast to fig. 6 (B) which shows normal stomach mouse wall. However, many coccoid forms in the mucosa and sub mucosa and connective tissue were seen in Fig. 7 (A) whereas, wavy fibres in the submucosal layer on which many dark bodies were deposited.

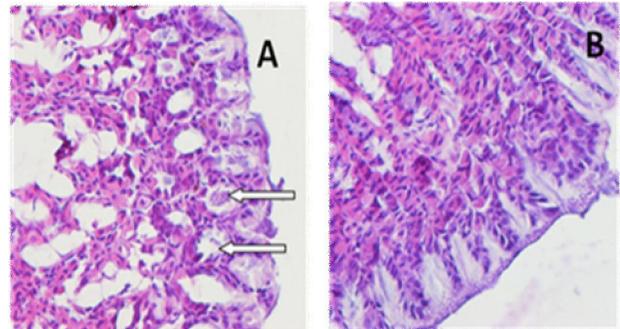


Fig.3 Section of mucosal layer of Albino Rat stomach (A) orally inoculated with *H. pylori* coccoid forms showing degeneration of the epithelial lining membrane and dark dense bodies inside gastric glands (B) normal section of control (x 400).

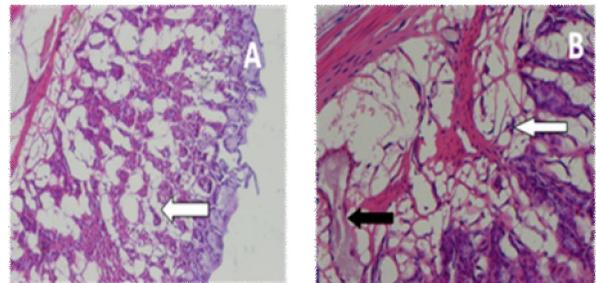


Fig.4 Section of mucosal layer of Albino Rat stomach that had been orally inoculated with *H. pylori* coccoid forms (A) showing degenerated epithelial lining membrane with no goblet cells and many vacuolated cells (B) showing dilated blood vessel (black arrow) and degenerated, vacuolated fused cells with dark dense bodies (x 400).

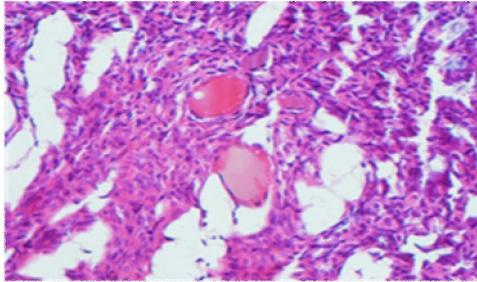


Fig.5 Section of Albino Rat stomach that had been orally inoculated with *H. pylori* coccoid forms showing intravascular haemolysis (x 400).

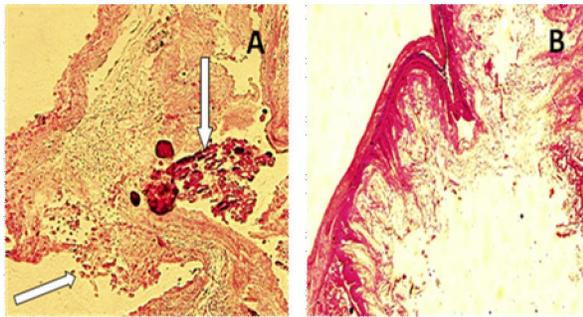


Fig.6 Section of mouse stomach that had been orally inoculated with *H. pylori* coccoid forms showing highly damaged epithelial lining membrane with degenerated cells in the inner layers and many scattered dark dense bodies (A), (x 630).
Section (B) show normal stomach mouse wall (x 250)

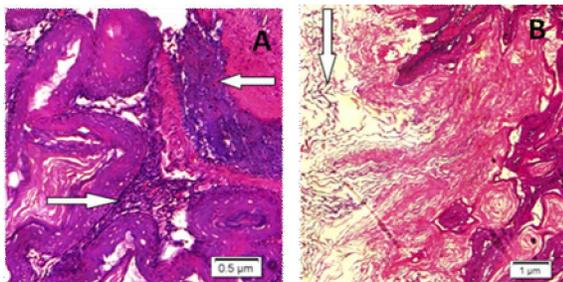


Fig.7 Section of stomach wall of Swiss mouse (A) shows many dark dense bodies in the mucosa, submucosa and connective tissue (x 260). (B) Section in the wall of mouse stomach showing many wavy fibers in the submucosal layer plus many dark dense bodies deposited on the fibers (x 630).

4. Discussion

Coccoid forms of *H. pylori* have for a long time been a debate between scholars. The fact that no one should ignore and has been documented is their existence in the stomach of patients together with spiral forms and their possible role in pathogenicity, Saito, *et al.*, (2003). Furthermore, what makes coccoid forms a dilemma to physicians, pharmacologists and scientists is that up to date, they are said to be

unculturable, Borriello, *et al.* (2005) and after eradication therapy a small amount of them revert to the unculturable state and remain in the form of coccoids, Bardakhch'ian, (2003). Above all, *H. pylori* has been classified as type 1 carcinogen of gastric cancer by the WHO (Correa and Houghton, 2007). All the previous data was a strong stimulus for the present study which was to investigate the capability of coccoid forms to cause cytopathic effect in laboratory animals.

Wang *et al.*, (1997) demonstrated that both forms of *H. pylori* can infect mice with an inoculum size of 10^8 CFU whereas, at the present study, an infectious dose of 7×10^6 and 7×10^5 of coccoid cell /ml were used. The former only allowed 24 hours survival of both rats and mice, whereas, the latter (7×10^5) allowed survival of the tested animals for 5 – 9 days. It was surprising that although Wang and his colleagues used a higher infectious dose, yet their mice survived for a longer period. This could be attributed to the genotype of the *H. pylori* strain under study that might have been more virulent than Wang's strain and also than the strains used by She and colleagues, Wang *et al.*, (2001); She, *et al.*, (2003). The present studied strain revealed to be VacA positive which could have exerted a toxic lethal effect on the inoculated animals. In addition, observation of a drop of the stock culture by phase contrast microscope showed some motile coccoid forms indicating its viability. What's more, Milyani and Barhameen, (2003) studied the survival ability of seven *H. pylori* isolates in three different fluids aerobically, at room temperature and at 4° C and reported differences among the survival ability of the strains, since only one strain was able to maintain a detectable level of 3.88×10^4 CFU after eight days in tap water at 4° C, after which viable count completely dropped. They concluded the possibility of *H. pylori* to stay viable but unculturable and thus might be a risk for transmitting infection. Also, the high diversity and variations among *H. pylori* strains and the role of VacA in causing epithelial cell damage with formation of large vacuoles within the cells have been well established, and could be another factor for the obvious toxicity at the present work, Milyani (2011); Argent *et al.* (2008). On the other hand, the obtained results at the present work, when inoculation with sub lethal dose lead to different abnormalities and pathological manifestations such as mouth ulcers, atrophy of terminals and the apparent acute toxicity that ended by death, may prove the pathogenicity of coccoid forms to rats and mice. Moreover, the histological abnormalities that occurred in the stomach including marked degeneration of the epithelial lining

membrane and vacuolated fused cells with dark dense bodies which are most probably coccoid forms (Lee and Megraud, 1996) may indicate their potent detrimental effect and a risk factor for other pathological manifestations (Blaser and Atherton, (2004), Hernando-Harder *et al.* (2009), Testerman *et al.*, 2011). Nonetheless, we should bear in mind the immune response of the tested animals sine it could also play a role in the final outcome of infection Benaissa, *et al.* (1996); Zhao, *et al.*, (2007). Adhesion of coccoid forms to gastric mucosal cells and their role in gastro-duodenal disease has also been studied and recorded, Liu, *et al.*, (2006); Vijayakumari, *et al.*, (1995).

In conclusion, the previous data strongly emphasize the pathogenic role of coccoid forms and recommend pursuing detailed research on this amazing phase of *H. pylori*. The clearly perceptible achievement and outcome of such research is: successful therapy, accurate diagnosis, extra biological data and the discovery of the source and precise mode of transmission which eventually will enable us to control and prevent different serious diseases caused by *H. pylori*.

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6/11/2011

Protective effect of ginger (*Zingiber officinale*) against metalaxyl induced hepatotoxicity in albino mice**Hawazen A. Lamfon**

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Abstract: The present work studied the effect of metalaxyl, an acylalanine fungicide, on the liver of albino mice and the possible role played by the aqueous extract of Ginger (*Zingiber officinale*) in attenuating the hepatotoxicity of metalaxyl. Metalaxyl treatment induced many histological changes in the liver including congestion of blood vessels, cytoplasmic vacuolization of the hepatocytes, necrosis and fatty degeneration. Metalaxyl caused marked elevation in serum ALT and AST. It also caused an increase in malondialdehyde and depletion of the activity of the antioxidant enzymes, catalase and superoxide dismutase in the liver. Treating animals with metalaxyl and ginger extract led to an improvement in both the histological and biochemical alterations induced by metalaxyl. Moreover, ginger reduced the level of malondialdehyde and increased the activity of antioxidant enzymes, SOD and CAT. These results indicated that ginger has protective effect against liver damage induced by metalaxyl and this may be attributed to its antioxidant and free radicals scavenging properties.

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Keywords: Protective effect; ginger (*Zingiber officinale*); metalaxyl; hepatotoxicity; albino mice

1. Introduction

The environmental contamination of pesticides as a result of their extensive use has become a serious problem. This stimulated the scientists to study its biological effects. Metalaxyl is a benzenoid fungicide used to control soil-borne fungal diseases on fruits, cotton, soybean, peanuts, ornamental and grasses (Sukul and Spiteller, 2000). On the other hand, metalaxyl showed hazardous effects in mammalian animals. Hrelia et al. (1996) reported that metalaxyl has cytogenetic effects on human and animal chromosomes only *in vitro* and not *in vivo*. In a long-term feeding study with mice at low levels of exposure, the animals' livers were the primary target for metalaxyl-related effect (Walker and Keith, 1992). Paolini et al. (1996) indicated the cocarcinogenic potential of metalaxyl in Swiss albino mice. Metalaxyl caused dose-dependent bradycardia, and at higher doses (250 and 300 mg/kg body weight) the sustained bradycardia led to cardiac arrest (Naidu and Radhakrishnamurthy, 1988). Sakr and Lamfon (2005) reported that metalaxyl induced histological and biochemical alterations in the liver of albino mice. Damsia et al. (2007) found that imidacloprid and metalaxyl separately or in combination induced *in vitro* micronucleus formation and sister-chromatid exchange induction in human lymphocytes and *in vivo* micronucleus induction in polychromatic erythrocytes of the rat bone-marrow. Sakr and Abdel-Samie (2008) reported that metalaxyl induced apoptosis and bax expression in hepatocytes of mice. Dasgupta et al. (2011) reported that residues of

buprofezin, chlorpyrifos, metalaxyl, and myclobutanil were detected in incurred grape and wine samples.

The potential role of dietary antioxidants to reduce the activity of free radical-induced reactions has drawn increasing attention. Ginger (*Zingiber officinale* Roscoe) is example of botanicals which is gaining popularity amongst modern physicians and its underground rhizomes are the medicinally useful part (Mascolo et al. 1989). Ginger was found to relieve the symptoms of nausea and vomiting associated with motion sickness, surgery and pregnancy (Gilani and Rahman, 2005). The pharmacological effects of ginger and its pungent constituents, fresh and dried rhizome were investigated. Among the effects demonstrated are anti-platelet, antioxidant, anti-tumour, anti-rhinoviral, anti-hepatotoxicity, anti-arthritis and anti-diabetic effect (Fisher-Rasmussen et al. 1991, Sharma et al. 1994, Kamtchoving et al. 2002, Islam and Choi, 2008). Ginger was found to have hypocholesterolaemic effects and cause decrease in body weight, glucose in blood, serum total cholesterol and serum alkaline phosphatase in adult male rats (Bhandari et al., 2005). Ginger extract-pretreated rats attenuated in a dose-dependent manner, CCl₄ and acetaminophen-induced increases in the activities of ALT, AST, ALP, LDH and SDH in the blood serum (Yemitan and Izegebu, 2006). The present work was conducted to study the effect of ginger extract on the hepatotoxicity of the metalaxyl in albino mice.

2. Materials and Methods

Animals

Sexually mature male albino mice (*Mus musculus*) weighing 20 ± 5 g was used. The animals were housed in plastic cages (40×30×16 cm) and kept in the laboratory under constant temperature ($22 \pm 1^\circ\text{C}$) for at least one week before and along the period of the experimental work. They were maintained on a standard rodent diet composed of 20% casein, 15% corn oil, 55% corn starch, 5% salt mixture and 5% vitaminized starch. Water was available *ad libitum*.

Preparation of ginger aqueous extract

Ginger (*Z. officinale* Roscoe) rhizome was purchased from the local market at Shebin El-kom, Egypt. One kilogram fresh ginger rhizome was cleaned, washed under running tap water, cut into small pieces, air dried and powdered. 125 g of this powder were macerated in 1000 ml of distilled water for 12 h at room temperature and were then filtered. The concentration of the extract is 24 mg/ml. Each animal in the present study was orally given 1 ml of the final aqueous extract (Kamtchouing et al., 2002).

Experimental design

All the experiments were done in compliance with the guide for the care and use of laboratory animals (National Research Council, 1985). Animals were divided into 4 groups.

Group 1: Animals of this group (20 mice) were orally given metalaxyl by gastric intubation at a dose level of 1/10 LD50 (130mg/kg body weight) three times per week for continuous 4 week (Sakr and Lamfon, 2005).

Group 2: Animals in this group (20 mice) were given the same dose of metalaxyl given to animals of group 1 followed by 1 ml of final aqueous extract of ginger (24 mg/ml) three times weekly for 4weeks. This dose of ginger was selected according to Sakr et al., (2011).

Group 3: Animals of this group (20 mice) were orally given ginger at the same dose level of group 2.

Group 4: This group is a control, in which animals (20 mice) were orally given water. 10 animals were selected randomly after 2 and 4 weeks of treatment and were sacrificed.

Histopathological examination

The treated animals and their controls were killed by cervical dislocation, quickly dissected and liver was removed, fixed in Bouin's fluid. After 24 h, tissues were rinsed three times in 70% ethanol, dehydrated using a graded ethanol series and then embedded in paraffin wax. Paraffin sections were cut into 5 micrometers thick slices and stained with

haematoxylin and eosin and examined under light microscope.

Biochemical assays

For enzymes determination, blood samples were collected from animals after 4 weeks of treatment. Sera were obtained by centrifugation of the blood sample and stored at -20°C until assayed for the biochemical parameters. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were measured using a fully automated Hitachi 911 analyzer (Tokyo, Japan). A commercial randox kits (Randox Laboratories, LTD, Ardomre, Crumlin, United Kingdom) were used in these analysis. In hepatic tissue samples, the extent of lipid peroxidation was estimated as the concentration of thiobarbituric acid reactive product (malondialdehyde) according to (Ohkawa et al., 1979). Superoxide dismutase activity was measured using the methods of Rest and Spitznagel (1977). The principal of this method depends on the ability of SOD to inhibit the power of phenazine methosulphate mediated to reduce the nitroblue tetrazolium. Catalase activity was determined from the rate of decomposition of H_2O_2 (Aebi et al., 1974).

Statistical analysis

The results were expressed as mean \pm SD of different groups. The differences between the mean values were evaluated by ANOVA followed by Student's "t" test using Minitab 12 computer program (Minitab Inc., State Collage, P.A).

3. Results

i. Histological results

Liver of control animals or animals given ginger extract showed normal structure (Fig.1). Examination of liver of mice treated with metalaxyl displayed many histopathological alterations. After two weeks from the beginning of the administration of the fungicide, the liver tissue revealed disruption of normal cords arrangements of the hepatocytes and the intrahepatic blood vessels were congested (Fig.2). Infiltrations by large mass of leucocytic inflammatory cells were observed (Fig.3) and the hepatocytes displayed cytoplasmic vacuolization (Fig.4). The histopathological changes of the liver were more pronounced after four weeks where the hepatic cells appeared with giant nuclei and their cytoplasm contained fatty droplets (Fig.5). Animals treated with metalaxyl and ginger for two weeks revealed that some hepatocytes showed fat droplets (fig.6). Examination of liver sections after four weeks revealed that liver tissue restored its normal structure and most cells displayed a certain degree of recovery besides the appearance of some binucleated ones.

ii. Biochemical results

Change in ALT and AST:

Figure (7) showed the effect of different treatments on serum ALT activity. Non-significant difference in serum ALT activity was recorded in mice treated with ginger extract in comparison with control group. Animals treated with metalaxyl showed a significant increase in serum ALT activity after 2 and 4 weeks of treatment. On the other hand, animals treated with metalaxyl and ginger revealed a significant decrease in ALT activity when compared with metalaxyl group. Figure (8) showed non-significant difference in serum AST activity in animals treated with ginger when compared with control group. Animals treated with metalaxyl showed significant increase in serum AST activity while animals treated with metalaxyl and ginger showed a significant decrease in AST activity when compared with metalaxyl treated group.

Change in MDA, SOD and CAT:

Table (1) showed the effect of different treatments on malondialdehyde (MDA) (index of tissue lipid peroxidation), superoxide dismutase (SOD) and catalase (CAT) in liver of animals examined after 4 weeks. MDA level was increased significantly, whereas the activity of SOD and CAT was found to be decreased in metalaxyl-treated animals when compared to the control group. Treating rats with ginger and metalaxyl increased MDA level and returned SOD and CAT activity to nearly that of the control.

4. Discussion

Results obtained in the present study indicated that metalaxyl induced many histopathological alterations in the liver tissue of mice such as tissue impairment, congestion of intrahepatic blood vessels, cytoplasmic vacuolization of the hepatocytes and fatty degeneration. Similar results were reported by Sakr and Lamfon (2005) and they added that metalaxyl affected liver enzymes (transaminases) in mice. The alterations induced by metalaxyl were also observed in liver of some mammalian animals exposed to various fungicides. When male and female rats were exposed to mancozeb, the liver showed centrilobular necrosis with extramedullary haemopoiesis and the kidney showed tubular dilation, necrosis and congestion of blood vessels (Szepvolgyi *et al.*, 1989). Selmanoglu *et al.* (2001) revealed congestion of blood vessels, increase in number of Kupffer cells, cellular infiltration and hydropic degeneration in liver of male rats treated with carbendazim.

Treating animals with metalaxyl induced a significant increase in the oxidative stress, malondialdehyde which is lipid peroxidation marker and a significant decrease in the level of serum antioxidant enzymes, superoxide dismutase and catalase. Hanukoglu *et al.* (1993) reported that lipid peroxidation and reactive oxygen species are produced by electron leakage outside the electron transfer chains and these oxygen radicals can initiate lipid peroxidation, to inactivate P₄₅₀ enzymes. Mathews *et al.* (2000) mentioned that the damage occurred in the cell membrane by hydroxyl radicals induced oxidation of polyunsaturated fatty acids in membrane lipid in a process called lipid peroxidation. Moreover, Banks and Soliman (1997) recorded increase in serum hydroperoxides and decrease in reduced glutathione after benomyl toxicity in rats. The authors added that the *in vivo* toxicity of benomyl may be associated with oxidative stress. According to Calviello, *et al.* (2006) fungicides-induced damage is closely associated with increase in lipid peroxidation and the decrease in the antioxidant enzymes. Sakr *et al.* (2007) found that mancozeb fungicide induced a significant decrease in the serum antioxidant superoxide dismutase and an increase in malondialdehyde which is lipid peroxidation marker in albino rats. The Liver toxicity recorded in the present study may be due to the oxidative stress resulted from metalaxyl or its metabolite.

1. The obtained results showed that treating rats with metalaxyl and ginger improved the histopathological and biochemical changes induced in the liver by metalaxyl. This indicated the effectiveness of ginger in prevention of metalaxyl hepatotoxicity. The effect of ginger on hepatic damage was studied by some investigators. The effect of the ethanol extract of the rhizome of *Zingiber officinale* was tested against carbon tetrachloride and acetaminophen-induced liver toxicities in rats. CCl₄ and acetaminophen induced many histopathological changes and increased the activities of ALT, AST, ALP, LDH and SDH in the blood serum. Ginger extract was found to have a protective effect on CCl₄ and acetaminophen-induced damage as confirmed by histopathological examination of the liver (Yemitan and Izegbu, 2006). Bhandari *et al.* (2003) studied the effect of an ethanol extract of ginger on country-made liquor (CML)-induced liver injury in rats.

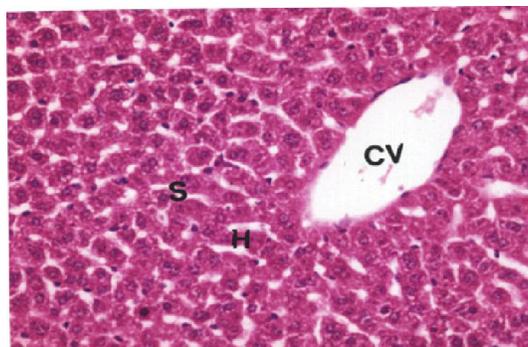


Fig.1. liver section of a control mouse showing hepatic strands (H), hepatic sinusoid (S) and central vein (CV), (X 400).

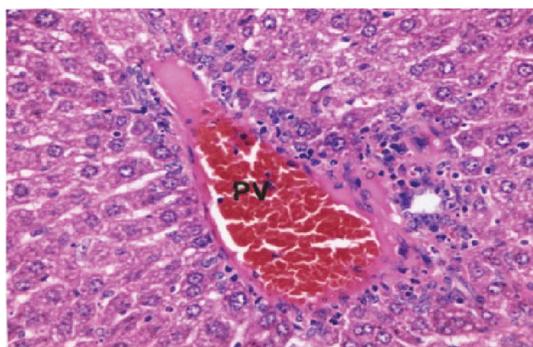


Fig.2. Section of liver of a mouse treated with metalaxyl showing congestion of portal vein with eroded lining (PV), (X 400).

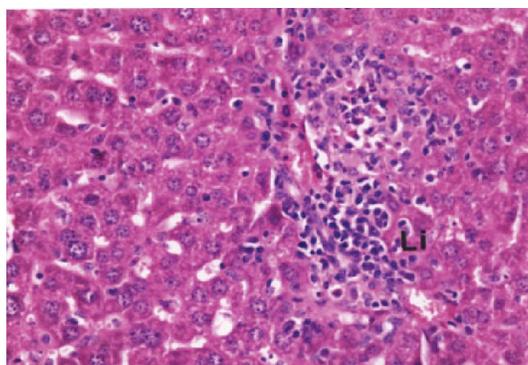


Fig.3 Specimen obtained from mouse treated with metalaxyl showing leucocytic infiltration, (X 400).

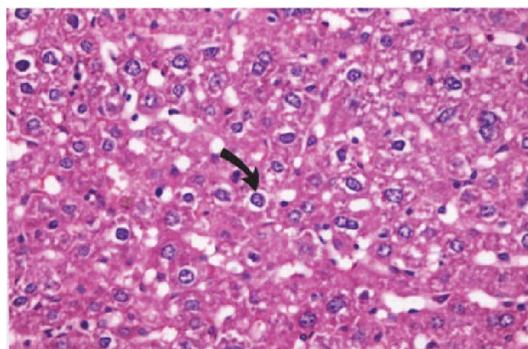


Fig.4. Liver section of a treated mouse showing cytoplasmic vacuolizations of the hepatocytes (arrow), (X 400).

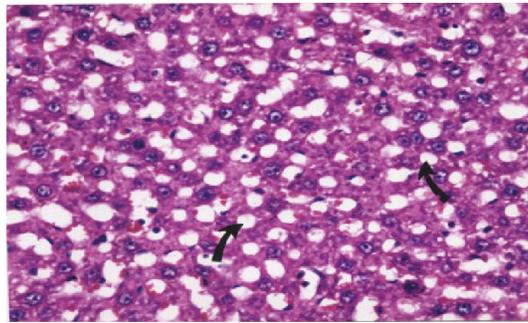


Fig.5. Liver section of a treated mouse showing fatty degeneration (arrows), (X 400).

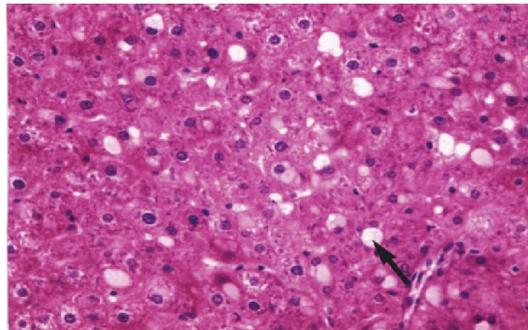


Fig.6. Liver section of a mouse treated with metalaxyl and ginger showing advanced degree of improvement with few number of fat droplets (arrow), (X 400).

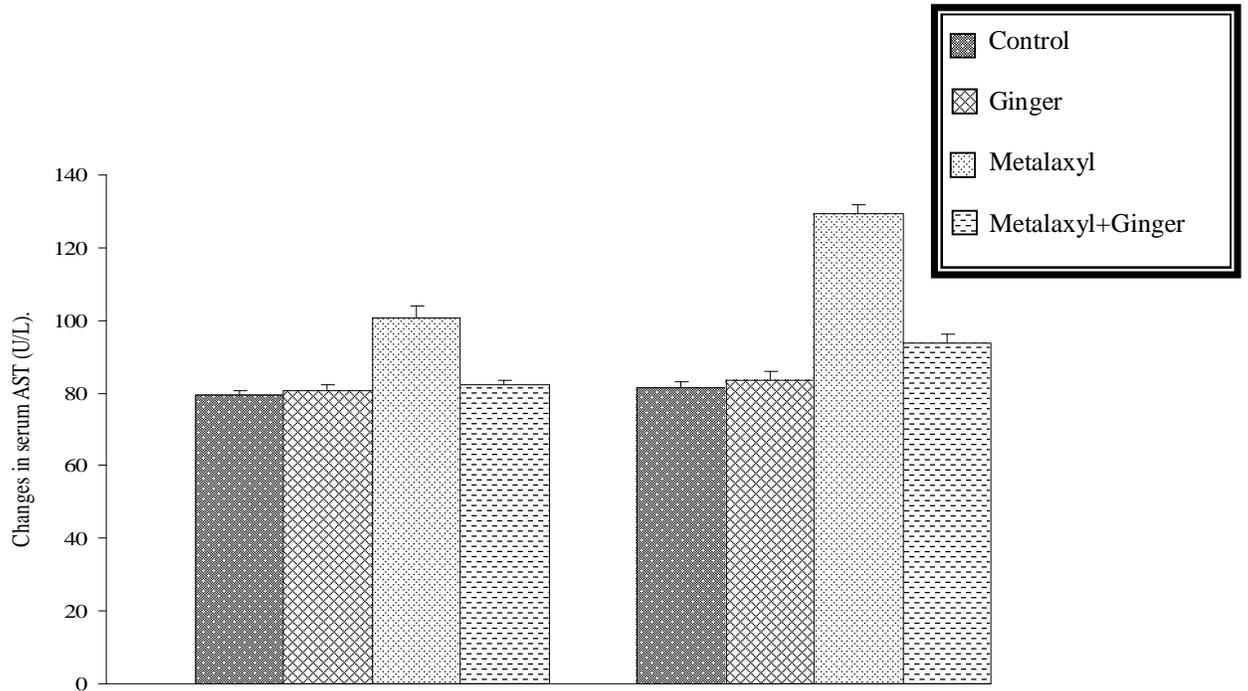


Fig.7. Effect of different treatments on serum AST.

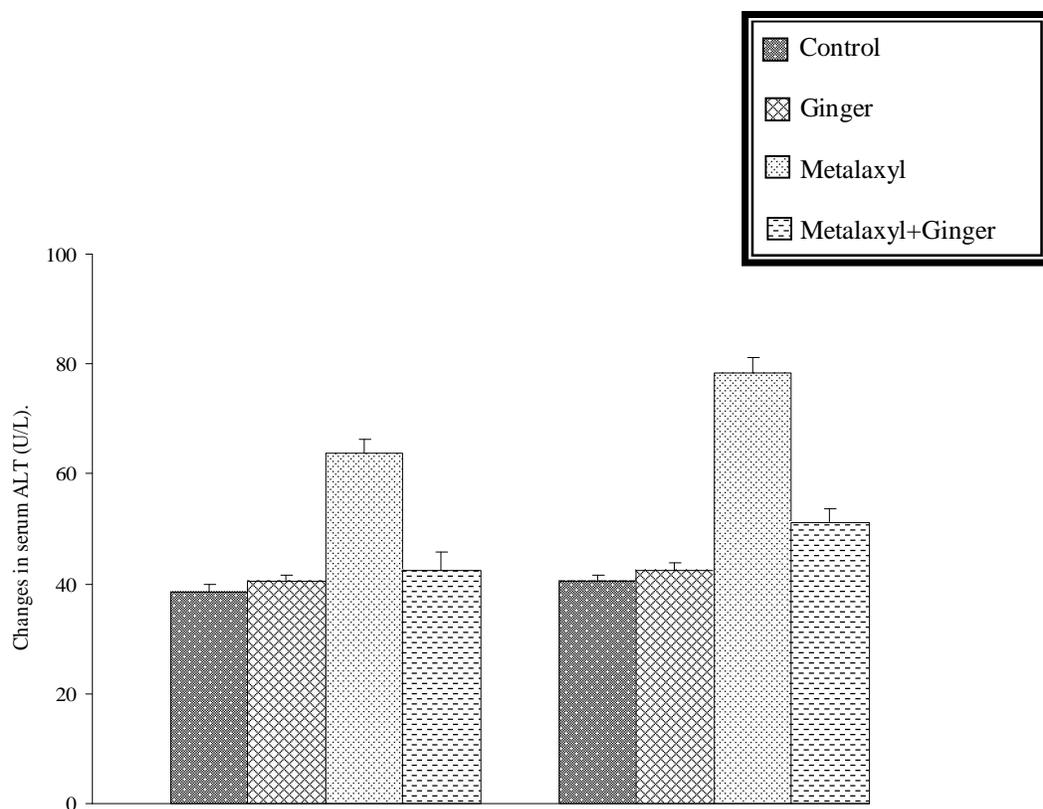


Fig.8. Effect of different treatments on serum ALT.

Table (1). Effect of Metalaxyl and/or ginger extracts on level of MDA, CAT and SOD activities in liver of mice.

Group	MAD (n mol/ml)	CAT (μ mol/ml)	SOD (μ mol/ml)
Control	15.5 \pm 1.5	6.5 \pm 1.2	140.5 \pm 5.5
Ginger	16.2 \pm 1.4	6.1 \pm 0.9	141.3 \pm 4.3
Metalaxyl	30.5 \pm 2.8*	2.5 \pm 0.6*	106.2 \pm 3.5*
Metalaxyl+Ginger	20.5 \pm 1.6	4.8 \pm 0.2	132.2 \pm 2.6

(*)Statistically significant ($P < 0.05$)

Their results showed that administration of ginger ethanolic extract (200 mg/kg) orally from day 15 to day 21 along with CML produced significant ($P < 0.01$) lowering of serum AST, ALT, ALP and tissue lipid peroxide levels. Moreover, ginger reduced the level of serum malondialdehyde acting as lipid peroxidation marker and increased the serum level of antioxidant enzyme, superoxide dismutase. Similarly, Siddaraju and Dharmesh (2007) reported that ginger-free phenolic and ginger hydrolysed phenolic fractions exhibited free radical scavenging, inhibition of lipid peroxidation, DNA protection and reducing power abilities indicating strong antioxidant properties. Ansari et al. (2006) showed that the ethanolic *Z. officinale* extract pretreatment for 20 days in

isoproterenol treated rats induced oxidative myocardial necrosis in rats, enhances the antioxidant defense (catalase, superoxide dismutase and tissue glutathione) and exhibits cardioprotection property. Ajith et al. (2007) reported that ginger ameliorated cisplatin-induced nephrotoxicity and this protection is mediated either by preventing the cisplatin-induced decline of renal antioxidant defense system or by their direct free radical scavenging activity. Amin and Hamza (2006) demonstrated that *Z. officinale* increased the activities of testicular antioxidant enzymes, superoxide dismutase, glutathione and catalase and reduced level of malondialdehyde. Ghasemzadeh et al. (2010) reported that young rhizome of *Z. officinale* had higher content of flavonoids with high antioxidant activity. Sakr et

al.(2011) reported that that ginger has ameliorative effect against kidney damage induced by metalaxyl and reduced lipid peroxidation and increased the serum level of antioxidant enzymes, SOD and CAT.

It is concluded from the present study that, ginger extract have protective effect against metalaxyl-induced hepatotoxicity. This effect may be mediated by free radicals scavenging activity of ginger.

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6/1/2011

Low Intensity Laser Versus Synthetic Bone Graft To Increase Bone Density After Enucleation Of Large Cystic Lesions Of Jaws

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Abstract: *Materials and Methods:* This study included 27 patients of both sex (17 males & 10 females) aged 20 - 48 years. They were divided into 3 groups, each group contained 9 Patients. All patients in all groups were selected to have large cystic cavities in their dental arches of different etiological factors, ranged in diameter 1.5 – 3.5 cm, and not approaching any vital structures. They underwent surgical enucleation of these cystic lesions. Patients of group (I) have received bone substitute in form of Algipore granules that were packed inside the bony cavities of enucleated cysts till complete filling. While Patients in group (II) have not received any grafting materials after cysts enucleation, but low intensity diode laser was applied to all of them in six sessions for each patient . Patients in group (III) ,control group, have not received any grafting materials after cysts enucleation. Radiographic evaluation of all patients was performed using digital radiography system (Digora). Radiographs were taken preoperatively and at intervals of 1 day, 6 weeks, 3 months and 6 months post surgically. The mean bone density at the same region of opposite side was also measured for comparison. *Results:* It was found that there was a significant higher bone density in Algipore group than other two groups at 1 day and 6 weeks time intervals, while there was no significant difference between Algipore and Laser groups at 3 months and 6 months post surgically. But both groups showed significantly higher bone density than control group at these 3 & 6 months time intervals. Furthermore, the bone density was significantly higher in Laser group than control group at 6 weeks time interval. In control group, there was no significant difference in bone density between all time intervals. In group I & II, there were significant increase in bone density in all time intervals compared with preoperative density, but, there were no significant difference in bone density between different time intervals in control group. *Conclusion:* Algipore (CORALS) can be a dependable bone substitute material for grafting bony defects in both jaws, Low intensity laser has also the ability to significantly increase bone density of empty cavities of jaws after enucleation of large cysts, so, it is preferred than Algipore specially with cases having infected lesions .

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Key words: Bone substitute material, Diode laser

1.Introduction

Large bony spaces left after enucleation of large cystic cavities of the Jaws represent a questionable issue for bone grafting procedures. To increase the bone density, low intensity laser was found to have a significant rule for this purpose too, Khadra et al.,(2004).

Algipore was studied against Low Intensity Diode Laser to fulfill the aim of increasing bone density for these bony spaces.

Roux et al (1988) reported that Corals have the advantage of being cheap , easily sterilized, inert (99% of calcium carbonate), biodegradable and well

reossified. They shorten surgical procedures by avoiding the use of iliac and/or costal grafts. No infectious complications have been noted, Roux et al (1988). Patat and Guillemin (1989) mentioned that “Experimental studies commenced in 1977 and

human clinical applications commenced in 1979, have largely demonstrated the biocompatibility of the coral material and its entirely original nature. This biomaterial is progressively and totally replaced by newly formed bone with the characteristics of the recipient bone (after completion of the restoration process), Patat and Guillemin (1989). Begley et al

(1995) in a comparison between Corals and others, said that “a layer of what appeared as dense calcification was seen around the coral implant. Coral elicited no marked inflammatory response, and this was attributed to the negligible amounts of protein present in these materials . Roux et al (1995) mentioned that “Madreporic Coral graft implants can be recommended as bone substitute in cranial base surgery: 1) The material simplifies the surgical procedure; 2) Harvesting of autologous bone is no longer necessary; 3) Transmission of infections like AIDS, Hepatitis C or Creutzfeld-Jacob-disease can be avoided with certainty”. Demers et al (2002) in their review for Corals as a bone substitute revealed that the structure of the commonly used coral, is similar to that of cancellous bone and its initial mechanical properties resemble those of bone, they are biocompatible, osteoconductive, and biodegradable at variable rates, and they added “When applied appropriately, natural coral exoskeletons have been found to be impressive bone graft substitutes. Turhani et al (2005) concluded that the results of their study showed that Algipore obtained from calcified red algae support the proliferation and differentiation of human osteoblast-like cells on its surface.

Rochkind et al (2004) ; Fukuhara et al (2006) ; Pretel et al (2007) and De Oliveira et al (2008) all revealed that the use of infrared LLLT directly to the injured tissue showed a biostimulating effect on bone remodeling and tissue repair by stimulating the modulation of the initial inflammatory response and anticipating the resolution to normal conditions at the earlier periods of time.

Saito et al (1997) ; Khadra et al (2004) ; Nissan et al (2006) ; Lirani-Galvão et al (2006) and Miloro et al (2007) all suggested that laser therapy of low power density is effective on bone formation and the bone healing process by affecting calcium transport during new bone formation .

Kusakari et al (1992) and Stein et al (2008) revealed that, the LLLT appeared to increase bone-forming activity of osteoblasts or may directly act on osteoblast-precursors and biostimulate osteoblast-like cells for enhancement of bone regeneration. Vladimirov et al (2004) said that “Laser therapy based on the stimulating and healing action of light of low-intensity lasers (LLLT), along with laser surgery and photodynamic therapy, has been lately widely applied in the irradiation of human tissues in the

absence of exogenous photo-sensitizers. Besides LLLT, light-emitting diodes are used in phototherapy (photobiostimulation) whose action, like that of LLLT , depends on the radiation wavelength, dose, and distribution of light intensity in time. Dörtbudak et al (2000) concluded that, irradiation with a pulsed diode soft laser has a bio stimulating effect on osteoblasts, which might be used in osseointegration of dental implants, Dörtbudak et al.,(2000).In bone grafting procedures, Many methods were used for measurement of bone density as dual X-ray absorptiometry, Bettin et al.,(2003); Johansson et al.,(2004); Kastl et al.,(2005); Marcen et al.,(2005).Peripheral quantitative computed tomography (pQ-CT) ,Butterfield et al.,(2005)· Micro-computed tomography (micro CT), Lu and Rabie (2004); Mankani et al.,(2004), Cutting torque measurements, Kastl et al.,(2005) and many other techniques. Sivarajasingam et al (2001) have measured Optical density of iliac and tibial grafts using a computerized densitometer, and compared them at 6 days, 6 weeks, and 3 months. Mankani MH. et al (2004) Concluded that the use of quantitative CT offers a practical approach for the non-invasive determination of new bone formation in mineralizing bone marrow stromal cells and hydroxyapatite-tricalcium phosphate(HA-TCP) transplants, Mankani et al.,(2004). Beltrame et al (2005) have presented an innovative calibration algorithm for a semi-quantitative analysis of non-standardized digitized X-ray images to investigate the progression of the new bone deposition and the osteo-integration at the bone-implant interface. Sanchez et al (2005) have measured the bone mineral density (BMD) and bone mineral content (BMC) by peripheral dual X-ray absorptiometry densitometer. Thorwarth et al (2005) used micro-radiography analysis for mineralization of autogenous bone grafts harvested from different sites concluded that the differences in mineralization depending on the origin of autogenous bone. Even after 6 months, these values could still be correlated to the transplants origin. Vossen et al (2005) have studied Bone quality pre- and post-transplant using other modalities by measuring acoustic velocity and density and by calculating elastic coefficients.

Aim of this study was to evaluate low intensity laser for increasing bone density in large bony cavities created by enucleation of large cysts of the jaws and also to compare between Low Intensity Diode Laser

and Corals as a bone substitute grafting material for filling these large bony cavities. In addition we aimed to Compare between the effect of grafting, non-grafting and Laser application procedures on bone densities of these cavities.

2. Material & Methods

2.1. Materials:

2.1.1. The Studied sample:

This study included 27 patients of both sex (17 males & 10 females) aged 20 - 48 years, they were divided into 3 groups:

Group I (Algipore Group): Contained 9 patients (4 males & 5 females) of average age 29.8 years.

Group II (Laser Group): Contained 9 patients (3 males & 6 females) of average age 31.85 years.

Group III (Control Group): Contained 9 patients (5 males & 4 females) of average age 30.95 years. All patients in all groups were selected to have large cystic cavities in their dental arches of different etiological factors, ranged in diameter 1.5 – 3.5 cm. and not encroaching any vital structures. (Figure 1)

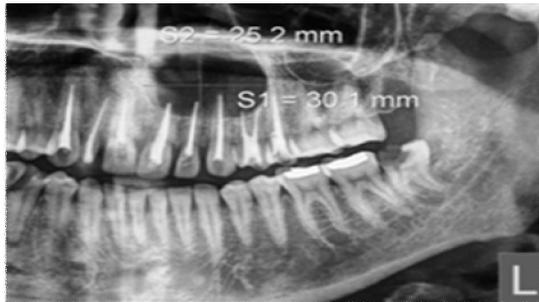


Figure 1: Large cystic lesion of left Maxilla

All patients underwent surgical enucleations of these cystic cavities using either pyramidal flaps or semi-lunar flaps according to the location of the cyst in

relation to the crest of the ridge. (Figure 2)



Figure 2: Surgical enucleation of lesions in 3 cases representing the 3 groups
(Above; are lesions in place & Below; are Cavities after lesions enucleation)

2.2. Methods:

2.2.1. Root canal treatments:

Root canal treatments were performed to the related affected teeth before or during the surgical procedures.

Patients in group (I) have received bone substitute graft in form of Algipore granules that were mixed with a blood sample from the patient, then, packed inside the bony cavities of enucleated cysts till complete filling of these cavities. (Figure 3)



Figure 3: Algipore granules are packed inside the cavity of enucleated cyst

Patients in group (II) have not received any grafting materials after cysts enucleation, but Low Intensity Diode Laser was applied to bony cavities of all of them in six sessions for each patient, day after day starting from 1 day post surgical.

2.2.2. Laser Procedure:

Quanta system apparatus was used, the wave length used was 980 nanometres (nm), the power was 0.1 watt (W), and the laser beam emission was in continuous mode. (Figure 4)

The fibre used with this device was 320 micron (μm).



Figure 4: Diode Laser Device

Diode laser application was done with the fibre placed in direct contact with the tissues. Laser beam has been applied to the bony cavity labially and palatally, the time of each application was 60 seconds for each 1cm width of the cavity (Figure 5)



Figure 5: Application of Diode laser intraorally (labially & palatally)
The total energy for each 1cm. width of the cavity was 12 Joule (J), (6 Joule labially and 6 Joule palatally) as: $\text{Joule (J)} = \text{Watt (W)} \times \text{seconds (S)}$

Green eye glasses were worn by doctor and patient during laser application for eye protection.

Patients in group (III) have not received neither grafting materials nor Laser application after cysts enucleation, they represented the Control group. Suturing of the flaps for all patients was performed using 000 black silk suture without placement of any

guided bone regeneration membranes, then, postoperative regimen of medications was prescribed for the patients. (Figure 6)



Figure 6: Suturing of the flap (Up) & 6 months postsurgical (Down)

2.2.3. Radiographic evaluation:

Radiographic evaluation of all patients was performed using digital radiography system (Digora) by Soredex Orion Corporation version 1.51. Radiographs were taken preoperatively and at time intervals of 1 day, 6 week, 3 month and 6 months post-surgically. All radiographs were taken using long cone parallel technique with the help of bite blocks to provide standardization of images or digital panoramic radiographs were obtained. The mean bone density at the same region of opposite side was also measured for comparison.

The density measurement window displayed the radiographs, and a rectangular area is marked on the image in the area of the bony defects and area measuring was performed. The mean density of pixels within the area of cavity was recorded and the other normal side too. Results were displayed as numeric statistical information, as a histogram showing density distribution, and a density profile. (Figure 7)

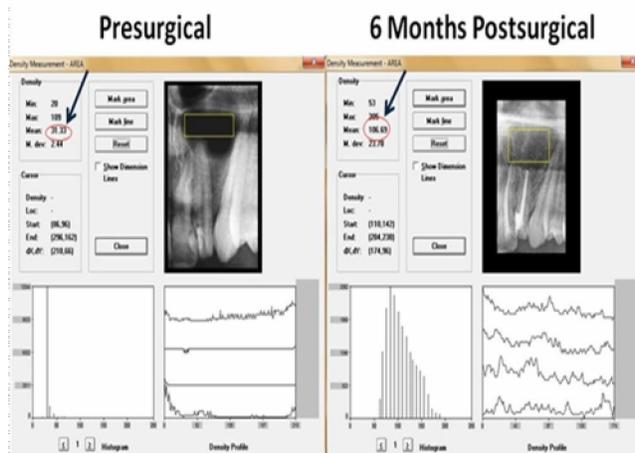


Figure 7: Measurement of bone density by DIGORA

2.2.4. Statistical analysis:

The data were tabulated and statistically analyzed using 2 ways ANOVA.

3. Results

At one day postoperatively: bone density in the Aligpore group showed significantly higher levels than both laser and control groups whose values were insignificantly different.

At six weeks postoperatively: Aligpore group still showed significantly higher bone density than both laser and control group, with another statistically significant higher bone density in laser group than control group.

At three months postoperatively: there was no statistically significant difference between bone density values of Aligpore and Laser groups, while both showed statistically significant higher levels than control group.

At six months postoperatively: there was no statistically significant difference between bone density values of Aligpore and Laser groups, while both showed statistically significant higher bone density than control group. (Figure 8)

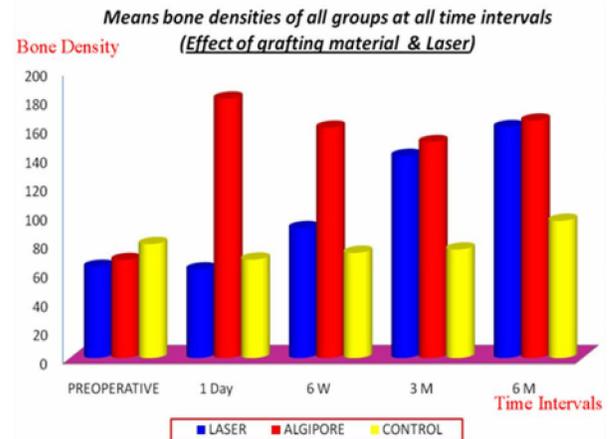


Figure 8: Mean values of Bone densities in all groups at different time intervals

In the laser group: there was no significant change in the bone density between preoperative and one day values, while there was statistically significant increase from 1 day to 6 weeks, from 6 weeks to 3 months and from 3 months to 6 months intervals.

In the Aligpore group: there was statistically significant increase from preoperative to 1 day intervals, there was statistically significant decrease from 1 day to 6 weeks postoperative intervals, followed by insignificant decrease from 6 weeks to 3 months, then there was statistically significant increase from 3 months to 6 months postoperatively.

In Control group: there was statistically insignificant decrease from preoperative to 1 day postoperative bone density values, followed by statistically insignificant increase from 1 day to 6 weeks, and another insignificant increase from 6 weeks to 3 month interval, then there was statistically significant increase from 3 months to 6 months. (Figure 9)

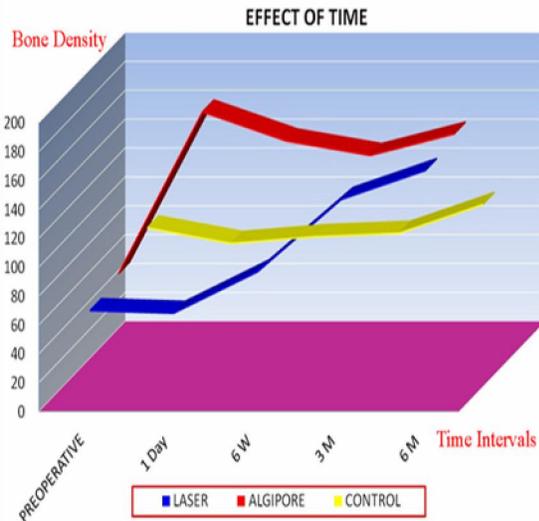


Figure 9: Effect of time on bone density in all groups throughout follow up periods

Difference was considered statistically significant at $p < 0.1$

Table (1): Original Statistical analysis of 2 ways ANOVA

ANOVA (2 Ways)						
Source of Variation	SS	df	MS	F	P-value	F crit
Sample (Time)	72419.1	4	18104.78	123.8715	1.23E-41	2.447237
Columns (Material)	101236.6	2	50618.28	346.3264	1.43E-50	3.071776
Interaction	75089.51	8	9386.189	64.21959	9.25E-40	2.016428
Within	17538.93	120	146.1577			
Total	266284.1	134				
LSD (at $p < 0.5$)	11.246					
LSD (at $p < 0.1$)	14.915					

Table (2): Means of bone densities readings of all groups at all time intervals to study the effect of time and the effect of technique

		LASER	ALGIPORE	CONTROL
Preoperative	Mean	63.45	68.13	79.23
	variance	111.61	236.28	37.89
1 Day	Mean	61.63	180.31	68.41
	variance	21.44	365.29	64.24
6 Weeks	Mean	90.33	160.11	73.14
	variance	79.48	180.83	57.53
3 Months	Mean	140.52	150.10	75.47
	Variance	62.03	78.05	52.68
6 Months	Mean	160.54	165.00	95.40
	Variance	89.41	589.57	166.05

Horizontally: Evaluating effect of technique used on bone density in each interval

Vertically : Evaluating effect of time on bone density in each group separately

4. Discussion

The corals were selected for this research as they are more available and cheaper than many other grafting materials, at the same time, the differences between corals and these various grafting materials were not significant, Velich et al., (2004). Corals also have no significant difference in bone density from autogenous bone grafts throughout time interval periods, Block et al.,(1998).

Algipore group had demonstrated better bone density than control group during all follow up periods that was in agreement with Sanchez et al, (2005) who have found that the bony defects where demineralized freeze-dried bone graft (DFDBG) was used, either with or without platelet-rich plasma (PRP), did demonstrate slightly greater Bone Mineral Density (BMD) and Bone Mineral Content (BMC) than those left untreated. Digital radiography was used to measure bone density as it could detect minute changes in density Jeffcoat(1993). Density measurement is used for providing an accurate measuring of gray scale values than the human eye can. The density of an image refers to its brightness. The maximum density value is 255, which corresponds to white. The minimum density value is zero, which corresponds to black. The different shades of gray have density values from 1 to 254 , Wenzel(1993). The bone density was significantly higher in laser group compared with control group at 6 weeks, 3 months and 6 months time intervals due to the ability of low intensity laser to increase bone density at the area of application. This was in agreement with (Khadra et al, 2004 ; Lirani-Galvão et al, 2006; Miloro et al, 2007; Nissan et al, 2006 ; and Saito et al,1997) who suggested that laser therapy of low power density is effective on bone formation and the bone healing process by affecting calcium transport during new bone formation.

In Conclusion : Algipore (CORALS) can be a dependable bone substitute material for grafting bony defects in both jaws, Low Intensity Laser has also the ability to significantly increase bone density of empty cavities of jaws after enucleation of large cysts, so, it is preferred than Algipore specially with cases having infected lesions .

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Survey of Relationship between the Capital Structure and Stocks Liquidity at the Accepted Companies in Tehran Stock Exchange Organization

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Abstract: Taking a look at the asymmetry of the current data at the market, the present research tries to attain some conclusions regarding the stock share holders and investors' responses towards the financial leverage and issuing of audited financial reports within seven transactional days before event (issuing financial reports) Compared to seven transactional days after event. With the application of the nonparametric tests in two cross sectional and pooled method amongst the companies which are member of Tehran Stock Exchange organization from 13 industries, the reactions toward the prices was measured by making use of four liquidity Proxies within the period of 2002-2007. The results showed a weak relation between the leverage and the liquidity ranking, and other variables including the proportional spread of stock price, Stock Price Depth and number of stocks circulation times (Turnover Rate of Stock), did not demonstrate a significant relation. The results show that the capital structure is a related and dependent factor (even if the weak one) for decisions made by the investors and the shareholders. In fact, they consider the risk of cash flows resulted from debts in their decision-making process parameters. [Ali Ahmadzadeh and Ameneh Malekinejad. Survey of Relationship between the Capital Structure and Stocks Liquidity at the Accepted Companies in Tehran Stock Exchange Organization. Journal of American Science 2011;7(6):1109-1118]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Spread of stock price, Stock Price Depth, Turnover Rate of Stock, Liquidity ranking and Asymmetric information.

1. Introduction

The capital structure is the mixture of long-term fund resources being used by the companies by means of which the financial supply of assets can be paid. The mixture of debt and the capital affects the value of the companies through the expected incomes resulting from capitals and the rate of capital expense. Changing this mixture, results in the modification of capital cost of the company. The main goal of capital structure is providing an appropriate combination of the long-term fund resources in order to minimize the capital cost of the company, thereby, maximizing its marketing value. This mixture is called "the optimized structure". The most important concepts for investment decision makings involve management and shareholders attitude, risk and return. The term "return rate" is applied in order to explain increasing or decreasing rate of investment during period of maintaining assets. The expected "return rate" informs the investor of the average reward which he/she anticipates is achieved within a certain period. The difference between the anticipation and reality which is probably resulting from unanticipated changes and evolutions is called the uncertainty of the stock return. The investor is always in search of risk reduction and increasing certainty of investment

profitability. Several factors lead to the deviation of the return rate and as a result, change of the stock price at the market including commercial risk, interest rate risk, risk of inflation, financial risk, risk of liquidity and risk of exchange rate. Illiquidity as a risk causes the enhancement of the shareholders expected return and their response against its fluctuations. The liquidity points out the acceleration and expense of trading an asset or stock in an active market. The more precise the recognition of buyer and seller and their evaluation from an asset, the rate of exchange will be increased and its expense will be decreased, and as a result, the degree of liquidity is increased. In fact, the more the seller is able to sell the asset quicker and with lower cost, the more the liquidity will be (Gelosten, 1985). In investment market, risk and the return are positively correlated. The risk of liquidity resulting from asymmetry of the information has a highly important effect on the return rate demanded by the shareholder and is influenced by many factors including financial (validity) leverage. Lismer, Kouner and Sanbeth (2008) in a research done in the United States concluded that changes of leverage solely justify 20% of the liquidity periodical changes (E. Lismond, 2003). Barath, Paskarliu and woo (2008) proved that those companies who have replaced debt with the

capital, economically and statistically faced with considerable amount of liquidity cost changes which originates from increase of information asymmetry (Mac Groat, 2008). Amihoud and Mendleson (1989) maintained that the increase in capital through debt can lead toward increasing asymmetry of information about the capital and by increasing the liquidity cost it will result in the enhancement of the capital.

2. Literature Review

The key parameter regarding efficiency of the financial markets structure is the expense of transactions. Most markets suggest different prices for the sellers and buyers, therefore the performance efficiency of the market can be measured by means of the price spread of the purchase request suggested by sellers. In case the suggested and requested prices are more close to the quoted price, this indicates the effectiveness of the market in appropriate pricing of that asset or stock (Sibilkov, 2007). The quality of disclosure is discussed as one of the most influential factors on the liquidity of an asset in the market which due to having some effects on the reduction of informational asymmetry and reduction of risk of variant selecting which can result in reducing capital expense of the companies. Amihud and Mendleson stated that since the liquidity increases the value of a company, the companies are more motivated to opt for the liquidity enhancement policies for securities (A. Lambert, 2006). In some cases, the problem is similar to the thing that Akarloff (1970) firstly introduced. He maintained that the informational asymmetry may result in pricing below or above the shares value of the companies. This issue effects the investment decisions made by investors and financial supply of the management. The management requires supply of funds in order to accept or reject the current positive net value projects, under such a circumstance, the decision to issuance stocks is dependent on the market status and asymmetry of the current information. In a manner that the shareholders are not able to have a prompt vision towards the company's situation, they may consider such issuance of stocks as a bad omen and a sign of financial weakness of the company and lower the price of their shares. The asymmetry issue is a problem which affects most often during the issuing of new shares which are used for financial supply of the company's new investments and lead to lowering the price of stocks. If the management goal is to maximize the return for all shareholders, the result will be the attainment of more cash amounts by the new investors in comparison with the previous ones. This may result in non acceptance of the project in the related field, even if it has a positive net value. This fact according which the liquidity via company

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decision makings can increase the value of companies indicated that the increase of liquidity can also decrease the cost of capital (Skinner, 1991). In order to have better understanding of the effect of liquidity on the capital structure of the company, one can look at the capital's cost of the company (taking the literature of the market internal structure into account which indicated the effect of illiquidity over the profit expected by the shareholder). The theoretical literature of the asset pricing states that the uninformed sellers who transact against those informed buyers demand more return rate for the relatively non-liquidated securities (Frider, 2006). Amihud and Mendleson (1986) stated that the higher cost related to transaction of stocks with low liquidity has led to higher claimed return rate and the mere liquidity demand generates higher capital cost. They claim that higher asset maintenance period allows the investors to gain higher expected return/gain by keeping a wide range of assets and as a result of effect of net cost of transaction. The studies all express that investors having assets with more liquidity should pay more amount and they request to be compensated for bearing amounts related to illiquidity. The validity of company can also be increased by reduction of the costs of inflation. Gloston and Milgram (1985), who dealt with the study of relationship between the risk and the price difference for the suggested trade by both seller and purchaser demonstrated that the accounting-specific ratios (including percent of paid profit, size of asset and growth of asset) as the risk parameters have a negative relation with price difference suggested for sale transaction of shares. They proved that the expenses of variant selection results from uncertainty about the future liquidity value of that asset. Their research was based on this concept that the difference of price recommended for sale is merely an informational phenomenon. The quality of information exposure and publicity at the market and the manner of data analysis by the users are to different and important aspects in the market that highly influences the liquidity of shares. Kupland and Galie (1983) decided to define a model for the informational asymmetry. In line with this, they demonstrated that the asymmetry of information in the market leads to increase of the price spread. W. Butler, Groleun and Weston (2002) proved that the liquidity of the capital market is an important determining factor of enlargement cost of capital. Those researchers found in their study that after monitoring the other factors, the investment banks bear lower costs for companies having higher liquidity rates. In fact, the companies with more cashable shares have lower capital cost. W. Anderson (2002) while mentioning the relationship between

total leverage and the company's liquidity rendered a model which anticipated that long-term usage of high debt amount will result in high level maintenance of assets having high liquidities. They found some evidence regarding the existence of a positive relation between leverage and maintenance of liquidity assets, and based upon such findings, they introduced a correlated loop for high leverage, high liquidity and slower growth. Mortal and L. Lipson concluded that companies having stocks with higher liquidity rates are more inclined to apply lower financial leverage and act for their financial provisions through the stocks. Frieder and Martel (2006) Assuming that the debt obliges managers to make better investment decisions found that, while the leverage increases, the scope of suggested price of the sale of stocks decreases. Besides, when the liquidity decreases, the leverage increases. In fact, while the expense for financial supply increases through shares the managers usually seek for using debts. Their results showed that one percent of increase in the spread will lead toward 3% of leverage enhancement. Buhler and Tib (2006) concluded that liquidity risk has a determining impact on the value of the market of company and an optimized leverage. The debt validity scope at the basic market also depends on the degree of liquidity risk. Ratio of debt against high capital in their model will result in lower validity scope. Adrian and Song shine (2008) found a strong positive relation between changing leverage and changing the size of balance sheet (change of asset). They also found that the financial intermediaries are able to moderate their balance sheets in such a way that they will have high financial leverage during high liquidity period and will have low financial leverage during the recession period.

3. Questions and Research Hypotheses

This research evaluates the proportional spread of stock price, Stock Price Depth and number of times of stock circulation (Turnover Rate of Stock) during the issuing of audited financial reports (the balance sheet) by the application of the suggested prices for sale of stocks in order to assess the followings:

Is there any relationship between the capital structure and liquidity of stocks of companies being accepted at the exchange market?

In order to answer the above question and taking the existing theoretical basics of it into account, one group of main hypotheses and one group of sub-hypotheses have been formulated as the following:

3.1. Main Hypotheses

1. There is a relation between ratio of the long-term debt toward long term assets and average of spread of stock price.

2. There is a relation between the ratio of the long-term debt toward long term assets and average of Stock Price Depth.
3. There is a relation between the ratio of long-term debt to long term assets and the average of Turnover Rate of Stock.
4. There is a relation between the ratio of long-term debt to long term assets and the rank of the stock liquidity.

3.2. Sub-Hypotheses

1. There is a difference between the average of difference spread of stock price(C Spread) of the leveraged companies and the non-leveraged ones.
2. There is a difference between the average of difference of stock price depths(C Depth) in leverage companies and the one in the non-leveraged ones.
3. There is a difference between the average of difference of Turnover Rate of Stock (C Turnover Rate) of leveraged companies and the non-leveraged ones.
4. There is difference between the average of stock liquidity rank of leveraged companies and the non-leveraged companies.

4. The Methodology of Research

The current research is of applied type and since it is based on the generalization of information coming from a small portion of society named as sample and also because the variables are studied without any alterations, it is also analytical. The duration of the current research was selected by taking the approximate duration of more activities of Tehran Stock Exchange market and ease of access of exchange data into consideration, and a period of 6 years from the year 2002 till 2007 was selected for the financial reports of the companies.

5. Statistical Sample Selection Terms and Conditions

By considering the independent and dependent research variables which includes capital structure and stocks liquidity (which requires the application of exchange of companies' information) the following limitations were defined for selecting sample containing most active companies during the states period:

1. The companies which have been a member of Tehran Stock Exchange during 2002 and their membership have been continued till the year 2007.
2. All companies that their financial year ends in 12.29.
3. All financial moderating and investing companies were omitted from the sample list.

4. All companies who have the data required by research (enough financial Reports) during the above time duration.
5. Companies that during the above 6 years period have less than 6 months of Inactivity (non conduct of stock trades registered at the Trade Panel).
6. The companies which have at least 5 registered trades within each of one month periods before and after the date of publicizing audited financial reports.

In general and after imposing the above restrictions and conditions, there remained 57 companies out of 13 industries all of which were evaluated and tested as the statistical sample. The theoretical basics of the research has been collected from various Persian and Foreign articles and translated books and the data related to the research variables includes data gained by the financial reports and dates of issuance via Tadbir Pardaz and Pars Portfolio software, and also the data regarding price and volume of transactions has been gathered from the Exchange Information Software by paying attention to bulk transactions omission requirement and also ease of having access to that information. After the collecting procedure was finished, the data has been examined with two cross sectional and whole annual methods and after assessing variables, the SPSS software was applied in order to make some statistical evaluations. After the test for determining normality of data, the type of the required test for assessing each hypothesis was determined. In such a manner that Pearson correlation test has been applied for main hypothetic test and also for testing secondary theories (difference of mean between two independent groups of the leveraged and non-leveraged companies) the Kroschall-valis test was used. In case of existence of relation between variables, the Regression Equation has been applied. In order to perform tests, firstly the leverage of companies has been calculated and the mean of leverages of each year has been considered separately. In the next phase, companies having leverages more than or equal to the mean were considered as the leveraged companies and the companies with leverage lower than the mean were considered as non leveraged companies.

6. Measuring Research Variables

6.1. Independent Variable

6.1.1. Capital Structure

It points to the left side of the balance sheet and by means of mixture of the long-term funds resources the payments for the financial supply of the assets are arranged.

a) Ratio of the long-term debts to long term assets:

$$L_{it} = (LD/LA) \times 100 \quad (1)$$

In which:

L = Leverage

LD = Long-term debts

LA = Long term assets

i= i company

t= year of t

6.2. Dependent Variable

The liquidity points to traded asset with lower cost and higher speed. In this research, liquidity means liquidity of the “stocks” of a company and for measuring it, following four parameters have been defined:

a) Proportional spread of stock price

$$SPREAD_i = \frac{AP - BP}{(AP + BP)/2} \times 100 \quad (2)$$

b) Stock Price Depth

$$DEPTH = \frac{TAP}{TBP} \times 100 \quad (3)$$

c) Number of frequency of stocks circulation

$$TURN\ OVER = \frac{NST}{NSO} \times 100 \quad (4)$$

d) Liquidity ranks or score (through symmetrical mean of the six parameters):

$$M_j = N / \left(\frac{1}{I} \right) \quad i = 1.2, \dots, N = 1.2, \dots, 6 \quad (5)$$

In which:

SPREAD= Total ration of relative price gap for company i in the time period t

AP (ask Price) = Average of price requested by purchaser during t

BP (Bid Price) = Average of the seller' suggested price during t

TAP = Total value of stocks requested by the buyer

TBP= Total value of stocks suggested by the seller

NST = Number of Stocks Traded

NSO= Number of Stocks Outstanding

M_j= j M investment company

N= Number of sextet indicators

I = Indicator of I M from the series (Number of traded stocks, Value of traded stocks, Number of trade days, Number of times of accomplished trade, average of the number of distributed stock and average of the existing value of company stocks)

T= time duration under study

I = Sample under study

Since the goal of evaluation of stockholders and investors' reactions in the short run against the issuance of financial reports and companies' capital structure, therefore the average of 7 days before and 7 days after issuance of financial reports were calculated and similar to Kanagartenam, J.louboo and J.Valen method, the average data before the event (issuance of the audited financial reports) was

calculated as the proxy for each of the spread, depth and Turnover Rate of Stock variables.

The following indexes are defined during this phase:

$$C \text{ SPREAD} = \text{SPREAD}_{t+1} - \text{SPREAD}_{t-1}$$

$$C \text{ DEPTH} = \text{DEPTH}_{t+1} - \text{DEPTH}_{t-1}$$

$$C \text{ TURNOVER} = \text{TURNOVER}_{t+1} - \text{TURNOVER}_{t-1}$$

C SPREAD = the difference of proportional price spread

C Depth = the difference of stocks depth

C TURNOVER = the difference of number of times of stocks circulation

SPREAD_{t-1} and SPREAD_{t+1} = the average percent of the proportional spread of stock price in period before and after the event (Issuance of audited financial reports)

DEPTH_{t-1} and DEPTH_{t+1} = the average stocks depth in the period before and after the event (Issuance of audited financial reports)

TURNOVER_{t-1} and TURNOVER_{t+1} = the average index of stock circulation in the period before and after the event (Issuance of audited financial reports)

(The liquidity rank has been considered as total and as annual total average point and the test and its analyses are done annually and distinct from way of calculating other 2 parameters where the periods before and after the event have been considered).

6.3. Controller Variables

In this research, the following variables have been used as a controlling variable for removing their effects on the dependent variable:

1. Size of the company: Equal to the natural logarithm of the company's asset book value.

2. Stock return: Equal to annual average of the price difference at the beginning and end of trading period of the stocks plus Cash Dividends by price of the start of the period.
3. Cash Dividends: equal to the amount of distributed liquidated profit among the shareholders.
4. Return of the assets: The parameter is the profitability of the company which has been calculated as percentage of ratio of the net income to the total assets book value.

7. Test Hypotheses

7.1. Main Hypotheses

This group of hypothesis deals with the study of existence of relation between the capital structure and the liquidity of shares. In order to test the above theories and studying the existence of a significant relation and determining type and degree of the relation which exist between capital structure and liquidation, the Pearson's correlation test and correlation analysis has been used. Comparing significance level with the test level (0.05) in cross sectional method is a good indicator of non existence of significant relation between leverage and variables for liquidity per each year. In other words, the difference of spread, depth and rank of liquidity showed the correlation coefficients of respectively 0.369, 0.33 and 0.336 and significance level of 0.005, 0.012 and 0.011 in the year 2002 and in the year 2004, the sole rank of liquidity had 0.00 significance level of 0.449 correlation coefficient with having leverage.

Table1. Correlation test between liquidity variables and leverage in cross sectional method

Title	Description	1381	1382	1383	1384	1385	1386	Test Result
Spread and Leverage	Correlation Coefficient	0.369	0.096	-0.064	-0.156	0.023	0.09	Reject of hypothesis H1
	Significance level	0.005	0.259	0.635	0.247	0.866	0.251	
Depth and Leverage	Correlation Coefficient	-0.330	0.46	0.069	0.199	-0.024	0.075	Reject of hypothesis H1
	Significance level	0.012	0.168	0.612	0.139	0.86	0.428	
Turnover Rate and leverage	Correlation Coefficient	-0.158	0.086	-0.052	0.085	-0.220	0.421	Reject of hypothesis H1
	Significance level	0.241	0.437	0.703	0.531	0.1	0.006	
Liquidity rank and leverage	Correlation Coefficient	0.336	0.37	0.449	0.068	0.076	0.038	Reject of hypothesis H1
	Significance level	0.011	0.494	0.000	0.617	0.574	0.12	

Due to largeness of significance level out of test level (in general format), all of the above results ended in

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rejection of H1 hypothesis. However, based on the pooled method the rank of liquidity has correlation

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coefficient of 0.22 with significance level of 0.003. As follows, the summary of the results of this test have been given by the method of total years.

Table 2. Result of correlation test between liquidity variables and leverage

Leverage	Pearson Correlation Coefficient	Significance Level	Test Level	Test Result
Difference of Spread and leverage	0.024	0.687	0.05	Reject of Hypothesis H1
Difference of Depth and leverage	0.007	0.906	0.05	Reject of Hypothesis H1
Difference of Turnover Rate and leverage	-0.080	0.176	0.05	Reject of Hypothesis H1
Difference of leverage rank and leverage	0.22	0.003	0.05	Reject of Hypothesis H0

Due to significance of the correlation test only in the method of the total years, the regression test was performed between dependent variables (liquidity) and independent variable (leverage) and all controlling variables (return, Cash Dividends, profitability, size). In this test, only the rank of liquidity also had a linear relation in the model. The determination coefficient of 0.151 and the moderated determination coefficient of 0.132 show that 0.132

percent of modifications of liquidity rank are anticipated by these variables. The significance of the total Regression Model is evaluated by ANOVA test and then the significance of individual coefficients is reviewed by the table of coefficients. The purpose of analysis of the regression variance is to evaluate the certainty about existence of a linear relation between the two variables.

Table 3. Analysis of ANOVA and Durbin Watson's Test

Description	Watson Durbin statistics	Determination Factor	Moderated determination factor	F statistics	Significance level	Result
Leverage and Spread	1.978	0.011	-0.011	0.612	0.802	There is no linear relation
Leverage and depth	1.914	0.014	-0.008	0.738	0.713	There is no linear relation
Turnover Rate and leverage	2.233	0.004	-0.018	0.148	0.981	There is no linear relation
Liquidly and leverage	1.723	0.151	0.132	0.619	0.000	There is no linear relation

Since Durbin Watson's statistics in the above table are placed at 1.5 till 2.5 time span which indicate the nonexistence of correlation among errors. In addition, because all achieved significance levels in the hatched boxes (liquidity rank and leverage) are less

than 0.05; they indicate the existence of a linear relation between mentioned variables and the model.

8. Leverage, Liquidity Rank and Controlling Variables

Table4. Liquidity variables significance coefficient & leverage at Regression Model based on pooled method

Variable	Non standardized coefficient		Standardized coefficients	t	Significance level
Fixed Coefficient	150.266	17.113		8.781	0
Leverage	0.671	0.218	0.178	3.083	0.002
Profit	-0.205	0.044	-0.268	-4.61	0
Cash Dividend	-0.004	0.003	-0.079	-1.297	0.196
Profitability	-0.252	0.335	-0.046	-0.753	0.452
Size	-4.061	1.215	-0.193	-3.343	0.001

• By Studying the coefficient table well indicates the significance of some of coefficients (the hatched boxes) in the equation related to the leverage and liquidity rank. During the total model fitting,

fixed coefficient, first type leverage, return and size showed a significance level lower than 0.05. The aforesaid variables were fitness retested in order to estimate the main model.

Table5. Durbin Watson's test and final model determination coefficient

Model	Correlation Coefficient	Determination Coefficient	Moderated determination coefficient	Estimate standard deviation	Durbin Watson Statistics
1	0.376	0.141	0.132	63.55	1.708

Table6. Coefficients and significance level at the final model

Variable	Non standardized Coefficients		Standardized coefficients	t	Significance level
Fix coefficient	137.496	15.91	_____	8.642	0
Leverage	0.795	0.207	0.214	3.845	0
Profit	-0.199	0.041	-0.275	-4.869	0
Size	-4.07	1.198	-0.193	-3.396	0.001

• In this manner, one estimates the following linear relation between the rank and leverage

• of liquidity and controlling variables by considering Durbin Watson and Linearity of the Tests of Model:

$$LD = 137.496 + 0.795L - 0.199 RE - 4.070 S \quad (6)$$

In which:

LD (Liquidity Degree) = Average of the company's liquidity annual rank

L = Average of annual leverage (ratio of long-term debt to long term Assets)

RE = Average of the annual stocks return of the company

S = the size of the company (Total of the assets)

= Measurement error

This groups of theories deals with the existence of a significance difference between each of liquidity parameters in two leveraged and non leveraged independent companies. Results achieved by testing this group of theories in two cross sectional and total year methods showed that there is no significance difference between each one of liquidity variables of these two groups of companies. These results gained by Kroschall-valis test, have resulted in acceptance of H_1 only during the year 2004. Similarly, these two groups of companies demonstrated a significant difference with each other by 0.043 of significant difference between difference of spread, 0.39 between difference of depth and 0.001 significant differences between liquidity ranks of two groups.

9. Secondary Theories

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Table7. Difference and significance level of liquidity and leverage variables in two leveraged and non leveraged groups

Title	Description	2002	2003	2004	2005	2006	2007	The Test result
Spread between the two groups	Average difference	-0.72	-0.05	0.89	0.64	-0.29	-0.35	Reject of Hypothesis H1
	Significance difference	0.762	0.873	0.043	0.702	0.649	0.541	
Depth between the two groups	Average difference	0.43	-0.02	-0.87	-0.74	0.86	-0.840	Reject of Hypothesis H1
	Significance difference	0.598	0.823	0.043	0.296	0.643	0.084	
Circulation between the two groups	Average difference	-0.61	1.19	-0.15	0.16	-0.42	-0.609	Reject of Hypothesis H1
	Significance difference	0.151	0.196	0.238	0.33	0.898	0.004	
Liquidity rank between two groups	Average difference	-27	12	-0.68	-12	-.11	-0.215	Reject of Hypothesis H1
	Significance difference	0.091	0.444	0.001	0.598	0.555	0.098	

The decision-making principle in this rest can also be the comparison of the significance level with the test level (0.05). Taking the achieved results in the above table into consideration, with 95% of certainty it can be stated that only the spread, depth and rank of liquidity of two leveraged and non leveraged groups of companies have had a significance difference with each other and in remaining years none of the liquidity variables did not demonstrate a significance difference in these two groups. However, on total years method, the rank of liquidity with significance

level of 0.002 rejected zero hypothesis and demonstrated a significant difference between these two groups of companies which in total one can mention that: The liquidity rank of non-leveraged companies is lesser(better) than the rank of the leveraged ones. In other words, one can express that the investors prefer the companies which have lower leverage than those having higher leverage. In the following part, the results of this test based on the pooled method:

Table8. Difference and significance level of liquidity and leverage in two leveraged and non-leveraged groups by pooled method

Year	Leveraged companies mean	Not leveraged companies mean	Significance level	Test Level	Test Result
Spread	0.373	0.502	0.367	0.05	Reject of Hypothesis H1
Depth	-0.431	-0.650	0.143	0.05	Reject of Hypothesis H1
Circulation	0.258	0.390	0.928	0.05	Reject of Hypothesis H1
Liquidity Rank	115	87	0.002	0.05	Reject of Hypothesis H1

Leverage is among those subjects the increase of which can influence the risk of the investor and his/her expected return. Since all shareholders have their own extra payments, it is not reasonable that we expect them to pay attention and react toward the increase of leverage and as a result toward increasing the possibility of bankruptcy. However, as it was mentioned in the result, while making decisions by the investors, the amount of debt used by the companies has had lower priority and the investors do not pay considerable reactions against increase of debt. Regarding the long-term debt, one can mention that due to the fact that the long-term debts allocate a small section from the left side of the balance sheet, perhaps one may anticipate the behavior of the investor and his/her lack of attention toward the long-term debts (which is necessary to mention that the major part of the long-term debts consists of retirement benefit provision). It is worth mentioning that the event and date of publication considered by this research may be the date of issuance of the audited financial reports being selected due to its more reliability. However, one should not ignore this reality that the disclosure of information in Iranian market results in considerable moderation of the prices prior to official publication and also one should note that most often, there is very huge time span between audited and unaudited financial reports that if the sensitivity of the investor toward financial leverage is considered, it is not unusual to be able to moderate the prices in a response to this aspect during such a time span.

10. Conclusion and Suggestions

The overall results related to the current research which was conducted in two cross sectional and total years methods demonstrates that there is a weak relationship between the leverage (ratio of the long-term to long term assets) and liquidity rank. The other variables (price spread, stock depth and the Turnover Rate of Stock) did not show any significant relations. The leveraged companies showed higher liquidity rank (better rank) in comparison with the non-leveraged ones. With regard to this, the results of the current research corresponds with researches such as Simon (1996), W Butler, Groloun and Weston (2002), Mortal and L.Lipson (2003), Adryan and Shang shin(2008) , who have achieved a positive relation between leverage and liquidation. These results show that both the leverage and capital structure are considered as a related factor (even if they are weak ones) in decision-making trends of investors and shareholders and actually the investors take the risk of cash flows resulting from debt into account while taking decisions with their own parameters and principles.

Suggestions made out of research result:

- Informational asymmetry is one of the main reasons for the price spread and also the reduction of stocks liquidity at the market. The asymmetry results from lack of enough and prompt disclosure of information by the companies. If all the audited accounting information is presented in due course can have informational content and can involve in the process of pricing. Therefore, it is recommended to the Stock Exchange Organization to take more measures regarding establishment of necessary rules and regulations in order to maintain enough disclosure and information equilibrium and also due presentation of accounting and auditing information.

- One of the reasons behind the ambiguity of shareholders' reactions toward the distributed news can be the availability of restricting regulations such as base volume and the limitation of the economic fluctuation range. Such regulations adversely impact the natural trend of the market and the procedure of supply and demand. It is recommended to the Exchange organization to present appropriate approaches in order to assist in the completion of natural procedure of the market.

- Taking such various studies into account, the price spread and Stock Price Depth are considered as one of the significant and dependent tools of measuring liquidity of stocks. It is recommended that the Securities Exchange inserts the difference of prices of the suggested traded transaction accompanied by liquidity rank being used by investors, analysts and researches in its publicized reports by providing all required facilities.

- Considering the role of quality of disclosure played in liquidating the stocks of the companies, it is recommended to the managers to disclose complete information for investigators and in this way, reduce the informational asymmetry in the market and lower the indirect costs by increasing liquidity of stocks.

- By considering the effect of debt on the cash flows and risk and the company value and also since there are stockholders having extra payments in the companies, it is recommended to the stockholders and investors to pay attention to the balance sheet information and financial leverage of the companies while taking some investment decisions.

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Intervening Variables of Human Errors in Iranian Public Hospitals

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Abstract: Patient safety and the prevention of medical errors have become the focus of most healthcare providers. This study aimed to determine intervening variables of human errors in Iranian public hospitals. The data were collected via researcher-made questionnaire with the reliability coefficient 0.98. The questionnaire was scored by five point Likert Scale. Rotation method of Varimax with Kaiser Normalization was used via Factor analysis. The results of the study showed factor of healthcare provider explained 7.81 percent of total variance. It had twelve intervening variables affect medical errors in Iranian public hospitals. The most factor loadings (0.718) was related “Inadequate ability of healthcare provider to decision making accurately and timely” and the Least factor loadings (0.53) was related “Inadequate awareness/consciousness of health care providers (consume alcohol, Drowsiness)”. The findings of this study revealed the systemic approach must be replaced in hospitals setting to ensure the provision of patient safety and showed the most important causes for the avoidance of the culture of blame.

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Keywords: Human Errors, Hospital, Intervening Variables.

1. Introduction

The larger numbers of patients are seriously harmed as a result of adverse events despite the best intentions of dedicated, hard-working health-care providers. One of the most commonly cited causes of medical errors and adverse events is human error (Busse and Johnson, 1999; Cooper et al., 1978; Leape, 1994; Pelletier, 2001; Wilson et al., 1995; Kathleen L, 2006).Human error is routinely blamed for accidents in the air, on the railways, in complex surgery and in healthcare generally. (cook, Woods and Miller,1998). When an error or adverse event occurred in a hospital setting, the most common reaction was to blame a person (Woodhouse et al., 2004;cook, Woods and Miller,1998).However, most error eventually passes through the hands of a care provider. Even when the primary cause of harm is system failure, there is usually a human standing at the bedside. The human factor of medical error is the most tangible, the most visible, and the most disturbing (cosby,2003). Healthcare services are also human activity systems (Behara and Valentine,2001). The delivery of safe, high-quality health care has always been a goal of physicians, nurses and other health-care professionals. Indeed, students in medical and nursing schools have long been taught Florence Nightingale’s dictum (also attributed, with some

debate, to Hippocrates, or the Hippocratic Oath): “first, do no harm” (Nightingale , 1863). Patient safety teaching needs to convey an understanding of the causes of adverse events and help develop skills to deal with error in healthcare settings. Graduates need to know how to reduce the occurrence of errors and also what to do when they make errors, when they witness an error or when they are told that someone else has made an error(patey et al.;2007). The level of attention paid to the problem of medical errors has accelerated markedly in recent years, with research and discussion leading to a number of improvement initiatives in both the public and private sectors. Many physicians, nurses, pharmacists, rehabilitation therapists, and other types of health care providers may carry out these activities. Each provider has a vital role in patient care. Thus, the hospital has the highest level of accountability to ensure that each of these practitioners is qualified to provide safe and effective care and treatment to patients. So recognize the intervening variables of healthcare provider errors are a necessary step toward improving patient safety and reducing medical errors. The aim of this study was to identify the Intervening Variables of Human Errors in Iranian Public Hospitals.

2. Methods

This research was done in 2009-2010. Population included 684 process owners (12-person teams) in 57 public university hospitals of Tehran province (N = 684) including (24 non-teaching hospitals and 33 teaching hospitals) were active. The sample size was 396 persons selected by classified random sampling. The data were collected by a self-made questionnaire. Items to be included in the questionnaire were identified from literature review, focus group discussion, to ensure cultural adaptability of the literature in the Iranian healthcare setting. Focus group discussion was held in public hospitals, involving doctors, nurses, allied health staff and managers. Focus group discussion was prompted using items from the literature about patient safety. Content validity and construct validity were assured with expert judgment. The questionnaire was pilot tested for clarity on 36 process owners who were physicians, nurses and have experience of executive management. Analysis of the pilot data led to minor changes in the final survey instrument. Changes included modified wording of several questions to improve clarity as the removal of questions to maximize the internal consistency of the instrument. The reliability of the questionnaire was determined using Cronbach's alpha with the reliability coefficient 0.98. The constructs tested for internal consistency using Cronbach's alpha correlation. Correlations of the constructs were high, ranging from $r=0.81$ to $r=0.98$. The final questionnaire comprised 145 questions, which measured responses to one dependent variable, 7 demographic questions. Responses were scored 5 for extremely agree and one for extremely disagree.

The survey questionnaire was administered to 408 process owners in each of 34 public hospitals (There were 20 teaching hospitals and 14 non-teaching hospitals in the sample). Finally 398 questionnaires were completed.

The data were analyzed using SPSS Version 17. Exploratory factor analysis was used to determine the number and nature of factors describing the covariance structure of data.

3. Results

396 process owners' including 217 females and 179 males participated in this study. They all had a degree from B.S. through Ph.D. (170 B.S., 39 M.S., 71 M.D. and 116 Ph.D.). They had experience included (7% with a range of 1 to 5 yr, 14% with a range of 5 to 10 yr, 27% with a range of 10 to 15 yr, 28% with a range of 15 to 20 yr, 11% with a range of 20 to 25 yr, 13% with a range of 25 to 30 yr).

The result of KMO test for all the factors was 0.952, which is acceptable for factor analysis (Jae-On Kim, Mueller CW., 1985)

Table1. KMO and Bartlett's Testa

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.952
Bartlett's Test of Sphericity	Approx. Chi-Square	44104.622
	df	10440
	Sig.	.000

a. Based on correlations

Table 2 illustrates process owner in Iranian public hospital only could identify 69.995% factors affecting medical errors. They believed that healthcare providers affect medical errors only 7.81% and the causes of 62.182% medical errors related to the other factors.

Table2. Total variance explained related to healthcare provider and the others factors

factor	Initial Eigen values		
	Total	% of variance	Cumulative%
healthcare provider	48.985	33.783	33.783
The others			36.212
Total			69.995
factor	Extraction Sums of Squared loadings		
	Total	% of variance	Cumulative%
healthcare provider	48.985	33.783	33.783
The others			36.212
Total			69.995
factor	Rotation Sums of Squared loadings		
	Total	% of variance	Cumulative%
healthcare provider	11.334	7.816	7.816
The others			62.182
Total			69.995

Twelve intervening variables as shown in figure1, whose factor loadings (absolute value) on this factor are relatively large among all the factors, are identified to interpret it. The priorities of key intervening variables considered.

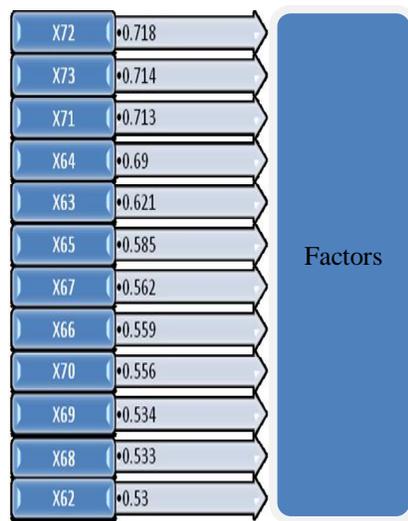


Figure1. Factor loadings (absolute value) on the factor of healthcare provider

The names and description of intervening variables affecting healthcare provider errors in Iranian public hospitals are:

- X72: Ability of healthcare provider to decision making accurately and timely
 X73: Effective patient assessment (correct diagnosis) with healthcare provider
 X71: Awareness of healthcare provider about potential risk point
 X64: Skills or the ability to act promptly and timely interventions of healthcare providers
 X63: Knowledge of healthcare provider
 X65: Experience of healthcare provider
 X67: Psychological characteristics of healthcare provider (e.g. concentration of thought, attention, and tranquility)
 X66: Physical characteristics of healthcare provider (fatigue, hunger, thirst, disease)
 X70: Ethical and legal responsibility and accountability of health care provider to its patients and community
 X69: Emotional barriers and motivations of healthcare provider
 X68: Healthcare provider use of consultation and specialists
 X62: Awareness/consciousness of health care providers (not to consume alcohol, not to work drowsily)

4. Discussion

Based on the results of the present research, the most significant intervening variables of human errors in Iranian public hospitals are 'Inadequate ability to decision making accurately and timely', 'Ineffective patient assessment (Incorrect diagnosis)', 'Inadequate awareness about potential risk point', 'Inadequate skill or ability to intervene promptly and timely', 'Inadequate knowledge', 'Inadequate experience', 'Psychological characteristics', 'Physical characteristics', 'Ethical and legal responsibility and accountability to patients and community', 'Emotional barriers and motivations', 'don't use of consultation and specialists', 'Inadequate awareness/consciousness'.

These finding are similar to the findings of the research titled "Work system design for patient safety: the SEIPS model" carried out by Carayon et al. in 2006. They showed that 'Education', 'skill', 'knowledge', 'Motivation and needs', 'Physical characteristics', 'Psychological characteristics' were elements of person component in their model.

The result of study done by West et al.(2009) about " Association of resident fatigue and distress with perceived medical errors" showed that among internal medicine residents, higher levels of fatigue and distress are independently associated with self-perceived medical errors. This paper had the similar results about physical characteristics such as fatigue and disease affect to human errors. Numerous reports have implicated fatigue and sleepiness as contributors to medical errors (Kohn, Corrigan, Donaldson; 1999, AHRQ; 2009, Lockley et al; 2007).

Helmreich and Musson(2003) in their research have found that lack of proficiency (training issue) or alertness(fatigue issue)are Individual (Physician) factors that increase probability of medical errors. Kumar and Steinbach used implementing the six sigma DMAIC cycle and developing cause-and-effect diagram in their research and showed that the causes of anesthesia errors were poorly trained people, poor anesthesia-related experience, poor familiarity with surgical procedure, poor familiarity anesthetic method, lack of skilled assistance or supervision, fatigue, haste, carelessness, negligence, restriction of visual field, emergency case, inadequate communication with team or laboratory personnel, methods. That paper had the similar results. It showed that preventable medical errors may occur because of doctors and nurses lack of experience. Consequently, a physician or nurse during their residency should not be allowed to be in charge of a task until he or she has assisted an experienced physician/nurse for a certain amount of time with that specific task. The number of training-on-the-job hours a hospital staff member has achieved should be

recorded. Before achieving the minimum amount of experience, a staff member should only be allowed to assist experienced staff. Medical errors caused by physician or nurse fatigue can be easily eliminated through the implementation of maximum working limits. In order to prevent medical errors that result from haste, understaffing must be resolved. There are cases, such as emergencies, where haste is inevitable. However, many situations where haste occurs can be prevented, since many errors resulting from haste have their source in understaffing. Therefore, quotas must be implemented that determine how many hospital staff members are required for a certain number of patients (Kumar and Steinbach, 2008).

Also Krueger (1994) has found substance abuse, and emotional distress can all adversely affect performance of health care provider.

In this study, clinical skills such as 'Inadequate ability to decision making accurately and timely', 'Ineffective patient assessment (Incorrect diagnosis)' are the highly loaded variables on factor of human error. Failures of judgment and decision making are led to the incorrect diagnosis.

Medical and other health information is essential for making correct decisions about which patient needs can be met by the health care organization; the efficient flow of services to the patient; and the appropriate transfer or discharge of the patient to his or her home or another care setting. This information may be in paper or electronic form or a combination of the two.

Diagnostic failures accounted for the majority of the adverse events in EDs reported by the Harvard Practice Study, and most were judged as negligent (leap; 1991). A number of authors have described the diagnostic process and where it can go wrong. (Graber, Gordon and Franklin ;2002, Kuhn;2002, Elstein and Schwarz ;2002, Kovacs and Croskerry ;1999).Diagnosis is always an interaction between the patient and the doctor or other professional, who are both influenced by the system in which they work (Vincent, 2006). Furthermore, a number of individual characteristics and the role they might play in terms of work practices that affect patient safety have been studied. The individual characteristics most likely to affect safety are low risk perception, sensation seeking, Type A behavior (aggressive, competitive and impatient), high self esteem, psychological ill health, and attitudes concerning safety (Firth-Cozens, Cording, Ginsburg, 2003). We cannot change the human condition, we can change the conditions under which humans work (reason, 2000).

So, we can control these intervening variables by corrective action to ameliorate deficiencies identified following competency testing.

Conclusion

In Iran healthcare provider is identified at the sharp end of errors but the individual is not the only cause. Multiple factors affect the patient safety. They may only affect care indirectly. For the provision of patient safety requires spreading systematic approach. This approach helps to identify other factors affecting medical errors and lead to develop comprehensive and systematic management based on safety and quality. This approach leads to proactive rather than reactive risk management. Developing this approach need to attract the participation of all stakeholders. To reduce medical errors the hospital must constantly evaluate (measure) its performance and use that information to identify ways in which it can improve. This self-evaluation must be planned and ongoing and should focus on systems and processes, not solely on individual performance. To be successful, the hospital leadership must ensure that the climate does not allow focus on "who is to blame." Appropriate educating for healthcare provider such as national and international conferences; ongoing professional education and development; Training of staff can help.

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Carbon sequestration potential of Eucalyptus and Acacia plantation in central areas of Iran

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Abstract: Carbon sequestration potential of *Eucalyptus camaldulensis* Dehnh and *Acacia salicina* Lindl planted in 1980 was studied at the age of 30 years in the elevation plain areas of Iran. Two station of this plantation in province were selected the sample plots and the diameter at breast height of all trees was measured. At least, there trees from each diameter class were randomly selected and cut and different parts of the trees including, trunks, branches and leaves were separately weighed. The main roots of one tree from each diameter class were also nine collected and weighed. To estimate the man weight of litter per hectare, 40 sample plots of one square meter were randomly chosen and the amount of litter was determined. The percent of organic carbon in leaves and litter was also calculated in the laboratory. The amount of carbon sequestered in the soil of plantation area was calculated and compared with control. This study showed that the amount of carbon sequestered by *E.camaldulensis* in the productive site and poor site was about 8.2 and 1.73 ton ha⁻¹year⁻¹, respectively. On the other hand, for *Acacia salicina* in the poor site of this figure was 2.1 ton/ha in year. The highest the amount of sequestered carbon in *E.camaldulensis* was in 30 centimeter diameter class. This figure for *Acacia* was in 25 centimeter diameter class. The amount of carbon sequestered in different parts of the tree showed a significant difference at 0.01 also in *E.camaldulensis*, there was a significant difference in the amount of carbon sequestration between the suitable and poor sites. This study showed that there is a great potential of plantations in Fars province and similar areas of the country. This plantation will maintain suitable green areas and belts and produce wood materials for consumption in several ways. Forever planting trees will lead to the reduction of CO₂ in atmosphere which reduces the greenhouse effect, a program which is university promoted and partially sponsored by united nations and some industrialized countries.

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Key words: Carbon sequestration, plantation, *Eucalyptus camaldulensis* Dehnh, *Acacia salicina* Lindl., Iran

1.Introduction

Researchers generally believe that the main factor of increasing the temperature of earth is CO₂ (Korner *etal.*,2003). From the time of beginning industrial revolution in 19th century, the viscosity of carbon dioxide in atmosphere has reached from 280 to 365 section in million and its considered that in 21th century it would be reached to 600 section in million which this cause increasing medium annual temperature of the earth at the rate of 1C° to 4C°(Korner *etal.*,2003).However main part of carbon is holed by oceans and is kept as reserves, but studies show that the source of oceans are not so big that can reserve additional carbon in themselves and its residue should be reserved in land (Kenneth *etal.*, 2000). The main resources for reserving carbon are plants particularly forests. Forest ecosystems of the world in case of activity in order to reserve carbon, can hold about 2.3 gig ton carbon annually(Thompson *etal.*,1989). It's estimated that average rate of distributed CO₂ from fossil fuels and change of the use of farms during 1980 by now is about 7.6 milliard ton in a year(Dixon *etal.*,1994). Refining carbon by artificial methods such as filtration and etc include a lot of charges so that this

expense in America has been measured about 100 to 300 \$ for each ton carbon (Finer,1996). In this direction, industrial countries, have predicated prolonged programs in order to decrease the viscosity of carbon dioxide that in Kyoto conference, this problem was pronounced seriously and countries were obliged to reserve carbon by using particularly natural and artificial forests.

In this case of using plants and planting trees in the form of plantation we can not only create green place and produce wood or use other benefits of forest, but also can obtain the aim of reserving carbon. In most countries, considerable researches have been done for measuring the potential of fixing carbon and different methods for doing this in natural and planting forests and its continuing (Cannel *etal.*,1992 ;Dixon *etal.*,1994).

By accessed to the potential of reserving carbon in plantations of eucalyptus and acacia planted in this area, it will be provided a good background for developing plantation.

2. Materials and Methods

This study has been done in growing places of basin 21 from dividing the auriferous basins of center area of country .With due attention to ambrotermic curve of beginning and end moisture period is 20 Nov. and 15 Feb. respectively. Minimal absolute temperature is -2 C° and maximum temperature is 45 C°. There are two research stations of adaptation tests of different eucalyptus and acacia species have placed in the area of planting place were considered as sample plots.

Sample plots

For species eucalyptus according to adaptation of this species in all conditions of planting place , sample plots were selected in two planting place of weak and relatively fertile and *A.Salicina* due to the lack of planting in different planting place , forcefully was selected in a planting place of sample plots.

Measurement of biomass

In other to determine the situation of planted mass in selected sample plots from diameter at breast to accuracy of centimeter were measured hundred per cent , and all aggregated statistics were analyzed by using the soft wares Minitab and Excel and drawing the curve of number in diameter classes and height was done. According to the dispersion of number in diameter classes of existing trees , in each mass , minimal 3 trees from each diameter class were selected randomly within existing trees and marked with dye and after the cutting of different organs , were weighed with accuracy of gram. In order to estimate the existing litter under trees, 40 sample plots of one square meter under sample trees were chosen and existing litter were weighed with accuracy of gram. From each diameter class, one sample selected and all roots with the diameter more than 1mm were collected until the depth of 2 meter and were weighed. After generalizing obtained numbers to all existing trees, the weight of existing biomass weighed in each sample plots.

Determining conversion coefficient

From different organs of trees and litters of different mass, three samples delivered to laboratory and then in order to samples were placed into kiln after completely conversion to ash, these . These samples were weighed again. By determining the weight of ash and having initial weight and the ratio of organic carbon to organic materials, the amounts of organic carbon in each tree organs were calculated separately. Finally by having initial weight and percentage of organic carbon for each organ separately, conversion coefficient was calculated.

3. Results

Results of measuring different organs

The results of statistical analysis at the basis organs of cutter sample trees in the station number one as relatively fertile planting place and the station number two as a weak planting place have been presented in terms of ton in hectare in year in table 1. A: Eucalyptus relatively fertile growing place, B: Eucalyptus weak growing place.

Table 1 – Results about the production of biomass in different aerial organ in ton in hectare in year

aerial organ	total	Weight of litter	weight of root	Wet weight of leaf	Wet weight of lops	Wet weight of trunk
A	15.906	1.578	3.050	0.406	1.562	13.938
B	3.813	0.268	0.284	0.156	0.483	3.813
Acacia	3.981	0.205	0.066	0.146	0.508	3.327

Table 2-concersion coefficient of different organs to organic carbon (%)

Organ	trunk	lops	leaf	root	litter
species					
E.Camaldulensis	28.4	24.5	21.34	52.7	46.65
A.Salicia	34.25	28.59	16.85	53.36	47.99

Table 3-percent rates of organic carbon in different growing places (%)

Species	Growing place		Soil depth
	Weak	Relatively	
E.Camaldulensis	0.321	6.709	0-30
A.Salicia	0.175	-	0-30

Results of determining conversion coefficient of biomass to organic carbon

The results of the experiments about determination of conversion coefficient of wet weight of different organs of tree species to organic carbon in this project have been shown in table 2.It is necessary to note that between the obtained numbers for repeating the samples, meaningful difference was not observed.

Results of determining the amounts of reserved carbon in soil (*E. camaldulensis*)

By doing the experiment, of determining the amounts of organic carbon of harvested soil from different planting place and comparing with control

samples, the amounts of percentage of organic carbon in different growing places have been presented in table 3.

Results of the amounts of annual carbon sequestration

The results from the measurements and generalization of conversion coefficient in the region of the project at the basis of ton in hectare in year have been presented in table 4.

Table 4 the amounts of carbon sequestration (ton) in different parts of studied species

species	total	soil	litter	Root	leaf	lops	trunk
A	8.407	0.353	0.836	1.710	0.97	0.483	4.158
B	1.734	0.119	0.228	0.132	0.111	0.143	1.001
Acacia	2.1019	0.20	0.104	0.109	0.104	0.245	1.239

A: Eucalyptus relatively fertile growing place ,B: Eucalyptus weak growing place

Statistical analysis of *E. camaldulensis* in fertile growing place

The results from comparing between average carbon sequestrations in different organs of *E.camaldulensis* in this growing place shows that there is a meaningful percentage of difference between carbon sequestrations in different organs at level 1%. According to Danken test, the average amounts of carbon sequestration in different organs are placed in three classes. Average weight of sequestrated carbon in trunk with 164 kg is maximum rate and is placed in class A and sequestrated carbon in root with 75 kg is placed in class B and the weight of carbon in lops and leaf don't have any difference in one percent together and are placed in class C. The details of statistical analysis have been presented in tables 5 and table6.

Table 5 variance analysis of carbon sequestration in different organs of eucalyptus in relatively fertile growing place

Resources of change	Amount of F	Degree of freedom	Average square	Total squares
Organs	75.366**	3	190489.743	571469.230
Error		161	2703.292	400087.71
Total		164		971556.411

**Significant level 0.01

Table 6-Danken test, average carbon sequestration in different organ of eucalyptus

Organ	Class	Average weight of sequestrated carbon
The weight of carbon in trunk	A	29.4671
The weight of carbon in trunk	b	3.8846
The weight of carbon in leaf	C	1.0941
The weight of carbon in root	B	4.8933

Weak growing place

The results of comparing between the average carbon sequestrations in different organs of *E.camaldulensis* in this growing place shows that there is a meaningful percentage of difference between carbon sequestrations in different organs at level 1%. According to Danken test, average amounts of carbon sequestration in different organs are placed in three classes.

Average weight of sequestration carbon in trunk with 30.34is maximum rate and is placed in class A and sequestrated carbon in lops and root is placed in class B and don't have meaningful difference together in level 1 percent. Average weight of carbon in leaf with 1.1 is placed in class C. The details of statistical analysis have been presented in table 7 and table 8.

Table 7 variance analysis of carbon sequestration in

Resources of change	Amount of F	Degree of freedom	Average square	Total squares
Organs	532.955**	3	52521.824	147565.472
Mistake		1188	98.548	127075.478
total		1191		274640.950

different organs of eucalyptus in weak growing place
**Significant level 0.01

Table 8 Dankan test, average carbon sequestration in different organs of eucalyptus in weak growing place

Organ	Class	Average weight of sequestrated carbon
The weight of carbon in trunk	A	30.47
The weight of carbon in trunk	B	3.55
The weight of carbon in leaf	C	1.1
The weight of carbon in root	B	4.6

The species *A. Salicina*

The table of variance analysis between the weights of sequestrated carbon in different organs of *A. Salicina* planted in the region show that there is a difference at the level of 1 percent between the weights of different organs. According to Danken test , average amounts of carbon sequestration of different organs are placed in 3 class. Average weight of sequestrated carbon in trunk with 45.9 is maximum rate and is placed in class A and sequestrated carbon in lops with 6.3 is placed in class B and with the weight of root. At level 1, it doesn't have meaningful percentage of difference. Average weight of the carbon in leaf with 1.579 is placed in class C. Average weight of sequestrated carbon in root with 4.34 is placed in class B C and doesn't show a meaningful percentage of difference at level 1% with leaf and lops. The details of statistical analysis have been presented in tables 9 and table 10.

Table 9 – variance analysis of the amounts of sequestered carbon in different organs of acacia in

Resources of change	Total squares	Degree of freedom	Average square	Amount of F
Organs	124724.397	3	4154.799	109.337**
Error	389370.845	1024	380.245	
total	514095.242	1027		

**Significant level 0.01

Table 10- Dankan test, carbon sequestration in different organs of acacia

Organ	Class	Average weight of sequestrated carbon
The weight of carbon in trunk	A	45.9
The weight of carbon in lops	b	6.3
The weight of carbon in leaf	C	1.579
The weight of carbon in root	B	4.34

Discussion

The results of this research showed that species *Eucalyptus camaldulensis* Dehnh and *Acacia Salicina* Lind I can thoroughly located in rigid regions and play an efficient role in relation to carbon sequestration. Analyzing collected information and statistics in relation to studied species in this research show that *E.Camaldulensis* in the station which due to suitable depth of soil and coming up of underground waters , is as a relatively fertile growing place which after so years could produce the amounts of 20.534 ton biomass that by considering the litter poured under trees and the amounts of carbon added to soil as compared with control region could reserve

the amount of 8.2 ton organic carbon in hectare in year.

In the station due to stony soil and coming down of underground waters , as a result of lower fertility as compared with the station as a weak growing place, planted eucalypts has relatively weak growing condition so that after 30 years could produce amounts of 4.4 ton biomass. By considering the litter and existing carbon in soil , these samples have reserved totally 1.1 ton organic carbon in hectare in year. The acacia, after 30 years could produce amounts of 4.253 ton biomass. By considering the litter and existing carbon in soil, totally these samples have reserved 1.5019 ton organic carbon in hectare in year.

From the view of the share of each organs in carbon sequestration 50% of the production of biomass has been allocated to trunk wood that in this research in eucalyptus in both growing place is also close to 50 but acacia biomass with 75% relative to announced numbers in references , has meaningful difference which is considered that the reason being the decrease of the production of leaf , root and lops , like wise being pure in mass and being low the plants under floor can be also major reasons(Watson *etal.*,2000) . The amounts of sequestrated carbon by soil of two studied species in eucalyptus biomass are 0.227 and 0.131 ton in hectare in year respectively and in acacia biomass is 0.90 ton in hectare in year which there is a meaningful difference in comparing between two species. In relation to high difference between the amounts of sequestrated carbon in soil, of acacia and eucalyptus and being low in it , it seems that the availability of higher nitrogen in under floor soil of acacia as a result of high speed in mineralizing organic carbon cause the amounts of sequestered carbon relative to available soil under floor of eucalyptus be low. In relation to the amounts of produced litter under floor of studied species, it seems that according to the ability of fertility in studied growing place and species combination of studied biomass, acceptable rates have been estimated.

The amounts of produces litter depends on major factors like type of species , climate , fertility of growing place and ability of production so that for different species in different growing places , different numbers have been presented(Watson *etal.*,2000).

In relation to obtained coefficients in order to convert wet weight of biomass to carbon at the basis of previous researches , conversion coefficient was considered 21% for needle – leaf trees and 24% for wide – leaf trees (Thampson *etal.*,1989). Also in another research , total conversion coefficient of the weight of dry wood to carbon has been considered

50% and certain weight of needle – leaf trees has been estimated 350 kg /m³ and for wide – leaf trees 550 kg/ m³ (Kilbride *etal.*,1999).

In this study also at the basis of measurements, different numbers were obtained for different organs. Table 2 which minimum percentage is related to leaves and maximum percentage is related to roots which is seems that the decrease of conversion coefficient in leaves is due to the amounts of minerals in leaves are high. The reason that conversion coefficient is high in acacia is probably low amounts of water in roots. Generally , conversion coefficient of produced biomass in all above organs and underground of eucalyptus has been calculated 34% and for acacia this amounts are 35.6% which is more than announced average in references.

By considering aerial organs singly, conversion coefficient for eucalyptus is 27.6% and for acacia is 30.7 which it seems that the reason of its increase rather than announced rates, in references, is dryness of studied regions and being low of moisture of produced organs (Finer ,1996).

In relation to the amounts of root production , we should say that because of good permeability of soil in studied area , the volume of produced root specially in eucalyptus is very well which according to the limit of studied depth with considering available roots in lower depth , the volume of real production of root is more than calculated numbers. In relation to the amounts of total carbon sequestration in different forest masses, we should say that there is a direct relationship between sequestered carbon with the type of species, fertility of growing place, cultivating operations and forestology which is done during life period of trees (Dewar *etal.*,1992). In the studied region because of the lack of doing cultivating operations in planted biomass and near distance of trees, we can increase the growing of trees.

Generally , according to complex subjects in natural ecosystems and problems such as mineralizing organic materials , impact of climatic factors and other factors on absorption of CO₂ in trees , wider researches in this era seems necessary .

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Impact of Educational Program among Open Heart Surgery Patients on Minimizing the Incidence of Post Operative Infections

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Abstract: The present study aimed to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections. Data were collected from cardiothoracic surgery department, intensive care unit, and outpatient clinic at Assiut University Hospital. The study was conducted on 60 adult patients with open heart surgery (30 - study group and 30 - control group) who have been selected randomly. Data were collected through: four tools; (cardiac surgery patient needs assessment sheet, cardiac teaching program based on individualized patient needs assessment, cardiac post operative observation checklist sheet, and cardiac post operative wound site infection evaluation sheet). Results of this study concluded that, more than half of the patients in study group 53.3 % were females, 70 % were married, and 40 % their ages ranged from 18 - 29 years. While the majority of the patients in the control group 63.3 % were male, 46.7 % were married, and 33.3 % from 30 - 39 years. Conclusion; Significant differences for improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. The study recommended that, pamphlets and simple illustration booklet should be available for patients illiterate to with simple explain how to safely live after open heart surgery. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.

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Key Words: Educational Program; Heart Surgery; Patient Post Operative Infection

1. Introduction:

Cardiac surgery is surgery on the heart and/or great vessels performed by a cardiac surgeon. Frequently, it is done to treat ischemic heart disease (for example, coronary artery bypass grafting), correct congenital heart disease, or treat valvular heart disease created by different causes including endocarditis. It also includes heart transplantation (<http://en.wikipedia.org>, 2007).

Postoperative surgical site infections (SSIs) are a major source of morbidity in the United States. Wound infections rates are; clean surgery infection rate typically 1-2 %, clean-contaminated infection rate usually < 10 %, contaminated infection rate 15-20 %, and dirty infection rate 40% (<http://www.worldwidewounds.com/2005>).

Nurses play a vital role in the prevention of SSIs in patients with open heart surgery. By managing disease processes, through education and assessment (Harrington *et al.*, 2005). The unique challenge for the critical care nurse is to integrate theoretical knowledge, assessment skills, and problem solving ability to provide optimal nursing care and maintain high quality outcomes (Morton & Fontaine, 2009).

Pre operative preparation for cardiac surgery includes physiological and psychological components. Physiological preparation includes history, physical examination, chest radiography, and an ECG. Effective pre operative teaching, which reduces anxiety and physiological responses to stress and after surgery, is an important aspect of psychological preparation. The surgical procedure, the Intraoperative, and postoperative experiences are explained to the patient (Morton & Fontaine, 2009).

Post operative phase patients are transported directly to the intensive care unit (ICU), where they recover from anesthesia and usually remain for 24 hours after surgery. Patients arrive in the ICU with numerous lines and tubes (e.g., endotracheal tube and hemodynamic monitoring lines). Immediate postoperative care involves cardiac monitoring and maintenance of oxygenation and hemodynamic stability (Rosborough, 2006).

Discharge instructions for heart surgery patients includes observe appetite of the patient, signs and symptoms of swelling, sleeping condition, gastro intestinal problems as constipation, diet, care of incision, instruction about medication used, activity, shower daily if he/she is strong enough to stand and wash the incision with a mild antimicrobial soap. Using a clean towel, the patient should pat dry the

incision. No lotions, creams, oils, or powders are to be used. The patient also should avoid sun exposure, sexual, driving, lifting heavy objects, work, stress management and follow exercise program given to the patient by physical therapist in the hospital (Society of Thoracic Surgeons, 2006).

Significance of the study:

Wound site infections are a major source of post operative complications, accounting for approximately a quarter of all nosocomial infections. Many international studies have defined the patients at highest risk for infection in general and in specific operative procedures (Abd El Aziz *et al.*, 2007). However, there is a scarcity of local studies dealing with this problem. It is hoped that, data generated from this study could help in educating the patient and managing care for patients with open heart surgery as well as training adequately the patients to decrease incidence of infection and complications. Complications increase morbidity, inpatient stay, hospital cost, and increase mortality of patients. So, this study will be carried out to investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections.

Aim of the study:

To investigate the impact of educational program among open heart surgery patients on minimizing the incidence of post operative infections.

Research hypothesis:-

Open heart surgery patient attending educational program will exhibit a positive effect on minimizing surgical site infections post operatively.

Material and Methods:

Research design:

Quasi-experimental research design was utilized to fulfill the aim of this study.

Materials:-

Setting:-

Cardiothoracic surgery department, intensive care unit, and outpatient clinic for follow up at Assiut University Hospital.

Subjects:

Patients admitted in cardiothoracic surgery department (60 patients) were included in the study, (31) male and (29) female their ages ranged between 18 and 60 years. The patients classified inrolled randomly (convenience sample) into two groups (study and control group). The study group (30 patients) who were received nursing instruction (educational teaching nursing program), while the control group (30 patients) who were received routine hospital care.

Tools of the study:

Four tools were used to investigate the impact of educational program among open heart surgery

patients on minimizing the incidence of post operative infections. These tools were deduced by the researcher based on reviewing of related literatures (Horan & Gaynes, 2004; Williams & Wilkins, 2006; Smeltzer *et al.*, 2008; Berman *et al.*, 2009; Morton & Fontaine, 2009; Proehi, 2009).

Tool I:

Cardiac surgery patient needs assessment sheet (Annex 1):

This tool was developed to assess open heart surgery patients needs. It contains 23 items and will be developed by the researcher and it includes 5 parts:

Part I: Assessment of the sociodemographic patients' profile: To assess the patients profile as patient's name, age, sex, marital status, diagnosis, family size, housing condition...ect).

Part II: Patients nursing needs pre cardio surgery: This part includes structured items to identify patient's pre cardiac surgery nursing needs.

1. Present, Past, and family history

Scoring system:

$$\text{For body mass index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height (in meters)}^2}$$

This equation and classification of BMI were adopted from (Davis and Sherer 2000; Syed *et al.*, 2000).

2. Physical examination.

3. Psychological needs: assess psychological state of patient such as fear, irritable, insomnia, and apprehensive.

Part III: Laboratory investigation.

Part V: Diagnostic procedure.

Part IV: This part carry out pre/ post test questionnaire and observation checklist sheet was used prior to implementation of the teaching program to measure the exact knowledge level and assessment practice for patient about open heart surgery. The same part used after implementation of the teaching program and after 2 weeks later to evaluate the gain in knowledge after the intervention. It consists of 2 main parts: Patient assessment knowledge and practice about open heart surgery.

Scoring system:

As regard patient assessment knowledge about open heart surgery which includes 18 items, each item was assessed, categorized, and scored into either yes = 1 or no = 0 on all items. Patient assessment practice about open heart surgery. Which includes 14 items, each item was observed, categorized, and scored into either yes = 1 or no = 0 on all items.

Tool II:

Cardiac teaching program based on individualized patient needs assessment (Annex2)

The educational program was designed to minimizing the incidence of post operative infections

with open heart surgery patients through individualized session of educational program. It developed by the researcher based on the review of relevant literature, available resources, and the patient needs assessment. Number of session; a total 9 educational sessions will be conducted for each patient in addition to the pre assessment session. Preparing of educational training place, teaching aid and media (pictures, Arabic handout; the content of program modified in Arabic language and give it to the patient, and models) to help and facilitate the implementation of the educational program for the patient. Prepare the contents of training program, based on the assessment and the available equipment in the unit for its application.

The first session; included information about the heart and its function, meaning of heart disease.

The second session; provided information about open heart surgery and importance of surgery.

The third session; included information about teaching skills related to preparation before surgery.

The fourth session; included information about daily activity and exercises.

The fifth session and sixth session; included information about wound care schedules.

The seventh session; included information about specific nutrition for post cardiothoracic surgery.

The eighth sessions; included information about wound infection: local and systemic signs and symptoms, and medication used.

The ninth session; included information about discharge instructions for heart surgery patients. The duration of each session about 15 – 20 minutes according to patient tolerance. The end of each session makes discussion and feedback, except for the session for discharge instruction, which take 60 minutes

Tool III:

Cardiac post operative observation check list sheet (Annex 3):

An observation checklist was designed based on reviewed related literature Serna & Cathy (2006); Bonnie & Barnard (2007). The observation was performed to evaluation of effectiveness of the educational nursing program related to postoperative wound management on minimizing infection before discharge and follow up post discharge.

As regard cardiac post operative observation check list sheet, each item was observed, categorized, and scored into either present or not present on all items of local wound manifestation of infection and systemic manifestation schedule of observations.

Tool V: Cardiac post operative wound site infection evaluation sheet:

Used evaluation tool sheet for wound site infection (Southampton Wound Assessment Scale) The

wounds were graded before discharge and after 10 – 14 days postoperatively into one of four categories; normal healing, minor complication, wound infection , and major haematoma (Pudner, 2005).

Southampton scoring system:

Grade	Appearance
0	Normal healing
1. Normal healing with mild bruising or erythema: A B C	Some bruising Considerable bruising Mild erythemia
2. Erythema plus others signs of inflammation: A B C D	At one point Around suture Along wound Around wound
3. Clear or haemoserous discharge: A B C D	At one point only (< 2 cm) Along wound (> 2 cm) Large Volume Prolonged (> 3 days)
4. Major complication (Pus): 0 A B	Normal At one point (< 2 cm) Along wound (>2cm)
5.	Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration

Scoring system:

As regard cardiac post operative wound site infection evaluation sheet, each item was observed, categorized, and scored into either present or not present on all items of Southampton scoring system for study and control groups.

2. Methods:-

Techniques for data collection:

- Official approval and administration permission were obtained from the head of internal cardiothoracic surgery department and post operative ICU to collect the necessary data.
- The consent from the patients who will be participating in the study will be taken.

1. The tools 1, 2, 3 and 4 used in this study was developed by the researcher based on reviewing the relevant literature (Bonnie & Barnard, 2007).

2. Jury of programs tested by 5 expertise's from the field of staff thoracic surgery and nursing educators for content validity of program.

- A pilot study was conducted during September 2009. It included 5 patients, in order to test the clarity and applicability of the tools.

- The data collection covered a period of one year starting from October 2009 till the end of October 2010.

3. Confidentiality and anonymity were assured.

Description of the nursing intervention program:

This program included three major parts;

1- The first was concerning the cognitive skills, i.e. knowledge about; The heart and its function, meaning of heart disease, definition and indications of open heart surgery, wound care schedules, knowledge about preoperative preparation, and postoperative instructions as regards open heart surgery, information about specific nutrition for post cardiac surgery, wound infection; local and systemic signs and symptoms, and medication used and discharge instructions for post cardiac surgery patients, and the importance of follow-up instruction of care.

2- The second was concerning the practical skills, i.e. deep breathing and coughing exercise, leg exercise, activities of daily living.

3- The third was related to carry out (implementation) the educational program practice among open heart surgery patients on minimizing the incidence of post operative infections.

Procedure:

The study was carried out in three phases: 1st, 2nd and 3rd phases:

1- Preparatory phase (Assessment and planning phase), involved the following: Review of relevant literature (Berman *et al.*, 2009), (nursing textbooks, journals, internet resources, etc), about nursing care for cardiac patient, jury for program by 9 expertise nurses and doctors, arrange for the training program schedule, based on the contents of the program, each patient was interviewed and counseled individually, time availability and the resources available.

2-The second phase (implementation phase): This phase comprised the preoperative, postoperative, and during this phase the exercise training program was implemented.

Pre-operatively:

- Patients were equally enrolled in the study as control and study groups sequentially. The 1st patient's interview was used to explain purpose and nature of the study as well as patient agreement for voluntary participation was obtained.

- The 1st 3 sessions from educational nursing program were carry out in 2nd interview with study group and take break 10 minutes between every session.

- The 4th, 5th, and 6th sessions from educational nursing program were carry out in 3rd interview with study group and take break 10 minutes between every session.

- The last 3 sessions from educational nursing program only were carry out in 4th interview with study group and take break 5 minutes between every session.

Postoperatively:

- The 5th interview with study group was at 1st day post-operatively, and then once time daily during hospitalization for base line data was obtained from study and control groups patients to fill tool 3.

- Before discharge the investigator emphasized the importance of follow up visit for all subjects (study and control) and arranged with study group the time and place for follow up which were 2 weeks postoperatively in out patient cardio thoracic surgery clinic at Assiut University Hospitals.

3-The last phase of proposed teaching program is the evaluation phase. After implementation as well as after 2 weeks the patient knowledge and practices has been evaluated by the researcher through filling the tool (1). Also local wound and systemic manifestation of infection was assessed utilizing tool 3 during hospitalization before discharge and after 2 weeks post discharge (follow up). A line of contact was established between the investigator and subjects of both groups for feed back, monitoring, and provision of needed consultation and help.

Analysis of data

Data collected by computer program SPSS" version. 17" Chicago. USA. Data expressed as "mean \pm standard deviation" "number, percentage". Using T.test to determine significant for numeric variable. Using Chi.squire test to determine significant for non-parametric variable. Using person's correlation for numeric variable in the same group.

n.s P > 0.05 no significant.

P < 0.05 significant.

** P < 0.01 moderate significant.

*** P < 0.001 highly significant.

Limitations of study:

1- Time available for follow up not enough as many patients were coming from far town and need to leave hospital early.

2- The patient's anxiety and feelings of vulnerability may interfere with the ability to learn information provided.

3- Participants suffered from transportation and financial problems.

3. Results:

Distribution of the biosociodemographic variables in study and control group subjects: the data reveals the more than half of the patients' in study group 53.3 % was female, 70 % were married, were 40 % from (18 to 29 years), 33.3 % were illiterate, 50 % were non working, family size 70 % from 4 to 8 persons and 56.7 % were moderate housing condition.. While the patients' in control group 63.3 % were male, 46.7 % were married, were 33.4 % from (30 to 39 years), 26.7 % were read & write, 43.3 % were non working, family size 66.7 % from 4 to 8 persons and 46.7 % were low housing condition. With no statistical significant difference between study and control groups as regards biosociodemographic variables.

Distribution of the sample according to vital signs means scores preoperative assessment for both study and control groups: There are highest mean scores as regard to temperature and pulse rate in control group than in study group (37.04 ± 0.37 , 36.92 ± 0.457 and 85.53 ± 15.38 , 83.43 ± 11.55 , respectively). Table show that highly statistical difference between control and study group related to respiratory rate ($P = 0.005$).

Distribution of the sample according to preoperative risk factors for study and control group: the high percentage in both study and control groups (80 % and 73.3 %, respectively) have non smoking. As regards body mass index the highest percentage (63.3 % and 40%, respectively) in study and control groups have standard level of weight. As regard percentage of chronic obstructive pulmonary disease and use of antibiotics they were equally in both groups, while highest percentage in study group have used of anticoagulant (80%) and one third of patients in control group have hypertension (33.3 %).

Distribution of the sample according to hereditary diseases & medical history for both study and control group: more than half percentage (60 %) in study group have diabetes and 40 % have hypertension and in control group were 80 % of patients have diabetes and 76.7 % hypertension. As regard the medical history streptococcal infections it was found that 86.7 % and 96.7 % in study and control groups, respectively. There was significant difference related to hypertension between both groups.

Table (1): This table shows that the cardiovascular preoperative and health habits clinical assessment for both study and control groups. The findings indicated that 96.7 % and 100 % of the patients in the study and control groups had palpitation preoperatively, while half of the sample in both study group and control had equal percent of leg edema. Concerning of extremity pain of both study and control groups

preoperative assessment; the findings indicated that there were significant differences between the study and control groups in preoperative period ($p < 0.05$).

The data reveals that cigarette smoking the majority of the patients' in study group had smoked cigarette more than control ones (83.3 %, 62.5 % respectively). The result also revealed that, there were highest mean scores of smoking index was found in study group than control ones (310 ± 65.21 , 120.23 ± 20.25 , respectively). The data reveals that the patients' in control group as performing exercise more than study ones (33.3 %, 26.7 % respectively). Difference was statistically significant ($p < 0.01$) for smoking index, and common symptom.

Table (2): This table demonstrates that significant difference was found between study and control groups as regard magnesium studies finding ($P = 0.042$).

Table (3): This table demonstrates that, significant difference was found between study and control groups as regard coagulation factories and blood glucose studies.

Table (4): The highest percentage (33.33 and 26.67 %) in study group and in control groups were has knowledge about rest and sleep. As regards percentage of knowledge about define of surgical site infection, sources and predisposing factors for surgical site infection, health teaching activities after discharge, notify the physician if patient have any abnormal, and daily activities to infection control they are equally in both groups and they have not any knowledge about this items.

Table (5): As regards pre operative nursing care practice the highest percentage (73.33 % and 66.67 %) in study and in control groups were have about foot and leg exercises, while they have not any knowledge about how to use incentive spirometry and elastic stocking. Also the table shows that assessment of level of practice about post operative nursing care among patients in study and control group, approximately an equal percentage in study and control groups (73.33 % and 70 %) were have knowledge about nursing care of urinary catheter, activities and exercises in intensive care unit. As regards discharge instructions for open heart surgery patients the highest percentage (60 % and 43.33 %) for study and control groups have had knowledge about how perform walking exercises.

Table (6): The above table shows that, there were significant differences improvements throughout the educational program phases among study group regarding total score of knowledge and practice with $P = 0.000$, 0.000 about open heart surgery.

Table (7): The above table shows that, there were statistical significant differences improvements of throughout the educational program phases among

study group while non statistical significant differences were noticed throughout the educational program phases among control group regarding level of knowledge and practice.

Table (8): This table shows that, Non significant difference were existed between infection scoring system at three phases for both group in all items except normal healing in pre discharge ($P = 0.06$). Also table enumerate that significant difference in post discharge for all items except major complication ($P = 0.015$), deep or severe wound infection ($P = 0.03^*$), and clear wound discharge ($P = 0.009$).

Table (9): This table demonstrates that, non significant difference between study and control groups as regard to hospital stay and ICU stay.

Figure (1): The table mentioned that, statistical significant differences of study groups was exited between housing condition & incidence of namely fever ($p=0.005$), delayed wound healing ($p=0.027$) and pneumonia ($p=0.027$).

Figure (2): The table shows that, statistical significant differences was exited for study group between ICU stay & incidence of fever, delayed wound healing, endocarditis, myocarditis, pericarditis and pneumonia.

Figure (3): The table mentioned that, a statistical significant difference was exited for study group between hospital stay & incidence of endocarditis, myocarditis, and pericarditis ($p < 0.01$).

Table (1): Distribution of the sample according to preoperative cardiovascular clinical assessment and health habits for study and control group.

Variable	Group				X ² Test	P-value
	Study group (n=30)		Control group (n=30)			
	No.	%	No.	%		
Common symptoms for cardiovascular:						
– Chest pain	27	90	29	96.7	1.735	0.306
– Palpitation	29	96.7	30	100	1.515	0.500
– Dyspnea	27	90	28	93.3	0.228	0.500
– Cough	21	70	21	70	0.738	0.611
– Oedema	15	50	15	50	1.02	0.602
– Extremity pain	21	70	28	93.3	8.05	0.021*
– Nocturnal Dyspnea	28	93.383.	30	100	0.651	0.246
– Fatigue	25	3	28	93.3	0.735	0.212
Health habits:						
– Use of tea and coffee	7	23.3	14	46.7	0.041	0.082
– Use of alcohol	1	3.3	1	3.3	0.392	0.754
– Smoking	6	20	8	26.7	0.483	0.381
Type of smoking:						
– Cigarette	5	83.3	5	62.5	0.931	0.417
– Shisha	0.0	0.0	2	25		
– Both	1	16.7	1	12.5		
Degree of smoking:						
– Mild	1	16.7	6	75	0.925	0.061
– Moderate	3	50	2	25		
– Heavy	2	33.3	0.0	0.0		
Smoking Index :						
– Mean \pm SD	310 \pm 65.21		120.23 \pm 20.25		37.43	0.01*
Exercise:						
– Yes	8	26.7	10	33.3	0.397	0.389
– NO	22	73.3	20	66.7		

(*) Statistically significant $P < 0.05$.

Table (2): Comparison between pre and post operative electrolytes disturbance finding among open heart surgery patients for both study and control group.

Variable	Group								X ² Test		P-value	
	Study (n=30)				Control (n=30)				Pre	Post	Pre	Post
	Pre		Post		Pre		Post					
	No	%	No	%	No.	%	No.	%				
Serum sodium (Na+):												
– Normal	28	93.3	25	83.3	28	93.3	21	70	0.083	0.521	0.694	0.180
– Abnormal	2	6.7	5	16.7	2	6.7	9	30				
Serum potassium (K +):												
– Normal	26	86.7	27	90	24	80	26	86.7	0.071	0.081	0.365	0.50
– Abnormal	4	13.3	3	10	6	20	4	13.3				
Calcium (Ca++):												
– Normal	25	83.3	21	70	24	80	16	53.3	0.028	0.904	0.50	0.144
– Abnormal	5	16.7	9	30	6	20	14	46.7				
Magnesium (Mg++):												
– Normal	26	86.7	25	83.3	25	83.3	18	60	0.34	15.93	0.50	0.042*
– Abnormal	4	13.3	5	16.7	5	16.7	12	40				

Table (3): Comparison between pre & post operative as regard coagulation factors, renal function studies & glucose among open heart surgery patients for both study and control group.

Variable	Group								X ² Test		P-value	
	Study (n=30)				Control (n=30)				Pre	Post	Pre	Post
	Pre		Post		Pre		Post					
	No.	%	No.	%	No.	%	No.	%				
Prothrombin time:												
– Normal	16	53.3	2	6.7	20	66.7	14	46.7	0.283	12.43	0.215	0.000***
– Abnormal	14	46.7	28	93.3	10	33.3	16	53.3				
Prothrombin concentration:												
– Normal	12	40	4	3.3	18	60	14	46.7	0.392	8.43	0.098	0.005**
– Abnormal	18	60	26	86.7	12	40	16	53.3				
International normalized ratio:												
– Normal	17	56.7	12	40	19	63.3	16	53.3	0.415	0.253	0.396	0.219
– Abnormal	13	43.3	18	60	11	36.7	14	46.7				
Glucose:												
– Normal	20	66.7	11	36.7	26	86.7	20	66.7	0.273	7.43	0.063	0.029*
– Abnormal	10	33.3	19	63.3	4	13.3	10	33.3				
Urea:												
– Normal	28	93.3	23	76.7	30	100	26	86.7	0.415	0.053	0.246	0.253
– Abnormal	2	6.7	7	23.3	0.0	0.0	4	13.3				
Creatinine:												
– Normal	27	90	24	80	25	83.3	24	80	0.292	0.382	0.353	0.626
– Abnormal	3	10	6	20	5	16.7	6	20				

(***) statistical highly significant P < 0.001.

Table (4): Pre-operative knowledge level for patients' about open heart surgery between study and control group.

Variable	Group								P-value
	Study (n=30)				Control (n=30)				
	Yes		No		Yes		No		
	No.	%	No.	%	No.	%	No.	%	
Definition of the heart.	5	16.67	25	83.33	4	13.33	26	86.67	0.425
Function of the heart.	6	20	24	80	5	16.67	25	83.33	0.561
Definition and indications of open heart surgery	1	3.33	29	96.67	0.0	0.0	30	100	0.623
Complications occur after open heart surgery.	1	3.33	29	96.67	2	6.67	28	93.33	0.745
Define of surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Sources of surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Predisposing factors for surgical site infection.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Complications of surgical site infection.	3	10	27	90	2	6.67	28	93.33	0.582
Guidelines for good diet.	2	6.67	28	93.33	3	10	27	90	0.473
Weight control.	1	3.33	29	96.67	2	6.67	28	93.33	0.498
Health teaching activities after discharge.	0.0	0.0	30	100	1	3.33	29	96.67	0.498
Notify the physician if patient have any abnormal.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Rest and sleep.	10	33.33	20	66.67	8	26.67	22	73.33	0.391
Returning to work.	3	10	27	90	2	6.67	28	93.33	0.425
How to stop of smoking?	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Daily activities to infection control.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Guidelines for patient when taking medication.	2	6.67	28	93.33	3	10	27	90	0.493
Nursing care for common problems after open heart surgery.	3	10	27	90	2	6.67	28	93.33	0.582

Table (5): Peri-operative knowledge level regarding nursing care practice for open cardiothoracic surgery patient between both study and control group.

Variable	Group								P-value
	Study (n=30)				Control (n=30)				
	Yes		No		Yes		No		
	No.	%	No.	%	No.	%	No.	%	
Pre operative nursing care:									
- Coughing and breathing exercises.	19	63.33	11	36.67	17	56.67	13	43.33	0.431
- Foot and leg exercises.	22	73.33	8	26.67	20	66.67	10	33.33	0.627
- Performing arm and shoulder exercises.	16	53.33	14	46.67	15	50	15	50	0.465
- Used of elastic stocking.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
- Mouth care.	8	26.67	22	73.33	5	16.67	25	83.33	0.251
- Incentive spirometry.	0.0	0.0	30	100	0.0	0.0	30	100	0.0
Post operative nursing care:									
- Patient observation in intensive care unit.	18	60	12	40	17	56.67	13	43.33	0.521
- Nursing care of chest tube.	21	70	9	30	20	66.67	10	33.33	0.602
- Nursing care of urinary catheter.	22	73.33	8	26.67	21	70	9	30	0.584
- Nursing care of nasogastric tube (ryle).	19	63.33	11	36.67	18	60	12	40	0.493
- Activities and exercises in intensive care unit.	22	73.33	8	26.67	21	70	9	30	0.479
Discharge instructions for heart surgery patients:									
- Wound care of the site of operation in home.	13	43.33	17	56.67	12	40	18	60	0.315
- Walking exercises.	18	60	12	40	13	43.33	17	56.67	0.482
- Steps for measuring radial pulse.	8	26.67	22	73.33	9	30	21	70	0.291

Table (6): Comparison of knowledge and practice scores among cardiac surgical patients post implementing educational program at three phase's pre, post and follow up for study group.

Variable	Program phases						P-Value
	Pre-program		Post-program		Follow up		
	No.	%	No.	%	No.	%	
Level of knowledge:							
- Satisfaction	2	6.67	27	90	26	86.63	0.000***
- Unsatisfaction	28	93.33	3	10	4	13.33	
Level of practice:							
- Satisfaction	13	43.33	25	83.33	24	80	0.000***
- Unsatisfaction	17	56.67	5	16.67	6	20	

Table (7): Knowledge and practice scores among open heart surgery patient for both group throughout three phase's pre, post and follow up.

Variable	Program phases		
	Pre-program	Post-program	Follow up
	Mean ± SD	Mean ± SD	Mean ± SD
Knowledge (Total score = 18 degree):			
- Study group	2.055 ± 0.92	15.69 ± 1.38	15.46 ± 1.07
- Control group	1.88 ± 0.42	2.16 ± 1.01	2.16 ± 1.01
P-value	0.274 n.s	0.000***	0.000***
Practice (Total score = 14 degree):			
- Study group	6.86 ± 2.38	13.13 ± 0.641	13.00 ± 0.925
- Control group	2.26 ± 2.04	2.26 ± 2.04	2.26 ± 2.04
P-value	0.485 n.s	0.001**	0.001**

Table (8): Infection scoring system among open heart surgery patient before and after discharge (follow up) for both groups.

Variable	Group								χ ² Test		P-value	
	Study (n=30)				Control (n=30)				Pre	Post	Pre	Post
	Pre		Post		Pre		Post					
	No.	%	No.	%	No.	%	No.	%				
1. Normal healing	25	83.3	30	100	16	53.3	24	80	24.35	9.25	0.02*	0.03*
2. Normal healing with mild erythema:												
0 Normal	17	56.7	30	100	16	53.3	22	37.3	0.721	7.531	0.06	0.015*
A Some bruising	13	43.3	0.0	0.0	12	40	7	23.3				
B Considerable bruising	1	3.3	0.0	0.0	10	33.3	6	20				
C Mild erythema	7	23.3	0.0	0.0	8	26.6	5	16.6				
3. Erythema with inflammation:												
0 Normal	22	73.3	30	100	22	73.3	24	80	0.348	9.25	0.403	0.03*
A At one point	8	26.67	0.0	0.0	4	13.3	4	13.3				
B Around suture	1	3.3	0.0	0.0	8	26.6	6	20				
C Along wound	1	3.3	0.0	0.0	0.0	0.0	0.0	0.0				
D Around wound	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
4. Clear discharge:												
0 Normal	28	93.3	30	100	21	70	26	86.7	0.371	27.43	0.259	0.009**
A At one point only	2	6.7	0.0	0.0	9	30	4	13.3				
B Along wound	2	6.7	0.0	0.0	1	3.3	0.0	0.0				
C Large Volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
D Prolonged	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5. Major complication (pus):												
0 Normal	30	100	30	100	26	86.7	28	93.3	0.092	0.342	0.06	0.246
A At one point	0.0	0.0	0.0	0.0	4	13.3	2	6.7				
B Along wound	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
6. Deep or severe wound infection:												
0 Normal	27	90	30	100	26	86.7	25	83.3	0.352	6.93	0.500	0.026
A wound infection	3	10	0.0	0.0	4	13.3	5	16.7				

Table (9): Comparison between duration of patient's stay among open heart surgery patient at intensive care unit (ICU) and hospital department for both groups throughout three phases of educational program.

Variable	Group		X ² Test	P-value
	Study(n=30)	Control (n=30)		
	Mean ± SD	Mean ± SD		
Hospital department stay	31.83 ± 16.88	30.60 ± 12.58	0.391	0.749
ICU stay	4.83 ± 2.10	5.43 ± 2.97	0.425	0.371

Fig. (1): Relation between housing condition & incidence of infection in study group

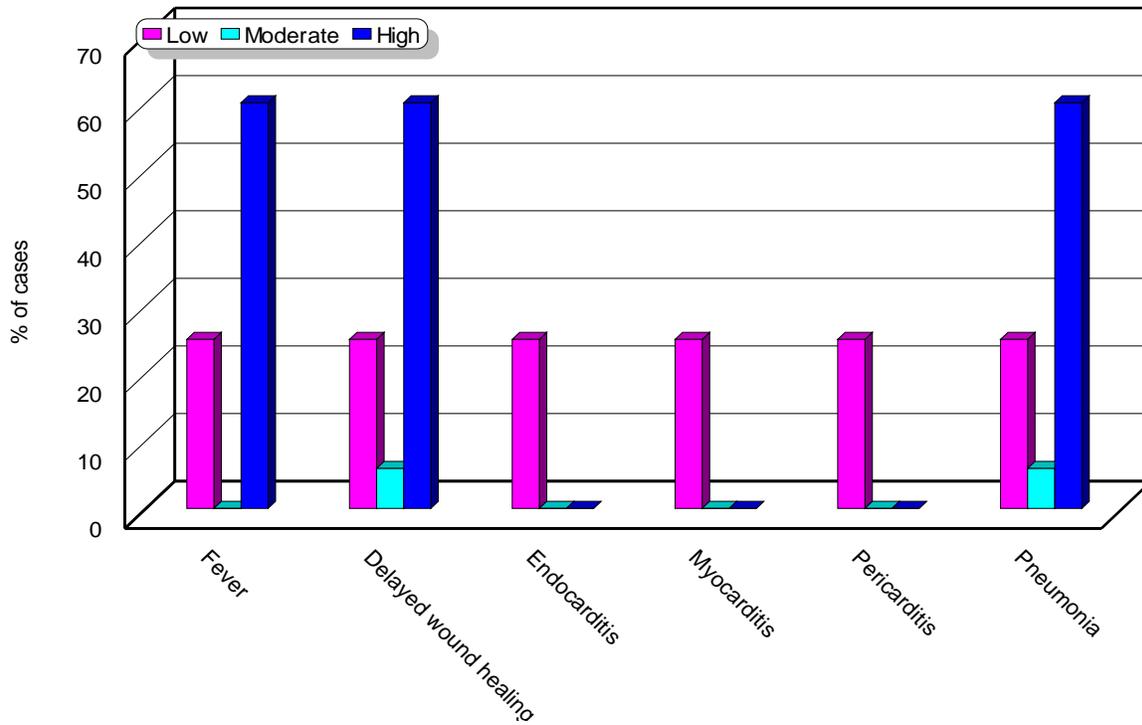


Fig. (2) Relation between ICU stay & incidence infection in study group.

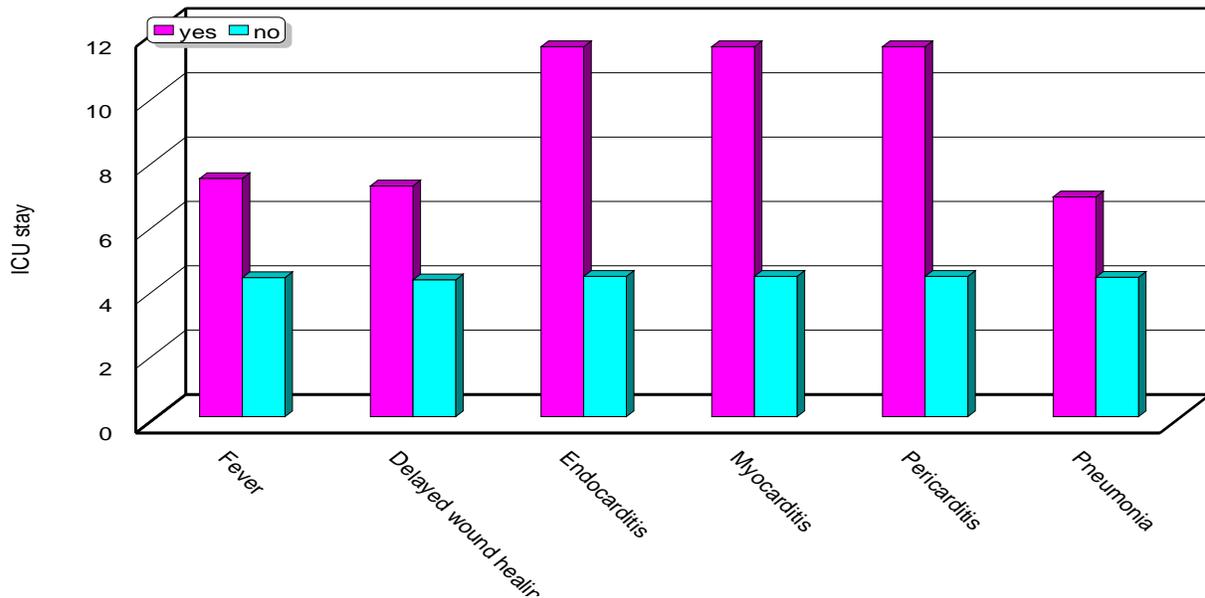
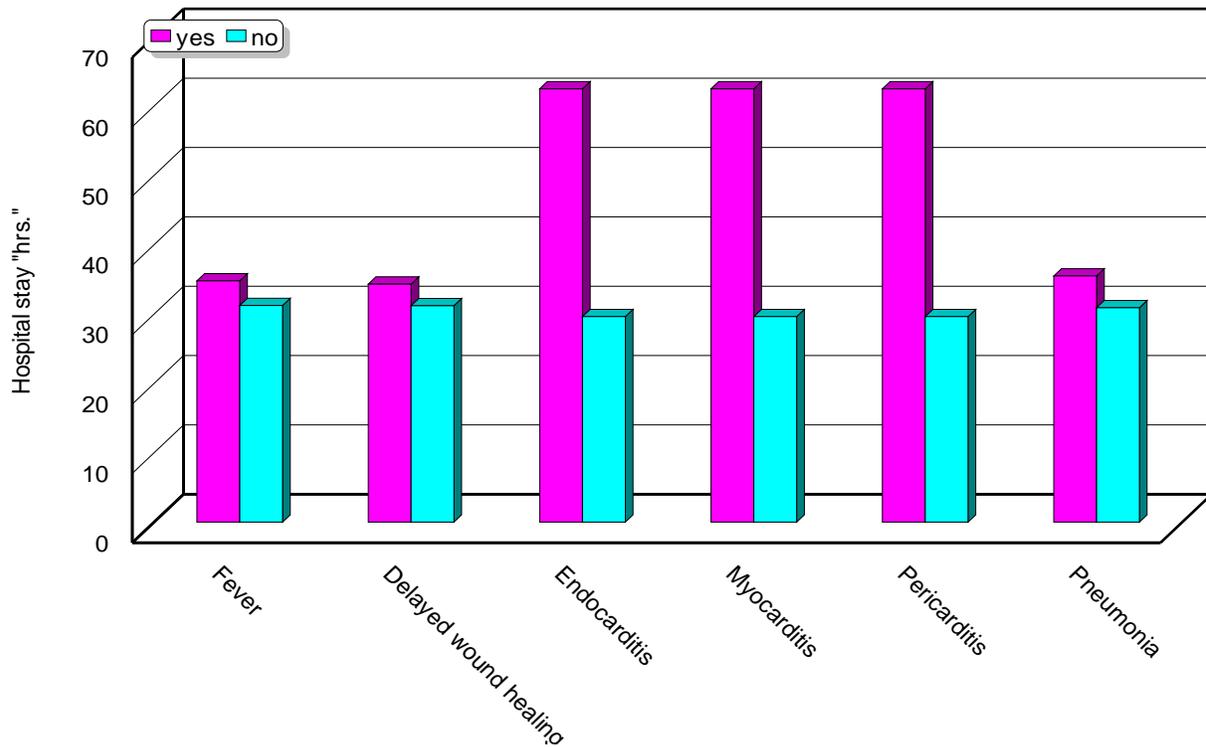


Fig (3): Relation between hospital stay & incidence of infection in study group

4. Discussion:

Patient education is an essential component of nursing practice, there has been a continuous development and emphasize on the leadership role of nurses in the arena over the last century. Kane (2003) stated that the nurse is responsible for providing preoperative nursing care for patients which includes assessing physical and psychological needs preparing patients for operation includes the following instruction such as listing medication routinely, limitation of eating or drinking before surgery with specific time, bathing, checking vital signs, laboratory investigation and administrating preoperative medication.

Based on the results of the present study biosocio-demographic characteristics, two groups study & control were included in this study with no statistically significant differences shown between them regarding; sex, age, marital status, educational level, occupation, family size, and housing condition at the beginning of the study.

Concerning sex, the present study showed that approximately half of study and control groups were female, this result agree with Hopkins, (2005) study finding who mentioned that the majority of participated patients with open heart surgery were females. Whiles this disagrees with that of Stahle(1997) and Borger (1998) who reported that fewer female patients than males (female: male ratio = 1: 4.4).

The result revealed that, more than one third of the total studied patients were in the age group from 18 - 29 years old in study group and control group. On same line, this finding disagrees with Chih-Hung (2005) who reported that the number of open heart surgery is increasing in patient who are 50 years old or more.

The present study findings have shown that; one third of the study groups were illiterate and less than one third of the control group were able to read and write. As patient's education can increase the patients' awareness toward the surgery and the importance of follow up program.

The present study showed that, the mean scores vital signs in study group in preoperative phase were less than those of the control ones especially for temperature and pulse (85.53 ± 15.38 , 83.43 ± 11.55 and 37.04 ± 0.37 , 36.92 ± 0.457 respectively) with highly statistical difference between control and study group related to respiratory rate (0.005). Punder (2005) and Koplow and Hardin (2007) mentioned that pulse and blood pressure serve as useful tools to assess cardiac output in heart disease..

Based in the results in the present study preoperative cardiovascular clinical assessment, more than two third of study group and all patients who participate in control group have palpitation and

nocturnal dyspnea, these findings is at one with those of Gamer *et al.*(1996), Mangram *et al.*(1999), and Spelman *et al.* (2000) who reported that, all patients with cardiac disease have complained with palpitation and nocturnal dyspnea.

The present study showed that, consumption of tea and coffee it was more prevalent among control group subjects than those in the study ones. More than two third of study and control group were non smoker. This agrees with those of Kleinbaum *et al.*(1998), Delgado *et al.*(2001), and Kern (2005) who reported that, the majority of sample in study and control group were smokers and smoking is considered one of the risk factors for sternal surgical site infection.

According to Debacker *et al.*(2003) who recommended that physical activity for cardiac patient should be positively encouraged because this may reduce blood pressure, cholesterol level, and body weight. Patients should be encouraged to exercise at least four times a week, but preferably daily for a period of 30 minutes. Exercise does not need to be complex or competitive; a daily walk is sufficient to gain health benefits. These contradicts with study more than two third of the patients were not performing exercises (walking) in both groups. The American College Sports Medicine (ACSM, 1993) guidelines and Ellis (1995) who stressed that the individual will benefit from daily bouts of aerobic exercise totaling 30 minutes.

According to Syed and Davis (2000) who mentioned that within the standard level of weight 20 to < 26, over weight 26 to < 30, obese > 40 Kg. It was found in the present study, two third of the study and more than one third in the control group were having standard level of weight. According to Grady and Jalowiec (1995), Debacker *et al.*(2003) and Jarrick(2006) who recommended that nutritional information should be given to optimize wound healing, maintain ideal body weight and reduce cholesterol levels if elevated.

With regard associated disease, the study revealed that less than one third of subjects in study and control group were complaining from diabetes this may be due to that most of the sample were young (18 -29 years). Slaughter *et al.* (1993), Minohara *et al.*(1993), Spelman *et al.* (2000), Swanton (2003), American Heart Association(2004) consistent diabetes and obesity were independent predictors of sternal surgical site infection following coronary artery bypass grafting.

Also in the present study, it was found that half of subjects in study and control group were complaining from chronic obstructive pulmonary disease. However, Paletta *et al.* (2000), Keogh(2003), American Heart Association(2004),

Adam (2005), Drain and Forren (2009) and Morton and Fontaine (2009), emphasized that patients complaining from chronic obstructive pulmonary disease lead to impaired sternal wound healing.

In this context finding that all patients who participate in study and control group were using antibiotics, this is in agreement with those of Paletta *et al.*(2000);Trick *et al.* (2000) and Abd El Aziz *et al.* (2007) who mentioned that, the use of antimicrobial prophylaxis surgical procedures is one of the measures used to prevent the development of a surgical site infections.

The present study mentioned that more than two thirds of the patients in study and more than one third in control group were using anticoagulant. This agrees with those of, Kern (2003), and Punder (2005) who recommended that patients with mechanical prosthetic valves will require warfarin anticoagulation for life to prevent thrombosis and embolism.

Based on present finding mentioned that more than half of the patients in study and two thirds in control group have normal laboratory values of prothrombin time in preoperative period, while more than two thirds in study and more than half in control group have abnormal values as regard prothrombin time in postoperative period, this may be related to anticoagulation therapy.

The present study revealed that, more than two thirds in study and control group have normal laboratory values as regard serum sodium, serum potassium, calcium, and magnesium. This is in with accordance Noronha and Matuschak(2002), Dlercks (2004), Palmer(2006) and Urden *et al.* (2006), who mentioned that normal serum potassium levels are 3.5 to 4.5 mEq/L. Hyperkalemia and Hypokalemia elicits significant changes in the electrocardiogram (ECG) and impairs myocardial conduction.

Regarding glucose level two thirds of the patients in study and more than two thirds in control group have normal values as regard glucose level in preoperative period. In addition Garber *et al.* (2004) and Wynne *et al.* (2007) consistent the detection of increased blood glucose (more than 110 mg/dl) during a fasting state may indicate diabetes mellitus.

The present study showed that, the highest percentage (33.33 % and 26.67 %) in study and control groups respectively were having knowledge about rest and sleep. It also showed that most of patients had a general lack of knowledge in both groups about other items. Level of knowledge was insufficient this may be due to inavailability of training programs and lacking of continuous educations. This result was in agreement with Bedier (2005) who found that their was lack of patient's knowledge about pre and post operative care which predict poor recovery outcome

After implementing of the educational program study group patients had a highly significant improvement than those of control ones in relation to all items of knowledge. In this respect, Jennifer (2003) and Charlson *et al.* (2006) found that, applying nursing intervention postoperatively plays a major role in patients' improvement of knowledge and recovery.

As regard level of preoperative nursing care practice for open heart surgery patient, more than half of the patients in both groups had knowledge about performing foot and leg exercise. It also revealed that more than one third in study and control groups has no knowledge about how to perform coughing and breathing exercises, arm and shoulder exercise. According to American College Sports Medicine (ACSM, 1993) guidelines and Urden *et al.* (2006) recommended that exercise is important in the maintenance of the healthy heart.

Based on present finding assessment of practice level about post operative nursing care among patients in study and control groups, approximately an equally more than two thirds of patients in both groups have knowledge about nursing care of urinary catheter, activities and exercises in intensive care unit. It also showed that lacking of patient's knowledge about patient observation in intensive care unit, nursing care of nasogastric tube, and nursing care of chest tube in both study and control groups.

Regarding post operative activities, Charlson and Islam (2003) stressed that, following the cardiac surgery; the patient must be encouraged slowly to resume an active life, while minimizing the risk associated with overexertion. On the other hand Gerald and Fletcher (2007) . Abdel Monem (2008) illustrated that, active but not restrictive range of motion of extremities is also well tolerated early after cardiac surgery as long as activities do not stress or impair healing of sternal incision while patient become stable and early ambulated from bed.

As regards discharge instructions for open heart surgery patients, more than one third for study and control groups has had knowledge about how to perform walking exercise. Backer *et al.* (2003) and Punder (2005) recommended that a daily walk is sufficient to gain health benefits for patients after open heart surgery.

Before program implementation (pre-test) there was unsatisfactory level of knowledge. The implementation of educational program showed an improvement in patient' level of knowledge regarding all information related to open heart surgery. This has improved immediately after the program implementation and remained in the follow up.

The present study revealed that, before program implementation the patient did not have any

background or information about level of practice in preoperative, postoperative nursing care and discharge instructions for open heart surgery. Post program implementation their were significant improvement in patient' level of nursing care practice about open heart surgery preoperative, postoperative and discharge instructions on immediate post-test and follow up test.

According to Morton *et al.* (2005); Morton and Fontaine (2009) effective preoperative teaching program for patient before open heart surgery is important to help the patient in rapid recovery and prevent postoperative complications. The surgical procedure, the intraoperative and postoperative experiences are explained.

In the present study there were statistical significant differences in improvements throughout the educational program phases among study group regarding total score of knowledge and practice about open heart surgery.

The study in the line with those of Morton *et al.* (2005); Morton and Fontaine (2009) ; Okkonen and Vanhanen (2006) who emphasized that after cardiac surgery the patient may experience pain resulting from the chest or leg incision. In addition Wynne *et al.* (2007) and Osborn (2010) illustrated that the goals of nursing management is a thorough assessment of the patient's pain using a pain scale, provide a calm environment, adequate period of rest and sleep, administration of analgesics based on the report of pain intensity.

In present study the scoring system used is of Southampton Wound Assessment Scale to assess surgical wound infection in patients, the wounds graded before discharge and after 2 weeks postoperatively. In the present study, more than half of the patients in study and control group were having normal healing with mild erythema predischarge, while in follow up phases all patients in study group and more than two third in control group were having normal healing with mild erythema. In addition Bailey *et al.* (1992), Morris (2003) and Punder (2005) devised the Southampton Wound Assessment Scale to assess surgical wound infection in patients following surgery; the wounds were graded before discharge and 10-14 days postoperatively into one of four categories; normal healing, minor complication, wound infection, and major haematoma.

Based on the study results; it was clear that there were a significance difference as regard the relation between hospital stay and ICU stay and incidence of infection. Eagle *et al.* (2004), Morton and fontaine (2009) supported that length of stay in ICU and hospital environment after cardiac surgery increased risk for sternal surgical site infection.

It was found that in the present study there was significance difference as regard to relation

between housing condition and incidence of fever, delayed wound healing and pneumonia. This in line with Minohara *et al.* (1993) and Campbell (2000) and DVLA (2003) who found that poor housing condition increases incidence of surgical site infection.

It is the fact that study documented the statement of role of the nurse play a vital role in the prevention of SSIs in patients with open heart surgery, identification of early signs of infection are vital to the prevention and optimum treatment of SSIs. The critical care nurse must be integrating theoretical knowledge, assessment skills, and problem solving ability to provide optimal nursing care and maintain high quality outcomes for open heart patients.

Conclusion:

Based on the result of the present study, it can be concluded that; Significant differences in improvements throughout educational program phases among study group regarding total score of knowledge and practice about open heart surgery. A significant relation was existed between age, nutritional status, diabetes, hospital stay, ICU stay and incidence of delayed wound healing among study group.

Based on results of the present study, the following can be recommended:

I. For patients:

1. Patients who have had valve replacement require additional verbal and written information about protecting their prosthetic valve from infective.
2. The patients must understand the importance of oral hygiene and visiting a dentist regularly because dental infections can affect the valve prosthetic.
3. Tell the patients about importance of regular follow up in regular time.
4. Advice the patient regarding effective education and information are required to enhance understanding of drug therapy (anticoagulant drug).

II. For nurses:

1. An in-service education center should be established within Assiut University Hospital to improve nursing staff level of knowledge and performance.
2. To reduce the rate of infection, implementation of universal precaution and comprehensive education are required.

III. In services:

1. Follow-up care for patients with open heart surgery phone calls, home health visits and clinic visits would help to pinpoint problems and solve it.

2. Establishment of specialized cardiac clinics in all health centers to help guiding and caring for patient with open heart surgery.

IV. For research (future study):

1. Importance of doing separate studies of open heart surgery helpfully lead to more effective and preventive – based strategies for future.
2. Studies should be done for those patients who high risk for infection

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A comparative study in Money Attitude among University Students: A Gendered View

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Abstract: The paper aims to examine gender differences in money attitude among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences for different dimensions of money attitude, in which males were attached to money as a power/prestige tool while experiencing anxiety and having a retentive attitude toward money. Meanwhile female students were conservatively minded about money, as well as being attached to money for self-gratification purposes. [Leila Falahati, A Comparative Study in Money Attitude among University Students: A Gendered View. Journal of American Science 2011;6(3):1144-1148]. (ISSN: 1545-1003).

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Keywords: Money Attitude, Gender, University Students, Financial Behavior,

1. Introduction

Money attitude and behavior have been a common cause of concern among economists, psychologists, and sociologists for over three decades. The majority of studies have recognized different aspects of money, demographic variables that are associated with money attitudes, and frameworks based on psychometric theories to explain financial behavior (Masuo, et al., 2004). Studies of financial issues revealed that attitude to money play an important role in determining a person's financial management and level of financial well-being (Joo and Grable, 2004; Porter and Garman, 1993; Shim, et al., 2009). A number of research findings emphasized that, generally, persons with stronger perceptions and positive financial attitudes tend to be more satisfied with their financial appraisals (Joo and Grable, 2004) and have more effective money management. In respect of financial matters, previous research generally proposed that past experiences formed attitudes toward money.

Evidence suggests that attitudes precede the development of money behavior (Roberts and Jones, 2001), in other words, money attitude contributes to predict financial practices (Dowling et al., 2009; Shim, et al., 2009). Attitude has been defined as "a tendency to act in a favorable or unfavorable way toward an object" (Eagly and Chaiken, 1993). Concerning money, Lown and Ju (1992), proposed that our attitudes and feelings surrounding money are integrated into our lives and, thus, motivate behavior in subtle ways.

In this respect Lim and Teo (1997) studied a sample of undergraduate university students in Singapore, and found that students who experienced financial hardship were more likely to use money as a form of evaluation, be more generous to the less fortunate, and have higher levels of financial anxiety compared to students who had not experienced financial hardship (Lim and Teo, 1997). Abelson and Prentice (1987) indicated that the ways in which individuals define their relations to material possessions reflect their general beliefs and values about money, which are typically influenced by past experiences.

The studies of money attitude among university students indicate that males and females understand money differently. Previous researchers who have examined the relationship between socio-demographic variables and money attitudes concluded that males and females have different beliefs about money (Allen et al., 2008; Hayhoe et al., 2000), which is due to the different financial socialization during childhood (Hira and Mugenda, 2000; Lim et al., 2003). The results of financial attitude studies (Dowling, et al., 2009; Hayhoe, et al., 2000; Lim, et al., 2003; Masuo et al., 2002) among college students revealed significant differences between male and female students in money attitude dominants.

Gender theories suggest that men's and women's perceptions are different, in part, due to socialization (Hira, 1997). However, it is well documented (Gutter et al., 2009; Newcomb and

Rabow, 1999; Shim et al., 2010) that families use different strategies to financially socialize boys and girls, which includes protecting girls from financial issues, and encouraging boys to participate in family financial decision making and practices (Newcomb and Rabow, 1999).

Lim and Teo (1997) conducted a study on a sample of undergraduate university students in Singapore, and found that students who experienced financial hardship were more likely to use money as a form of evaluation, be more generous to the less fortunate, and have higher levels of financial anxiety compared to students who had not experienced financial hardship (Lim and Teo, 1997). In addition, the findings of Lim and Teo (1997) showed some gender differences, with males often using money as a means of evaluation compared to females.

Later Lim et al., (2003) conducted a study among the Singaporean Chinese, which supported that men were more concerned about the power and anxiety dimensions, while women were more concerned about the budget, retention and evaluation dimensions of money attitudes. Lim et al., (2003) concluded that gender differences in money attitude might relate to the variation of socialization and traditional gender role expectations, especially in the Asian context. Men expect to be the breadwinners and the head of the family; therefore, men have a power/prestige money attitude. However, since women are expected to hold family roles they are attached to budget and retention money dominants.

Furthermore, Lim et al., (2003), following a review of the literature (e.g. Prince, 1993), indicated that women are more likely to view money as a means for attaining gratification, by allowing them, among other things, to acquire treasured possessions. He mentioned that, relative to men, as women are prone to underestimate their knowledge in financial matters (Goldsmith and Goldsmith, 1997), they may be more anxious about their finances and other finance-related matters (Lim, et al., 2003).

The findings of Hayhoe et al. (2000) among college students suggest that males tend to be more obsessed with money than female students, while female perceptions were influenced by money attitude of power/spending and retention. Finally, the results of Baker and Hagedorn (2008) among students revealed that males tend to score higher on both power-prestige, and on frugality-distrust. Furthermore research findings indicated that students perceive a higher level of financial problems due to a negative attachment to money and lack of financial management skills (Hayhoe et al., 2005; Hira and Mugenda, 2000; Kidwell and Turrissi, 2004; Norvilitis et al., 2006).

However, gender differences in financial attitude may result in differences in the level of financial knowledge, which, in turn, has a significant effect on financial behavior and financial well-being accordingly. In addition, money attitude is the focus of financial planners, since understanding how money attitudes relate to investment and savings behavior provides an overview for planners to provide more practical programs to enhance students' financial management skills accordingly.

2. Materials and Methods

2.1 Instrumentation

Financial attitude was measured by adopting six dimensions of Furnham's Money Beliefs and Behaviours Scale (MBBS) and adapted to the Malaysian context. Furnham's (1984) scale comprised six dimensions obsession, power/ prestige, retention, security, inadequacy/ anxiety, and effort /ability. However, based on the Malaysian context the self-gratification dimension was replaced with the effort/ability dimensions and all the statements were developed for the Malaysian context as well. The total score money attitude and six dimensions were computed by summing the scores of 1 to 4.

2.2 Sample procedure and sample profile

Data were collected using a stratified sampling method at six public and five private universities across Malaysia. A self-administered questionnaire was used as the data collection methodology. Of the 2,500 students who responded to the survey, 40.4% were male and 59.6% were female students; 71.4% were Malay being the major ethnic group in Malaysia, 21.7 % were Chinese, 5 % were Indian and others (.8%). The mean age of the respondents was 21 years. Students from public universities were 60% while others, 40%, studied in private universities.

2.3 Data Analysis

To determine gender differences in money attitude the mean comparison t-test was conducted between male and female students.

3. Results and Discussions

The results of the t-tests were given in Table 1 indicated that there were no statistically significant differences in the money attitude score; however significant differences were observed all money attitude components between male and female students except in obsession attitude. Given results revealed that male students ($M= 8.5$) are used money as power/prestige power/prestige means, compare to female students ($M= 7.62$). Findings of t-test indicated on the statistically significant difference

$t=8.811$, $P\leq.00$, between male and female students. In addition male students have higher level of anxiety ($M= 7.35$) about money while female have a lower level of anxiety ($M=7$), and male students are more retentive ($M= 4.16$) than female students ($M= 3.93$). Findings of t-test given in Table 1, indicated on statistically significant differences in anxiety ($t= 4.4$, $P\leq.00$) and retention ($t=3.97$, $P\leq.00$) between male and female students.

Results of mean comparisons revealed that female students ($M= 7.82$) use money for self-gratification and celebrate to compare to male students ($M= 7.27$), in addition female students ($M= 9.86$) are more conservative in money issues than male students ($M= 9.52$). Results of t-test indicated on the statistically differences in self-gratification attitude ($t= -6.69$, $P\leq.00$) and conservative attitude ($t= -4.82$, $P\leq.00$), between male and female students. The findings revealed that male students are more concerned about money.

Table 1: The Result of the t-Test for Financial Attitude

Items	Male	Female	t	Sig
Financial attitude	48.26	47.82	1.42	.136
Obsession	11.45	11.58	-1.207	.227
Power/Prestige	8.5	7.62	8.811	.000
Self- gratification	7.27	7.82	-6.69	.000
Anxiety	7.35	7	4.4	.000
Conservative	9.52	9.86	-4.82	.000
Retention	4.16	3.93	3.97	.000

**df*:2145

These results are consistent with past findings, which suggest that males are more concerned about money than females (Barber and Odean, 2001; Funfgeld and Wang, 2009; Norvilitis, et al., 2006). The findings revealed that female students are more obsessed (Hayhoe et al., 1999), and security minded about money (Masuo, et al., 2004; Wilhelm et al., 1993), however, in contrast with their conservative attitude towards money, female students use money for self-gratification. Male students are more concerned about using money for power/prestige (Lim, et al., 2003) and are retentive and have anxiety (Lim, et al., 2003) about money issues. These findings indicate that while men use money to gain prestige and spend money to have influence on others, they experienced more stress about money and were even reluctant to spend money on necessities, such as buying books.

4. Conclusion and Implications

The main aim of the present study was to determine gender differences in money attitude

dimensions among students. The findings reveal that in a comparison of money attitude components, male students show more likelihood of demonstrating power/prestige, higher anxiety and retention attitude toward money than females. In contrast, females have a self-gratification and more conservative attitude toward money. There are no differences in the money attitude score and obsession attitude, between male and female students. The attachment of male students to money as power/prestige indicates that male students use money as a tool to influence others, which may increase the likelihood of experiencing a higher level of debt to achieve more power in financial matters. In addition, male students are retentive and more anxious about money, which indicates that they are also worried about their financial situation. Together these factors indicate that male students are attached to negative aspects of money and although they use money as a source of influence on others, they experience anxiety and have a retentive attitude toward money. Female students use money for self-celebration and spend money in order to reduce stress. Females have a conservative attitude toward money and are secure minded about money issues. It can be concluded that female students have a more positive attitude toward money than male students.

The findings of the present study indicate that both male and female students perceive money differently, which may be due to differences in the socialization process and past experiences about money or may even be related to the differences in financial skills and knowledge between male and female students. However, it is acceptable among researchers that differences in money attitude may result in different financial management, which should receive more attention by scholars and financial practitioners. Therefore, to enhance students' attitude toward money, policymakers should understand that providing educational programs to enhance the students' attitude toward money is more important than providing financial support and educational loans.

Policymakers should consider enhancing students' attitude toward financial aids among college students. Based on the findings of the present study it is recommended that further research be conducted to understand attitude formation and the factors that predict money attitude among male and female students. In addition, since the main part of attitude is formed during socialization, financial education programs may be provided for families as well. Students may not be the only target group in educational programs, as all attitudes, skills, and habits are formed during early childhood by families and reinforced by other socialization agents in later

life. Therefore, the improvement of family financial knowledge, attitude and skills is important to students. These findings should motivate all financial

professionals to encourage schools to include personal finance in the school curriculum.

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Time in Mullah Sadra's and Henri Bergson's thoughts

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Abstract: "Time" is one of the existential aspects of human and, Man always finds himself bounded by the time, as if man is its captive and has no way out of such captivity. Mulla Sadra and Bergson are two philosophers from two different philosophical schools, who have opened new horizons and masterminded new patterns in their interpretation of time. Mulla Sadra and Bergson believed that the reality of time should be interpreted in relation to existence. Mulla Sadra conceives time as a reality which is abstracted from the existence quality of material being; Bergson also conceives time as being synonymous with motion and calls it a duration (duree), which can be comprehended only through consciousness and pure intuition, and forms the foundation of our existence. In this paper, after elucidating time from viewpoints of these two philosophers, we will try to create proximity between these two points of view and open up a window for conjunction and adaptation.

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Keywords: Bergson; Mulla Sadra; time; duration

1. Introduction

Time is one of the fundamental subject matters that have always engaged Man's thought and mind. The background of the problem of time goes much farther than that of metaphysical thought; and in no historical period of human life it has been pulled out of the hideout of his mind and thought. For him, every moment of time is important and he has bitter and sweet memories of those moments. In every moment, human has paid careful attention to the depth of the reality of time and has sought to discover its untold secret. Time is a subject matter, which in addition to philosophy, has reserved an outstanding place in contemporary art and science. It is a problem which no scientist has been - never and in no period and under no philosophical system - needless of thinking about it. To this end, the problem of time is considered to be a conjunction for many scientists and philosophical schools; and although it has a general meaning, which is apparently comprehensible to the public, its reality is amongst the most unfamiliar and the most unknown aspects of life.

2. Time, from a Historical Approach

The history of thought shows that cognition of "time" and its definition has a long-standing background as such that centuries before the beginnings of philosophical discussions in Greece, followers of Zurvanite religion in ancient Iran believed in two forms of time: 1. The passing time (to which we are captive) 2. The existential time (which is one of hypostases of the Divine Essence, while the other two are: Ahura Mazda and the Devil). According to Zurvanite religion, in the absence of time nothing

could be possible. Basically, by limitation of the "time" in this religion, existence emerges (Ebrahimi Dynani). It should be noted that followers of Zurvanite religion believed in the archetype of time, which was known as "Zurvan"; they considered Zurvan as the first being, an everlasting & eternal subject, and creator of the world.

In Plato's viewpoint, time has come to the existences in association with the creation of the world, and serves as a link between the world of being (eternal) and the world of becoming (temporal). Plato aimed to create a link or connection between the sensible world and the intelligible world and time is playing such a role and will be terminated by the end of the world:

"... The master thought of creating a moving picture of eternity. Striving for this goal and meanwhile trying to create the required order and system in the world, he made a constant picture of eternity - which is incessantly in unity and immobility. This picture is constantly moving on the basis of numerical plurality and is the same thing that we call "time" ... anyway, time and world were created together, so that if one day they are expected to be annihilated, they would be annihilated together ... (Plato).

Aristotle, with his natural and mechanical vision to creation, considered the time as the result of continues and circular motion of the first heaven; a motion which, in his view, penetrates from outside and proves the existence of the Creator. He says:

"We would realize existence of the time only when we recognize motion by diagnosing before and after of the motion; and it is only after recognizing before and after of the motion that we say time has passed" (Aristotle).

Therefore, in Aristotle's point of view, motion justifies existence of time and if we do not perceive the motion, we could not perceive time. Plotinus also believed in stability of the One and nous, but considered the universal soul to be a variable, whose changes are the origin of creating creatures and events in the world. In this perspective time emerges in soul and nature, as if he considered time as continuation and perpetuation of the life of soul (Nasrollah). The Islamic philosophy in its early stages of evolution and prosperity was under the influence of Greek thoughts, especially those of Aristotle's. Accordingly, most definitions are inclined toward the thought of Aristotle, and this is clearly seen in ideas of Alfarabius, Avicenna and, Averroes who usually consider time as an effect of motion and relate it to the first heaven. A few number of Muslim theosophists considered time as an fantasy concept, but some other medieval theosophists and philosophers believed in both spiritual and material time (Najafi). Kant in his philosophy took into consideration the same role for "time" that has been given to "existence" in Islamic philosophy, especially in its Sadrian style (Hadad Adel). Kant considers time as a priori condition for each experience and internal and external sensitive intuition. Heidegger too would consider time as the only possible horizon for emergence of existence and believes that time and existence, are interdependent on each other and thus cannot be separated. In his view, time is neither physical nor cosmic, but has an original and fundamental proportion with "existence" (Heidegger).

As it was mentioned earlier, most Muslim philosophers - especially the Peripatetic philosophers - followed Aristotle in the matter of "time". Avicenna in his "al-Isharat al-Tanbihat (Remarks and Admonitions)," writes about the essence of time as follows:

"And know that renewal (getting new), is not possible without changing the mood; and changing the mood is not possible without a subject possessing the power of changing the mood. This connection is dependent on motion and a moving; that is to say to variation and variable, especially anything, in which connection and non-interruption is possible; that is to say the circular positional motion. This connection is measurable, because "before" is sometimes closer and sometimes farther. Therefore, it is the same quantity that measures variation and transformation. Such a thing [with the said features] is the "time". Time, is the quantity of motion, not in terms of distance, but in terms of transpositions which do not come together" (Avicenna). Accordingly, in view of Avicenna "time" is an essential concept, which is placed in the Aristotelian table of categories and

because of its motion, overcomes the objects. Mulla Sadra usually uses the same statement; but after encountering vague and controversial questions, he suggests a novel theory about the time, and although he does not abandon the Aristotelian physical time, he does not consider it as being authentic. He considers physical time as an offshoot of the existing time.

3. Existence of time

Mullah Sadra in his "Al-Asfar" brings about two reasons to prove the existence of time. He calls one of the two reasons "the physicist argument", in which he tends to prove existence of time through physics, which is the way physicists prove it by using physical preliminaries as discussed below:

1. Suppose that two moving objects start to move together and stop moving together, but the distance they take is not the same. For example, one takes 10 km and the other 15 km.

2. In the second assumption, suppose that both of the moving objects take the same distance but they neither move together nor stop together, or they start moving together but do not stop together, or they do not start moving together but stop together.

Now, in this assumption, we are witnessing two types of quantities. One is the static continuous quantity, which we call distance; and the other is the non-static continuous quantity that is time, which is abstracted from quickness and slowness of motions (Mulla Sadra).

Another reason that Mulla Sadra adduces is called "the theological method", and his purpose of choosing this title is to argue the priory philosophy, which is asserts as follows:

Every contingent thing is precedent to something prior to it, and this priority cannot come together with the subsequence. There is a type of precedence that could neither coincide with us nor come after us. Such precedence is the origin of abstraction of time which is inherently not capable of being converted to subsequent (Mulla Sadra).

4. Whatness of the Time

After discussing existence or nonexistence of the time in Mulla Sadra's thoughts, now we try to find out what the time is and what definition Mulla Sadra has offered in this regard. As it was mentioned earlier, Aristotle and consequently most Muslim philosophers believed that time is the quantity of motion; and motion means an accidental affair; that is to say motion takes place in accidents and not in substance. Therefore time is the same static continuous quantity. However, we will see here that while Mulla Sadra accepts that time is the quantity of motion, his interpretation of time and motion differs

from those of Aristotle and most Muslim philosophers; because, on one hand Aristotle considers motion to be related to the accidents of substance, while Mulla Sadra believes that motion is within the substance itself and not away from it. Furthermore, Aristotle considers time as the quantity of rotating motion of the heaven but Mulla Sadra considers it the quantity of the motion of the substance which stays as the fourth dimension besides the three dimensions of the physical substance. His phrase is as follows:

"So time is a quantity of nature whose essence is renewed in terms of essential precedence and subsequence as such that the mathematical body is the degree of being natural in terms of the acceptance of the three dimensions. Therefore, there are two extensions for the nature (physical substance) and there are two quantities for it; one gradual temporal that accepts division into temporal precedence and subsequent, and the other special repulsive which accepts division into special precedence and subsequent. The ratio of quantity to extension is the ratio of the specified to the vague which are one in terms of existence but are different in terms of consideration" (Mulla Sadra).

He then explains his views, reminding that time is not a biased and independent issue, like darkness and brightness, and its existence is rather inseparable from the existence of motion and consequently from the existence of substance. It is only in our subjective analysis that we separate time from of motion and ultimately from the substance. His statement is as below:

"One, who ponders a bit on whatness of the time, would realize that it has merely an intellectual consideration, and happening of it to a subject in terms of existence, is not like external accidents of the things, like blackness, hotness, etc. Time is rather of analytical accidents of its subject and existence of such accident in outside cannot be separated from existence of their subjects; because, the relationship between them is merely subjective..." (Mulla Sadra). It is however understood from Mulla Sadra's statement that time (and motion) is amongst philosophical secondary intelligible whose origin of abstraction is in the external world, but has no instance there. The external world is as such that mind will abstract time from it with the help of analysis.

But in the world outside of our mind there is no being as time against the physical substance as in the case of motion, what exists in the outside world is the same physical substance that notion of the concept of motion is abstracted from observing its presence in point "A" and comparing it with its existence in point "B".

Therefore, it seems that in the opinion of Mulla Sadra time is neither an objective or biased entity nor a completely subjective entity, like the logical secondary intelligible or illusions that are the outcomes of man's misconception; it is rather a subjective being, derived from the background and origin of objective abstraction.

In fact, in the opinion of Mulla Sadra, time, motion and physical being are of a same existence. He rejects the duality between motion and time, as he does not believe that motion and time are external accidents for the material being. Mulla Sadra has a very precise statement in this regard, which is rooted in his ideas about substance and accident. Mulla Sadra's opinion on the relation between substance and accident is totally different from those of Aristotle and Avicenna. He views accidents and attributes of each object in terms of existence, as the degrees and positions of the existence of substance. According to him, each attribute and accident in an object is exactly attribute and accident of the specific existence of that object. Thus motion of an object is the identity of that object. Accordingly, Mulla Sadra extends the motion to the category of substance and figures it as the amount of motion in substance. From his point of view, time is the essential appraiser of material substance and, therefore, all substances and material phenomena have their own specific time because time is one of the many aspects of their existence (Akbarian). Thus, Mulla Sadra considers time as a visible extension or the fourth dimension of material existence and in his point of view temporality of the objects is an indication of some sort of extension in their existence. In his detailed analysis, objects have two extensions; one in the ground of space and the other in the ground of time. The special traction has three geometrical dimensions and the time traction is resulted from the inner flux of material universe:

"... The nature has two extensions and two quantities; one is gradual and temporal and could be illusively divided into 'before' and 'after' of the time; while the other is expelling and spatial and could be divided into spatial 'before' and 'after'" (Mullah Sadra).

The mentioned phrase is amongst the most important and enlightening expressions of Mulla Sadra about the time. The fact that time is the fourth dimension of material and has no other external existence except for this is a great discovery in discussion over "existence of the time".

Of course, the philosophical term the "fourth dimension" in the Sadrian philosophy should not be mistaken for the physical term "general relativity" of Einstein. The universe having for dimensions in Sadrian interpretation is a metaphysical concept which could be experimented. This dimension is not

a quantitative dimension but an "existential dimension", derived from the state of "being" of the material being and interferes in its "identity". In fact, "time" is a fluid and renewable identity from which the mind is capable of abstracting an intellectual consideration called "time". According to this statement, motion, and consequently time, do not undergo any categories and may not be regarded as an essential concept. It is rather a fluid existence which acts like the motion and fluid existence in the external world; and it is only in the subjective analysis that mind can differentiate them. In order to understand the reality of time which is constantly renewed and is in fluidity and anxiety, one should to it and perceive it intuitive.

"They (substances) are existential identities which are by essence not under substance and quality and quantity other than these categories and species and geniuses; because, they are existences that have been imparted from affairs of the first right, they (pure beings) are effects of intellectual light and illuminating shadows of Him – the Almighty" (Mullah Sadra).

5. Time in Bergson's thought

The theories that have been presented about time before Bergson have usually emphasized on its quantitative aspects. Its qualitative characteristics have neither been a matter of question nor been paid the least attention. Bergson's point of view in the history of Western thoughts in this regard is being considered as a turning point. Bergson opposes the widespread interpretations of time and presents a new pattern. He considers the concept of time, as reflected in the current tradition of philosophy and physical sciences, as a spatial time and believes that these pretend to be measuring the time, while it is indeed the space that measures it. In this attitude, time has transpositions and belongs to the world of objects which is needed for giving order and regulating our motions and activities as such that is appropriates the social environment, but it is not the real time (Wall). Rather, the real time is a much deeper understanding which is in ourselves and belongs to ourselves which Bergson interprets as duration. In his point of view the real time is duration. Duration is absolute fluidity and dynamism. In Bergson's thought duration is being considered as multiplicity of conscious states which has unified his thought from his first philosophical work, "Time and Free Will", where it distinguishes between absolute multiplicity and multiplicity of conscious states, to the creative evolution.

In Bergson opinion, the unreal time is generated from our interpretation of space and in our normal everyday life we measure this time with such

matters as hours and calendar. Separation of time and space from each other and identification of two different times, one the unreal time which is resulted by the adjustment with space and dimension and, in other words, is a quantity and the other which is real time and means that the same duration which is a quality, is among outstanding points in Bergson's philosophy.

"There are two possible conceptions of time; one free from all alloys, the other temporally bringing in the idea of space" (Bergson).

"The concept of conventional time which is used in science, including mathematics, is together with the notion of space and in Bergson's opinion; this common and spatial concept of time is in fact abstracted from the real time, meaning duration. If we refer to our life and true experience of the time, we will find out time as duration; but when we build concepts or try to make an assessment of it we replace it with space and consider time to be spatial. In fact, this concept of time is a spatial or mathematical concept of duration.

For the sound interpretation of duration an example of Bergson himself would be effective:

1 –We imagine the material point "A" moving on a straight line with infinite length.

2. We imagine that "A" is a self-conscious being with intuitive knowledge of a succession which feels its own changes.

3. From this point two modes could be assumed:

a)"A" has an idea of the space.

b)"A" knows nothing about space, which we should accept this assumption in the understanding of duration.

4. We choose the first assumption that "A" is conscious of the space. Based on this assumption, "A" understands its successive approach as a line, because in this case "A" places itself somewhere above the line and thinks in a three-dimension space, because as long as we do not expect ourselves out of the line and become conscious of the free space around it, we could not imagine the line at all. The mistake that is being made by those who consider duration like space, but with a more simple nature, originates from this point. They would put psychic states side by side and make a line or chain out of it and imagine that space is not involved in this operation, while idea of a line in the absence of the involvement of space and perception of the free space around it has no meaning.

5) We choose the second assumption in which "A" has no idea about space. In this assumption "A" will not understand succession of its states and transformations in the form of a line. Instead, sensations will be added together like forces

and become harmonious like consecutive notes of a melody. Therefore, it is clear that a pure duration means a succession of qualitative changes which have influenced each other to the extent that have been melted in each other, there is no boundaries among them, do not tend to separate, and have no proportionality with numbers and counting that could guarantee imagination of space (Bergson).

Bergson considers negligence of the predecessors to the time as their lack of attention to continuity of time and presence of past in present and believes that the predecessors were only concerned about passage and wastage of time. Time for the predecessors was not theoretically significant because "duration" showed nothing but the destruction of their nature; while science deals with the fixed nature (Bergson).

In brief, several characteristics could be outlined for "real time" in Bergson's philosophy:

1 - Real time is a continuous reality whose components are so intermingled with each other that could not be distinguished from one another. There is an unbreakable unity between the past and the present. To further elucidate the problem, Bergson distinguishes two types of multiplicities in "Time and Free Will". The first is absolute multiplicity or distinctive multiplicity, which belongs to material objects that are located in place, and the other is a continuous multiplicity, which belongs to our conscious states and its elements are combined with each other (Bergson).

In Bergson's point of view multiplicity of conscious states is a qualitative multiplicity and absolute multiplicity is quantitative. These two temporal multiplicities would become further clear when we deal with our immediate experience, where Bergson elucidates it by providing an example. He says, for example, take our conscious of the successive strokes of the bell we are hearing, I may count the single strokes "in which case I shall have to separate them, and this separation must take place within some homogeneous medium in which the sounds, stripped of their qualities, and in a manner emptied, leave traces of their presence which are absolutely alike" (Bergson). This homogeneous medium can't be the time, because they can't persist in order to be added to others. Therefore it is space and a multiplicity which accompanies space and takes place in space. Bergson calls it an absolute multiplicity, and the spatial time on this basis is an absolute multiplicity. On the other hand, I may "I retain each of these successive perceptions in order to combine it with the others and form a group which reminds me of an air or rhythm which I know: in that case, I don't count the sounds, I limit myself to gathering so to speak, the qualitative impression

produced by which series" (Bergson). In this case, our attention is not towards any sound as a specific external single unit against the total sound; on the contrary we hear a melody or a tune in which single music notes melt or become fluid but join together and form an organic whole. Although sounds come individually and one after another, "we perceive them within each other ... its totality may be compared to a living being whose parts, although distinct, permeate an another because they are so closely connected" (Bergson). Therefore, in addition to the ability of projection of a medium or homogenous mediator which creates some kind of succession of distinct, coherent and unified units, we can this conceive of succession without distinction and think of it as a mutual penetration, an interconnection and organization of elements, each one of which represents the whole, and can't be distinguished or isolated from it except by abstract thought" (Bergson).

According to Bergson, thought this "succession without distinction" which is an indication of continuous multiplicity is basic characteristic of our consciousness and conscience because it is in the state of duration or real continuity. And duration is not a series of separate moments, rather every moment of it flows with other moments and instead of being a distinct and detached piece is a continuous process and constantly every new moment of it would be dipped with whatever it had been before (Bergson).

2. Duration is a pure quality which is only received through immediate intuition. As it was said earlier, duration is multiplicity of the conscious states. "What is duration within us?" a qualitative multiplicity, with likeness to number; an organic evolution which is yet not an increasing quantity; a pure heterogeneity within there are no distinct qualities" (Schwartz).

Heterogeneity is a feature of duration and when we talk about mathematical time we think of a heterogeneous mediator in which self-consciousness states have been put together like a space in order to form a multiplicity.

3. Duration is subsistence and in the light of the attention to the conscious states and life itself, it could be comprehended. The duration which is comprehensible through self-consciousness, because of being immediate of these perceptions is considered of the most irrefutable personal experience. The example that Bergson brings for this problem is that if I want to make a glass of water with sugar for myself, the more I try the less success I will gain, I have to wait until sugar dissolves. This minor point is highly informative. Because the time I have to wait for is no more that mathematical time which is being

imposed throughout the world history ... This conforms with my impatience; that is with part of my duration, which could not be prolonged or shortened deliberately. This is not thinkable, but is subsistence (Bergson).

4. Real time is unified with life and is not out of it, therefore wherever there is a sign of life, time is extensive. Time is real for life as it is for the empty upper part of the sand-glass, and its filled bottom (Bergson). Bergson's most beautiful expression about unity of time with the life is this immortal phrase: "wherever there is something living, a book is opened wherein time is being registered" (Bergson).

Wherever change is evolved, it will have duration as well. But, if motion is denied, duration would no more have a meaning. When each being is the result of its past, it would lose nothing in the passage of time; rather the more time moves on, the more will be added to its perfection and corpulence. Presence of the past in present is tantamount to the presence of all achievements of life in the status of man itself. Duration is not merely a moment replacing another moment; duration is constant progress of the past which gradually moves towards future and gets corpulent with its progress (Bergson).

6. Comparison between Mulla Sadra - Bergson thinking regarding time

1. There is an important distinction and separation in the opinions of the two philosophers. In Bergson's thought, the distinction between the unreal time and the real time is discussed as duration. Duration is undividable but the unreal time is spatial and therefore is dividable. In Mulla Sadra, as was mentioned earlier, unlike the predecessors the quantitative view to time is a curtailed, partial and incomplete interpretation of the time. In the opinion of Mulla Sadra time is within the existence trait of a temporal object which is adopted from the manner of its existence. Time accounts for the fluid reality of material beings. However, it should not be forgotten that the real time (quality time) from Bergson's point of view has been noted with respect to its manner of existence and, in this respect, greatly resembles Mulla Sadra's expression about time.

In the thought of the two philosophers, the unreal time, is quantitative and therefore is measurable and real time as well, has no transposition, before and after, beginning and end, and is not basically capable of having transpositions, while transposition constitutes essence of the unreal time.

2. As it has been mentioned, both the philosophers admit the possibility of access to the reality of time through presence and intuitive perception, which Bergson calls intuitive perception (Mulla Sadra holds

the same idea with regard to perception of the reality; yet he interprets the concept of "existence" a philosophical secondary intelligible like the concept of time). They also emphasize over this point that understanding and perceiving time, through conceptual encounter and reason, is not accessible and acquirable; in Bergson's words, what is obtained through reason in proximity with time is a fabricated time, false and unreal, and mathematical and quantitative not real and true (though Mulla Sadra does not consider conceptual analysis of time fabricated and false like Bergson).

3. In Sadrian philosophy, substantial motion and time acquire a closely intertwined relation to such an extent that in the understanding of each one of them the other cannot be neglected. He brings a reason to prove the substantial motion that one of its preliminaries is based on understanding and perceiving the reality of time. Mulla Sadra, through understanding the reality of time as one of the fluid and transient aspects of the dimensions of material beings, offers a reason on the existence of motion in the substance. On this basis, he considers every material being to be temporal and having time dimension; and because every being which has such a continuation within its essence would be gradually obtainable and would enjoy wide range of components in the span of time, he comes to the conclusion that existence of each physical substance is gradual, transient and renewable and when interfering in a temporal phenomenon, this is the same time of substantial motion; termination of the motion of substance is tantamount to termination of time and no physical substance could be assumed being apart from time. Generally speaking, in this view, the world is a fundamental motion; and this motion and evolution is the same as its existence and identity. In fact, the entire universe is a moving object with a single movement; every existing and every incident is a part of this single motion which is renewed and finds new creature in every single moment. In this case, the exact concept of substantial motion is that all particles of the world are constantly wasted and renewed. This constant wastage and renewal embodies not only all status and accidents of the objects, but also their entire identity and existence. Mulla Sadra also attributed this to human existence. In his opinion, the reality of human existence is a gradual and fluid reality whose motion begins from the first stages and finally, reaches the status of abstraction and understanding of the Holy reality. Time, like existence, has a close relation with the constant and continued creation. Every material phenomenon is transformable in its essence and substance and its existence at any given moment, is different from its existence in another moment;

therefore, the act of "permanent creation" by the divine absolute essence is underway - uninterrupted. Bergson, like Mulla Sadra, views termination of motion in the world as termination of time and, as was mentioned before, stresses that: Human and the world, which are constantly renewing and rehabilitating their existence, are considered as duration. "The world is duration. The more we ponder about the nature of time, the more we will understand that continuation, meaning innovation and creation of forms and constant preparation of issues, is absolutely new" (Bergson). If not exaggerated, some of the expressions of Bergson are so similar with remarks of Mulla Sadra and it seems that they have been quoted from Mulla Sadra's Al-Asfar. From Mulla Sadra point of view, in the turning points of physical and chemical transformations, a substantial evolution occurs and a new "self" is created in the world, but such renewal is a constant and permanent issue which infiltrates every particle of the creatures in the world. Therefore, creatures of this world at any moment achieve a new identity.

4. Among differences between the two philosophers which could be noticed about the time is that Mulla Sadra in addition to the favor shown to the existential dimension of the reality of time, also considers its conceptual, reasonable and quantitative dimensions as well and defines each of them in its special place. But, Bergson terms time, or in his own interpretation, the spatial time as fabricated and false time and not only regards no place for it, but denies it as well.

Of course, since the two philosophers come from two different philosophical schools, perhaps through greater pondering and deliberations, their differences even in the topic of discussion, could be further identified, but in this paper we were after taking steps in the path of comparison leading to conjunction and highlight common views the two philosophers share with each other. Therefore, we relinquish from focusing in detail on the differences of the two philosophers.

7. Conclusion

Given that Mulla Sadra and Bergson, due to their philosophical origins, have no intellectual affinity and background for mental relationship, however, their approach towards time is an indication of a new and fresh look which has not been given any attention by the predecessors. Of course, this does not mean that opinions of the two philosophers are fully compatible with regard to the time. Similarities that exist in the proximity of the two philosophers in this subject and comprehension and perception of time through the passage of presence and intuition, which

is in fact the basis and fundamentals for Bergson's philosophy as well as qualitative look and encounter with it in presence and in existence suggests unanimous look of the two philosophers to this reality, give us and excuse for comparing them. Of course we did not speak of their differences, because with regard to their adherence to two distinctive philosophical schools; addressing the differences would make speech tedious and thus would not realize our purpose and ultimate goal from this written article.

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Serum Levels Of Proinflammatory Cytokines (Interleukin 6 & Interleukin 15) And Adiponectin In Hashimoto's Thyroiditis With Different Thyroid Function States

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Abstract: Hashimoto's thyroiditis is a localized autoimmune disease which is characterized by an overactive immune response of the body directed against its own tissues causing prolonged inflammation. Numerous cytokines have been identified at sites of chronic inflammation such as arthritis, thyroiditis and periodontitis as interleukin 6 and interleukin 15. Adiponectin, adipocyte-derived proteins, have immunoregulatory properties and it controls immune responses and inflammation. This study aimed to determine the levels of adiponectin, interleukin 6 and interleukin 15 in patients sera of Hashimoto's thyroiditis with different thyroid functional states (hypothyroidism, euthyroidism and subclinical hypothyroidism). Subjects and methods: Seventy patients (8 males, 62 females) of newly diagnosed Hashimoto's thyroiditis (HT) in Al-Azhar University Hospitals were selected on the basis of high serum levels of anti-thyroid peroxidase antibody (TPO Ab). The patients were divided according to the thyroid function tests into three groups: Free triiodothyronine (FT3), free tetraiodothyronine (FT4) and thyroid stimulating hormone (TSH). The first group was patients with hypothyroidism (H) (3 males, 25 females with mean age 46.5 ± 6.23) with increased TSH and decreased both FT3 and FT4; the second group was patients with euthyroidism (E) (2 males, 16 females with mean age 48.77 ± 6.56) with normal TSH, FT3 & FT4 and the third group was patients with subclinical hypothyroidism (SH) (3 males, 21 females with mean age 48.95 ± 6.61) with increased TSH and normal both FT3 and FT4. The fourth group is a healthy control group (C) (2 males, 15 females with mean age 49.52 ± 7.55) with matched age, gender and body mass index (BMI) with the patient groups. TPO Ab, FT3, FT4, TSH, adiponectin, IL-6 and IL-15 serum levels were measured in all groups. Obtained results revealed a highly significant increase in the mean serum levels of TPO Ab, IL-6 and IL-15 were detected in each of the three patient groups compared to the control group. A positive correlation between adiponectin and each of BMI and WHR in group II (E) only was detected. Also, a highly positive correlation was found between IL-6 and IL-15 in the patient groups. On conclusion, IL-6 and IL-15 may have a possible role in the pathogenesis of Hashimoto's thyroiditis irrespective to thyroid function states. In contrast, the serum level of adiponectin may have no role in Hashimoto's thyroiditis.

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Keywords: Hashimoto's thyroiditis (HT), interleukin 6 (IL-6), interleukin 15 (IL-15), adiponectin

1. Introduction:

Autoimmune diseases affect 5-10 % of the population and are characterized by an overactive immune response of the body directed against its own tissues causing prolonged inflammation. Endocrine autoimmune diseases include Hashimoto's thyroiditis (HT), Graves' disease and type I diabetes mellitus (Sieminska *et al.*, 2010).

Hashimoto's thyroiditis is the most common organ specific autoimmune disease. It is the commonest cause of primary hypothyroidism. An average of 1 to 1.5 in a 1000 people has that disease. It occurs far more often in women than in men (between 10:1 and 20:1) and is most prevalent between 45 and 65 years of age (Paknys *et al.*, 2009). The original study by Hashimoto indicated a striking increase in the number of lymphoid cells and

scattered plasma cells in the thyroid gland (Figueroa-Vega *et al.*, 2010).

Numerous cytokines have been identified at sites of chronic inflammation such as arthritis, thyroiditis and periodontitis. One of these, interleukin-6 (IL-6), is a major mediator of host response to tissue injury and infection (marker of inflammatory status) (Gani *et al.*, 2009). Also, there is evidence of overproduction of IL-6 in obesity (Olszanecka-Glinianowicz *et al.*, 2004) and autoimmune diseases such as rheumatoid arthritis (Hirano *et al.*, 1988), systemic lupus erythematosus (Chun *et al.*, 2007), allergic urticaria (Lawlor *et al.*, 1993) and Crohn's disease (Gross *et al.*, 1992). Among thyroid autoimmune diseases, increased IL-6 levels have been observed in Graves' disease (Salvi *et al.*, 1996), subacute thyroiditis, and aminodarone-

induced thyrotoxicosis (Bartalena *et al.*, 1994). IL-6 regulates growth and differentiation of thyroid cells and its expression in thyrocytes correlates positively with the degree of lymphocyte infiltration (Ruggeri *et al.*, 2006). IL-6 plays a major role in B cell differentiation and also enhances T cell proliferation and bone resorption. There is a significant correlation between tissue levels of IL-6 and the severity of the coincident inflammation. IL-6 is a 26-kDa glycopeptide whose gene is found on chromosome 7 (Dayer and Choy, 2010).

The cytokine interleukin 15 (IL-15, a protein of 114 amino acids) was first discovered due to IL-2 like stimulatory actions on T cells. The heterotrimeric IL-15 receptor comprises the α and β chains of the IL-2 receptor with a unique γ subunit. These shared receptor subunits most likely explain the similar T cell growth factor properties of both IL-2 and IL-15 (Van Heel, 2006). Several cell types can produce IL-15 including macrophages, keratinocytes, muscle cells, dendritic cells, endothelial cells and neural cells (Bigalke *et al.*, 2009). IL-15 has a number of activities including recruitment and activation of T cells, maintenance of T cell memory, stimulation of proliferation and immunoglobulin synthesis by B cells, natural killer (NK) cell proliferation, activation of neutrophils and inhibition of apoptosis (Quinn *et al.*, 2009).

There is evidence for crosstalk between adipose tissue and the immune system. Proper production of adipocytokines is needed to keep optimal immune responses. Overnutrition has been found to increase the risk of autoimmune diseases and, conversely, undernutrition has been associated with impairment of cell-mediated immunity (Otero *et al.*, 2006).

Leptin and adiponectin, adipocyte-derived proteins, have immunoregulatory properties and they control immune responses and inflammation. These adipocytokines play an important role in the pathogenesis of several autoimmune diseases such as rheumatoid arthritis, type 1 autoimmune hepatitis, lupus erythematosus, type 1 diabetes mellitus and autoimmune encephalomyelitis (Durazzo *et al.*, 2009). However, very little is known about adipocytokines production in autoimmune thyroid diseases (Lago, 2007). Sieminska *et al.*, 2008 have previously found elevated levels of adiponectin in Graves' disease, and hyperadiponectinemia was related to hyperthyroidism and to TSH-receptor antibodies.

The aim of the present study was to determine the levels of adiponectin, interleukin 6 and interleukin 15 in sera of patients with Hashimoto's thyroiditis with different thyroid functional states (hypothyroidism, euthyroidism and subclinical

hypothyroidism) to find its possible role in disease pathogenesis.

2. Subjects and Methods

Seventy patients (8 males, 62 females) of newly diagnosed Hashimoto's thyroiditis (HT) in Al-Azhar University Hospital were selected on the basis of high levels of anti-thyroid peroxidase antibody (TPO Ab) in the serum. Diagnosis of the patients was confirmed by typical hypoechogenic pattern on thyroid ultrasound, presence of a firm and symmetrical enlarged thyroid and thyroid biopsy if possible. Exclusion criteria: Patients receiving anti-thyroid drugs or L-thyroxine therapy were excluded. None of the patients had other autoimmune diseases as type 1 diabetes mellitus, rheumatoid arthritis, pernicious anemia or systemic lupus erythematosus.

The subjects involved in this study were divided into four groups. The first group was patients with hypothyroidism (H) (3 males, 25 females with mean age 46.5 ± 6.23) with increased TSH and decreased both FT3 and FT4. The second group was patients with euthyroidism (E) (2 males, 16 females with mean age 48.77 ± 6.56) with normal TSH, FT3 & FT4. The third group was patients with subclinical hypothyroidism (SH) (3 males, 21 females with mean age 48.95 ± 6.61) with increased TSH and normal both FT3 & FT4. The fourth group was apparently healthy subjects as a control group (C) (2 males, 15 females with mean age 49.52 ± 7.55) of matched age, gender and body mass index (BMI) with the patient groups; they had a normal range of TPO Abs, normal physical & ultrasonographic thyroid examination. BMI was calculated as the ratio of weight to the square of height, and waist hip ratio (WHR) was calculated by dividing the circumferences of the waist and hip. Blood samples were collected from the patients on diagnosis and centrifuged. The serum was kept frozen at -70°C until use.

FT3, FT4 and TSH were measured using an automated VIDAS machine (BioMerieux, France), by Enzyme Linked Fluorescent Assay (ELFA). Normal ranges were 2.5-8.3 pmol/L for FT3, 8.0-24.0 pmol/L for FT4 and 0.25-5.0 $\mu\text{IU/ml}$ for TSH.

TPO Ab was measured by commercially available enzyme immunoassay kits (Accu-Bind ELISA Microwells, Monobind Inc, USA) (Portman *et al.*, 1985). Values in excess of 40 IU/ml were considered positive for the presence of anti-TPO autoantibodies. Serum level of adiponectin was determined by quantitative sandwich enzyme immunoassay technique from Quantikine Research, USA (Kishore and Reid, 2000). Normal range for adiponectin was 0.86-21.42 $\mu\text{g/ml}$. Serum level of IL-6 was determined using AviBion Human IL-6 ELISA Kit, Origenium Laboratories, Finland and according to

the manufacturer's directions its normal range up to 3.12 pg/ml (Allen, 1997). IL-15 determination using Quantikine Research, USA according to the manufacturer's directions by ELISA technique and its normal range up to 3.9 pg/ml (Grabstein, 1994).

Statistical Analysis:

Data was statistically analyzed using SPSS program version 15 for windows (SPSS, Inc., Chicago, IL). The relation between each group from the three patient groups and the control group was done using ANOVA test. Post Hoc test f (LSD) was done to show the mean and SD of each variable. Determination of Pearson's correlation coefficient (r) was used for correlation between quantitative variables. P-value less than 0.05 were considered to have significant difference.

3. Results:

As shown in table (1); a highly significant (0.001) increase in the mean serum levels of TPO Ab, IL-6 and IL-15 in each of the three patient groups was observed compared to the control group. The serum adiponectin, BMI and WHR showed no

statistically significant difference among the groups. Regarding mean serum levels of FT3 and FT4, there was a significant (0.001) decrease in H group only compared to the control one. A significant (0.001) increase in the mean serum level of TSH was revealed in both H and SH groups compared to the control group.

As shown in table (2); the correlations between adiponectin & BMI and adiponectin & WHR, were significant (P<0.05) in group II only.

As shown in table (3); There was a significant positive correlation of serum level of IL-6 and IL-15 in the three groups (r= 0.941, 0.826 and 0.719 in group I, II and III respectively with p value <0.001 in the three groups).

Considering the serum level of IL-15 as in table (4), it showed no significant correlation relationship with TPO Ab in group I, II and III. A significant negative correlation was found between IL-15 and FT3 in group I (r=-0.389 & p<0.05) and group III (r=-0.505 & p<0.05). Regarding the correlation between IL-15 and FT4, a significant negative correlation was found (r=-0.538 & p<0.001) in group III only.

Table (1): Clinical and biochemical characteristics in all groups.

	Group I H group (n=28) Mean± SD	Group II E group (n=18) Mean± SD	Group III SH group (n=24) Mean± SD	Control group (n=17) Mean± SD
TPO Ab (IU/ml): P value	128.9±44.1 P1=<0.001*	86.3±18.8 P2=<0.001*	102.5±11.8 P3=<0.001*	22.0±5.9
FT3 (pmol/L): P value	1.9±0.4 P1=<0.001*	4.9±2.0 P2=>0.05	4.7±1.8 P3=>0.05	4.5±1.6
FT4 (pmol/L): P value	6.5±0.9 P1=<0.001*	13.6±5.1 P2=>0.05	13.6±4.9 P3=>0.05	13.1±3.2
TSH (μIU/ml): P value	8.9±1.3 P1=<0.001*	3.2±1.6 P2=>0.05	7.5±2.0 P3=<0.001*	2.7±1.3
Adiponectin (μg/ml): P value	19.4±5.9 P1=>0.05	18.4±3.2 P2=>0.05	18.4±5.6 P3=>0.05	17.6±4.4
IL-6 (pg/ml): P value	5.1±1.2 P1=<0.001*	5.1±1.0 P2=<0.001*	5.0±0.8 P3=<0.001*	1.5±0.7
IL-15 (pg/ml): P value	5.0±1.2 P1=<0.001*	5.3±1.1 P2=<0.001*	5.0±0.8 P3=<0.001*	1.5±0.7
BMI (kg/m²): P value	25.9±4.9 P1=>0.05	25.6±4.0 P2=>0.05	25.4±3.1 P3=>0.05	24.6±3.8
WHR: P value	0.8±0.0 P1=>0.05	0.8±0.1 P2=>0.05	0.8±0.0 P3=>0.05	0.8±0.2

P1= group I vs. control group.
P3= group III vs. control group.

P2= group II vs. control group.
P value is highly significant at <0.001*

Table (2): Pearson's correlation between adiponectin and clinical & biochemical parameters in group I, group II and group III:

	Adiponectin serum level ($\mu\text{g/ml}$)					
	Group I (H) n=28		Group II (E) n=18		Group III (SH) n=24	
	r	P value	r	P value	r	P value
TPO Ab (IU/ml):	0.103	>0.05	-0.114	>0.05	-0.076	>0.05
FT3 (pmol/L):	-0.015	>0.05	0.179	>0.05	-0.046	>0.05
FT4 (pmol/L):	-0.059	>0.05	0.233	>0.05	0.108-	>0.05
TSH ($\mu\text{IU/ml}$):	-0.205	>0.05	-0.029	>0.05	-0.209	>0.05
BMI (kg/m^2):	0.132	>0.05	-0.600	<0.05*	-0.098	>0.05
WHR:	-0.025	>0.05	0.488	<0.05*	0.241	>0.05
IL-6 (pg/ml):	-0.002	>0.05	-0.031	>0.05	0.119	>0.05
IL-15 (pg/ml):	-0.007	>0.05	-0.018	>0.05	0.100	>0.05

P value is significant at <0.05*

Table (3): Pearson's correlation between IL-6 and biochemical parameters in group I, group II and group III:

	Serum levels of IL-6 (pg/ml)					
	Group I (H) n=28		Group II (E) n=18		Group III (SH) n=24	
	r	P value	r	P value	r	P value
TPO Ab (IU/ml):	-0.298	>0.05	0.06	>0.05	0.292	>0.05
FT3 (pmol/L):	-0.324	>0.05	-0.135	>0.05	-0.240	>0.05
FT4 (pmol/L):	-0.218	>0.05	-0.087	>0.05	-0.219	>0.05
IL-15 (pg/ml):	0.941	<0.001**	0.826	<0.001**	0.719	<0.001**

P value is highly significant at <0.001**

Table (4): Pearson's correlation between IL-15 and biochemical parameters in group I, group II and group III:

	Serum level of IL-15 (pg/ml)					
	Group I (H) n=28		Group II (E) n=18		Group III (SH) n=24	
	r	P value	R	P value	R	P value
TPO Ab (IU/ml):	-0.311	>0.05	-0.012	>0.05	0.207-	>0.05
FT3 (pmol/L):	-0.389	<0.05*	-0.390	>0.05	-0.505	<0.05*
FT4 (pmol/L):	-0.240	>0.05	-0.290	>0.05	-0.538	<0.001**

P value is significant at <0.05*, P value is highly significant at <0.001**

4. Discussion

Hashimoto's thyroiditis is a localized autoimmune disease which is characterized by the production of the antibodies against thyroid auto-antigens and infiltration of cytotoxic T cells in the thyroid gland leading to the destruction of follicles (Tagami *et al.*, 2010). It is originally described as stroma lymphomatosa which is featured as the formation of lymphoid follicles, marked changes in the thyroid epithelial cells, extensive formation of new connective tissue and diffuse infiltration of round cells (Hollowell *et al.*, 2002). The current study aimed to determine the levels of adiponectin, IL-6 and IL-15 in sera of patients with Hashimoto's thyroiditis with different thyroid functional states

(hypothyroidism, euthyroidism and subclinical hypothyroidism).

In the current study, a highly significant increase in the mean of serum level of TPO Ab was detected in the patients groups compared to control group as the selection of the patients in this study depended on the presence of high serum level of TPO Ab. Xie *et al.*, (2008) reported that TPO Ab is the hallmark of HT which could be detected in almost 95% of HT patients' sera. Paknys *et al.*, (2009) stated that Hashimoto's thyroiditis and Graves' disease are different expressions of a basically similar autoimmune process and the clinical appearance reflects the spectrum of the immune response in a particular patient. During that response, cytotoxic

autoantibodies, stimulatory autoantibodies, blocking autoantibodies or cell-mediated autoimmunity may be observed. Persons with classic Hashimoto's thyroiditis have serum antibodies reacting with thyroglobulin and thyroid peroxidase. These antibodies (particularly antibodies against thyroid peroxidase) are complement-fixing immunoglobulins and might be cytotoxic. In addition, many patients have cell-mediated immunity directed against thyroid antigens (Umar *et al.*, 2010). Also regarding TPO Ab, no significant correlations were found in this study between each of TPO Ab and IL-6 or TPO Ab and IL-15 in H, E or SH groups. This observation agreed with Prummel and Wiersinga, (2005) as they stated that considering the fact that high TPO Ab concentrations correlate with increased frequencies of Th-1 responsible for thyroid damage and the loss of thyroid function, it can be speculated that antibodies influence the level of TSH. However, Nielsen *et al.*, (2009) reported that the exact role of antibodies against thyroid peroxidase is unclear but it is likely that they promote the release of a variety of cytokines including IL-6, TNF- and IFN- .

A significant decrease in serum levels of FT3 and FT4 in group I (H) was detected as that group contained patients having HT with hypothyroid functional state. Also, a significant increase in serum level of TSH in groups I and III (H and SH groups). McCanlies *et al.*, (1998) defined HT with hypothyroidism by the presence of high titers of TPO Ab or thyroglobulin antibodies, elevated levels of TSH in the absence of medication, a positive medical history and/or a positive clinical examination. While, they defined euthyroid HT as elevated TPO Ab or thyroglobulin antibodies and normal TSH without the positive medical history or clinical examination seen with hypothyroidism. Xie *et al.*, (2008) revealed that patients with HT have a great deal of clinical status; in general, it is an inconvertible process of evolving from euthyroidism to hypothyroidism and the positive TPO Ab increases the probability of developing hypothyroidism but the progression rate of euthyroidism to subclinical and even to overt hypothyroidism is variable and the progression mechanism of HT is still unclear.

Regarding, adiponectin serum level, the current study showed that no statistically significant difference in comparing patient groups with control group. Durazzo *et al.*, (2009), Aprahamian *et al.*, (2009) and Ehling *et al.*, (2006) revealed that it is well known that adipocytokines as adiponectin have immunoregulatory functions and their concentrations are elevated in the peripheral circulation of patients with many autoimmune diseases such as type 1 autoimmune hepatitis, rheumatoid arthritis and systemic lupus erythematosus but the detailed

mechanisms of adiponectin actions remain unknown. Sieminska *et al.*, (2008) mentioned that very little is known about adipocytokines production in autoimmune thyroid diseases although they found elevated levels of adiponectin in Graves' disease and hyperadiponectinemia was related to hyperthyroidism and to TSH-R antibodies. However, the results of the present study agreed with Sieminska *et al.*, (2010) as they revealed that although overproduction of adiponectin is pathologically involved in collagen-induced inflammatory autoimmune diseases, their results showed no difference of serum adiponectin level was observed with regard to the presence of HT. No significant correlation was observed between adiponectin and TSH in the three groups. This is in contrary to Obregon, 2008 who found that TSH receptors have been found on several fat depots and in animal experiments, TSH directly influences adipose tissue and stimulates adipogenesis through these receptors on the surface of adipocytes. These findings suggest that the pathogenesis of autoimmune thyroiditis is different and independent of connections with adipose tissue as the explanation of Sieminska *et al.*, (2010).

The correlation study between adiponectin and each of BMI and & WHR, showed no significant correlation either in group H or group SH. These results could be attributed to BMI and WHR in the subjects in this study were in normal range. Arita *et al.*, (1999) revealed that in human, adiponectin levels were found paradoxically to be decreased in obese only, compared with normal individuals, making it the only known adipocyte-specific hormone that is down-regulated in obesity.

The current study, reported a significant increase in IL-6 and IL-15 serum levels in the Hashimoto's patient three groups as compared to the control group. Also, a significant positive correlation was found between IL-6 and IL-15 in the three patient groups. Ruggeri *et al.*, (2006) and Matsumura *et al.*, (1999) agreed with our results as they stated that different cytokines released by immune cells cause thyroid cell damage and are involved in inflammatory processes. This finding suggests that IL-6 and IL-15 are involved in the development of the disease in the different thyroid function status. Taddei *et al.*, (2006) explained that the chronic activation of the immune system due to HT can lead to impaired endothelium dependant vasodilatation and may cause endothelial dysfunction in humans and IL-6 promotes atherogenesis directly by endothelial-dependant mechanisms and indirectly by stimulating hepatic production of C reactive protein. Also regarding IL-15, Bigalke *et al.*, (2009) stated that IL-15 is a proinflammatory cytokine that is present in a broad variety of tissues and cells. It

causes a stimulation of T cell and B cell proliferation and activity whereas IL-15 particularly promotes the proliferation and survival of natural killer cells (Bulanova *et al.*, 2001). Natural killer cells are bone marrow-derived granular lymphocytes that, without previous sensitization and restriction by major histocompatibility proteins, are cytotoxic against malignant and virally infected cells (Dunne *et al.*, 2001).

Furthermore, no significant correlation was observed between adiponectin and IL-6 or IL-15. Rovin and Song, (2006) and Sieminska *et al.*, (2010) disagreed with these results as they stated that the adipokine possesses anti-inflammatory properties although recent studies have documented pro-inflammatory and immunomodulatory effects. They explained that adiponectin activates pro-inflammatory transcription factor NF- κ B and ERK1/2MAPK and influences immune responses by regulating T cell activation and suppressing B cell development. They added that the interplay between adiponectin and immune cells plays a role in the development of autoimmune diseases, and in these states, adiponectin correlates with increased serum levels of leptin and IL-6. Also Quinn *et al.*, (2009) observed that IL-15 is a cytokine that is highly expressed in muscle tissue and it has a relation with the adipokine as it act as a circulating myokine that inhibits adipose tissue deposition. The results in this study might be attributed to the patients who were selected with normal weight and normal BMI.

From the results of the current study, we concluded that, IL-6 and IL-15 serum levels may be involved in the pathogenesis of Hashimoto's thyroiditis whatever thyroid function status; however, serum adiponectin may have no role. Future studies are recommended to find its exact role in disease monitoring.

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Theoretical Study of the Tautomeric Preference and Self Association Processes of 2-Pyrrolidinone

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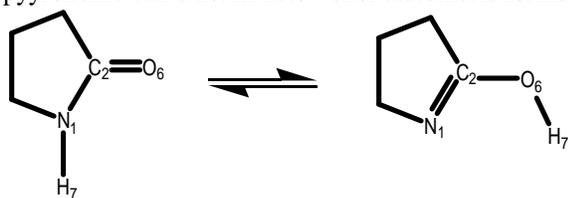
Abstract: Relative tautomerization energies, dipole moments for the tautomers of 2-pyrrolidinone was studied by quantum-chemical calculations, using the B3LYP level of calculation with the 6-311G(d,p) basis set in the gas phase with full geometry optimization. Entropies, enthalpies and Gibbs free energies for the tautomerization process of 2-pyrrolidinone was obtained using the RHF/6-31G(d) level of computation. The calculations showed that, the Keto form is the most stable form in the gas phase. The entropy effect on the Gibbs free energy change of the tautomerization process 2-pyrrolidinone is found to be very small, and has practically no significance for the tautomeric equilibria of the 2-pyrrolidinone. The enthalpic term is dominant in the determination of the equilibrium constant. The ability to form dimer, trimer and tetramer was investigated concerning the energetical changes; dipole moments using the RHF/6-31Gd level of computation. The thermodynamic parameters at different temperatures were studied using the PM3 semiempirical method. The results showed that, there is a high interconversion process between the cyclic and open dimer. Also, the probability to form higher association forms is presumably rare. At room temperature 2- pyrrolidinone only could exist in a dimer form in equilibrium with the monomer. The results are in good agreement with the available experimental data.

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Key words: 2-pyrrolidinone, tautomerization, self association, thermodynamic Parameters, theoretical calculations.

1. Introduction

The experimental studies on tautomerism still a challenging task, because most of the tautomers are not observed in the experimental studies due to their low concentration. So, the theoretical investigation of tautomers is meaningful. 2-pyrrolidinone (2-py), is a saturated cyclic five membered ring molecule, which has the peptide moiety HN-C=O containing an acidic NH proton and a basic C=O group, that can act as a hydrogen bond donor and hydrogen bond acceptor with the expected hydrogen bonding interactions. The protropic tautomerism of these 2-pyrrolidinone, results from the migration of liable hydrogen from the ring nitrogen or oxygen atom, hence the 2-pyrrolidinone can exist in keto - enol tautomeric forms.



Knowing the relative stabilities of the various tautomeric forms of a molecule is not only important for chemical research but also the fundamental for biological research [1-2].

The proton attached to the Nitrogen atom (N1) in the 2-py molecule, is responsible for its interaction with different molecules through hydrogen bonding.

Several experimental studies have been conducted on the self association of 2-pyrrolidinone molecule [3-7]. Although theoretical calculations were proved to give good results for thermodynamic properties [8-10], little attention has been paid to the influence of temperature on tautomerization process, and no theoretically thermodynamic studies at different temperatures were reported [11].

Hydrogen bonding and proton transfer have been studied in great detail both experimentally and theoretically [12-14]. Substantial progress has been achieved in the elucidation of the detailed mechanism of proton transfer in small molecules using high-level ab initio quantum mechanical theory [13, 15, 16]. However, the ab initio approach becomes prohibitively expensive in terms of computer resources and time when dealing with large organic molecules or molecular associations. Therefore, it is of considerable interest to study the applicability of semi empirical methods for the confident prediction of hydrogen bonding interactions. The semi empirical method, namely PM3, describes the energetics and topographies of hydrogen-bonded systems fairly accurate [17, 18]. Accordingly, we present here the results DFT and RHF calculations for the proton transfer process, as well as the RHF/6-31Gd and PM3 methods of calculations, for studying the ability to form dimer, trimer and tetramer, concerning the energetical changes and the thermodynamic

parameters at different temperatures, respectively, for depth comprehension of these formation processes.

2. Methods of Calculations

All of the calculations have been performed using the Hyperchem 8.0 program [19]. The molecular stability as well as a thermodynamic study of the keto- and enol- tautomeric forms, were theoretically investigated using the B3LYP and RHF level of computation using the 6-311G(d,p) and 6-31G(d) basis sets, respectively. For studying the self association process of 2- pyrrolidinone, the RHF /6-31G(d) method was used for the geometry optimization and for the dipole moment, the length of the hydrogen bond formed as well as the energies of the different associated forms without any geometrical constraints. The semi empirical PM3 method was used for the thermodynamic studies on the self associated forms of 2-pyrrolidinone molecule. The vibrational frequencies were calculated to confirm all stationary points. The thermodynamic parameters were calculated at (300-500) K temperature range.

3. Results and Discussion

3.1. Tautomerization of 2-pyrrolidinone

The complete transfer of the acidic hydrogen attached to nitrogen to the basic Oxygen atom of the ketonic group in the same molecule, lead to the formation of the 2-pyrrolidinone tautomeric form, and an equilibrium state between the keto and enol tautomers could be established.

Two possible conformations of 2-pyrrolidinone could be expected. A one-dimensional potential energy scans were performed to determine the most stable structure, where the torsion angle $N_1-C_2-O_6-H_7$ is changed in the range of -180 to 180° , starting with the O-H Cis conformation to the nitrogen atom ($\angle N_1-C_2-O_6-H_7 = 0^\circ$) and with 20° angle increment, applying the B3LYP/ 6-311G(d,p) method (Fig. 1). As seen in Fig. 1, the energy profile shows local minimum at about -180° and 180° and a global minimum at 0° , corresponding to the cis form which is more stable than the trans form by about 6.2 Kcal/mol.

The calculated optimum energies of the two tautomers and that of the transition state of 2-pyrrolidinone, and some geometrical parameters for the transition state are shown in Table 1 and Fig. 2, respectively.

As indicated in Table 1, the keto form is found to be more stable and has a lower binding energy by about 8.5 Kcal/mole than the enol form. The conversion process from keto to enol form requires an energy barrier of about 66.9 Kcal/mole. Also, from Table 1, one can see that the ring twisting angle

in the keto and enol forms are 25° and 17° , respectively. This gives an indication that the proton transfer process results in a decrease in the ring twist angle, and this explains the lower stability of the enol form. The dipole moment (μ), is an important tool which can be used to show the charge distribution in a molecule, and it is one of the properties often used to rationalize the structure of many chemical systems [20]. Thus, by comparing the calculated dipole moment values, 4.134 and 1.264 Debye, for the optimized structures of the keto and enol tautomers respectively, with the experimentally measured value for the monomeric 2-pyrrolidinone (3.96 Debye) [21], a strong evidence for the existence of the 2-pyrrolidinone molecule in the keto form rather than the enol form can be supported.

After the stationary points were located, vibration frequencies were calculated in order to ascertain that the structures found corresponds to minima on the potential energy surface. Based on the vibrational analysis, the changes of the thermodynamic properties: Change in free energy G , change in enthalpy H , change in entropy S , as well as the equilibrium constant(K) as a function of temperature for the keto-enol conversion process, were theoretically determined from the results of electronic, vibrational and electronic components using the RHF/6-31G(d) level of calculation, for the tautomerization process with the temperature ranging from 300 to 500 K (Table 2). Plot of the relations between equilibrium constant (K) and the absolute temperature (T) is shown in Fig.3.

With a correct application of the equation $G = -RT \ln K$, the value of the equilibrium constant K which represent the expected ratio of 2-pyrrolidinone to the 2-pyrrolidinone has been found to be of a value less than 1.45×10^{-7} at room temperatures (Table 2). This indicate the predominance of the keto form of 2-pyrrolidinone at room and lower temperatures. As observed in Fig. 3, the presence of the enol form increased by increasing temperature, but, even at 500°C the ratio enol to keto form is not expected to exceed 10^{-4} , which is relatively a very small ratio. In addition to that, the entropy effect on the Gibbs free energy change of the tautomerization process is very small (Table 2), and has practically no significance for the tautomeric equilibria. Thus, the enthalpic term is found to be dominant in the determination of the equilibrium constant.

3.2. Self-association of 2-pyrrolidinone and Temperature effect

The acidic NH proton and the basic C=O groups, in 2-pyrrolidinone molecule, permit the possible self-association via hydrogen bonding ($-C=O \dots H-N$) to be expected [22, 23]. Association

may take place between two or more molecules to form open linear dimers, cyclic dimers, open linear trimers, cyclic trimers and open and cyclic tetramers. However, higher degrees of association to form higher polymeric structures are also expected. Other type of association, which is described as a kind of side-association of two molecules to form side on dimer could be expected [24]. Such association can occur between the N-H group of one molecule and the N-H and the C=O groups of the other molecule, where the N-H hydrogen atom of the first molecule will be hydrogen-bonded with the N-H nitrogen atom of the second molecule, and the N-H nitrogen atom of the first molecule will be hydrogen bonded with the oxygen atom of the carbonyl group of the second molecule (Fig. 4). Accordingly, we can say that we are dealing with the reversible process:



Where M represents the molecule in the monomer state, and n is the degree of association. An equilibrium state between monomer state and self-associated state are established.

The electronic structure of the different expected self-associated structures were theoretically calculated and their geometry were optimized, representing a stationary point in the potential energy curve using the RHF /6-31Gd level of computation. The binding energies, hydrogen bond distance and the dipole moments of the different associated form of the 2-pyrrolidinone molecule are depicted in Table 3. On the other hand, geometry optimization of the side on self-association dimer (Fig 4) did not show any stationary point in the potential energy curve, and the structure is rapidly converted to cyclic dimer structure. This indicated that such kind of association does not represent a stable association form in case of 2-pyrrolidinone.

To the best of our knowledge, there is a lack in the study of the temperature dependence of the self association of 2-pyrrolidinone. Thus, the thermodynamic parameters of the conversion processes, H, G, and S as well as the equilibrium constant K as a function of temperature, were calculated from the results of quantum mechanical calculations of electronic, vibrational, rotational, and translational energy components, and the estimated entropy at different temperatures using the PM3 level of computation. The relation between the equilibrium constant K and temperature for the conversion between monomer and both expected cyclic and open dimeric, trimeric and tetrameric associated forms, are shown in Figs. 5, 6, 7.

From the results of this thermodynamic study, it can be seen that the conversion process of 2-pyrrolidinone in its cyclic trimer state to the open

linear trimer state, as well as the conversion for the cyclic tetramer state to the open linear tetramer state is highly increased as the temperature increase (Figs, 6 and 7). Moreover, by comparing the equilibrium constant values for the conversion process for these higher associations at room temperatures (less than 10^{-4} mol/l), one can predict that there is no existence of the higher polymeric structures such as trimers or tetramers in the association model.

From previous experimental studies [5-7], it was reported that, at low concentration of 2-pyrrolidinone, the dominant species will be the cyclic associated dimer (with zero dipole moment), in addition to the open dimer is present with small amounts. For the conversion process of 2-pyrrolidinone from the cyclic dimer to the open linear state, the K values is highly increased as the temperature increase (Fig.5-c). This indicated that as the temperature increase, this favors the conversion of 2-pyrrolidinone from the cyclic dimer to the open dimer. Since the dipole moment value is a very useful tool to deduce the structure of a molecule [20]. Thus, by comparing the experimentally determined dipole moment value (2.30 D) from the nonlinear dielectric spectroscopic study [21], with the calculated values for the cyclic and the open associated forms (Table 4), one can predict that, the higher measured value for dipole moment for the dimer (more than zero and lower than 4.13 D) indicates the very rapid inter conversion between cyclic and open associated structures.

Also, it worthy to notice that, the binding energies of the cyclic and open dimer, are 13.5 kcal/mol and 8.7kcal/mole, respectively. These values when compared with experimentally determined dissociation energies of the water dimer [25], which give an indication that, the hydrogen bonding interaction in 2-pyrrolidinone is moderate. Moreover, the G values for both dimers (Table 3) increase with the increase of the temperature, indicating that the interaction weaken as the temperature increase. From Table 5, it can be noticed that, the enthalpy change in the conversion process from the cyclic to open dimer is an endothermic process. In addition to that, the value of the equilibrium constant is high enough to raise the probability of the existence of the open dimer at room temperature, which support the idea of rapid their conversion [25].

As observed from the previous results, one can conclude that, the association process to form cyclic or open species must be considered not only a factor of energy, but also a factor of the thermodynamic parameters of the equilibrium process.

Table 1: Calculated energies and dipole moment of tautomers and its transition states using B3LYP 6-311G(d,p) calculations.

Conformation	Total Energy (K Cal/mol)	Dipole Moment (Debye)	Ring twist angle
Keto	-179802.82	4.134	25
Enol	-179794.29	1.264	17
Transition state	-179735.95	3.343	21

Table 2 : Theoretically calculated thermodynamic parameters of the conversion process of 2-pyrrolidinone to 2-pyrrolidinole .

Temp (Kelvin)	H (Kcal/mol)	G (Kcal/mol)	S (cal/mol/deg)	K
300	9.688	9.40	0.00096	1.45x10 ⁻⁷
320	9.690	9.38	0.00097	4.01x10 ⁻⁷
340	9.697	9.36	0.00099	9.83x10 ⁻⁷
360	9.704	9.34	0.00101	2.17x10 ⁻⁷
380	9.711	9.32	0.00103	4.44x10 ⁻⁶
400	9.716	9.30	0.00104	8.45x10 ⁻⁶
420	9.715	9.27	0.00106	1.51x10 ⁻⁵
440	9.731	9.26	0.00107	2.57x10 ⁻⁵
460	9.727	9.23	0.00108	4.16x10 ⁻⁵
480	9.738	9.21	0.00110	6.48x10 ⁻⁵
500	9.750	9.19	0.00112	9.75x10 ⁻⁵

Table 3: Calculated Dipole moment values and some characteristic data For self-associated molecules using the RHF/6-31G(d) calculations.

Compound	Dipole moment (Debye)	Total energy Kcal/mol	O...H distance A	Binding energies Kcal/mol
Monomer	4.28	-178764.760		
Cyclic Dimer	0.3636	-357542.98	1.98816	13.5
Open Dimer	2.094	-357538.25	2.02586	8.7
Cyclic Trimer	0.000	-536315.71	1.97713	21.4
Open Trimer	5.637	-536311.08	2.01237	16.8
Cyclic Tetramer	0.1120	-715076.94	2.02751	17.9
Open Tetramer	5.0309	-715073.67	2.00748	14.6

Table 4: Theoretically Calculated thermodynamic parameters of the conversion process of monomer 2-pyrrolidinone to cyclic and open dimmers.

Temp (K)	monomer to cyclic dimer				monomer to open dimer			
	H	G	S	K	H	G	S	K
300	-2.670	0.27	-0.0099	0.0036253	-0.560	1.74	-0.0038	0.1047
320	-2.408	0.59	-0.0094	0.0025962	-0.324	1.78	-0.0043	0.0935
340	-2.360	0.66	-0.0090	0.0019507	-0.268	1.93	-0.0048	0.0855
360	-2.196	0.99	-0.0086	0.0015251	-0.128	1.97	-0.0052	0.0797
380	-2.154	1.05	-0.0083	0.0012325	-0.028	2.10	-0.0056	0.0755
400	-2.860	1.36	-0.0079	0.0010241	-0.300	2.11	-0.0060	0.0725
420	-1.792	1.40	-0.0076	0.0008713	-0.388	2.30	-0.0064	0.0703
440	-1.668	1.47	-0.0072	0.0007565	-0.492	2.50	-0.0068	0.0688
460	-1.474	1.67	-0.0069	0.0006682	-0.766	2.51	-0.0071	0.0679
480	-1.468	1.77	-0.0066	0.0005992	-0.800	2.80	-0.0075	0.0675
500	-1.250	1.95	-0.0063	0.0005444	-1.004	2.896	-0.0078	0.0673

H, gas-phase (kcal /mol); S, gas-phase entropy (cal /mol / deg); G, gas-phase free energy (kcal /mol); K equilibrium constant.

Table 5 : Theoretically Calculated thermodynamic parameters of the conversion process of cyclic dimmer to open dimmer.

Temp o K	H	G	S	K
300	2.101	-2.00	0.01367	28.89
320	2.097	-2.29	0.01374	36
340	2.092	-2.59	0.01380	43.82
360	2.086	-2.79	0.01385	52.26
380	2.182	-3.18	0.01390	61.26
400	2.180	-3.38	0.01395	70.76
420	2.172	-3.67	0.01398	80.69
440	2.164	-3.86	0.01401	91.00
460	2.263	-4.26	0.01405	101.65
480	2.254	-4.55	0.01407	112.56
500	2.255	-4.76	0.01411	123.70

H, gas-phase (kcal /mol); S, gas-phase entropy (cal /mol / deg); G, gas-phase free energy (kcal /mol); K equilibrium constant.

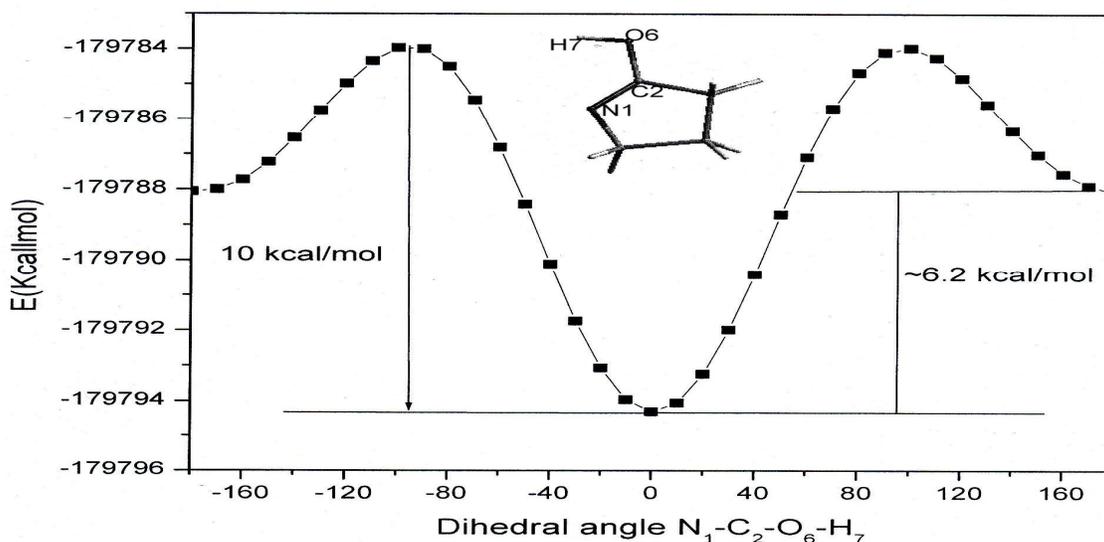


Fig.1: The energy profile for the rotation of the O-H group in 2-pyrrolidinol by B3LYP/6- 311G(d,p) basis set.

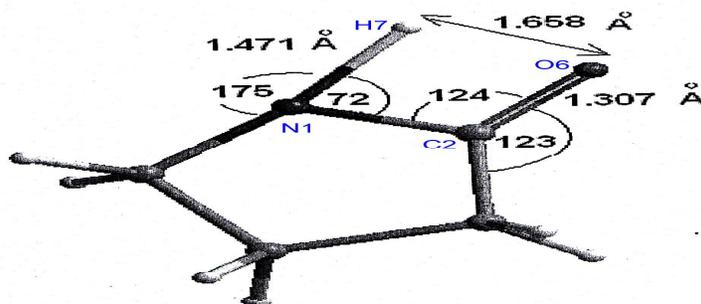


Fig.2: The characteristic structural parameters of the transition state of keto-enol conversion.

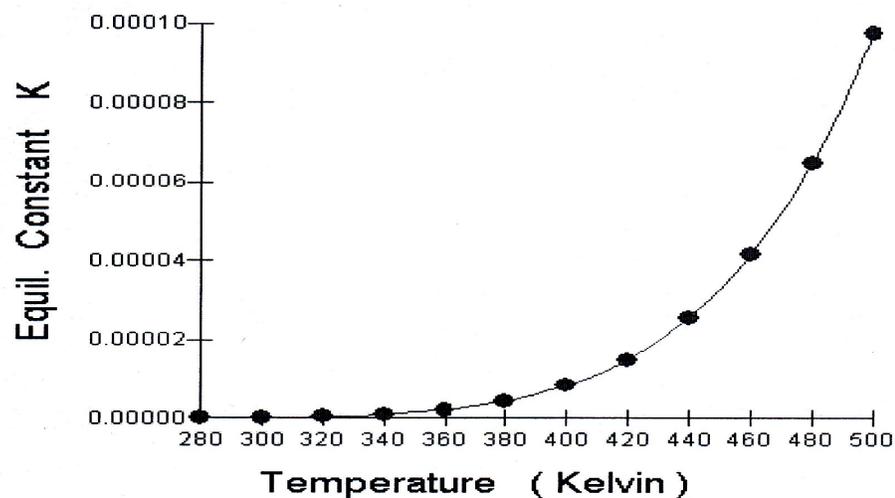


Fig.3: Variation of equilibrium Constant (K) with temperature for the keto - enol tautomerization calculated using RHF /6-31G(d) basis set.

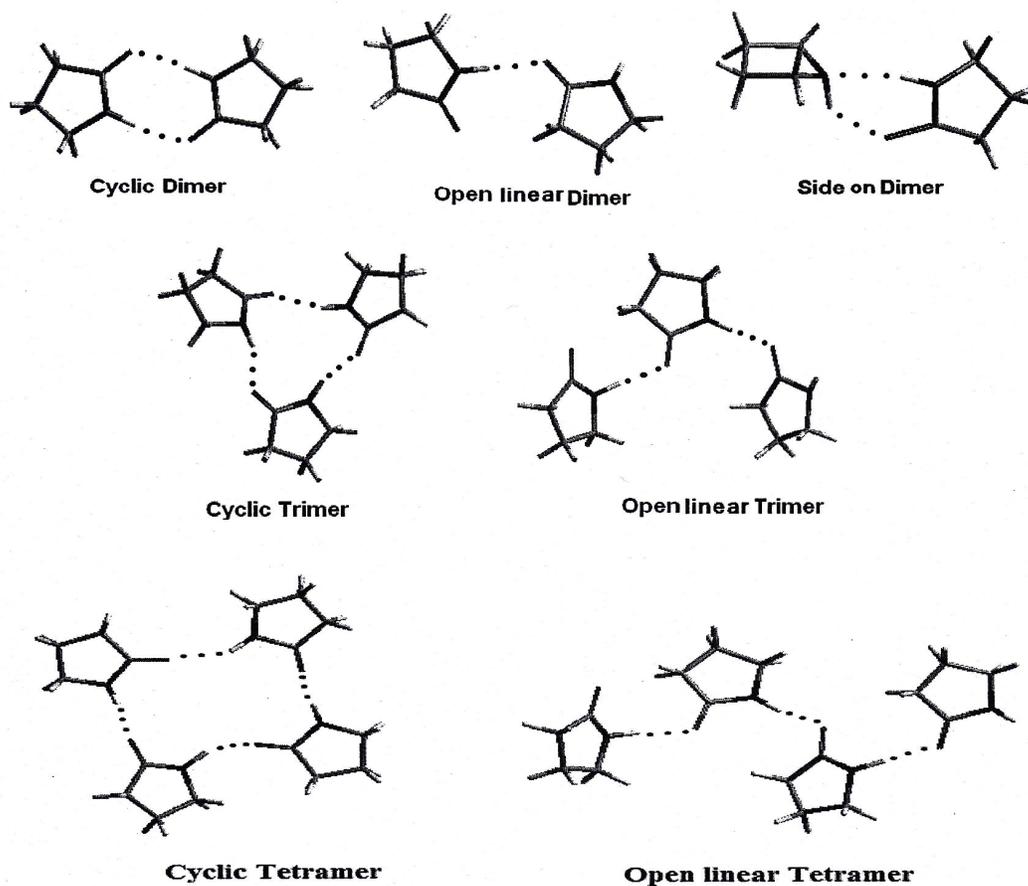


Fig.4: The expected self-association structural forms of 2-pyrrolidinone.

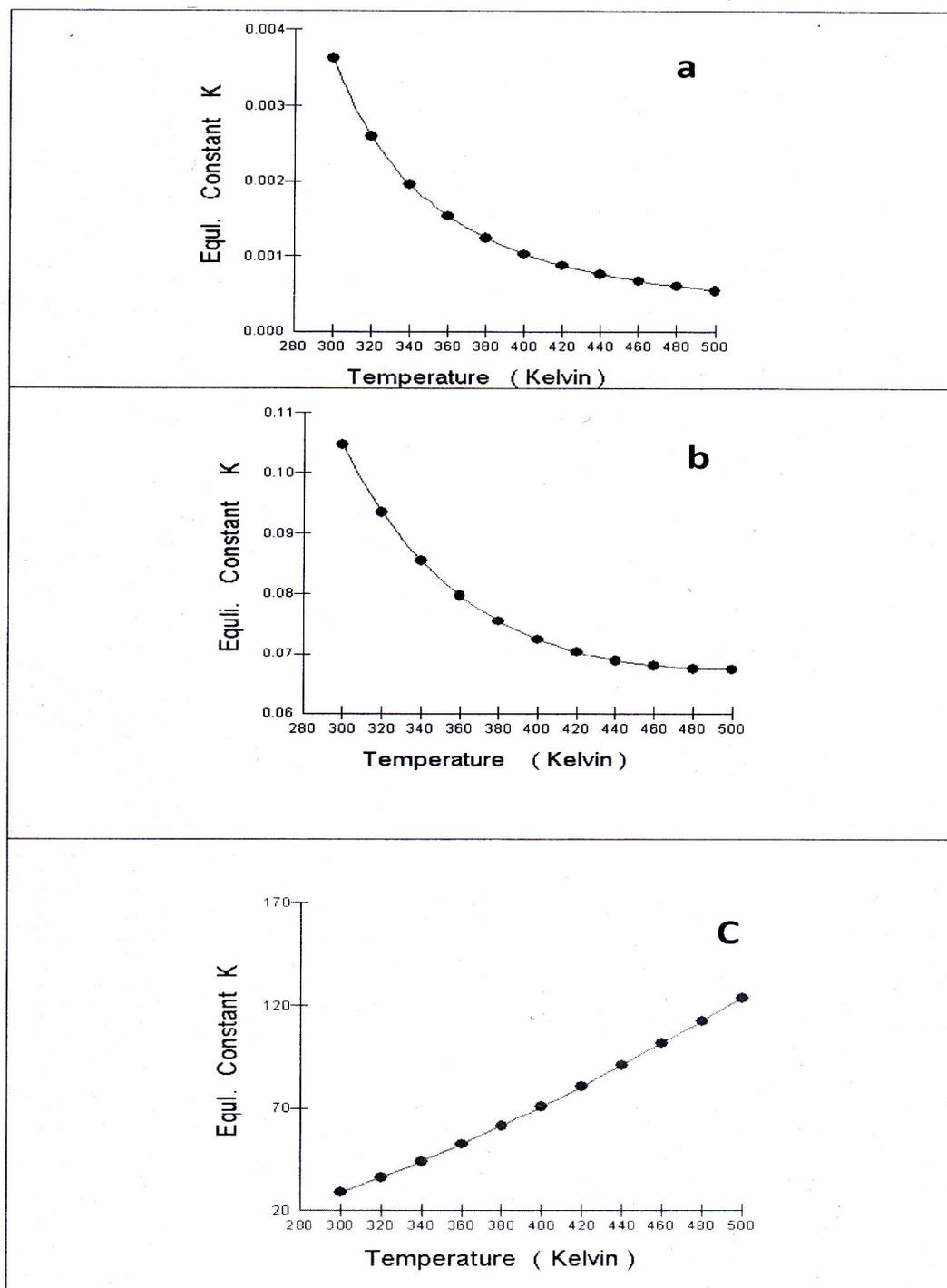


Fig.5: Variation of equilibrium Constant (K) with temperature for the conversion process of (a) monomer 2-pyrrolidinone to cyclic dimer; (b) monomer 2-pyrrolidinone to open dimer; (c) cyclic dimer to open dimer.

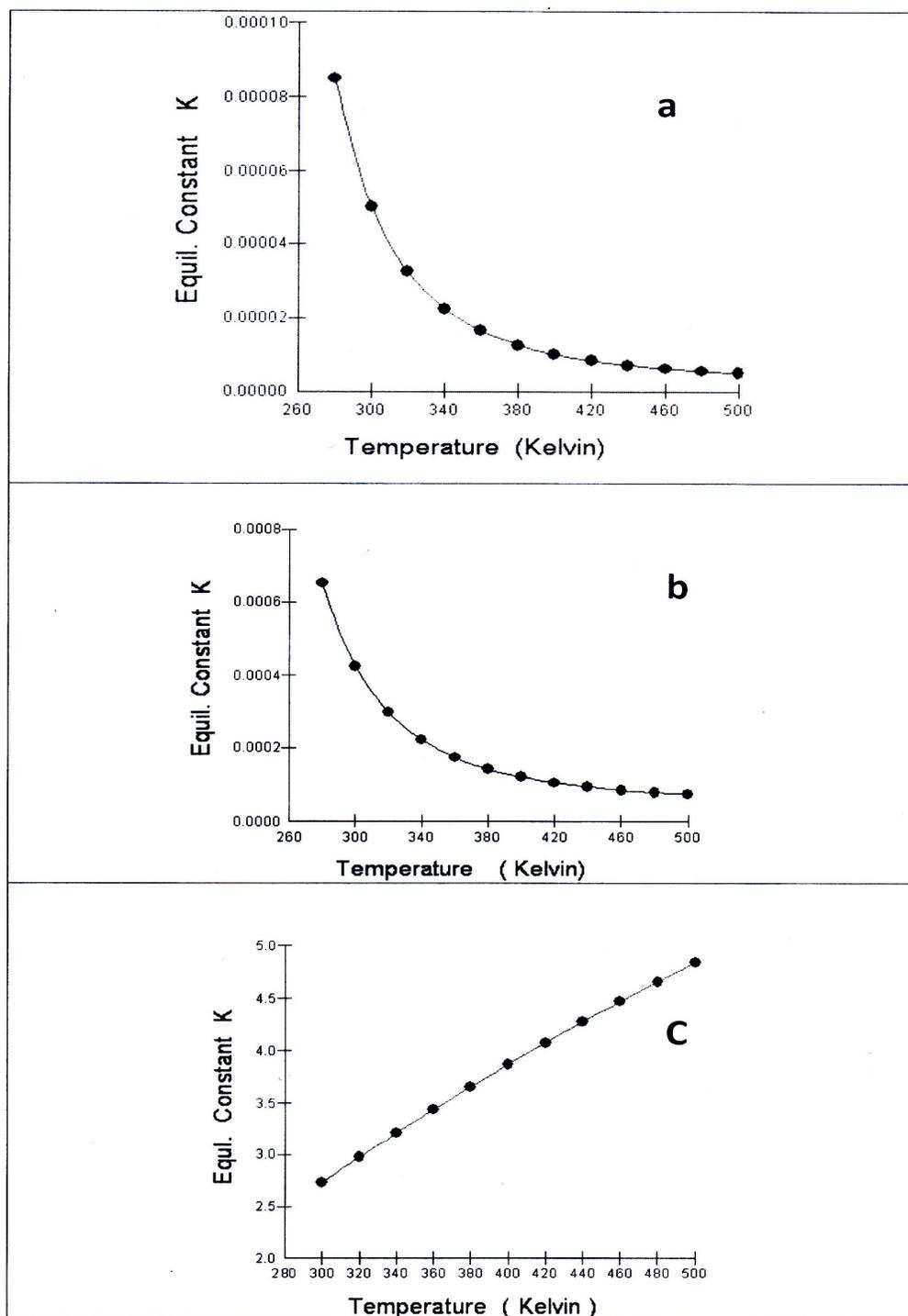


Fig.6: Variation of equilibrium Constant (K) with temperature for the conversion process of (a) monomer 2-pyrrolidinone to cyclic trimer; (b) monomer 2-pyrrolidinone to open trimer; (c) cyclic trimer to open trimer.

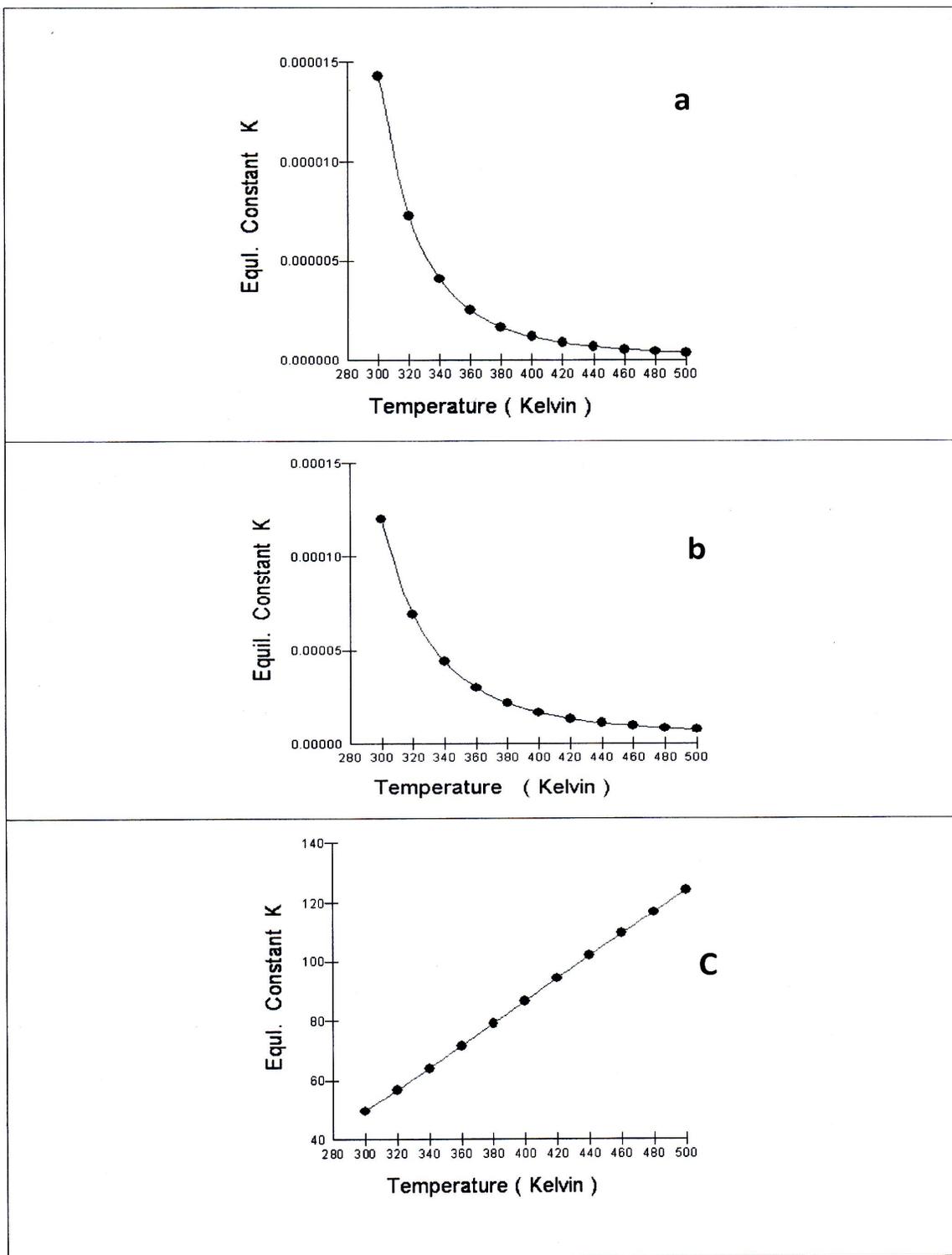


Fig.7: Variation of equilibrium Constant (K) with temperature for the conversion process of (a) monomer 2-pyrrolidinone to cyclic tetramer; (b) monomer 2-pyrrolidinone to open tetramer; (c) cyclic tetramer to open tetramer.

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Determination of Lead by Square Wave Adsorptive Stripping Voltammetry Using Ammonium Pyrrolidine Dithiocarbamate

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Abstract: In this work optimal working conditions were established for the determination of trace levels of lead on hanging mercury drop electrode with Ammonium pyrrolidine dithiocarbamate (APDC) as a preconcentrating agent in acetate buffer media using square wave anodic stripping voltammetry. The optimized experimental conditions include pH, APDC concentration, accumulation time, accumulation potential, scan rate, pulse amplitude and SW frequency on the voltammetric response were studied. A linear relationship between the peak current and lead concentration was obtained over the range (5-40 ppb) with correlation coefficient of 0.99911. Detection limits of 0.89 ppb was obtained with standard deviation of 0.03706. The interference by metal ions which are of great significance in real matrices have been studied. The formation of complex formed between lead and APDC was investigated using both of SWASV and cyclic voltammetry technique. The method was successfully applied for the determination of lead in tap water samples.

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Key Words: Lead, APDC, Square wave, Cyclic Voltammetry, tap water

1. Introduction:

Lead is a ubiquitous environmental pollutant with no known biological function. It exhibits severe deleterious effect on human [1] that has strong chemical toxicity at low concentrations. It can occur as a result of industrialization in the production of pigments, anticorrosion coatings, lead smelter, alloys, and batteries, causing significant disturbances in air, dust, soil, water, sediments, food, etc. The world health organization (WHO) and the US environmental protection Agency (EPA) have set maximum levels of 50 and 10 $\mu\text{g l}^{-1}$ of Pb in sea water and drinking water, respectively [2,3]. Exposure to high levels of trace metal ions (e.g. Cd(II), Pb(II), Cu(II), and Hg(II)) causes a variety of health problems, because they tend to accumulate in the body, and have low rate of clearance [4,5]. Therefore, it is critical to minimize the exposure of humans to these contaminants and this can be ensured through effective water quality monitoring.

As we all know lead is one of the most abundant heavy metals and its toxic effects cause environmental and health problems because of its stability in contaminated sites and complexity of mechanism in biological toxicity, particularly dangerous for children leading to mental retardation when exist with abnormal concentration in body fluid [6]. Lead ions can also interfere directly with calcium signaling, since it has a similar ionic radius to Ca^{2+} and hence the ability to substitute for calcium [7].

Several analytical techniques are available for quantification of lead such as atomic absorption spectrometry (AAS) [8], inductive coupled plasma mass spectrometry (ICP-MS) [9], inductive coupled plasma atomic emission spectrometry (ICP-AES) [10], high performance liquid chromatography [11], capillary electrophoresis [12], backward line scattering [13], and anodic stripping voltammetry (ASV) [14]. Among these methods, adsorptive stripping voltammetry (AdSV) is commonly employed because of its wide linear dynamic range and low detection limit which achieved as the result of performing the preconcentration steps directly into the voltammetric cell, thus decreasing the sampling handling, risk of sample contamination, and multi-element analysis capacity. An additional advantage of AdSV over other methods is the simplicity of the instrumentation, which is relatively inexpensive, small in size, requires low levels of electrical power and is sufficiently portable to permit its use in the field. Also possibility of analyzing various samples without the need of a prior separation is also convenient. Thus, adsorptive stripping analysis [15-17] is becoming a widely accepted tool for trace amount measurements of heavy metal ions. The history, theoretical background and application, of AdSV are given in references [18-21]. AdSV is widely used for individual and simultaneous determination of heavy metals and many reports on the application of AdSV for the determination of lead were listed [22-25]. The mercury film electrode (MFE)

[14] and the hanging mercury electrode (HMDE) [26] have been traditionally used for ASV because of the advantageous analytical properties of mercury in the negative potential range. So the aim of this work is to find a new procedure to determine the concentration of the lead using a APDC on HMDE using anodic stripping voltammetry .

2. Experimental:

2.1. Apparatus:

A Metrohm 693 VA processor with a three electrode system consisting of a hanging mercury drop electrode (HMDE) as the working electrode, Ag/AgCl reference electrode and a platinum counter electrode were used to obtain the voltammograms. A hanna 211 pH meter was used to determine the pH of solutions.

2.2. Reagents:

Ammonium pyrrolidine dithiocarbamate (Analar, BDH) was dissolved in absolute ethanol give 10^{-2} M stock solution. Stocks solution of lead (1000 mg l^{-1}) was prepared by dissolving 0.1598g of lead nitrate in deionized water and diluting to 100 ml in volumetric flask. Standard solutions of Pb(II) or ligand with lower concentrations were prepared daily by diluting the stock solutions. Acetate buffer was prepared by dissolving 13.6g of sodium acetatetrihydrate in deionized water and diluting to 1.0 L. Appropriate volumes of this solution were adjusted to the required pH with glacial acetic acid.

2.3. Procedure:

The general procedure adopted for obtaining square wave adsorptive stripping voltammograms was as follow:

The supporting electrolyte solution (10ml acetate buffer pH 3.5) containing $3 \mu\text{mol/L}$ was pipette into the cell and purged with nitrogen for 7 min. the deposition potential (-0.35V vs. Ag/AgCl) was applied to fresh mercury drop while the solution was stirred for 180sec. At the end of deposition time the stirrer was switched off, and after 10 sec had elapsed to allow the solution to become quiescent, the potential was scanned in a positive direction from -0.3 to 0 V using square wave adsorptive stripping Voltammetry, with a scan rate of 60 mV/sec. , Modulation frequency 160 Hz and a pulse amplitude of 50mV each scan was repeated three times with a new drop for each analyzed solution and the mean value was obtained.

After back ground stripping voltammograms had been obtained, an aliquot at the Pb(II) standard was introduced into the cell and following the described procedure, the sample voltammogram was achieved, lead peak was registered at about -0.35V ,

and its current was used as a measure of lead concentration all equipments were carried out at room temperature.

3-Results and Discussion

3.1 Effect of operational parameters:

3.1.1. Effect of pH variation:

The effect of the solutions pH on peak current (Fig. 1) of the Pb-APDC complex was studied in the 3.0 – 6.0 range. C_{pb} and C_{APDC} were 20 ppb and $3.1 \mu\text{mol l}^{-1}$, respectively ($E_{\text{acc}}:-0.45\text{V}$, $t_{\text{acc}}:60\text{s}$). It is clear that peak current of the Pb-APDC complex is maximum at $\text{pH} = 3.5$ and decreases rapidly after $\text{pH} 3.7$. Greater pH values cause a decrease in the peak current and the signal is very broad probably due to the diminished complexing ability of the ligand at such pH values, so pH value of 3.5 was chosen for the whole study.

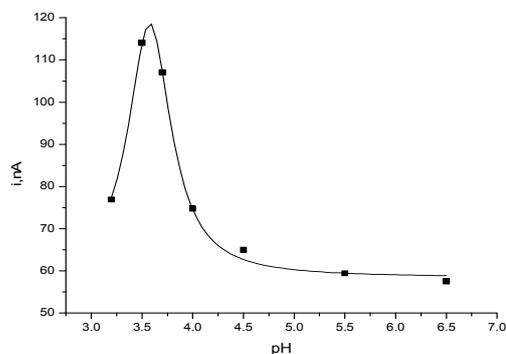


Fig.1: Influence of pH on the peak current of the Pb-APDC complex. Conditions: Pb(II): 25ng/ml ; $C_{\text{APDC}} : 3 \mu\text{M}$; $E_{\text{acc}}:-0.45\text{V}$; $t_{\text{acc}}:60\text{s}$; scan rate 20mV/s ; pulse amplitude : 20mV ; and frequency: 50Hz .

3.1.2. Effect of APDC concentration (C_{APDC}):

The influence of the ligand concentration on the peak current (Fig.2) was studied with APDC concentration in the range of ($0.1 \mu\text{mol l}^{-1}$ - $4.4 \mu\text{mol l}^{-1}$) for pb(II) 20 ng/ml , while other standard measuring conditions remained constant ($\text{pH} : 3.5$; $t_{\text{acc}} :60\text{s}$; $E_{\text{acc}}-0.45\text{v}$)

The results show that by increasing the ligand concentration the peak current increase (as expected) showing that peak current is strongly depend upon the ligand concentration. For higher concentration $4.4 \mu\text{mol l}^{-1}$ a slight decrease in the peak current was observed this effect may be due to the competitive adsorption of APDC with the complex form. An optimum APDC concentration of $3.1 \mu\text{mol l}^{-1}$ was selected for farther studies.

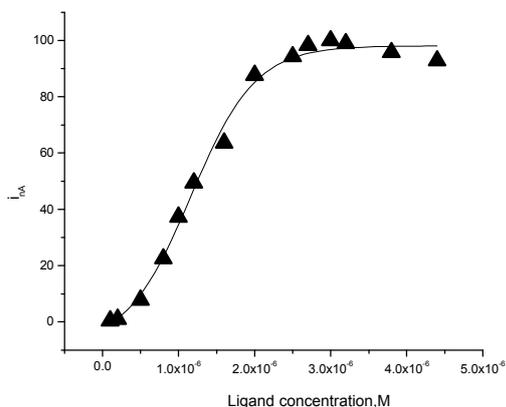


Fig.2: Influence of C_{APDC} on the peak current of the Pb-APDC complex.

Conditions:Pb(II):20ng/ml; pH3.5; E_{acc} : -0.45V; t_{acc} :60s; scan rate 20mV/s; pulse amplitude :20mV ;and frequency:50Hz.

3.1.3. Effect of accumulation potential:

Fig.3 shows the variation of accumulation potential between -0.6 to -0.1 V with the optimum reagent concentration and other standard measuring conditions remained constant (pH: 3.5; C_{APDC} : $3.1\mu\text{mol l}^{-1}$, t_{acc} : 60s).

The peak current extremely increase from -0.1 to -0.35 v due to increase in the accumulation of Pb-APDC on the surface of the electrode. A decrease in peak current is observed by changing potential from -0.4 to -0.6 v. An accumulation potential of -0.35 V gives the best sensitivity and was chosen for subsequent work. More negative potential values cause electrolysis of Pb(II). Also this decrease in peak current may be due to the adsorption of the ligand on the electrode surface, and thus, cause decrease in the ligand concentration.

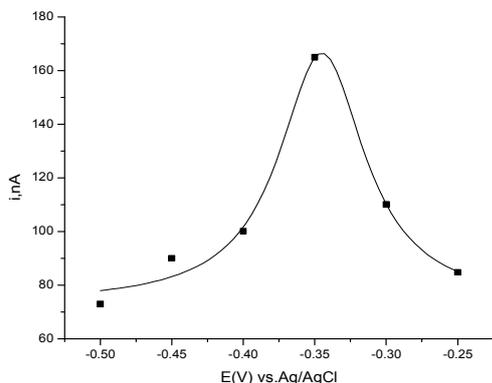


Fig. 3: Influence of E_{acc} on the peak current of the Pb-APDC complex.

Conditions:Pb(II):20ng/ml ; pH 3.5; C_{APDC} $3\mu\text{M}$; t_{acc} :60s; scan rate 20mV/s; pulse amplitude :20mV ;and frequency:50Hz.

3.1.4. Effect accumulation time:

The extent of preconcentration depends on the length of time over which the adsorption is allowed to proceed. The longer the accumulation time, the more pb(II) APDC complex is adsorbed and the larger the peak current observed. The peak current increase almost linearly at first and then curve slightly toward the time axis up to 270 sec, (Fig. 4). Such time dependant profiles represent the corresponding adsorption isotherms, the choice of accumulation time requires a trade-off between sensitivity, speed and selectivity. Thus 180 sec was selected to comprise between sensitivity and speed .Also 180 sec. give sharp peak after this time a broader peak is obtained.

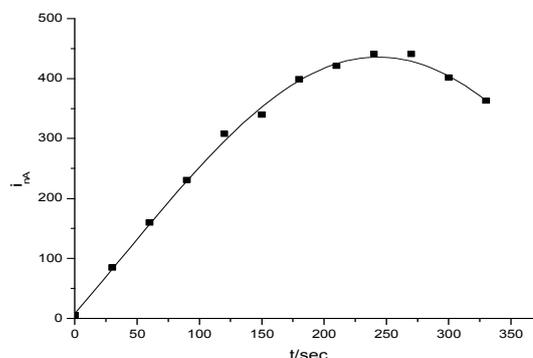


Fig. 4: Influence of t_{acc} on the peak current of the Pb-APDC complex.

Conditions:Pb(II):20ng/ml ; pH 3.5; C_{APDC} $3.1\mu\text{M}$; E_{acc} :-0.35V; scan rate 20mV/s; pulse amplitude :20mV ;and frequency:50Hz.

3.2 Effect of potential sweep conditions:

3.2.1. Scan rate:

The potential scan rate for SW-AdSV procedure was tested in the range between 2 and 80 mV/sec. and the stripping peak current that was obtained showed a linear dependence on the scan rate (Fig. 5). This linear behavior may suggest that the peak current comes largely from surface adsorbed species [27].

In this work, a potential scan rate 60 mV/sec was chosen and used in all experiments.

3.2.2. Square wave frequency :

The peak current of pb-APDC increased when the frequency increase from 30 to 160 Hz (Fig. 6) and it was concluded that in order to assure maximum peak and more sensitive peak, 150 Hz square - wave frequency was the ideal choice for this operational parameter.

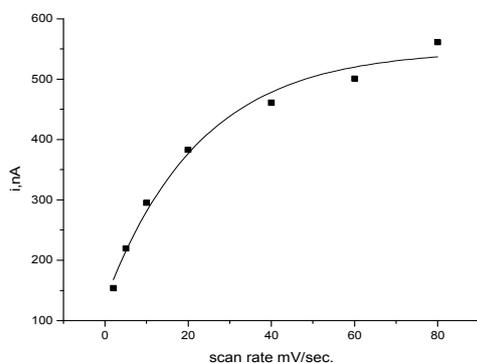


Fig. 5: Influence of scan rate on the peak current of the Pb-APDC complex.

Conditions: Pb(II):20ng/ml ; pH 3.5; C_{APDC} 3.1 μ M; E_{acc} :-0.35V; t_{acc} :180s; pulse amplitude :20mV ;and frequency:50Hz.

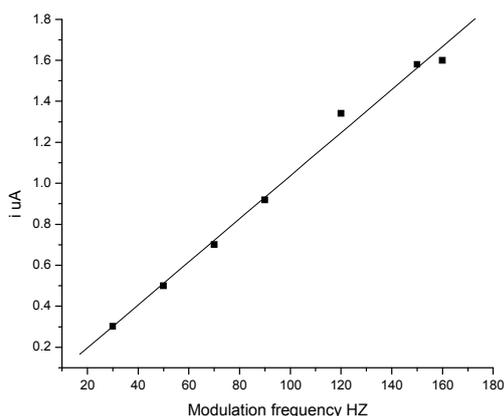


Fig. 6 Influence of frequency on the peak current of the Pb-APDC complex.

Conditions: Pb(II):20ng/ml ; pH 3.5; C_{APDC} 3.1 μ M; E_{acc} :-.35V; t_{acc} :180s; scan rate:60mv/sec ; pulse amplitude :20mV.

3.2.3. pulse amplitude :

Varying the value of excitation wave pulse amplitude (Fig. 7) plays an important role for the measured peak current increasing this parameter over the range 10-50 mV, resulted in extremely enhancement of the voltammetric peak current. As a result 50 mV were adopted as optimum for pulse amplitude.

3.3 Analytical parameters:

Once the most ideal and suitable chemical conditions and instrumental parameters for the stripping voltammetric determination of lead metal

ions were established, calibration plot for this metal ion was recorded to estimate the analytical characteristics of the developed square wave adsorptive stripping voltammetry method.

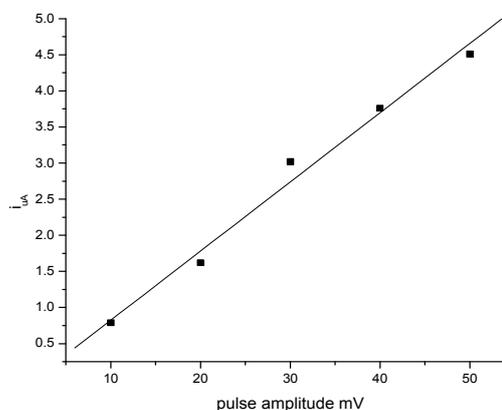


Fig. 7: Influence of pulse amplitude on the peak current of the Pb-APDC complex.

Conditions: Pb(II):20ng/ml ; pH 3.5; C_{APDC} 3.1 μ M; E_{acc} :-0.35V; t_{acc} :180s; scan rate 60mv/sec ; frequency 160Hz.

3.3.1. Calibration graph and detection limit:

The calibration graph (Fig.8) for the determination of lead was obtained under the optimized conditions. The pH : 3.5; C_{APDC} : 3.1 μ mol l^{-1} ; t_{acc} : 180 s ; E_{acc} : -0.35 V. C_{APDC} is 3.1 μ mol l^{-1} , adsorptive curves of pb (II) at concentrations from 5 to 40 ng/ml produce a linear calibration plot ($R=0.99911$) . The precision expressed as the relative standard deviation (RSD) was 0.31535 % for nine successive measurements of the same sample containing 20.0 ng/ml of pb (II). The limit of detection (LOD) is equal to three times the standard deviation of the blank peak current divided by the slope of the calibration curve $3s_b/m$ is equal to 0.89 ng / ml.

3.4 Influence of other metal ions:

To evaluate the selectivity of the method, the influence of many ions on the determination of Pb(II) was examined in the presence of optimum reagent concentration 3.1 μ mol l^{-1} and 20 ng/ml Pb(II). In adsorptive voltammetry interference may arise from competitive adsorption of the ions and their complex or from reduction in the vicinity of the analyte peak the major sources of interference are likely from co-existing metal ions capable of forming complexes with the used chelating agent, hence, affecting SW-AdSV response via an over lapping peak or competing for adsorptive sites on available

ligand. The effect of the following ions, which is of great significance in industrial or environmental matrices, was tested at the optimal experimental conditions. The results of this study on the lead APDC reduction peak are summarized in Table 1.

Table 1: Effect of interfering species on the lead-APDC reduction peak.

Substance added	Concentration (ppb)	Change in i_p %
Zn ²⁺	1000	-4.76
Sr ²⁺	10000	-1.11
Fe ³⁺	3000	-9.31
Ni ²⁺	1000	-13.9
Cd ²⁺	400	-7.06
Cu ²⁺	40	-3.85
Hg ²⁺	100	+2.94
PO ₄ ³⁻	10000	-4.01
HCO ₃ ⁻	10000	-9.29
NO ₃ ⁻	800	-9.25
F ⁻	800	-1.7
Br ⁻	400	-2.8
Cl ⁻	400	-1.1

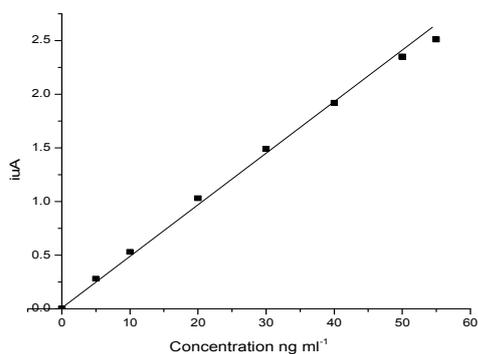


Fig.8: Calibration curve at optimum condition.

3.5 Evidence of complex formation:

Both square wave voltammetry and cyclic voltammetry have been utilized to elucidate and confirm the possible complexation reaction which can occur between lead and ammonium pyrrolidine dithiocarbamate.

Fig. 9 shows an evidence of complex formation between Pb and APDC using square wave voltammograms, this was established as result of tracking the addition of APDC to Pb which produces a series of overlapping signals. Two peaks predominate where one corresponds to a reduction process of free (labile) Pb²⁺ (E_p at -0.36V), this peak current decrease and shifted to more negative potential with the addition of ligand. This behavior may be attributed to the fact that Pb atom is restricted

by two moles 1:2 stoichiometry of the ligand [28-29], so energy is required to reduce such restriction in the complex formed. On the other hand, a new peak is formed (at more positive potential) and its height increase with the addition of the ligand, this peak is related to the reduction

Fig. 10 shows cyclic voltammograms as an evidence of complex formation between Pb and APDC in 0.1 M acetate buffer solution of pH 3.5. As seen from Fig. 10-a, there is an oxidation and reduction peak for APDC at -0.53V and -0.34V which disappear upon the addition of the metal. Pb²⁺ shows reduction and oxidation peaks (Fig.10-c) at -0.40 and -0.35V, respectively which decrease by adding the ligand. A new peak appears at -0.134 and -0.146 V at the same conditions (Fig.10-b) where the Pb-APDC complex formed as a new species.

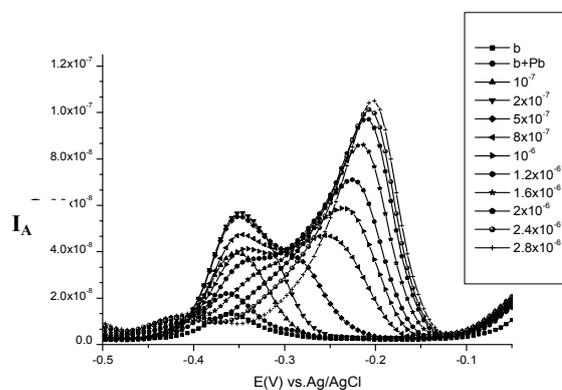


Fig.9: Square wave voltammogram of 20ng ml⁻¹ Pb (II) with different concentrations of APDC

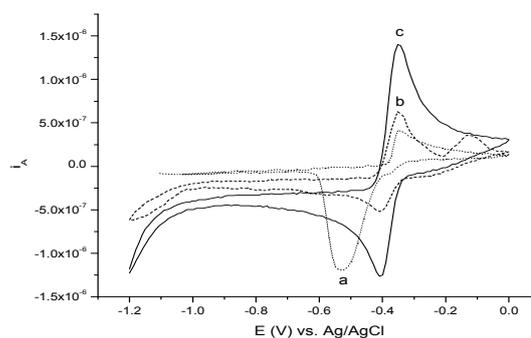


Fig. 10: Cyclic voltammograms of a: 5x10⁻⁴ mol l⁻¹ APDC ,b: 5x10⁻⁴ mol l⁻¹ APDC + 30mg l⁻¹ Pb(II), c: 30mg l⁻¹ Pb(II). pH 3.5,scan rate 500mVsec.⁻¹

3.6 Application:

The utility of the developed method was tested by determining lead in some synthetic mixtures (Table 2) which give good recoveries. The proposed procedure was successfully applied for the determination of the concentration of lead metal in tap water sample by SWASV technique. The sensitivity was calibrated by standard additions to the sample and the initial metal concentrations were calculated by extrapolation. Consequently, linear calibration range was automatically obtained as being related to quantitative mode of the voltammetric unit. As can be seen from Fig.11, the current of the oxidation peak of lead increased by the addition of the standard solution. The concentration of Pb (II) in tap water of Mansoura city (Egypt) was found to be 25 ng ml⁻¹. This value is in the limit values according to TSA, WHO, EPA [30,31].

Table 2 : Determination of Pb(II) 20 ng ml⁻¹ in some synthetic mixtures.

Mixture number	Synthetic mixtures	Recovery
Mixture (1)	NO ₃ ⁻ , PO ₄ ³⁻ , Cl ⁻ , HCO ₃ ⁻ , CO ₃ ²⁻ , F ⁻ , Br ⁻	99%
Mixture (2)	Zn ²⁺ , Fe ³⁺ , Sr ²⁺ , Ni ²⁺	106%
Mixture (3)	Fe ³⁺ , Sr ²⁺ , PO ₄ ³⁻ , Ca ²⁺ , Mg ²⁺ , CO ₃ ²⁻ , HCO ₃ ⁻	94%

(1) anions concentrations 500 ppb
(2) cations concentrations 1000 ppb

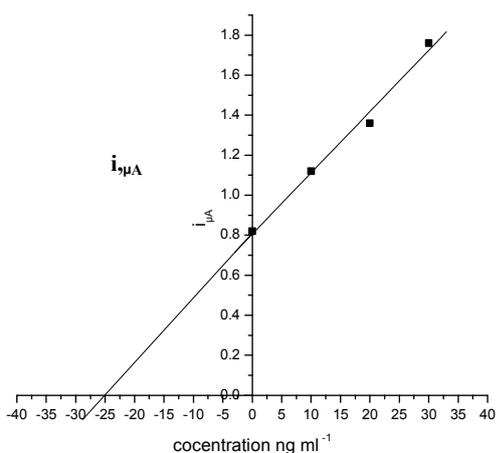


Fig. 11: The calibration plot of Pb(II) obtained from standard addition to tap water sample by SWASV

technique.

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Gender Differences in Financial Literacy among College Students

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Abstract: The paper aims to examine gender differences in financial literacy among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences in different dimensions of financial literacy, in which males were more knowledgeable in financial matters than female students. The results revealed that among the six dimensions of financial literacy, male students have more knowledge concerning credit and risk management, while females are more knowledgeable in respect of general financial literacy. [Leila Falahati, Gender Differences in Financial Literacy among College Students. Journal of American Science 2011;7(6):1180-1183]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Keywords: Gender, Financial Literacy, College Students, Financial Education,

1. Introduction

Gender issues have received considerable attention in statements concerning economics and finance in recent decades. Since gender differences have been observed in a number of financial domains, such as behavior, investment and, perhaps, most importantly, in financial skills, gender issues have become a concern among economists and gender educators. Scholars have documented gender differences in financial affairs such as financial literacy, attitudes and particularly financial behavior.

Prior studies have determined that financial literacy has important implications for financial behavior. However it is widespread among researchers that people with low financial literacy are more likely to have problems with debt (Lusardi and Tufano, 2009b), lower level of wealth management (Hilgert et al., 2003), and, most importantly, a lack of retirement planning (Lusardi et al., 2009a). Lusardi (2010) indicated that financial literacy is the main component of financial decision-making, and many young people desire more financial literacy.

Young adults, particularly college students, receive more attention from financial educators (Goldsmith and Goldsmith, 2006; Gutter et al., 2010; Hayhoe et al., 2000; Hira et al., 2000; Joo, 2008; Norvilitis et al., 2006), as they have easier access to financial sources such as credit, debt and educational loans than previous generations of students. However, because of the lack of financial management skills and poor money management, students report greater financial problems, greater stress, as well as decreased financial well-being (Hayhoe et al., 2005; Hira and Mugenda, 2000; Kidwell and Turrisi, 2004; Norvilitis, et al., 2006).

In terms of financial literacy, college students showed an extensive gender disparity (Barber and Odean, 2001; Goldsmith and Goldsmith, 2006). Garman and Fogue (2006) pointed out that financial literacy is a fundamental tool in successful financial management. However, the research findings indicate that female students consider themselves as being less knowledgeable about financial topics (Hira and Mugenda, 1999), financial analysis (Webster and Ellis, 1996) and investing (Goldsmith and Goldsmith, 1997). In comparison to men, recent studies have also found that women are less knowledgeable financially (Goldsmith and Goldsmith, 2006).

To aid young adults, particularly college students, it is crucial to understand their level of financial literacy and, most importantly, understanding gender differences in financial literacy would provide more knowledge about students' financial needs. Furthermore, since college students are the future labor force contributors, it is necessary to understand the financial needs and dilemmas of males and females in conducting their finance during college life. Most importantly, the lack of financial literacy may lead college students to become involved in a higher level of financial problems during college life, which has a significant effect on their present and future family, and career life.

2. Materials and Methods

2.1 Instrumentation

Financial literacy knowledge was measured by an instrument developed by Sabri et al., (2006) based on the Malaysian context. The instrument consisted

of 25 true and false questions concerning financial goals, financial records, savings, investment, retirement, banking system, time value of money, wills, insurance, education loan, and general knowledge on personal finance. However, finally, the components comprised six dimensions including: general knowledge, investment, savings, record, credit, insurance and risk management. The total score for financial knowledge and the six dimensions was computed by summing the correct answers for 25 questions.

2.2 Sample procedure and sample profile

Data were collected using the stratified sampling method at six public and five private universities across Malaysia. A self-administered questionnaire was used as the data collection methodology. Of the 2,500 students who responded to the survey, 40.4% were male and 59.6% were female students; 71.4% were Malay being the major ethnic group in Malaysia, 21.7 % were Chinese, 5 % were Indian and others (.8%). The mean age of the respondents was 21 years. Students from public universities were 60% while others, 40%, studied in private universities.

2.3 Data Analysis

To determine gender differences in financial literacy the mean comparison t-test was conducted between male and female students.

3. Results and Discussions

The results of the t-tests presented in Table 1, revealed that there were statistically significant differences between male and female students in the financial literacy score and some of its components. The results revealed that male students ($M= 12.61$) have a higher level of financial literacy than female students ($M= 12.21$). Assessment of financial literacy components indicated that female students ($M= 3.69$) have a higher level of knowledge in general issues than male students ($M= 3.63$). The findings indicated that the mean comparison for general knowledge was statistically significant, $t=-1.023$ $P\leq .00$.

Table 1: The Result of the t-Test for Financial Literacy

Items	Male	Female	t	Sig
Financial Literacy	12.61	12.21	2.58	.00
General	3.63	3.69	-1.023	.00
Credit	2.17	1.91	5.75	.00
Record	.940	.949	-.386	.696
Saving	3.071	3.075	-.073	.942
Risk management	1.57	1.43	3.56	.000
Investment	1.2	1.13	1.807	.071

**df*:2338

Male students have a higher level of knowledge concerning credit ($M= 2.17$) while females have a lower level ($M= 1.91$) and, in addition, male students have a higher level of knowledge of risk management ($M= 1.57$) than female students ($M= 1.43$). The findings of the t-test analysis indicated statistically significant differences for credit knowledge, ($t= 5.75$, $P\leq .00$) and for risk management, ($t=3.56$, $P\leq .00$) between male and female students. However, although there were no statistically significant differences between male and females for records, savings and investment items the mean comparisons revealed slight differences. The mean comparisons of savings, records and investment knowledge indicated that male students have a higher level of knowledge in investment items while females have a higher level of knowledge concerning records and savings.

These findings indicate that male students are more knowledgeable financially than female students, which is consistent with previous findings (Chen and Volpe, 2002; Eitel and Martin, 2009; Goldsmith and Goldsmith, 2006; Hira and Mugenda, 2000; Lim et al., 2003; Shim et al., 2010), and emphasizes that female students have less financial literacy than male students. Female students have less knowledge concerning credit, risk, investment and insurance (Goldsmith and Goldsmith, 2006; Hira and Mugenda, 2000), while male students are less knowledgeable in general knowledge, records and savings (Barber and Odean, 2001). The results indicate that female students are more knowledgeable concerning general issues and savings and recording, which are relevant to cash flow management, while male students are more knowledgeable regarding credit, risk and investment, which are relevant to financial planning.

4. Conclusion and Implications

The main aim of the present study was to determine gender differences in financial literacy among college students. The findings of the research indicate that male students are more knowledgeable than female students, however, among the six dimensions of financial literacy, male students have more knowledge concerning credit and risk management, and females are more knowledgeable concerning general knowledge. The findings indicated that female students have a lower level of financial literacy than male students, which may result in female students being involved in a higher level of financial problems due to the lack of proper financial skills and literacy. In addition, it should be noted that the financial socialization process is the main part of acquiring financial literacy and skills,

therefore, parents might also consider providing equal practical opportunities for sons and daughters to practice and learn financial matters.

Moreover, regarding the family sphere, schools have an important role in enhancing students' financial literacy, therefore, due to differences in male and female financial literacy there is the need to enhance schools financial literacy programs and expand practical subtitles. An efficient financial literacy program must teach not only the basic knowledge and financial techniques but also ways to enhance self-efficacy, stress management, problem solving and life skills, as well as methods for the wise and even righteous use of financial resources for both male and female students.

There are various sources that students can tap into to acquire financial knowledge, such as attending seminars, workshops, courses and even pamphlets. All of these sources can be beneficial as they help provide basic financial management knowledge and skills during college life and before the student graduates and enters the job market, thereby equipping them with the necessary skills to manage their income effectively.

It should be mentioned that since the majority of students, both male and female, after graduation, are future labor force workers, it is important to set up educational programs to educate students about financial skills and the necessities of efficient money management. Based on the present research findings it is recommended that in formulating a financial education strategy, the distinct features of financial knowledge and financial management, such as savings, insurance and risk management should be taken into consideration to meet the information needs and help educate individuals on financial matters.

In addition, it is recommended that the program provides relevant information about the financial literacy and its benefits in later lifecycles. Moreover, as there is a large proportion of females among students who perceive themselves as having a lower level of financial literacy than males, a special education program that covers financial literacy and managerial skills should be set up. This would be for the purpose of equipping females with appropriate financial skills, as they will constitute the main proportion of the labor force after graduation.

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Experimental study of the effect of polyethylene fibers with random distribution on the engineering behavior of the mixture of flimsy sand with clay soils

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Abstract: In this research, the shear resistance parameters of mixture of reinforced sand-kaolinite were determined with random distribution of polyethylene fibers (PEF). All samples were compressed to a certain density and then the direct shear test was done. The dimensions of direct shear set were 10×10×2 cm. Different materials such as sand, Kaolinite and polyethylene were used in the experiments. In these experiments, moisture content, amount of polyethylene (PEF), fiber size and speed of shear stress were variable. Test results show that by increasing fiber ratio the shear resistance parameters of sand-kaolinite mixture increase. Also, in reinforced mixture of sand-kaolinite the shear resistance increases by increasing the speed of shear stress.

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Key words: Sand-Kaolinite, Reinforced soil, Fibers, Direct shear test, shear stress speed

1. Introduction

Natural soil in the project site is not always suitable to use and may cause significant settlements due to loading on poor soil. To prevent these settlements or other poor mechanical properties, specific techniques should be used to improve these properties. To increase the soil resistance, designers always use mechanical processes such as compression, drainage by sand wells and consolidation and chemical processes such as reform and stabilization by the use of reinforcing elements (Nataraja and McManis, 1997). So far, different elements such as fiber glass, zinc coating steels and polymers such as geo-textiles, the geo-grades and fibers cut from polyethylene, polyester, and polypropylene has been used to reinforce the soil (Almansa and Cánovas, 1999). Gary and Ohashi (1983) have provided a model for the soil and fibers behavior in the shear zone. They determined the amount of fiber needed for optimal conditions of shear resistance by testing a large number of sand samples reinforced with plastic and fiber plant and a copper wire in direct shear set and analyzing the results. Nataraja and McManis (1997) carried out experiments on compression, direct shear, single-axis and CBR to investigate the behavior of (steel-fibre) reinforced clay and sand by synthetic fibers, and reported an increase in shear resistance, single-axis compressive resistance and particularly an increase in the CBR. The increase in impact resistance for steel-fibre reinforced concrete has been studied in several

experiments, e.g. by Nataraja *et al.* (2005), Luo *et al.* (2000), Almansa and Cánovas (1999).

In the investigation done by Naeini and Sadjadi (2008), the waste polymer materials has been chosen as the reinforcement material and it was randomly included in to the clayey soils with different plasticity indexes at five different percentages of fiber content (0%, 1%, 2%, 3%, 4%) by weight of raw soil. CBR tests are conducted by Kalantari *et al.* (2010) and their experimental findings are analyzed with the point of view of use of waste plastic fibers in soil reinforcement. Effects of Random Fiber Inclusion on Consolidation, Hydraulic Conductivity, Swelling, Shrinkage Limit and Desiccation Cracking of Clays (Abdi *et al.*, 2008) point to the strength and settlement characteristics of the reinforced soil and compared with un-reinforced condition.

Using polymer waste in the soil reinforcement reduces these waste materials and prevents environmental degradation, which is considered as one of today's industrial problems. Therefore, in this study the waste of mineral water bottles were used. Investigating Topic History has shown that till now studies were with constant shear stress speed, but the effects of earthquake on soil has always been of importance thus in this research, the effect of increasing shear stress speed has been analyzed.

2. Material and Methods

Soil and fiber characteristics: In this study, the polyethylene fiber taken from half-liter bottles of mineral water has been used to reinforce the soil. The used soil is a mixture of loose sand and kaolinite. Characteristics of sand and kaolinite are shown in Tables 1 and 2, and figure 1 demonstrates the aggregation curve of sand.

Table 1. Characteristics of tested sand

Special weight of sand in the loose state (g/cm)	1.39
Interior friction angle of sand in the loose state (degree)	30
Density (g/cm)	2.55

Table 2. Characteristics of tested Kaolinite classification

Classification(USCS)	Plastic Index (%)	Liquid Limit (%)	Plastic Limit (%)
CH	37	58	23

3. Results and Discussion

Proctor standard density test and the results: These experiments on different mixing ratio of sand with kaolinite performed and the results represented in Table 3 shows that engineering mixture of 25 percent kaolinite and 75 percent sand, has the optimal mode.

Table 3. Density Test Results

	Amount of Kaolinite (%)	Amount of Sand (%)	Optimum moisture percentage	Maximum special dry weight (kN/m3)
1	10	90	14.5	16.60
2	17	83	13	17.15
3	25	75	12.5	18.20
4	33	67	12.5	18.20

Direct shear test: This test used 10×10×2 cm mold on reinforced soil with three different weight percentage one, two and three and dimensions 16 × 4 and 12 × 4 mm

Direct shear test results: In this section results obtained from direct shear tests are offered.

Table 4. Direct shear test results of four different ratios of sand with kaolinite.

	Amount of Kaolinite (%)	Amount of sand (%)	Shear resistance (kPa) with 28 (kPa)vertical stress
1	10	90	21.72
2	17	83	23.30
3	25	75	31.78
4	33	67	29.56

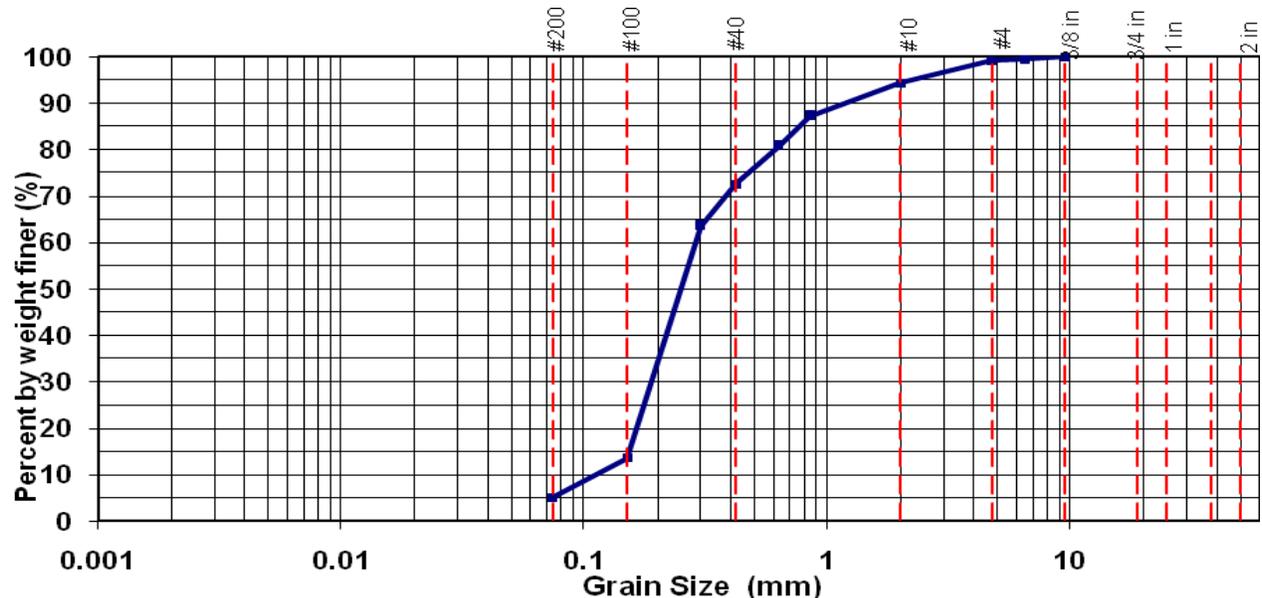


Figure 1. Sand aggregation curve

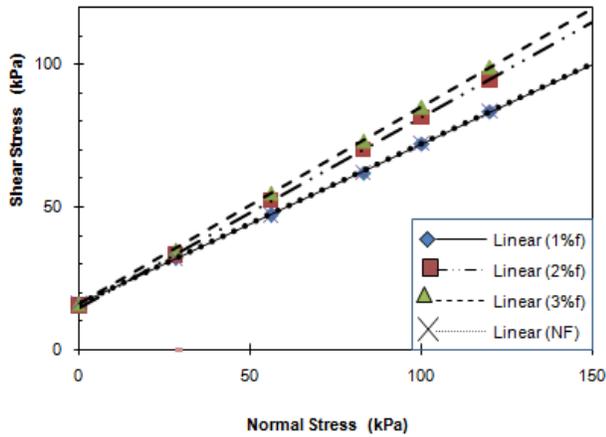


Figure 2. Changes in shear stress on the vertical stress on mixture $4 \times 16F-K25-S75$ with different weight percentages than optimum moisture content (NF = No Fiber)

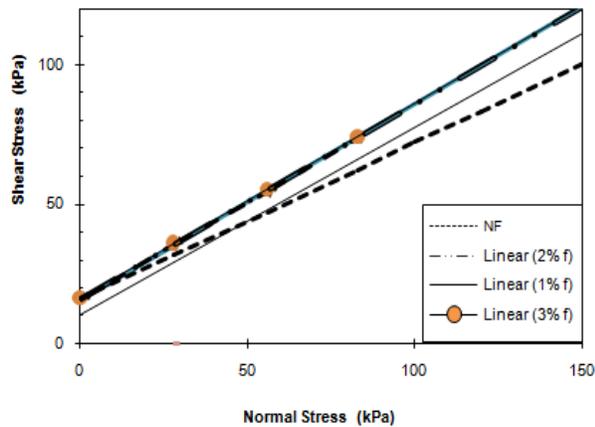


Figure 3- Changes in shear stress on the vertical stress on mixture $4 \times 12F-K25-S75$ with different weight percentages than optimum moisture content (NF = No Fiber)

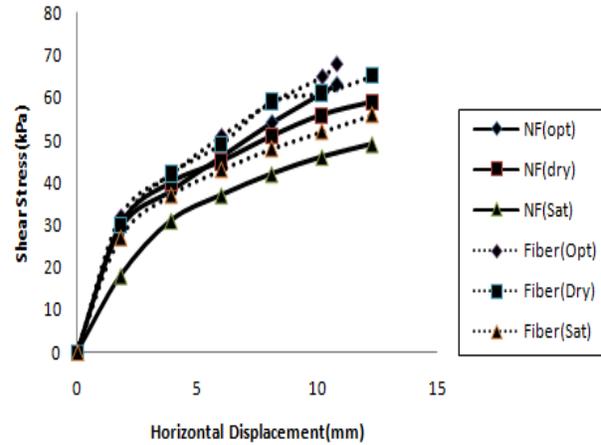


Figure 5. Comparison chart of changes in horizontal displacement against shear stress on the fiber reinforced soil mixture 12×4 and naked in different scenarios optimum moisture content, dry and saturated

4. CONCLUSION

1 - The Table 4 indicated that in state 1 than 3 highest resistances to shear has been made.

2 - In accordance with the second image fibers 16×4 are observed with increasing fiber, shear resistance value of the number kPa62 mode fiber free reaches the 73 kPa with 3 percent of the fibers and shows 17 percent increase.

3 - according to the image 3 with fibers 12×4 it is observed affected by different stress, vertical Shear stress level 83 kPa reaches the number 74 kPa and it shows 15 percent increase compared to the case without the fiber with the same vertical stress.

4 - As seen in Picture 4 the highest shear resistance is in a state of optimum moisture content and the least resistance has been made in saturated state

Table 5. Results in terms of changes in shear stress on the horizontal displacement mixing $4 \times 12F2-K25-S757$ optimum moisture content in a state with a loading speed 1, 2 and 3 mm/min

	Shear stress speed (mm/min)					
	1 mm/min		2mm/min		3 mm/min	
Vertical stress (kPa)	Horizontal displacement (mm)	Shear stress (kPa)	Horizontal displacement (mm)	Shear stress (kPa)	Horizontal displacement (mm)	Shear stress (kPa)
28	10.2	35.8	10.2	37.3	11.7	38.6
56	13.2	55.13	13.2	55.13	12.9	56.2
83	14.1	71.2	13.8	72.2	14.1	72.76

5 - As seen in Picture 5 the highest shear strength with a maximum shift in the shear mode has been made in the optimum moisture content and the least resistance is in saturated state.

6 - In accordance with image 5 broken loose soils cannot be seen, but with increasing horizontal force (shear) the amount of shear stress increases to its optimal value to achieve rupture shear stress, and after reaching the maximum, whatever the shear force increased no horizontal shift is observed and the numbers remain constant maximum numbers.

7 - Results of Table 5 show the amount of shear resistance with increasing shear stress velocity shows a 10 percent increase.

8 - Generally, mixing soil and fibers with constant shear stress speed, increase friction angle and reduce adhesion.

9 - Shear resistance of soil reinforced depends on the dimensions, fibers weight percentage and vertical stress.

10- Dimensions and weight percentage of reinforces will vary in accordance with different profiles of soil.

11 - With increase in shear stress velocity, horizontal displacement in the soil sample will happen less, so samples will be broken with further stress, and shear resistance will increase.

12 - Generally, mixture saturation decreases the shear resistance.

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Ethnic and Gender Differences in Financial Management among College Students

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Abstract: The paper aims to examine ethnic and gender differences in financial management among college students. Using the stratified sampling method, 2,340 college students from six public and five private colleges were studied. The findings indicate gender differences in financial management, in which female students performed greater financial management than male students. The results revealed significant ethnic differences in financial management, in which Malay students performed greater financial management than Chinese and Indian students. [Leila Falahati, Hamidreza Babaei, Laily Hj.Paim, Ethnic and Gender Differences in Financial Management among College Students. Journal of American Science, 2011;7(6):1189-1192]. (ISSN: 1545-1003).

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Keywords: Ethnic, Gender, Financial Management, College Students, Financial Education,

1. Introduction

Young adults, particularly college students, receive more attention from financial educators (Goldsmith and Goldsmith, 2006; Gutter et al., 2010; Hayhoe et al., 2000; Hira et al., 2000; Joo, 2008; Norvilitis et al., 2006), as they have easier access to financial sources such as credit, debt and educational loans than previous generations of students. However, a great body of research has documented significant gender differences in financial management (Masuo et al., 2004; Norvilitis, et al., 2006; Shim et al., 2009), the level of perceived financial problem among college students (Sabri et al., 2010) and the ethnic differences as well (McWhirter, 1997).

Financial research (Joo, 2008; Xiao et al., 2009) has long recognized that financial management is the main determinant of financial well-being, however, it is documented that one's financial management is influenced by individual and personal characteristics such as gender and ethnicity. Xiao (2008) indicated that common financial management includes practices relating to cash, credit and savings management (Xiao et al., 2006), for which effective behavior is to refer to positive or desirable behavior recommended by consumer economists as a way to reduce the level of financial problems.

The studies of financial management among college students (Borden et al., 2008; Eckel and Grossman, 2002; Knight and Knight, 2000; Lea et al., 1995; Livingstone and Lunt, 1993; Lyons, 2008) have shown that students have inadequate knowledge and skills to manage their finances. They fail to make correct financial decisions and experience a high

level of financial strain and problems such as debt load. The assessment of the research results revealed that the role of gender in financial management is unclear. For example, women are more likely to report having a budget than men (Henry et al., 2001), have more investment than men (Bajtelsmit and Bernasek, 1996) and are more likely to report using sound financial practices (Hayhoe, et al., 2000).

Conversely, others have found that women have more credit cards than men (Hayhoe, et al., 2000; Norvilitis, et al., 2006), men score higher on a test of financial knowledge (Goldsmith and Goldsmith, 1997), and women have higher levels of debt (Davies and Lea, 1995; Norvilitis, et al., 2006). However, the study of ethnic differences in financial management among college students is limited to McWhirter (1997). Generally, Malaysia is considered a multi race country with Malay, Indian and Chinese ideology, and a multicultural society with a mixture of Muslims, Hindus and Buddhists. Different ethnic backgrounds confirm the differences in ideology, life style and in turn differences in money practices.

However, the study of financial management among the ethnic groups in Malaysia is scarce. Ethnic and gender differences in financial management indicate that males and females and even different ethnic groups perform different financial management, which may have a different effect on their future life. Therefore, understanding differences in financial management provides proper knowledge concerning a student's financial needs and education to enhance their financial management.

2. Materials and Methods

2.1 Instrumentation

To measure financial management, two main dimensions including savings and spending behaviour were considered. To measure spending behaviour an instrument was developed by Sabri et al. (2006); it included 11 items requiring students to confirm whether they spent their money on those items using a Yes or No scale. Items included, mobile phone, Internet café, entertainment magazine, movies, games (Bowling, Snooker), beauty salon, cigarettes, drugs, alcohols, gambling and clubbing. Spending behaviour was computed by summing the items determined by students.

The higher the numbers of items the students spend money on, the lower the score and the lowest number of items receive the highest score. To measure saving behaviour an instrument including 5 items was adopted from Hilgert and Hogart (2002) which was concern about "saving times within six months", "saving for long term", "saving for short term" and "regarding financial condition in university, has enough money that can be put into savings". Savings behaviour was computed by summing the savings scores.

The highest score indicated good savings behaviour and the lowest score indicated poor savings behaviour. Financial management was measured by summing spending and savings behaviour; a higher score indicated safe financial management and a low score indicated risky financial management.

2.2 Sample procedure and sample profile

Data were collected using a stratified sampling method. The study sample comprised students from public and private universities; a total of 11 universities were randomly selected for the study (six public and five private universities). For each university a total of 350 students were randomly selected using the list of names obtained from each student affairs office. The total number of questionnaires distributed to the 11 universities was 3,850.

A total of 2,500 completed and usable questionnaires were returned by the students,

producing a 65% response rate. Of the 2,500 students who responded to the survey, 40.4% were male students and 59.6% were female students. The ethnic composition was Malay (71.4%), Chinese (21.7%), Indian (5.0%) and others (.8%). The age composition of students was lowest 20 years (39.3), 21-30 years (60.5%) and highest 31years (.2%). The mean age of the respondents was 20.9 years. Students from the public university were (60%) while the others (40%) study in private universities.

2.3 Data Analysis

To determine gender differences in financial management the mean comparison t-test was conducted between male and female students. To determine ethnic differences the Analysis of Variance (ANOVA) was conducted to determine the differences between three ethnics.

3. Results and Discussions

The findings in Table 1, indicated that there are statistically significant differences in financial management among the three ethnic groups ($F= 8.29$, $P\leq.00$). The results indicated that Malay ($M= 11.19$) students have greater financial management than Chinese ($M= 10.88$) and Indian ($M= 10.75$) students, however, in order of rank, Indians performed weaker financial management than the other two ethnic groups. Regarding the financial management dimension, the results depicted in Table 2, indicated that there are statistically significant ethnic differences in savings behavior ($F= 3.56$, $P\leq.00$), in which Chinese students ($M= 4.38$) have greater savings behavior, followed by Indian ($M= 3.98$) and then Malay ($M= 3.94$) students. However, there were no statistically significant differences in spending behavior between the ethnic groups.

The results of the t-tests, given in Table 2, indicate that there was a statistically significant difference in financial management between male and female students.

Table 1: The Results of ANOVA for Financial Management by Ethnic

<i>Items</i>	<i>Malay</i>	<i>Chinese</i>	<i>Indian</i>	<i>F</i>	<i>Sig</i>
Financial Management	11.19	10.88	10.75	8.29	.000
Spending behavior	3.94	4.38	3.98	3.56	.0
Saving behavior	9.11	8.96	9.04	2.21	-

The mean comparison of male and female students financial management revealed that female students ($M=11.25$) performed better financial management than male students ($M= 10.08$). This comparison was found to be statistically significant, ($t= -5.84$, $P\leq.00$). To assess financial management, the components revealed that male students have significantly better financial management ($t= 2.11$, $P\leq.00$) in savings ($M= 4.21$) than female students ($M=3.91$). The results indicated that female students spending behavior ($M=9.19$) is safer than that of male students (8.86). This comparison was found to be statistically significant, ($t= -5.27$, $P\leq.00$).

Table 2: The Result of the t-Test for Financial Management

<i>Items</i>	<i>Male</i>	<i>Female</i>	<i>t</i>	<i>Sig</i>
Financial management	10.08	11.25	-5.84	.000
Saving behavior	4.21	3.91	2.11	.000
Spending behavior	8.86	9.19	-5.27	.000

4. Conclusions and Implications

The overall findings of the present research indicated that males and females show differences in financial management, in which, overall, female students demonstrate better financial management and better spending behavior while males have better savings behavior. In respect of gender matters the findings emphasize that female students have better financial management than male students, which is consistent with the findings of Hayhoe et al. (2000). Female students spending behavior is better than male students, while male students have better savings behavior. These differences might indicate that female students are more concerned with better cash flow management (Hayhoe, et al., 2000; Henry et al., 2001) while male students are concerned about financial planning such as investment and savings. Concerning the findings pertaining to ethnicity, the present study confirmed the differences in financial management between the three ethnic groups, in which, overall, Malays performed greater financial management. In addition, the results indicated that Chinese student's performed greater saving behavior, which may be rooted in Chinese culture, in that there is greater concern for planning for investments for future life. However, there were no differences in spending behavior among the three ethnic groups.

5. Recommendations

As Malaysia is rapidly moving towards economic development, the majority of students after graduation are future labour force workers; consequently, it is important to set up educational programmes to educate students about financial skills and the necessities of efficient money management. Concerning the present research findings it is recommended that in formulating a financial education strategy, gender and ethnic differences in financial management should be taken into consideration to meet the information needs and help educated individuals in respect of financial matters.

In addition, it is recommended that the programme provides relevant information about the financial behaviour and its costs and benefits in later lifecycles. Moreover, as there were significant differences in financial management between the ethnic groups, it is recommended that a national education programme that covers managerial skills for all students is established in school. This would be for the purpose of equipping all students, beyond that of the individual ethnic and gender groups, with financial skills and proper knowledge in financial matters before leaving school and entering college life.

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Histological And Ultrastructural Changes In Mammalian Testis Under The Effect Of Hydrocortisone

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Abstract: Hydrocortisone is a synthetic glucocorticoid currently utilized in the medical fields for the treatment of various types of diseases. The present study aimed to investigate the histological and ultrastructural changes induced in mammalian testis under the effect of hydrocortisone. Twenty adult male rats weighing 150-200g were divided into two groups; group I, injected i.m. with hydrocortisone sodium succinate (30mg/100g b.wt.) , daily for 15 days. Whereas, group II were kept as control. (injected with 0.6ml of bacteriostatic water). Histologically, testes of treated rats displayed thickening of tunica albuginea, disruption of spermatogenesis evident, marked reduction in germ cells caused dilatation of intercellular spaces, detachment of Sertoli cells from the irregular basal lamina, in addition to necrotic Leydig cells with infiltration of the interstitial tissues. Ultrastructurally, treated testes showed thickening and irregularity of the surrounding basal lamina, cytoplasmic vacuolation of atrophied Sertoli cells, shrinkage and pyknotic nuclei of spermatogonia and primary spermatocytes, condensed Golgi apparatus and detachment of the acrosomal granule from the anterior hemisphere of the nucleus of rounded spermatids, and disappearance of elongated spermatids and spermatozoa. Also, necrotic Leydig cells were observed in interstitial tissue. In conclusion, hydrocortisone administration into adult male rats exerts a clear effect on testicular structure and ultrastructure, which leads to much deficiency in their performance. So, it should be utilized under restricted precautions in the medical fields to protect the human health from its hazardous impact.

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Key words: glucocorticoids, histology, hydrocortisone, rat, testis, ultrastructure

1. Introduction:

Hydrocortisone is a synthetic glucocorticoid widely administered for the treatment of various types of diseases. It significantly reduced specific physical problems in prostate cancer patients and improved their emotional state (Kornblith *et al.*, 2001), it is used for the treatment of severe liver failure (Harry *et al.*, 2003), acute graft rejection in most forms of organ transplantation, some neoplastic conditions, collagen diseases, dermatological diseases, status asthmatics, allergic and anaphylactic reactions (Rigge and Jones, 2005), mild ulcerative colitis (Schimmer and Parker, 2006), acute pancreatitis (Wang *et al.*, 2007) and as bastion of control the brain swelling before, during, and after neurosurgical procedures, as well as during radiation and chemotherapy in the brain tumor patients (Da Silva and Schiff, 2007).

Jung and Inder (2008) reported that hydrocortisone administration is recommended in a wide scale for patients in the event of stress, severe illness, or surgical procedures; including minor surgery (i.e., hernia repair, laparoscopic cholecystectomy and knee surgery), moderate surgical stress (i.e., open cholecystectomy, partial colon resection, uncomplicated back surgery and hip

replacement), and major surgical stress (i.e., pancreato-duodenectomy, esophagectomy, total colectomy, repair for perforated bowel, cardiopulmonary bypass, ileofemoral bypass and oral surgical stress).

Also, hydrocortisone is the drug of choice for glucocorticoid replacement therapy in adrenal insufficiency diseases (Mah *et al.*, 2004; Salvatori, 2005; Nieman *et al.*, 2006), it is also used in the treatment of congenital adrenal hyperplasia, a group of inherited disorders in which 21-hydroxylase enzyme involved in the biosynthesis of corticosteroids is deficient resulting in low production of cortisol or aldosterone (Schimmer and Parker, 2006) and for the treatment of acute adrenal crisis (Bornstein, 2009).

In 2010, Romer *et al.* elucidated that hydrocortisone has been shown to affect declarative memory. Recently, Wirth *et al.* (2011) declared that intravenous hydrocortisone administration to depressed patients produced mixed effects on mood and emotional processing.

In experimental animals, involvement of hydrocortisone has been studied in some biological aspects on different body organs rather than the testis (Nosenko and Mishunina, 2005; Mantzoros *et al.*,

2006; Tariq *et al.*, 2007; Li *et al.*, 2008; Casella *et al.*, 2010).

These studies indicate that almost no attention has been given for the influence of hydrocortisone administration on mammalian testicular tissues. Therefore, the present study aimed to investigate the effect of hydrocortisone on adult rat testis from the histological and ultrastructural point of view.

2. Materials and Methods:

2.1. Experimental animals

Twenty male Swiss albino rats (*Rattus norvegicus*) weighing 150-200g, acquired from Schistosoma Biological Supply Program (SBSP) Theodor Bilharz Research Institute, were housed in clear plastic cages (2 animals/cage) with wood chips as bedding and given pellet rodent diet, milk and water *ad-libitum*. They were kept under controlled environmental conditions, including a temperature of 25°C and a 12h light/dark cycle.

2.2. Drug used in an experiment.

Hydrocortisone Sodium Succinate available in Egypt under trade name; Solu-Cortef[®] in the form of 100mg/2ml bacteriostatic water for injection which is manufactured by EGYPTIAN INT. PHARMACEUTICAL INDUSTRIES (E.I.P.I.CO., under Licence of UPJOHN s.a. Puurs-Belgium). It is a highly water-soluble sodium succinate ester of hydrocortisone (Schimmer and Parker, 2006).

2.3. Experimental design

The rats were divided randomly into two even groups; Group I, were intramuscularly injected with hydrocortisone sodium succinate, with a dose equivalent to 30 mg/100g.b.wt. Dissolved in 0.6 ml of bacteriostatic water in a daily manner at 9am for 15 days. This dose was determined in accordance to the dose utilized in previous researches of experimental rats (Bogdanov and Yarushkina, 2004, 2006 & 2007; Yarushkina, 2008). Whereas, Group II (control), were intramuscularly injected only with 0.6 ml of bacteriostatic water in the same manner as group I.

2.4. Histological preparations

The excised testes were fixed in Bouin's fluid for 24 hours, were subjected to the normal procedures for paraffin sectioning, cut at the thickness of 4-6 µm and stained with haematoxylin & eosin stains. The stained sections were examined and photographed by light microscopy (BX-40 Olympus), fitted with 10x - 40x objective lenses with an adjustable numerical aperture (3.3). Images were captured using camera (Panasonic CD-220).

2.5. Ultrastructural preparations

For ultrastructural evaluation by transmission electron microscopy as described previously by Dykstra *et al.* (2002), freshly excised testes were cut into small blocks (1×1mm³), fixed directly in cold 4F1G (i.e. 4% formalin + 1% glutaraldehyde adjusted at pH 2.2) for 24 hours, then were post fixed in 1% osmium tetroxide in 0.1M phosphate buffer (pH 7.3), dehydrated in an ethanolic series culminating in 100% acetone, and infiltrated with epoxide resin. After polymerization overnight at 60°C, semithin sections (0.5 µm) were stained with 1% toluidine blue in 1% sodium borate and examined with light microscope. Areas of seminiferous tubules were selected and the blocks trimmed accordingly. Ultrathin sections (80-90 nm) were cut, mounted on 200 mesh copper grids, and stained with uranyl acetate and lead citrate. The stained grids were examined and photographed by JEOL.JEM-1400-EX-ELECTRON MICROSCOPE at the Central Laboratory of Faculty of Science, Ain Shams University. The photographs were printed on KODABROMIDE F5s GLOSSY Black and White-Schwarzweib- Kodak.

3. Results

3.1. Histological study

Testes of control rats showed normal features of testicular tissue as illustrated in figures (1-3). The testis is enclosed in a thick fibrous capsule, the tunica albuginea. The seminiferous tubules are ensheathed by basal lamina formed of myoid cells. Each tubule possesses epithelial cells involved of Sertoli cells and the germ cells of various stages, covering the complete process of spermatogenesis. Sertoli cells exhibit typical irregular nuclei and well-defined cytoplasm. Spermatogonia are oval in shape, rest upon the basal lamina of the seminiferous tubule. Immediately above them are spherical primary spermatocytes, recognized by their copious cytoplasm and large nuclei containing coarse clumps of chromatin. Secondary spermatocytes are not seen in these sections due to the rapid division processes. Therefore, above the primary spermatocytes, there are large clusters of small rounded spermatids with rounded nuclei devoid of coarse clumps of heterochromatin, followed by elongated spermatids which undergo dramatic shape changes, forming spermatozoa. The interstitium between seminiferous tubules contain distinct Leydig cells and blood vessels.

Sections of testicular tissues obtained from hydrocortisone-treated rats displayed several histopathological changes as illustrated in figures (4-6). The seminiferous tubules surrounded by thickened

tunica albuginea, showing deformed Sertoli cells, being detached from the irregular basal lamina, marked reduction in the germ cells causing dilatation intercellular spaces, spermatogonia manifest vacuolated cytoplasm and pyknotic nuclei, primary spermatocytes reveal pyknotic nuclei, and the rounded spermatids having karyolytic nuclei. The effects are much severe in spermatid differentiation,

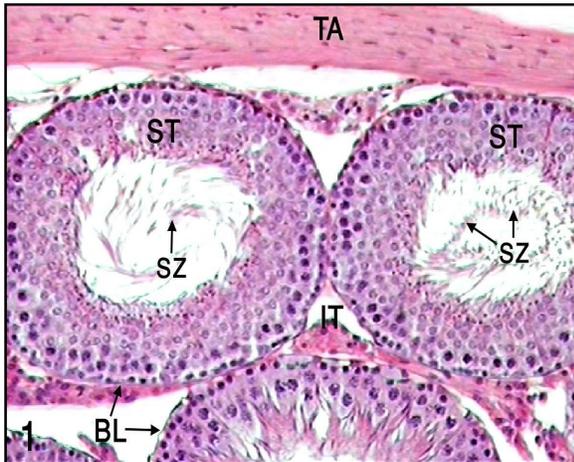


Figure (1): Normal testicular tissue architecture of control testis revealing tunica albuginea (TA), seminiferous tubules (ST) ensheathed with basal lamina (BL) and containing spermatozoa (SZ) in their lumens, in addition to the interstitial tissues (IT). (H&E, x330)

whereas there is a complete loss of elongated spermatids and accordingly of spermatozoa, which means that the spermatogenesis was arrested at the stage of rounded spermatids formation under the effect of hydrocortisone treatment.

The interstitial tissues between seminiferous tubules are infiltrated and the Leydig cells have pyknotic nuclei as clearly seen in figure (6).

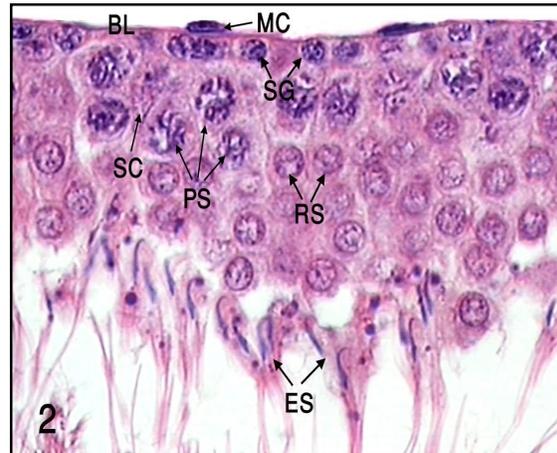


Figure (2): Normal seminiferous tubule of control testis surrounded by basal lamina (BL) with myoid cells (MC) showing Sertoli cells (SC) and germ cells including; spermatogonia (SG), primary spermatocytes (PS), rounded spermatids (RS) and elongated spermatids (ES). (H&E, x1320)

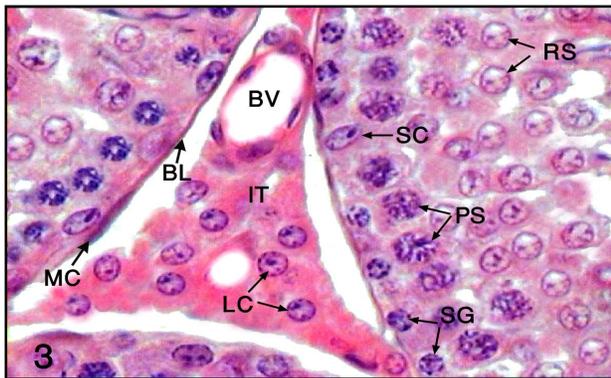


Figure (3): Normal architecture of interstitial tissue (IT) of control testis embodying clusters of Leydig cells (LC) and blood vessel (BV) and located in between three seminiferous tubules being surrounded by basal lamina (BL) containing myoid cells (MC), having spermatogonia (SG), primary spermatocytes (PS), rounded spermatids (RS) and Sertoli cells (SC). (H&E, x1320)

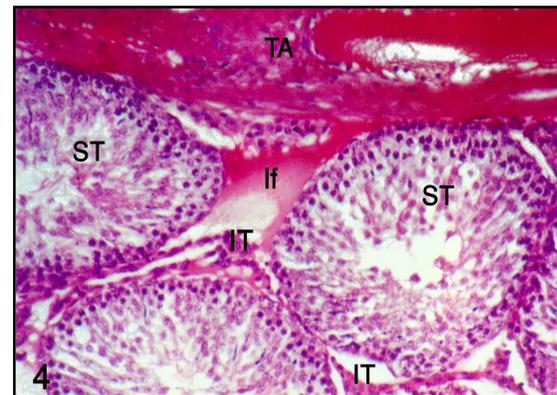
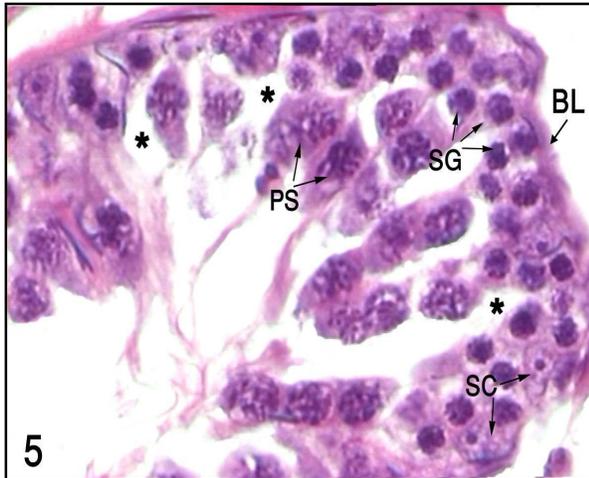
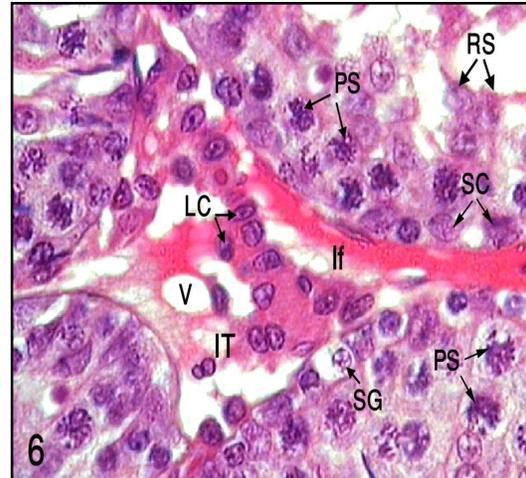


Figure (4): Destructed testicular tissues of treated testis elucidating thickened tunica albuginea (TA), deformed seminiferous tubules (ST) devoid of spermatozoa and infiltration (If) of the interstitial tissue (IT). (H&E, x330)

Figure (5): Destructed seminiferous tubule of treated testis displaying necrotic spermatogonia (SG) and primary



5
spermatocytes (PS). Detachment of Sertoli cells (SC) from the basement membrane. Dilated intercellular spaces (*) between germ cells are also noticed. (H&E, x1320)



6
Figure (6): Destroyed interstitial tissue (IT) of treated testis in between four seminiferous tubules revealing necrotic Leydig cells (LC), vacuolation (V) and infiltrated tissue (If). The seminiferous tubules showing vacuolated spermatogonia (SG), necrotic primary spermatocytes (PS) and rounded spermatids. Beside, deformed Sertoli cells (SC) are clearly seen. (H&E, x1320)

3.2. Ultrastructural study

Ultrastructural examination of control rat testis showed Sertoli cells and germ cells with cellular characteristics typical of those seen in active spermatogenesis. The germ cells in various developmental stages are arranged orderly as illustrate in figure (7). The spermatogonia rest upon the basal lamina of the tubules possessing mitochondria and nuclei with one or two nucleoli, euchromatin and dense clumps of marginated heterochromatin (Fig.7). while, in hydrocortisone-treated rats, the spermatogonia lost their normal architecture, being irregular or pyramidal in shape possessing all the features of necrotic cells as; shrinkage with pyknotic nuclei characterized by chromatin condensation. Accordingly, the intercellular spaces between these necrotic spermatogonia are dilated (Figs. 8 & 9).

The primary spermatocytes of control testis are rounded in configurations with prominent large rounded nuclei having distinct nucleoli, homogenous chromatin materials including both heterochromatin and euchromatin, and surrounded by nuclear membrane. The cytoplasm appear granular, characterized by dispersed oval mitochondria, cisternae of smooth endoplasmic reticulum, lysosomes and Golgi apparatus (Figs. 7 & 10). Whereas, primary spermatocytes of hydrocortisone-treated testis decreased in size, revealing condensed chromatin materials in the nucleus and in the

cytoplasm electron dense mitochondria and vacuoles are seen (Fig. 11).

As shown in figure (12), the electron micrograph of rounded spermatids of control rat testis manifested the formation of the acrosome in developing spermatid. This formation starts with the appearance of a proacrosomal granule in an acrosomal vesicle associated with the Golgi complex, then the acrosomal vesicle enlarged and adhered to the anterior pole of the nucleus, spreading over the hemisphere of the nucleus to form an acrosomal cap. Also, the cytoplasm possesses few stacks of rough endoplasmic reticulum, vacuolated mitochondria and lysosomes. The nucleus is well defined characterized by a single nucleolus, chromatin networks, and surrounded by distinct nuclear membrane. While, hydrocortisone-treated rat revealed rounded spermatids with ruptured plasma membrane in some positions, vacuolated cytoplasm, electron dense mitochondria, condensed Golgi apparatus and acrosomal granule detached from the anterior hemisphere of an obviously atrophied nucleus with disappearance of the nucleolus reflecting stage of karyolysis (Figs. 9&13). As previously mentioned, in the treated rats, the spermatogenesis was arrested at the stage of rounded spermatids formation as revealed by the disappearance of elongated spermatids and spermatozoa in these electron micrographs which means that they were severely affected post hydrocortisone treatment.

In electron micrograph of control testis, Sertoli cells showed distinct nucleus and cytoplasmic characteristics consistent with an active secretory state. It rests on the basal lamina of the tubule, extending towards the lumen of the tubule, filling the narrow spaces between the cells of the spermatogenic series. The cytoplasm contains mitochondria with distinct tubular cristae, cisternae of smooth endoplasmic reticulum, few stacks of rough endoplasmic reticulum, Golgi apparatus and lysosome. The nucleus appears irregular in shape, devoid of heterochromatin, containing a prominent nucleolus, surrounded by nuclear envelop and exhibits deep indentation as clearly observed in figure (14). While, Sertoli cells of hydrocortisone-treated rats are shrunk in size, containing electron dense mitochondria, fragmented smooth endoplasmic reticulum, lysosomes and vacuoles. The nuclei are irregular in shape with deep indentation and containing distinct electron dense nucleoli and prominent electron dense chromatin bodies (Figs 9 & 15). It is clearly noticed in figure (9) that, Sertoli cells detached from the basal lamina and moved towards the lumen of the tubule.

Normal Leydig cells of control rat possess large spherical nuclei with distinct nucleoli, euchromatin and coarse clumps of peripheral heterochromatin, in addition to the cytoplasm containing cisternae of smooth endoplasmic reticulum, mitochondria and lipid droplets. Monocytes are also found in the interstitial tissue. This cell is the largest white blood cells, highly motile, phagocytic cell and is the precursor of macrophages. It is characterized by a large eccentrically placed bilobed nucleus. Numerous small pseudopodia extend from the monocyte for its phagocytic role and amoeboid movement (Fig. 16).

Examination of the interstitial tissue from hydrocortisone-treated testis showed necrotic Leydig cells having deformed mitochondria, reduced smooth endoplasmic reticulum and few lipid droplets. Blood capillary lined with endothelial cells is also seen (Fig. 17).

4. Discussion

The testis is considered to be the most important organ in the male reproductive system. It is characterized by two main functions, synthesis of steroid hormones and production of spermatozoa (Carreau *et al.*, 2002). Various factors could affect spermatogenesis, among these factors are chemical agents, such as medicines and toxic elements in environmental pollution (Yano and Dolder, 2002).

Several studies had been carried out to investigate the severity of adverse effects of hydrocortisone as a synthetic glucocorticoid drug on

different body organs such as the pancreas (Gloor *et al.*, 2001), reproductive aspects of female rats (Piffer and Pereira, 2004), the thymus (Rodrigues-Mascarenhas *et al.*, 2006), the liver (Gevorgyan *et al.*, 2008), the hypothalamo-hypophyseal-adrenocortical system (Yarushkina, 2008) and the hippocampus (Tata and Anderson, 2010). Unfortunately, no literatures can be detected on the impacts of hydrocortisone on the structures and ultrastructures of mammalian testis. So, the present work aimed to throw the light on such studies in adult albino rat testis.

The results of the present study revealed various histological and ultrastructural alterations of the testicular tissues. The surrounding basal lamina of the tubules was thickened with irregular wavy appearance. The basal lamina plays an important role in maintaining substance transportation between interstitial tissue and spermatogenic epithelium and in maintaining the structural and functional integrity of tissues (Richardson *et al.*, 1998).

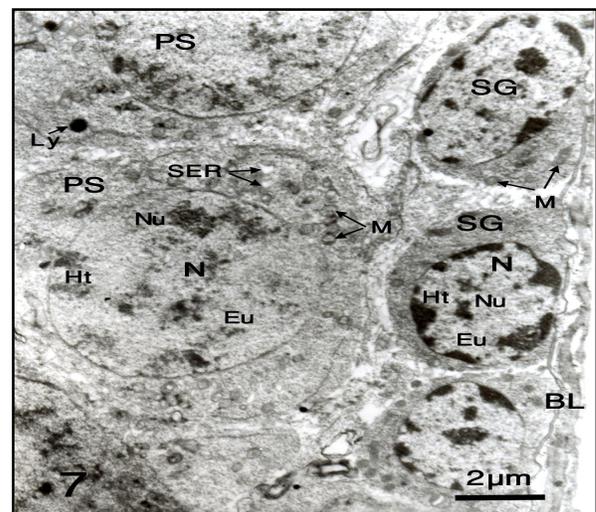


Figure (7): Seminiferous tubule of control rat surrounding by thin basal lamina (BL) and formed of; spermatogonia (SG) possessing rounded to oval nuclei containing nucleoli (Nu), euchromatin (Eu) and margined heterochromatin (Ht). The cytoplasm containing mitochondria (M), and primary spermatocytes (PS) which are rounded in shape having large rounded nucleus (N) containing; nucleoli (Nu), heterochromatin (Ht) and euchromatin (Eu). Mitochondria (M), smooth endoplasmic reticulum (SER) and lysosomes (Ly) are seen clearly in the cytoplasm. (x4000).

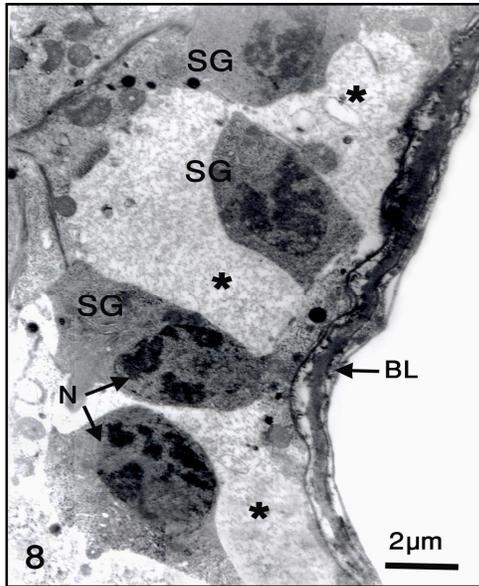


Figure (8): Seminiferous tubule of hydrocortisone-treated rat displaying degenerated spermatogonia (SG) with irregular shapes, detached from the thickened basal lamina (BL) and having pyknotic nuclei (N) with condensed chromatin, in addition to increased intercellular spaces (*) between them. (x4000)

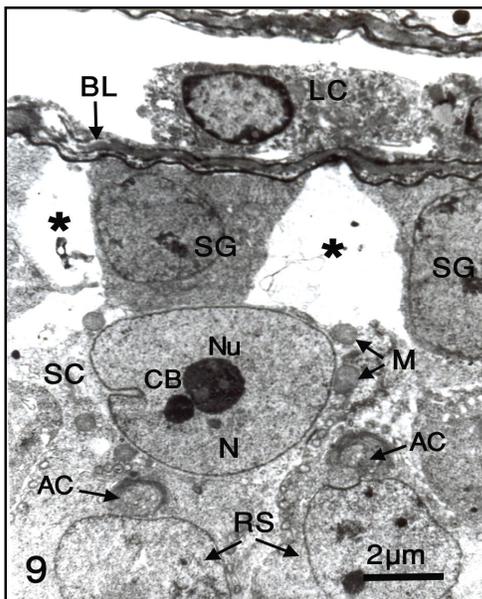


Figure (9): Another tubule of treated rat surrounded by an irregular, thickened basal lamina (BL) and having degenerated spermatogonia (SG) with trapezoidal shape and increased intercellular spaces (*) between them, round spermatids (RS) with detached acrosomal cap (AC) of their nuclei, in addition to Sertoli cell (SC) detached from the basal lamina, resting in front of the spermatogonia with destructed cytoplasm having few mitochondria (M). Besides, Leydig cell (LC) with pyknotic nucleus is also noticed. (x4000)

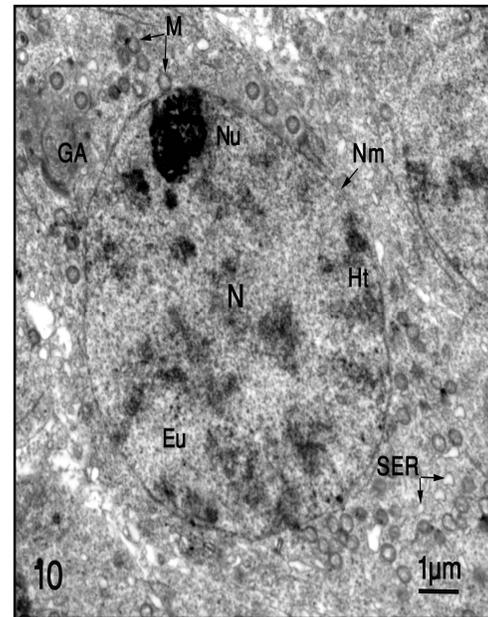


Figure (10): Primary spermatocyte of control testis having large rounded nucleus (N) containing nucleolus (Nu), heterochromatin (Ht) and euchromatin (Eu) and surrounded by nuclear membrane (Nm). The cytoplasm containing oval mitochondria (M), smooth endoplasmic reticulum (SER) and Golgi apparatus (GA). (x6000)

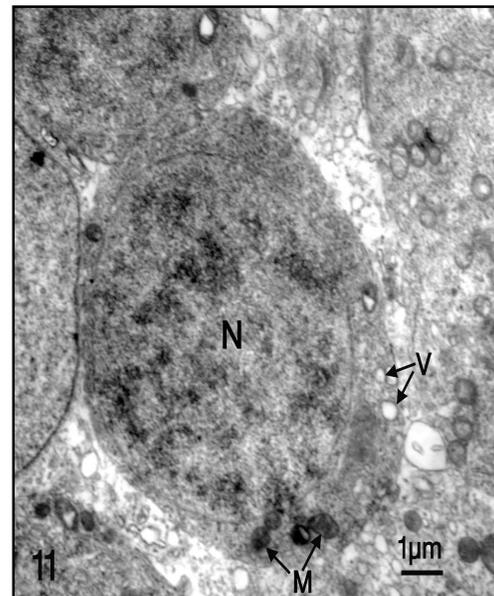


Figure (11): Primary spermatocyte of hydrocortisone-treated testis showing an atrophy in size, pyknotic nucleus (N) having condensed chromatin materials and the surrounding cytoplasm containing deformed mitochondria and vacuoles (V). (x6000)

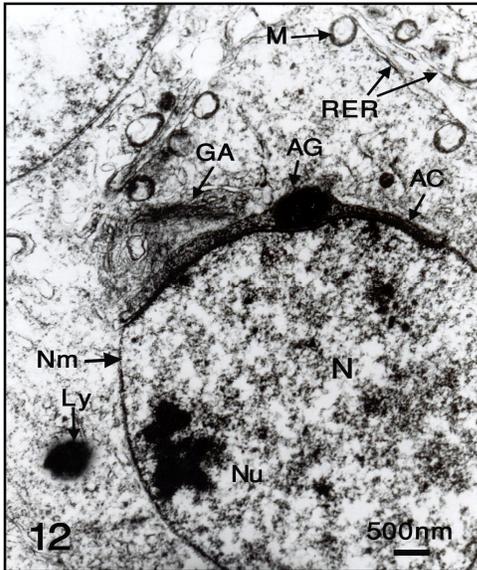


Figure (12): Rounded spermatid of control testis illustrating the formation of the acrosome, indicated by the presence of a proacrosomal granule (AG), acrosomal cap (AC), Golgi apparatus (GA) over the anterior hemisphere of the nucleus (N) which is rounded in shape, containing distinct nucleolus (Nu), homogenous chromatin materials and surrounded by nuclear membrane (Nm). The cytoplasm containing vacuolated mitochondria (M), few stacks of rough endoplasmic reticulum (RER) and lysosome (Ly). (x10,000)

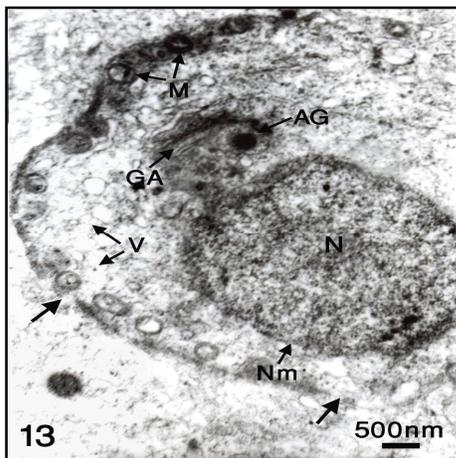


Figure (13): Rounded spermatid of hydrocortisone-treated testis exhibiting ruptured plasma membrane (arrows), detached acrosomal granule (AG) from the nucleus (N), condensed Golgi apparatus (GA), destructed stacks of rough endoplasmic reticulum (RER), mitochondria (M) in which some of them revealed deep electron density and numerous vacuoles (V). The nucleus showing an obvious atrophy in size with disappearance of the nucleolus reflecting stage of karyolysis. (x10,000)

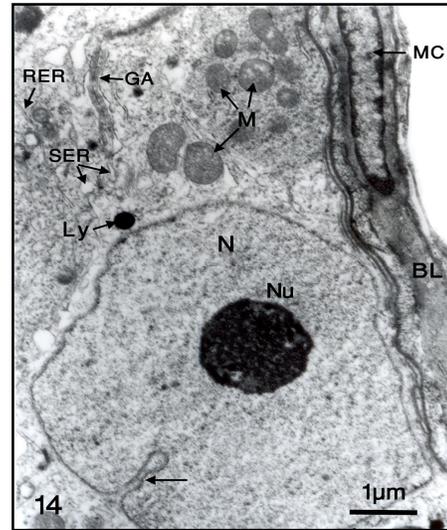


Figure (14): Sertoli cell of control testis revealing irregularly shaped nucleus (N), devoid of heterochromatin, containing one prominent nucleolus (Nu), and enclosed with nuclear envelope that exhibiting a deep indentation (arrow). The cytoplasm containing mitochondria with distinct tubular cristae (M), cisternae of smooth endoplasmic reticulum (SER), few stacks of rough endoplasmic reticulum (RER), Golgi apparatus (GA) and lysosomes (Ly). Part of the basal lamina (BL), with myoid cell (MC) are seen. (x7500)

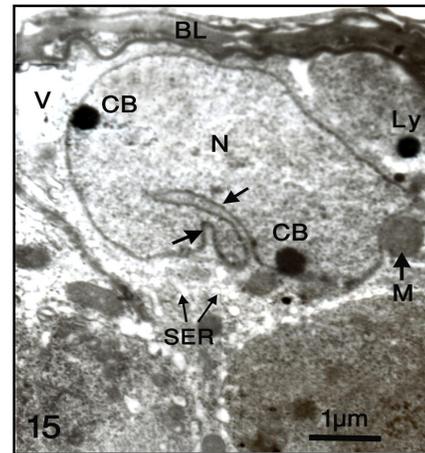


Figure (15): Sertoli cell of hydrocortisone-treated testis having cytoplasm containing electron dense mitochondria (M), lysosome (Ly), fragmented smooth endoplasmic reticulum (SER) and vacuoles (V). The nucleus (N) lacking of nucleolus, but containing two dense chromatin bodies (CB) adjacent to its inner nuclear membrane which is characterized by the presence of two deep indentations (arrows). Part of irregular, thickened basal lamina (BL) is also clearly observed. (x7500)

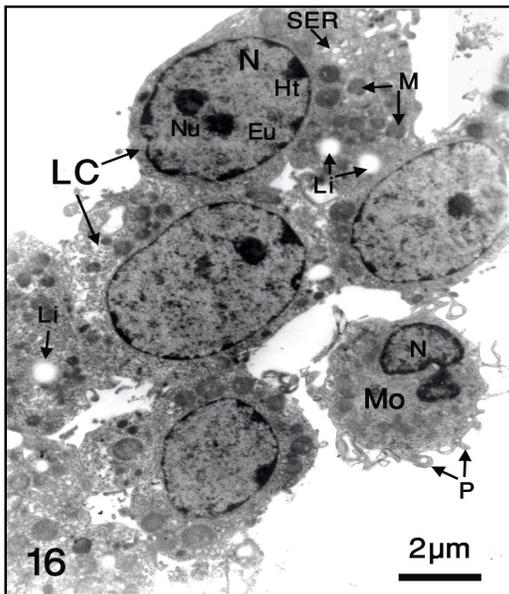


Figure (16): Interstitial tissue of control testis revealing normal fine structure of Leydig cells (LC), characterized by cytoplasm contain mitochondria (M), smooth endoplasmic reticulum (SER) and lipid droplets (Li), in addition to oval to rounded nuclei (N) containing one or two nucleoli (Nu), heterochromatin (Ht) and euchromatin (Eu). A monocyte cell (Mo) is also noticed with its eccentric nucleus (N) and numerous small pseudopodia (P) extending from it. (x4000)

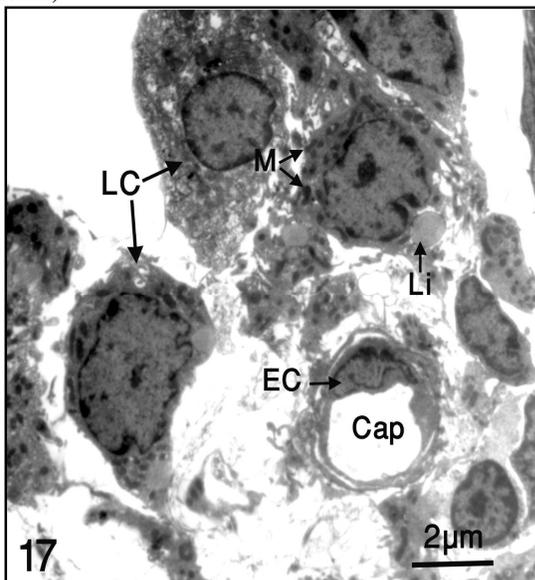


Figure (17): Interstitial tissue of hydrocortisone-treated testis displaying atrophied Leydig cells (LC) cytoplasm containing electron dense mitochondria (M), few lipid droplets (Li) and the nuclei (N) are irregular in shape showing signs of pyknosis. Blood capillary (Cap) lined by endothelial cell (EC) is also noticed. (x4000)

Many testicular disorders are associated with a thickened aspect of the tubular wall of the seminiferous tubules, which impairs the relationship between the inner tubular population and the interstitium. During the pathological thickening processes, Sertoli cell functions are progressively altered and eventually suppressed. According to the disturbance progresses, the germ cells display a progressive arrest of the spermatogenic processes. Subsequently, the lamina propria begins to separate, then thicken and finally shrunk. At the end of this process the basal lamina is absorbed, and leaves the so-called ghost tubules in the tissue (Anniballo *et al.*, 2000). Altered basement membrane structure has been associated with severe functional impairment of the testis. This destruction might subsequently affect transportation of oxygen, hormone, nutrition, and metabolites (Zheng *et al.*, 2008).

Interactions between Sertoli cells, peritubular myoid cells, Leydig cells, and germ cells are thought to be essential for spermatogenesis. Each of these interactions must be communicated through the extracellular matrix of the basement membrane. Many reports have demonstrated that over expression of the subtypes of type IV collagen correlates with abnormal thickened basement membrane and it is related to spermatogenic dysfunction in human and other mammals, since type IV collagen is a major constituent of mammalian basement membrane and is secreted by myoid cells and Sertoli cells (Dobashi *et al.*, 2003; Mattias *et al.*, 2005).

Sertoli cells have been shown to be the target for various toxicants (Krishnamoorthy *et al.*, 2005). In the present work, damage of Sertoli cells was evident following hydrocortisone administration. Dilated intercellular spaces and loss of contact between germ cells is apparently due to Sertoli cell disturbances which also lead to loss of these germ cells and finally to the destruction of testicular tissue and infertility (Monsees *et al.*, 2002). Sertoli cells foster the development and maintain the viability of germ cells by secreting hormonal and nutritive factors into a specialized compartment (blood-testis barrier), formed by tight junctions between the adjacent Sertoli cells and the germ cells. Also, it forms the sites of attachment of germ cells and provide physical support to them (Richburg, 2000; Sawada and Esaki, 2003). During spermatogenesis, spermatogonia differentiate into spermatocytes that cross through the blood-testis barrier as they mature and traverse the tubular lumen (Cook and Saunders, 2002; Siu and Cheng, 2004).

Spermatogonia demonstrated severe defects post hydrocortisone administration, they lost their

normal shapes, possessing features of necrotic cells. As De Rooij and Russell (2000) described, spermatogonia are particularly vulnerable to toxicants and physical agents. In particular, because of their mitotic activity, they are more vulnerable than Sertoli, Leydig cells and spermatids. Spermatogonia have three major roles; first, spermatogenesis is initiated via spermatogonia. Second, the population of germ cells is greatly increased via the mitotic activity of spermatogonia, as one spermatogonium on average goes through 8 to 9 divisions before differentiating into a spermatocytes. Third, regulation of germ cell numbers is accomplished in the spermatogonial population of cells. Thus, alterations of spermatogonia will be reflected on the development of the following stages of spermatogenesis.

Different defects in spermatocytes and spermatids post hydrocortisone treatment may reflect the disturbances in the microenvironment of the Sertoli cells, that affect the protein synthesis machinery essential for germ cell differentiation. Proteins necessary for the differentiation of germ cells are secreted at their highest rates in the testis during spermatid elongation and spermiation (Manivannan *et al.*, 2009).

The present results showed that hydrocortisone treatment also exerts an effect on Leydig cells; showing remarkable decrease in number and size. Close relationship between Leydig cells and blood vessels suggests that these cells are at high risk of exogenous toxicants. In normal testicular function, Leydig cells are the centers of fertility regulation and reproductive health (Boekelheide, 1993). Within the testis, steroidogenesis occurs in the Leydig cells. Inside these cells, the steroidogenic pathway begins in the cytoplasm and includes chemical reactions that occur in the mitochondria and smooth endoplasmic reticulum, where the final end product –testosterone- is produced (Dharia *et al.*, 2004).

The results of the present study are in accordance with other previous studies using other drugs, such as those reported by Yano and Dolder, (2002) after paracetamol treatment into rats, after injection of rats with Nandrolone decanote -an anabolic androgenic steroid drug- (Mesbah *et al.*, 2008), and post long-term treatment with the methanol subfraction of *Carica papaya* seeds in rats (Manivannan *et al.*, 2009).

In conclusion, data from the present study showed that hydrocortisone administration into adult male rats exerts a clear effect on testicular structures and ultrastructures including degenerated changes of germ cells, Sertoli cells, and Leydig cells. These changes reflect on their functions exerting deficiency in their performance. So, it should be utilized under

restricted precautions in the medical fields to protect the human health from its hazardous impact.

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Review of the effectiveness of management systems on empowerment of employees: A case study in an Iranian Power Generation Management Co.

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Abstract: One of the most important subjects in management research is empowerment of employees. Many researchers have studied empowerment in different organizations, and presented different theories about it. In this paper in order to find relationship between management system and increasing employee's empowerment, one main and three sub-hypotheses have been posed: Main hypotheses: the existence of integrative management systems would effect on increasing the employ's empowerment system ISO14001 and occupational health management system ISO18001. The method of research is experimental and tools to gather the data is questionnaire. The statistical society of this research is the employees of Shazand Power Generation Management Co. the number of sample is that had responded to the questionnaire were 100 employees. After analysis the data by software SPSS the following results had been seen: The existence of management systems with 0.802 coefficient correlation would effectively and strongly impact the employ's empowerment increasing and also the result of this study indicated that the existence of environmental management system with 0.633 coefficient correlation, the existence of quality management system with 0.733 coefficient correlation and the existence of occupational health and Safety management system with 0.833 coefficient correlation have had the most effect on the employees' empowerment. [Mojtaba Rafiey, Hadi Ghaffari, Mahdi Bandarkhany. Review of the effectiveness of management systems on empowerment of employees: A case study in an Iranian Power Generation Management. Journal of American Science 2011;7(6):1204-1210]. (ISSN: 1545-1003). <http://www.americanscience.org>.

Key words: Integrative management system, Quality management system ISO9001, Environment management system ISO14001. Empowerment

1. Introduction:

Quality and quest for quality, along, along with achieving an acceptable and promoting business process from various viewpoints, has been one of the most important. Debates during the past few years. Progress in the field of business and a bigger share of market along with access to such issues as customer's satisfaction, meeting legal and international requirements and are amongst the most fundamental factors persuading institutions to move towards systematizing their activities. Meanwhile, various international standards in the fields of quality, environment, safety and professional health, have had a fundamental and undeniable role. Similarities of such management systems and advantages of their synchronous implementation, has raised the issue of integrated management systems. Therefore the objective of establishing the integrated management systems and executing the empowerment process is to improve the quality level of products and speed of providing services the result of which being, satisfaction of expectations, demands, satisfaction of transformer, more profit and increased market share.

2. Problem statement and its importance:

The fact is that during the recent years, in line with evolution of the concept of quality and producing

superior products, other issues have been raised on behalf of state and social organizations such as the environment protection organization, insurance and social security institutions and ... without regarding which, the possibility to keep market, and survival in the competition field will not be easily feasible. On one hand, regarding the ever increasing growth of population and limitation of natural resources, environmental protection as one of the most crucial problems of the human society has been raised and this topic is not limited to the political and geographical border and demand for collective endeavor on behalf of all the inhabitant, of the earth globe. In the issue of unstained development too, optimal exploitation of natural resources, especially non renewable resources, quality products production and increased productivity has a crucial importance. Therefore, producing better product should not be done at the expense of damaging environment and destroying the human. Based on the above said reasons, many firms, in addition to obtaining the Quality Management system certificate (QMSC)², fake actions to obtain the Environmental Management Systems (EMS) and the Occupation Health and Safety Management System (OHSMS) and obtaining the relevant certificates from the certificate granting firms. Regarding the importance of establishing the

integrated management system in the institutions and empowerment of staff, in this research attempt has been made to answer to the following questions:

1. Is the integrated management system effective on empowerment of employees?
2. Which of the standard systems is more effective on empowerment of employees?

3. The research objectives

The main objective of the present research is to review effectiveness of executing the integrated management systems in the shazand power generation management Co. and identify the effective and key factors on increasing effectiveness of the management systems so that the power station directors can, through activating these factors achieving the objectives defined in the mission and policy of the institution.

Also, regarding that the present research is an applied one, several applications can be expected of it inducing:

1. Finding the relation between the standards and the manpower.
2. Is establishment of the management systems effective on empowering staff and how and to which degree?
3. Level of satisfaction of employees of establishment of such systems and the procedure of dealing with such cases.
4. theoretical bases of research:

A: The integrated management systems:

To do any type of business, there is need for a criterion for evaluating the activities and standards have been able to do this job. To establish an effective system in the institution, the four stages of planning, doing (execution), checking and action should be performed. The expanse of application of management standards depend on such factors as policy of the institution and nature of the activity conditions. The main factor has been the concept of integrating the triad interaction systems of management between them. The amplifying factor of the concept of integrating the management system enjoys many advantages arising from their implementation for the institutions [1].

The integrated management systems means a mixture of several management systems established, executed, monitored and measured as a limit and administered as a process.

The integrated management system includes the Quality Management System, Environmental Management System, and the Occupational Health and Safety Management Systems based on the interactional ISO, ISO 9001:2008, 14001:2004 and OHSAS 18001:2007 standards [2].

Synchronous establishment of the three systems will assist a combined or assembled management system. In this system, requirements and demands of the management, quality, and safety and environment systems are combined and obey a unique documentation system. In this system, the volume of the previous documents of quality is decreased and through integration into the safety management system is significantly reduced and a unique system is codified for all the free systems. Also the executive methods and directions are adapted to requirement of all the three systems and the volume of documents is reduced up to a one third. In the policy of these three systems, the main objectives of quality, environment and safety are defined. In the other words, at this stage the institution will be able to adapt its system with the integrated management system.

Advantages of the integrated management systems: some of the advantages of the integrated management system are as follows:

- Definition of the objective in a clear form and regarding the institution's policy.
- Preventing traveling the wrong courses towards the objective.
- Removing the interference and disharmony of the various intersystem mechanisms.
- Reduction of costs due to duplications.
- Establishment and expansion of the dynamic data circulation in the system.
- Providing the possibility of reviewing the system and removing the defects and weak points of the system.
- Provision of the possibility of obtaining feedback from details of the activities.
- Provision of a background for the various process predictions. [2].

4- Definition of empowerment

The English word 'empower' in the Oxford concise dictionary has been defined as to become powerful, authority to act making powerful and granting permit. This term includes the power and freedom of action for enforcing one's will and in the institutional concept; it means the change of culture and courage for establishment and running an organizational environment.

- Empowerment is a process through which a manager helps employees to obtain the ability required for independent decision taking. This process is effective not only on performance but also on personality of individuals [3].
- Empowerment means development of the individual's potentials and competence for attaining continuous empowerment in the institution's performance.

- Promotion of the employees' ability in better use of their power of change and analysis, having in sight in performing their works and complete participation in decisions effective on their lives.
- Empowerment is the process of developing the institution, leads to increase power of the staff to solve problems, promotion of their political and social insight and makes them able to recognize and control the environmental factors.
- Empowerment provides an environment in which employees can work with more authority and have a role in the process of change and product improvement, reduce their needs to their immediate supervisor and take part in realizing the firm's objectives [4].
- Empowerment is the process of achieving continuous empowerment in the institution's performance through developing influence based on competence of individuals and group in all areas and duties which are effective on performance and general operation of the institution [5].

5 - The fox empowerment model

Fox believes that empowerment is a process through which the empowerment and competence is developed information is shared and resources and support is also provided. Fox is attempting to provide a model for empowering the employees.

In this model each of the empowerment components (culture, contribution in information, development of competence, provision of resources and support) are singly tested and finally a model has been provided based on ethical requirements to comprehend and employ empowerment of employees. [3].

Fox in his proposed model believes that so far the employees have not developed their knowledge and skills during traineeship and while performing a duty they should be regarded as an apprentice and then, when they promoted their knowledge and skill, can continue their work as a specialist worker and finally become a master in their field of activity.

Organizational culture

Harrison and Stocks have raised an interesting debate on the method in which the culture of an organization can lead to empowerment. These two, consider the organizational culture that part of the institution which gives one a special feeling, Harrison and stocks believe that the ratio of culture to institution is similar to the ration of personality to an individual which is apart from beliefs, values, work styles, and relations which distinguishes an institution from another [20].

Data distribution

Data distribution amongst employees can inform employees of problems and events, and change them to powerful individuals. Once this situation is provided, little by little work will precede through another procedure. Task structures from proportional to needs and specialties (not through the order of hierarchical reports). Once this happens, and data is available extensively and in a short period, the institution can no more remain as it is [3].

Empowerment won't be possible but through commitment of managers to education and exchange of information with the employees to whom they paid no attention (Brandt, 1998:247).

Competence Enhancement

Another of the empowerment requirements is nurturing competences of individuals and groups in the organization. No doubt all individuals have potentials in themselves to empower of which, such competences should be nurtured and developed. Individuals require nurturing competences needed for legal participation. Management and staff both have an identical Responsibility to nurture such competences. Individuals and groups should attempt to nurture in themselves the needed knowledge for informed and constructive participation. Management in turn should provide the support needed by employees everywhere so that they can nurture the debated participation skill in themselves. Some of the pivotal competences are:

- self management ability
- Critical though
- Communication establishing skills
- Flexible decision taking

Access to sources

In addition to data provision, power is enhanced via providing other sources which assist individuals to perform their duties. In this case, managers empowered by others, are mostly like defenders of a football game other than players of the attack line they are. Mostly resource suppliers and obstacle removers rather than directors and commanders. [6].

Support

The technique or approach of assisting other to experience empowerment, is to provide social and emotional support for them. In the event that it is intended that employees feel empowerment, manager should praise them, persuade them, support them and ensure them. [3].

Challenge towards empowering employees

The most crucial existing challenges can be reviewed from the two managerial and consequential dimensions.

A. Managerial Challenges

- * Lack of self-concept
- * Managerial security threat [7]

Achievements of the empowerment programs

Empowerment programs provide the institution with the possibility to behave in a creative and innovative way and present it business schemes in such a way which can retain always its status in the best possible situation. The most conspicuous advantage of employing such schemes is that it provides the motives for ever increasing understanding and commitment of staff and the institution.

Here we will point out to some of the other most important executive benefits of the power enhancing programs:

- * Concentration on customer- orientation and attaining satisfaction of the referring customers as the main axis of the crucial institutional decisions.
- * Taking crucial organizational decisions in a team and group form.
- * Participation and sharing employees in responsibilities, skills and organizational authorities.
- * Control and evaluation of individual and organizational performance by the evaluating groups.
- * Establishment of agility in the institution and rapid accommodation with environmental changes and modifications.
- * Dominance of the key skill of working in community and with others as the basic organizational thought.
- * Changing the concept of commanding to the ability to influence on others.
- * Changed responsibility of managers from mere control to releasing hidden abilities of staff [8].

6. Research Method:

Regarding importance of subject in this research, various dimensions of the managerial and empowerment model of the Fox correlation research procedure has been used. In this research, the statistical population includes all employees of the Shazand Power Generation Co. (480 individuals). In the present study the simple random method was employed and the sample volume according to the John Haravy statistical formula was specified to be 92. For more reliability of results, 100 questionnaires was distributed amongst members of the statistical population. Local territory of this research is the Shazand Thermal Power Station.

To collect required data library and internet search tools and various papers were used.

In this research, empowerment of employees was used as dependent variable and the integrated management systems as independent variables.

For this purpose, a questionnaire with 45 questions was designed in the following two sections:

A. Factors of the integrated management systems, a total of 25 questions including: The occupational health and safety management systems (9 questions),

the factor of environmental management system (7 questions) the quality management systems (4 questions).

B. Powerful factor, a total of 20 question including the organizational culture (4 questions) participation in data (data sharing) (5 questions), competence development (4 questions).

Also in this research, for the purpose of questionnaire assessment the Cronbach alpha test was used and in a volume samples of 30 individuals the Cronbach alpha of 0.843 was obtained indicating that the validity and stability of the system is appropriate. Since the research findings is base on polling from the respondents, based on Likret scale therefore to analyze the obtained results the inference spearman correlation was used as follows:

$$R_{rth_0} = 1 - \frac{6\sum D^2}{N(N^2 - 1)}$$

Also for grading the integrated management systems, the standards were separately graded according to the Freedman test.

7. Findings of the research

In conclusions where tests are used in which the relation between two variables are surveyed, if the correlation coefficient between the two variables is less than 0.3, the relation between the two variables is evaluated as being weak and in the event of this coefficient's sum being between 0.3 and 0.7, this relation would be medium and in case of its sum exceeding 0.7 it means that there is a powerful relation between the two variables. Obtained results are presented in the following table:

Empowerment of employees	Factor of the management systems	Correlation Coefficient
	The quality Management System	0.733
	The Environment Management System	0.633
	The Occupational Health and Safety Management System	0.866

As it can be seen in the above table, the highest correlation exists between the occupational health safety of employees and empowerment (0.866) and the least correlation exists between the environment management system and empowerment of employees (0.633).

A. Conclusion from the first secondary hypothesis

Statistical hypotheses regarding the first research hypothesis was codified and tested as follows:

∩ There is no significant relation between establishment of the quality management standard system and empowerment of employees:

H_0

There is a significant relation between establishment of the quality management standard system and empowerment of employees: H_1
Following performing the pertinent test the P-Value = 0.000 was obtained therefore the H_0 hypothesis was rejected and the H_1 hypothesis was accepted. The correlation coefficient between the two factors of the quality management system and empowerment of (0.733) was obtained. As a result, it can be stated that establishment of the quality management system had a positive effect on empowering employees at the Shazand Power Generation Co. Management.

B. Conclusion regarding test of the second secondary hypothesis:

The statistical hypothesis regarding the second secondary hypothesis was codified as follows:

There is no significant relation between establishment of the standard of environment management and empowerment of employees: H_0

There is significant relation between establishment of the environmental management standard and empowerment of employees:

H_1

Through performing the relevant test, the p-value= 0.000 is obtained. Therefore the hypothesis H_0 was rejected and the hypothesis H_1 was accepted. Since the correlation coefficient of (0.633) was obtained between the environmental management standard and empowerment of employees, it can be concluded that establishment of the above said system also has a medium effect on empowerment of employees in the Shazand Power Generation Management Co.

C. Conclusion regarding the third secondary hypothesis tests

The statistical hypothesis regarding the third hypothesis was also codified as follows:

There is no significant relation between establishment of the occupational health and safety management system and empowerment of employees: H_0 there is a significant relation between establishment of the occupational health and safety management standard and empowerment of employees: H_1 .

Through performing the relevant test, the p-value = 0.000 was obtained, therefore the H_0 hypothesis was rejected and the H_1 hypothesis was accepted. Thence the correlation coefficient between the occupational health and safety management system standard and empowerment of employees (0.866) was obtained thus it can be concluded that establishment of the above said system as well has a significant effect on empowerment of employees in the Shazand Power generation Management Co.

D. Conclusion concerning the main hypothesis of research:

In this research, the integrated management systems were segregated into three systems of quality management, environmental management and health and safety management and defined based on the Fox model for empowerment of employees and its factors along with identification of IMS systems and presented based on constitution of the Shazand Power Generation Management Co. Statistical hypothesis regarding the main hypothesis of the research were codified as follows:

There is no significant relation ship between establishment of the management systems and empowerment of employees: H_0

There exists a significant relationship between establishment of the management systems and empowerment of employees: H_1 .

Through performance of the test, the P-value = 0.000 was obtained. Thus the H_0 hypothesis was rejected and the H_1 hypothesis was accepted.

Therefore in this research through test effectiveness level of the management systems on empowerment of the Shazand Power Generation Management Co. was studied and it was revealed that the correlation coefficient between the integrated management systems (IMS) and empowerment of employees is 0.802 indicating that there is powerful and effective relationship between these two parameters.

Conclusion

If we look at the management of the Shazand Power Generation Co. it will be revealed that the two principles of empowering employees and performing all commitments of the integrated management are the ideals, mission and organizational delegation of the Shazand Power Generation Management Co. Therefore, co-direction and relationship between these two parameters was considered. Obtained results indicated that establishment of management systems has a significant and powerful relationship with empowerment of employees.

In the first hypothesis, it was attempted to assess the effect of establishing the quality management system on empowerment of employees. Therefore regarding the definitions provided of the above said system and empowerment of employees, "empowerment is the process of achieving continuous improvement in performance of the institution through development of extended influence based on competence of individuals and groups in all areas and for all duties influencing their operation and general performance of the institution" [5]. Also, apart from the extensive application that empowerment has obtained in various social, political and educational areas, this idea has found a fundamental position in present

movements of institutions towards quality management and continued improvement.

Regarding the fact that manufactured product of the Shazand Power Generation Management Co., is required by the national power network however, uniform product production and its not being seen by the employees has caused this factor of quality management system to have a moderate effect on empowerment of employees. On the other hand however, since performing commands and standard points of quality management is obligatory, employees deem themselves committed to perform it to prevent unwanted problems and trips in power generation. Also, regarding the result obtained in test of the second hypothesis, it can be concluded that establishment of the environmental management system as well will have a moderate effect on empowerment of employees in the Shazand Power Generation Co. Therefore, since execution of command and environmental points is directly entrusted with the authorities of the power station and codification of schemes to prevent air pollution is continued by the Environment Department experts and experts of the Bakhtar Regional Power and the Tavanir Co. as well from which the employees are informed at on moderate level and only a few of them are involved in these issues however execution of schemes of waste reduction and developing the culture of reducing pollution, are included in the programs of the Bureau of Education and Management systems from which the employees have goods education and sufficient information.

In the third hypothesis test, regarding the high coefficient obtained, it is revealed that establishment of the above said system has also a very high effect on empowering of employees at the Shazand Power Generation Management Co. This is because from the very beginning of formation of the Shazand Power Generation Management Co. extensive activities were done regarding promotion of the safely culture at the employees level examples of which are as follows:

1. Employment of the visual management technique for the safety principles and criteria: in this method, the safety signal relevant to business in a beautiful and desirable form was installed in all departments such that such signals were seen in all spaces and passage locations of employees.

2. All the employees received continuous safety education such that it could be claimed that the highest contribution of education concerned the safety issues and that this training was provided at a very high and quite technical level with the technical staff however for the administrative staff it was also provided.

3. Commitment of all managers and staff to safety criteria is another of the crucial factors effective on increase correlation intensity. From the establishment of the Shazand Power Generation Management Co.

This commitment has been established and continued to present. Implementation of the occupational health and safety management and intermixture of the safety issues with routine affairs of staff was also another factor effective on increased correlation intensity.

Finally regarding the general results obtained in this research, it was revealed that there is a powerful and effective relationship between the integrated management systems (IMS) and empowerment of the employees at the Shazand Power Generation Management Co. therefore it is recommended that, due to importance of occupational and safety of employees and observing the environmental issues and observance of quality standards and as a whole execution of the integrated management systems, this research be implemented in a comparative form in all the state and private sectors in the power industry plants.

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The Potential Health Hazard of Tartrazine and Levels of Hyperactivity, Anxiety-Like Symptoms, Depression and Anti-social behaviour in Rats

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Abstract: The current research aimed to determine the influence of different doses of exposure to tartrazine on levels of hyperactivity, anxiety, depression and anti-social behaviours in rats. Forty five weanling male Wistar rats were randomly assigned into 3 groups of 15, divided on 2 replicates and administered our treatment daily in drinking water at different concentrations; 0, 1% and 2.5% for a 16 weeks period. Different animal models of anxiety; open field, elevated plus maze and dark-light transition tests were employed in our study. Tests for depression as well as social interaction were also used. Tartrazine-treated rats showed hyperactivity in open field test presented by increased horizontal locomotion. Anxiogenic effect of tartrazine was evidently observed during open field, elevated plus-maze and dark-light transition tests. Furthermore, tartrazine intake significantly promoted depression as expressed by prolonged immobilization during forced swim test. Impairment in social interaction test was also detected signifying the relevance of administered dose especially on numbers of bouts of social contacts. This study provides sufficient scientific evidence that a causal link truly exists between tartrazine and inflection of hyperactivity, anxiety and depression-like behaviours in rats and points to the hazardous impact of tartrazine on public health.

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Key words: Food azo-colours tartrazine, hyperactivity, anxiety, depression, social interaction, Wistar rats.

1. Introduction:

Color additives are used in a wide variety of foods such as beverages, dairy products, cereals, bakery goods, snack foods and ice creams. Although there are strict guidelines for chemicals to be approved as food additives, the safety of food colorants has not been rigorously proven, and acceptable daily intake (ADI) has been used to minimize any possible unfavorable effect of the dyes. Food azo-colours tartrazine is one of the most widely used artificial foods, drugs and cosmetic dyes.

Several human studies have related artificial food colorants such as tartrazine, sunset yellow, carmoisine and ponceau with conduct disorders (Weiss et al., 1980; Schab and Trinh, 2004). Moreover, increasing evidence suggests the potential toxicological risk of tartrazine (Mehedi et al., 2009). In addition, Schauss (1984) and Bateman et al. (2004) concluded general adverse behavioural and psychological effects with artificial food colorants in children.

A number of data has described tartrazine-related hyperactivity in children (Schab and Trinh, 2004; McCann et al., 2007). Moreover, noticeable effect of tartrazine on the behavior of young mice has been reported (Tanaka, 2006; Tanaka et al; 2008). Although several researches have linked tartrazine ingestion to a variety of immunologic responses

including anxiety and clinical depression (Rowe and Rowe, 1994), little rigorous research in the field of toxicological effects of tartrazine on behaviours relevant for models of CNS disorders, such as anxiety, depression and social behaviour were verified until recently.

Therefore, the goal of this study was to explore the adverse effect of long term exposure to food colorant tartrazine on hyperactivity as well as mood-like behaviours in the form of anxiety, depression and social interaction in rats.

2. Materials and Methods:

2.1. Animals and housing:

Forty five weanling male Wistar rats, weighing approximately 40-50 g were used in this experiment. Animals were obtained from the Unit for Laboratory Animals at Faculty of Veterinary Medicine, Cairo University. They were maintained in plastic cages, with stainless steel wire lids (bedded with wood shavings), on a standard laboratory feed diet. Feed and water were offered ad libitum. Rats were housed at a controlled temperature of $21 \pm 1^\circ\text{C}$, 60 % humidity and under a 12-h-light:12-h-dark schedule. All efforts were made to minimize the numbers of animals and their suffering in this study through following the guidelines released by Cairo University Policy on Animal Care and Use.

2.2. Administration of tartrazine:

Tartrazine (FD and C Yellow No. 5) was obtained from Sigma chemical Company (Sigma, Aldrich, USA) and dissolved in tap drinking water at a different concentrations; namely 0%, 1% (low dose) and 2.5% (high dose) (Mehedi et al., 2009). Rats were randomly divided into three groups of 15 animals, each and provided ad libitum access to drinking water containing tartrazine for 16 weeks. The control group received tap water only.

2.3. Behavioural measurements:

Behavioural tests were performed in the first half of light phase of the light/dark cycle. All behaviours were scored by a single trained observer unfamiliar with treated animals. Hand operated counters and stop watches were used to score animals' behaviour. Behavioural tests were separated by at least 24 h from each other and executed in the same order presented below.

2.3.1. Open field behaviour test:

The open field test provides simultaneous measures of locomotion, and anxiety (Kelly, 1993; Millan, 2003). The open field used was a square wooden arena measured (90 x 90 x 25cm). The wood of the apparatus is covered with a plastic laminate (formica), which prevents absorption of fluids (urine of rats). The floor was divided by black lines into 36 small squares (15 x 15cm). The open field maze was cleaned between each rat using 70% ethyl alcohol to avoid odor cues. The rats were carried to the test room in their home cages and tested once at a time for 5 minutes each. Rats were handled by the base of their tails at all times. Rats were taken from their home cages and placed randomly into one of the four corners of the open field facing the centre. The behavioural scores measured in this experiment included total numbers of line crossings, rearing against the wall, grooming, stretch attending posture and fecal boli.

2.3.2. Elevated plus maze test:

The elevated plus-maze was used for testing of anxiety and emotionality. The degree of avoidance of the open arms of the maze has been considered as a measure of strength of fear drive (Trullas and Skolnick, 1993). The apparatus consists of 4 crossed arms, two open arms (50 x 10 x 30 cm) and two closed arms (50 x 10 x 30 cm). The maze was elevated 65 cm above the floor. The rat was placed in the centre of the maze and the number of entries in open and closed arms, respectively, as well as the time the animal spent in the open and enclosed arms during a period of 5 min test session was recorded (Kierstin, 2003; Walf and Frye, 2007). After each

trial the maze was wiped out with a cloth dipped in 70% ethyl alcohol and allowed to dry.

2.3.3. Light-Dark transition task:

The light-dark box apparatus consisted of a light, open topped, opaque, plexiglas box connected to a dark, closed topped, plexiglas box, each compartment measuring (30 x 40 x 40 cm). The boxes were connected by a small opening that allows the rat to cross between chambers. The rat was placed in the light box, allowed to move freely between the chambers, and its location was recorded for 5 min. The time spent on the light side of this apparatus during the 5 min test session compared to the dark side was recorded and used as an index for anti-anxiety behavior (Hascoet et al., 2001; Walf and Frye, 2005). Light box entry was defined as the rat having all four paws into the light box.

2.3.4. Forced swim test:

Rats were tested in the forced swim test as previously described by Frye and Walf (2002). Rats were placed in cylindrical container (50 x 20 cm) filled with 30 cm of 22°C water. The water level does not allow the rat to rest on its tail, or escape the cylinder by climbing out. The rat was placed in the water for 6 min. The time spent floating (represented immobility) was scored during the last 3 min. The time spent immobile is considered as an index of depression-like behavior in rodents (Sanchez and Meier, 1997).

2.3.5. Social interaction test:

On the day of the experiment, animals were socially isolated in plastic cages measuring (43 x 28 x 15 cm) for 3.5 h prior to the experiment. The task was conducted by placing two animals belonging to the same experimental group, but from different cages, into the test cage for a 15-min period. Tested pairs did not differ in body weight by more than 15 g. The social behaviour was assessed for a pair of animals (Schneider and Przewlocki, 2005). The total time spent in social behaviour and the numbers of social contacts were measured (Niesink and Van Ree, 1989).

2.4. Statistical analysis:

Data for open field, elevated plus-maze, dark-light transition, depression as well as social interaction tests were analyzed by analyses of variance (AVOVA), using the general linear models procedure in SPSS[®] statistical software (SPSS, 2006). Statistical significance of difference between control and treated groups was determined by post hoc Tukey HSD test. A value of ($P < 0.05$) was considered

statistically significant. All data are expressed as mean \pm SEM.

3. Results:

3.1. Open field test:

The effect of tartrazine treatment on parameters of open field test was illustrated in Table 1. Rats under tartrazine effect increased significantly ($p < 0.001$) the mean covered distance in the open field test when compared with the control group. An anxiogenic like effect was obtained in tartrazine-ingested rats when compared to their counterparts in controls. Tartrazine-treated individuals presented a significant ($p < 0.05$) increase of rearing in peripheral area of the test. Treatment also significantly ($p < 0.05$) reduced numbers of central squares entered. A significant dose-dependent response was noted for numbers of grooming as well as stretch attending postures in tartrazine-exposed rats in comparison to their control ($p < 0.001$). The highest levels of these behaviours were recorded with high tartrazine dose. Moreover, a marked significant ($p < 0.01$) increase in fecal boli was also observed in rats following tartrazine treatment when compared to animals belonging to control group, regardless of incorporated dose.

3.2. Elevated plus maze:

The effect of tartrazine on measurement of elevated plus maze was demonstrated in Table 2. Regardless of the ingested dose, animals under tartrazine effects significantly ($p < 0.05$) diminished the numbers of entries in the open arms of the maze, accompanied with significant increase of this

measure in the closed arms. Regarding time spent in the open arms, tartrazine was significantly successful in endorsing an aversive dose-related effect since the shortest time spent in open arm was recorded with high tartrazine group.

3.3. Dark-light transition test:

A similar pattern of effects as those displayed in the elevated plus-maze was obtained in rats submitted to the dark-light transition test (Table 3). Statistical analysis showed that time spent by tartrazine-treated rats in the light compartment was significantly ($p < 0.001$) diminished, while increased in the dark compartment compared to control counterparts.

3.4. Forced swim test:

Immobility time during forced swim test was shown in Table 4. This measure was increased significantly ($p < 0.001$) in rats challenged with high dose of tartrazine compared to control rats.

3.5. Social interaction test:

Measurements of social interaction test in rats were presented in Table 5. Exposure to tartrazine significantly ($p < 0.001$) affected social interaction parameters as indicated by reduced time engaged in social behaviour with decreased numbers of social contacts as well. Although administered dose of tartrazine showed no significant change in time spent in social interaction, a marked significant dose response was noted for social contacts numbers ($p < 0.01$) showing less contacts with higher dose.

Table 1. Effect of tartrazine on the behaviour of rats in the open field test.

	Experimental Groups		
	(C) Group	(Low T) Group	(High T) Group
Total no. of squares crossed	50.20 \pm 2.95 ^a	68.87 \pm 5.22 ^b	79.87 \pm 4.33 ^b
No. of rears in the periphery	6.40 \pm 0.94 ^a	9.87 \pm 0.97 ^{ab}	10.80 \pm 1.27 ^b
No. of center squares entries	1.20 \pm 0.30 ^a	0.67 \pm 0.19 ^{ab}	0.27 \pm 0.15 ^b
No. of grooming	3.13 \pm 0.34 ^a	7.67 \pm 0.40 ^b	9.40 \pm 0.65 ^c
No. of stretch attending posture	1.53 \pm 0.34 ^a	2.53 \pm 0.26 ^a	5.93 \pm 0.59 ^b
No. of fecal boli	2.07 \pm 0.42 ^a	3.27 \pm 0.61 ^{ab}	4.87 \pm 0.52 ^b

(C) Group: Animals received plain water without any treatment and served as a control.

(Low T) Group: Animals received 1% tartrazine.

(High T) Group: Animals received 2.5% tartrazine.

^{a-c} Values within row with unlike superscripts differ significantly ($p < 0.05$), according to ANOVA. Values are expressed as mean \pm SEM, n = 15 in each group.

Table 2. Effect of tartrazine on the behaviour of rats during the elevated plus maze test.

	Experimental Groups		
	(C) Group	(Low T) Group	(High T) Group
No. of entries (open arm)	4.20±0.44 ^a	1.87±0.19 ^b	1.47±0.22 ^b
No. of entries (closed arm)	3.87±0.32 ^a	5.33±0.44 ^b	6.13±0.36 ^b
Time spent (open arm) (s)	71.33±6.23 ^a	54.27±4.06 ^b	27.40±3.97 ^c
Time spent (closed arm) (s)	180.27±12.32 ^a	196.73±6.91 ^a	205.80±7.59 ^a

(C) Group: Animals received plain water without any treatment and served as a control.

(Low T) Group: Animals received 1% tartrazine.

(High T) Group: Animals received 2.5% tartrazine.

^{a-c}Values within row with unlike superscripts differ significantly ($p < 0.05$), according to ANOVA. Values are expressed as mean ±SEM, n = 15 in each group.

Table 3. Effect of tartrazine on the behaviour of rats during the Dark-light transition test

	Experimental Groups		
	(C) Group	(Low T) Group	(High T) Group
Time spent (light compartment) (s)	227.33±9.49 ^a	109.00±10.21 ^b	107.60±9.58 ^b
Time spent (dark compartment) (s)	72.67±9.49 ^a	191.00±10.21 ^b	192.40±9.58 ^b

(C) Group: Animals received plain water without any treatment and served as a control.

(Low T) Group: Animals received 1% tartrazine.

(High T) Group: Animals received 2.5% tartrazine.

^{a-c}Values within row with unlike superscripts differ significantly ($p < 0.05$), according to ANOVA. Values are expressed as mean ±SEM, n = 15 in each group.

Table 4. Effect of tartrazine on the behaviour of rats during the forced swim test.

	Experimental Groups		
	(C) Group	(Low T) Group	(High T) Group
Immobility time (s)	39.60±3.02 ^a	48.40±3.42 ^a	83.47±5.48 ^b

(C) Group: Animals received plain water without any treatment and served as a control.

(Low T) Group: Animals received 1% tartrazine.

(High T) Group: Animals received 2.5% tartrazine.

^{a-c}Values within row with unlike superscripts differ significantly ($p < 0.05$), according to ANOVA. Values are expressed as mean ±SEM, n = 15 in each group.

Table 5. Effect of tartrazine on the behaviour of rats in the social interaction test.

	Experimental Groups		
	(C) Group	(Low T) Group	(High T) Group
Time spent in social interaction (s)	370.67±11.78 ^a	216.20±7.66 ^b	224.80±9.00 ^b
No. of social contacts	81.47±2.12 ^a	53.33±4.72 ^b	36.80±2.19 ^c

(C) Group: Animals received plain water without any treatment and served as a control.

(Low T) Group: Animals received 1% tartrazine.

(High T) Group: Animals received 2.5% tartrazine.

^{a-c}Values within row with unlike superscripts differ significantly ($p < 0.05$), according to ANOVA. Values are expressed as mean ±SEM, n = 15 in each group.

3. Discussion:

The present study elucidated the effect of tartrazine on open field locomotor activity in adult male Wistar rats. Tartrazine-treated animals significantly displayed higher levels of ambulation, a measure of hyperactivity, as indicated by increased numbers of crossing squares. Our findings are in accordance with previous scientific research reporting an association between behavioural deficits in young children in form of overactive, impulsive and inattentive behaviour and synthetic food colours (Boris and Mandel, 1994; Overmeyer and Taylor, 1999; Schab and Trinh, 2004; McCann et al., 2007). In contrast to our results, Tanaka (2006) demonstrated no link between tartrazine and hyperactivity in mice offspring. This discrepancy in results might be attributable to the different inoculated doses. Tartrazine-induced hyperactivity might be explained on the basis of zinc chelating property of tartrazine. Zinc depletion was found to be one of the potential causes of childhood hyperactivity following exposure to tartrazine (Ward et al., 1990). In addition, the formerly reported implication of azo dyes in motor system affection in mammals through dopamine pathways might further clarify the current noticeable hyperactivity in rats (Silbergeld and Anderson, 1882; Mailman and Lewis, 1983).

Anxiety in rats can be measured by behavioral reactivity to non-social or social stressors (Kim et al., 2004). These behaviors were compared by performing the open-field, elevated plus maze and the light-dark transition tests (non-social) as well as social interaction test (social). With regard to the present study, it is important to note that most of the behavioural models cited above have mainly been used in the studies on the neurobiological mechanisms implicated in the production of fear and anxiety elicited in animals exposed to aversive situations (Rodgers, 1997; Rodgers and Dalvi, 1997; Menard and Treit, 1999).

In our study, tartrazine caused a significant increase in the anxiety levels of rats in all three anxiety models employed. Regarding anxiety measurement in the open field test; numbers of rearing against the wall, central squares entered, grooming, stretch attending posture (risk assessment) as well as fecal boli, all parameters were greatly influenced by ingestion of tartrazine. Here, tartrazine prominently increased rearing activity regardless of the incorporated dose in rats. Rearing response against periphery has been proved to reflect higher levels of anxiety in rats (Anderson and Hughes, 2008). Again regardless of the administered dose, tartrazine-exposed rats showed increased entries of central squares in the open field. Frequent entries of central squares have been reported to indicate curious

animal with lower levels of anxiety (Frye et al., 2000). Supporting evidence for highly anxious rats in the current study derived from increased grooming activity. Moreover, expression of grooming behaviour was greatly affected by the administered dose where high doses of tartrazine were accompanied by increased grooming responses. Grooming has been validated as indicator of anxiety (Negishi et al., 2005). Risk assessment in the form of stretch attending posture was also found to increase after tartrazine exposure in rats. Higher frequency of these postures was reported to indicate anxious state of individuals (Blanchard et al., 2001). Where fecal boli were shown to be a sensitive measure for anxiety state of animals (Singer et al., 2005; Reolon et al., 2006), present administration of tartrazine was shown to enhance defecation. In light of the above mentioned observations, exposure to tartrazine was noted to induce anxiety state in rats. After ingestion of tartrazine, humans were proved to develop anxiety (Rowe and Rowe, 1994; Ansari and Mosayebzadeh, 2011).

Because of rats' innate fear of height and openness, rats tend to remain longer in the enclosed arm (Treit et al., 1993). Data derived from elevated plus maze further affirmed the previously observed effect of tartrazine on anxiety-related behaviours during open field test. Regardless of administered dose, decreased visits for open arms of elevated plus maze were recorded in our study after exposure to tartrazine. However, a dose-dependent effect of tartrazine on time spent in the open arms was evidently shown, where the less time was observed with high dose-administered rats indicating that they avoid this aversive region of the maze as reported in other studies (Bhattacharya et al., 1995; Schulteis et al., 1998). Therefore, time elapsed in the open arms might be considered as the more sensitive index for anxiety than number of visits.

The light-dark test has been used to assess the anxiogenic effects of multiple classes of drugs (Jonkman et al., 2005; Kliethermes, 2005). Our measurements of dark-light transition test also support the former observation of tartrazine-induced anxiety-like responses, where marked diminution in time spent in light compartment was noticed with tartrazine-exposed rats.

The forced swim test measures behavioural despair in rodents, and is generally used to study depression (Raghavendra et al., 2000). Currently, data of forced swim task revealed that tartrazine-exposed animals exhibited higher immobility; an index of depression-like behaviour (Sanchez and Meier, 1997), as a response for increased levels of stress reaction. Further support derived from earlier human study for Southwick et al. (2005), where

elevated cortisol in response to chronic stress was associated with increased manifestations of depression. The role of tartrazine in modulation of depression response has been formerly outlined in children where ingestion of tartrazine showed clinical depression, migraines and sleep disturbance (Rowe and Rowe, 1994). In addition, Novembre et al. (1992) reported two cases of unusual reactions to food additives (Tartrazine and benzoates) involving mainly the central nervous system (headache, migraine, over-activity, learning difficulties and depression).

Since many social disorder models in rodents are linked to human social deficits syndrome, social interaction test has been implemented in the current study. A profound reduction in time engaged in social interaction was observed in this work accompanied with decreased frequency of social contacts following exposure to tartrazine. The most interesting finding was the dose-related reducing effect on bouts of social contacts. These antisocial-related findings confirm our formerly reported results for increased hyperactivity, anxiety and depression in tartrazine-treated rats. Holmes et al. (2001) stated that presence of hyperactivity and inattention are the most highly related predisposing factors for presentation of antisocial behavior. Aberrant social behaviours or low levels of social interaction are symptoms of several psychiatric disorders, including anxiety, depression and social phobias (Crawley, 2007). Where serotonin system is important in the pathophysiology of psychiatric disorders including mood and anxiety, healthy levels of serotonin is essential to promote balanced mood (Millan, 2003; Dayan and Huys, 2008). The hippocampal serotonergic alterations have been reported to play an important role in control of anxiety, depression and other mood disorders (File et al., 1996, 2000). 5-hydroxytryptophan (5-HTP), a substance that is created naturally in the body from the amino acid tryptophan, has been shown to elevate the neurotransmitter serotonin naturally in the brain helping with depression and other mood disorders (Feurte et al., 2001; Moreno et al., 2006). Tartrazine has been found to diminish the ability of vitamin B6 to function in critical biochemical pathways such as tryptophan/serotonin metabolism (Bender, 1999; Meletis, 1999; Russo et al., 2003). This dysfunctional serotonin system might enlighten the noticeable tartrazine-imposed modulation in anxiety and depression disorders. Moreover, the underlying causes of these disorders are complex and may also involve other neurotransmitter systems including the noradrenalin and dopamine systems (D'Aquila et al., 2000; Ressler and Nemeroff, 2000). Serotonin can modulate the dopaminergic and noradrenalin

systems, and *vice versa* (Iyer and Bradberry, 1996; Esposito, 2006; Salomon et al., 2006).

In conclusion, the results reported herein potentially suggest the relevance of tartrazine in inducing harmful effects especially on behaviours related to anxiety and depression. This study also gives insight into the potential hazard of long term exposure to currently food-permitted colorants with increased incidence of psychological disorders and its co-morbidity impact on human health. Interesting avenues for further research on food colorants should be hearten in order to recognize their unexpected toxic effects and urge for prohibited use of harmful colours to ensure public health.

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A Study on the Vibrational Effects of Adding an Auxiliary Chassis to a 6-Ton Truck

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Abstract: Some of the truck producer involved in production of municipal-service vehicles make some modifications in the main chassis and permit overloading on it. With doing these modifications some special instructions must be considered such as: decreasing speed, strengthening the springs and chassis beams, and so on. Hence chassis vibrational behavior will change the dynamic behavior of automobile effectively, adding auxiliary chassis is an alternative trend to change the rigidity. But, the main question that must be answered is: Are natural frequencies of the modified chassis in suitable range? So, this paper investigates the vibrational characteristics of the chassis before and after strengthening. For this purpose, the modal analysis has been accomplished by the commercial finite element packaged ANSYS and natural frequencies and mode shapes have been determined. In addition, the relationship between natural frequencies and engine operating speed has been explained and, finally advantages of the modified chassis which leads to the increase of the rigidity with no much changes in natural frequencies, has been discussed. The results show that the road excitation is the main disturbance to the truck chassis as the chassis natural frequencies lie within the road excitation frequency range.

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Key words: Vibration, Modal analysis, Truck chassis, Auxiliary chassis, Finite elements.

1. Introduction

In Iran due to several reasons using truck-mounted sweepers is a preferred option in comparison to different types of compact street sweepers. Some of the companies involved in production of municipal-service vehicles install street sweeping equipments on trucks and launch their product to the market; by making some modifications in the main chassis of the truck and optimizing it for continental life in Iran. These equipments are shown in Table 1.

The mentioned equipments impose a considerable load on the truck and in order for the chassis to survive the loads some precautions must be taken. Also the chassis is bound to have the necessary rigidity for the loads. Adding double chassis known as auxiliary chassis and also changing the connecting bars are some usual tricks to enhance the rigidity. Such companies improve the stiffness and load bearing capacity of truck by installing an auxiliary chassis. This chassis is installed on the main chassis, stretching from the back-end up to the cabin of the truck. Using this method in addition to increasing chassis rigidity, chassis mass will increase and here we face the challenge: how do the car's dynamic behavior change with simultaneous increasing in mass and rigidity?

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taken. Also the chassis is bound to have the necessary rigidity for the loads. Adding double chassis known as auxiliary chassis and also changing the connecting bars are some usual tricks to enhance the rigidity. Such companies improve the stiffness and load bearing capacity of truck by installing an auxiliary chassis.

Table 1 Installed equipment on the truck.

equipment	weight (kg)
water tank	1200
trash tank	1500
second motor of truck	800
first vertical brush	115
second vertical brush	115
width brush	156
oil tank	30
right suction pump	110
left suction pump	110
back door	165
others	100

This chassis is installed on the main chassis, stretching from the back-end up to the cabin of the truck. Using this method in addition to increasing

chassis rigidity, chassis mass will increase and here we face the challenge: how do the car's dynamic behavior change with simultaneous increasing in mass and rigidity?

The dynamic response of simple structures, such as uniform beams, plates and cylindrical shells, may be obtained by solving their equations of motion. However, in many practical situations either the geometrical or material properties vary, or the shape of the boundaries cannot be described in terms of known mathematical functions. Also, practical structures consist of an assemblage of components of different types, namely beams, plates, shells and solids. In these situations it is impossible to obtain analytical solutions to the equations of motion (Fahi and Walker, 2004). Using numerical solutions and finite element methods will solve this problem.

Automotive industry is one of the biggest users of the technology of modal analysis. Truck chassis forms the structural backbone of a commercial vehicle. The modal behavior of car chassis is a part of most necessary information for the inspection into car's dynamic behavior. In this essay the modal analysis of modified truck chassis (combination of main chassis and auxiliary chassis) has been studied (Forouzan and Hosseini, 2010).

As a truck travels along the road, the truck chassis is excited by dynamic forces induced by the road roughness, engine, transmission and more. Under such various dynamic excitations, the truck chassis tends to vibrate [3]. Whenever the natural frequency of vibration of a machine or structure coincides with the frequency of the external excitation there occurs a phenomenon known as resonance, which leads to excessive deflections and failure. The literature is full of accounts of system failures brought about by resonance and excessive vibration of components and systems [4].

The global vibrational characteristic of a vehicle is related to both its stiffness and mass distribution. The frequencies of the global bending and torsional vibration modes are commonly used as benchmarks for vehicle structural performance. Bending and torsion stiffness influence the vibrational behavior of the structure, particularly its first natural [5].

The mode shapes of the truck chassis at certain Natural frequencies are very important to determine the mounting point of the components like engine, suspension, transmission and more. Therefore it is important to include the dynamic effect in designing the chassis [3].



Fig. 1 A view of truck

Many researchers carried out study on truck chassis. Vasek et al. (1998) have analyzed a truck dynamically. In their method in addition to simulating truck with finite element packaged ANSYS and being sure that structure vibrational modes are in appropriate range, they vibrationally analyzed it. Yuan Zhang and Arthur Tang (1998), compare natural frequencies of a ladder chassis with finite element and experimental methods. Guo and Chen (2008), research into dynamic and modal analysis of a space chassis (complex 3-dimensional chassis) and analyses transient response using the principal of superposition.

This paper deals with a 6 ton truck chassis that includes natural frequencies and mode shapes. This chassis has been shortened by related companies for using in municipal service (street sweeper) and here we face the challenge and it raises the question: Are natural frequencies of the modified chassis in suitable range?

In the studied model unlike the most previous models, rivets and bolts have been modeled completely. Also shell element has been used for analysis. This element has better and more disciplined meshing in comparison with other elements and has the capability of gaining more accurate results with the same meshing containing the related 3-dimensional elements. Validity of the results has been verified by comparing the results of a similar model by the model proposed by Fui and Rahman (2007).

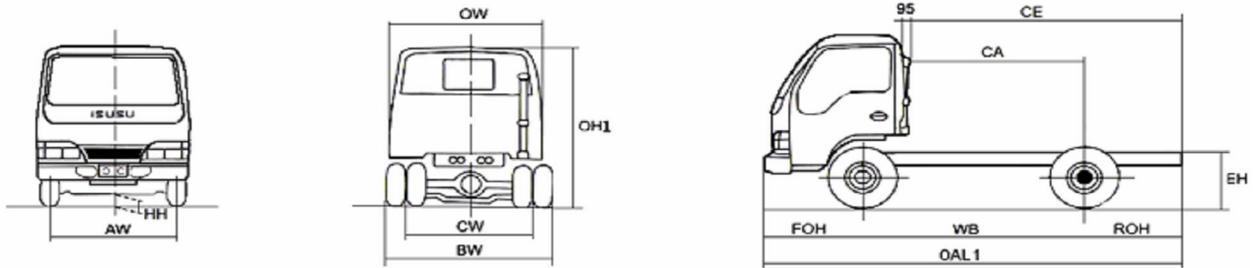


Fig. 2 Dimensional plane of truck

Table 2 Truck dimensions (in mm) related to Fig.1

EH	HH	OH1	CW	BW	AW	OW	CA	CE	ROH	FOH	WB	OAL1
830	210	2220	1650	2115	1680	1995	3195	4910	1700	1085	3815	6600

2. Truck chassis

In this article, a 6 ton truck chassis has been studied. This truck chassis is a ladder chassis and its longitudinal and cross connecting sections are channel shaped.

Automotive overviews are shown in Figs. 1 and 2 and Table 2 illustrate dimensions of studied truck. Chassis material is JIS-SAPH41 with 7800kg/m³ density, 520MPa yield strength, and 590MPa tensile strength.

The auxiliary chassis is bolted by using eight structural connectors which are placed asymmetrically on the main chassis and improves the stiffness of the system. The length of the main chassis is 567 cm (considering the 660 cm long initial chassis, some of which is cut) and it is 82.6 cm wide while the auxiliary chassis which has the same width and is 367 cm long, is placed on it. The vertical distance between the main chassis and auxiliary chassis is 26 cm. Figures 3 and 4 shown a view of

structural connector and a plan of auxiliary chassis, respectively.



Fig. 3 A view of structural connector

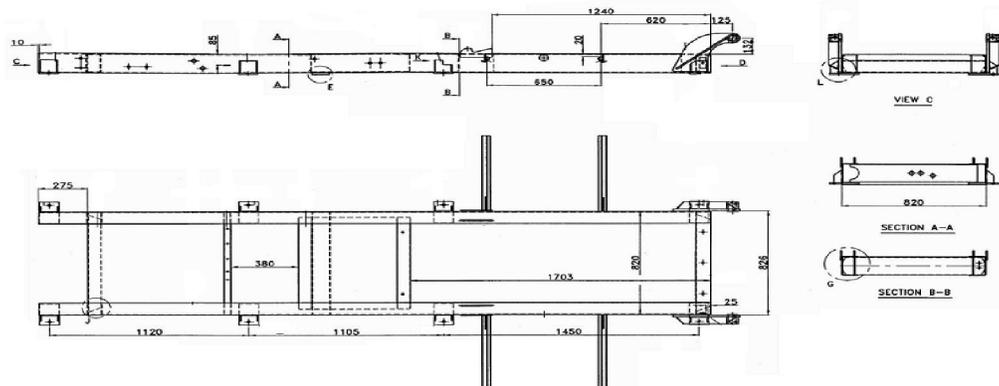


Fig. 4 A plan of auxiliary chassis

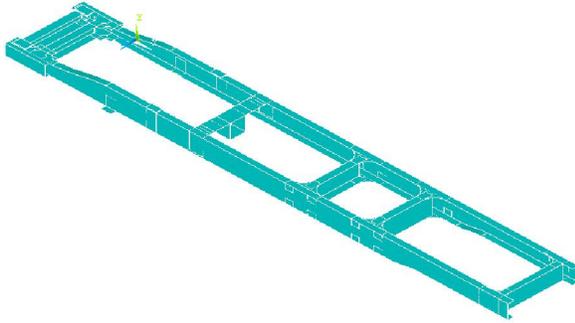


Fig. 5 Main chassis model.

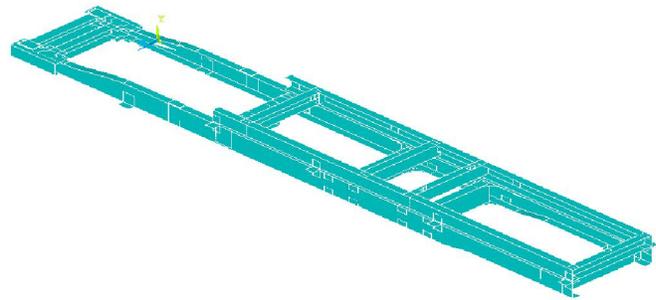


Fig. 6 Modified chassis model.

3. Finite Element model

Truck chassis has been modeled with 4-node shell element in ANSYS. Numerical studies on simple hollow rectangular beam show that this element is suitable for creating and meshing the model and it yields accurate results. The element used has 4 nodes with 6 degrees of freedom and is appropriate for linear and nonlinear deformations and also large deflections. There are approximately 70000 elements in the model that has proved suitable in comparison with other cases, so that the error in each case is less than one percent. In Fig. 5 and Fig. 6 main chassis model and modified chassis model have been shown.

Model with appropriate accuracy and with considering bolts and riveted joints effects has been simulated. Meshes and constraints have been shown in Fig. 7. The boundary conditions are different for each analysis. In normal mode analysis, free-free boundary condition will be applied to the truck chassis model, with no constraint applied to the chassis model [3]. A free-free boundary condition has been chosen as it is much simpler to test experimentally in this condition, if required (Forouzan and Hosseini, 2010).

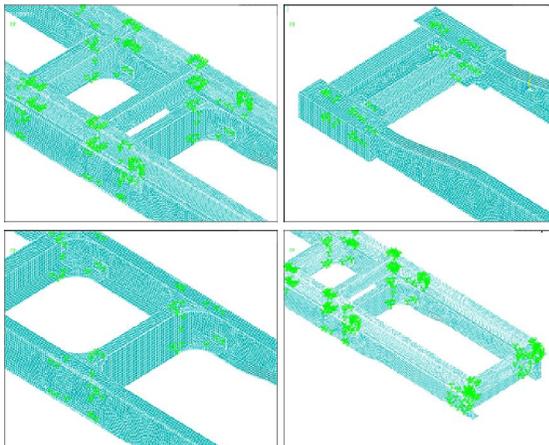


Fig. 7 Meshed chassis.

4. Modal analysis and results

Modal analysis has been performed after creating the chassis finite element model and meshing in free-free state and with no constraints. The results have been calculated for the first 30 frequency modes and show that road simulations are the most important problematic for truck chassis. In this analysis we have made use of subspace method in ANSYS.

Since chassis has no constraints, the first 6 frequency modes are vanished. 3 modes are related to the chassis displacement in x, y and z directions and 3 modes are related to chassis rotation about x, y and z axes. In Fig.8 related natural frequencies and mode shapes for chassis with maximum displacement in y direction in each mode, have been shown.

The first, second and sixth modes are the global vibrations, while the others are local vibrations. Local vibration starts at the third mode at 29.612 Hz. The dominant mode is a torsion which occurred at 7.219 Hz with maximum translation experienced by both ends of the chassis. The second mode is a vertical bending at 17.153 Hz. At this mode, the maximum translation is at the front part of the chassis. The third and fourth modes are localized bending modes at 29.612 Hz and 33.517 Hz. The maximum translation is experienced by the top hat cross member. The member also experienced big translation at fifth mode which is a localized torsion mode. The top hat cross member is the mounting location of the truck gear box. The sixth mode is the torsion mode at 38.475 Hz with maximum translation at both ends of the chassis.

Found natural frequencies from modal analysis of truck chassis, are used for determining the suitable situations for truck parts in working conditions. Figure 8 shows that twisting mode with the frequency of 7.219 Hz is the prevailing mode. Results of first 12 analyzed modes for main chassis are shown in Table 3.

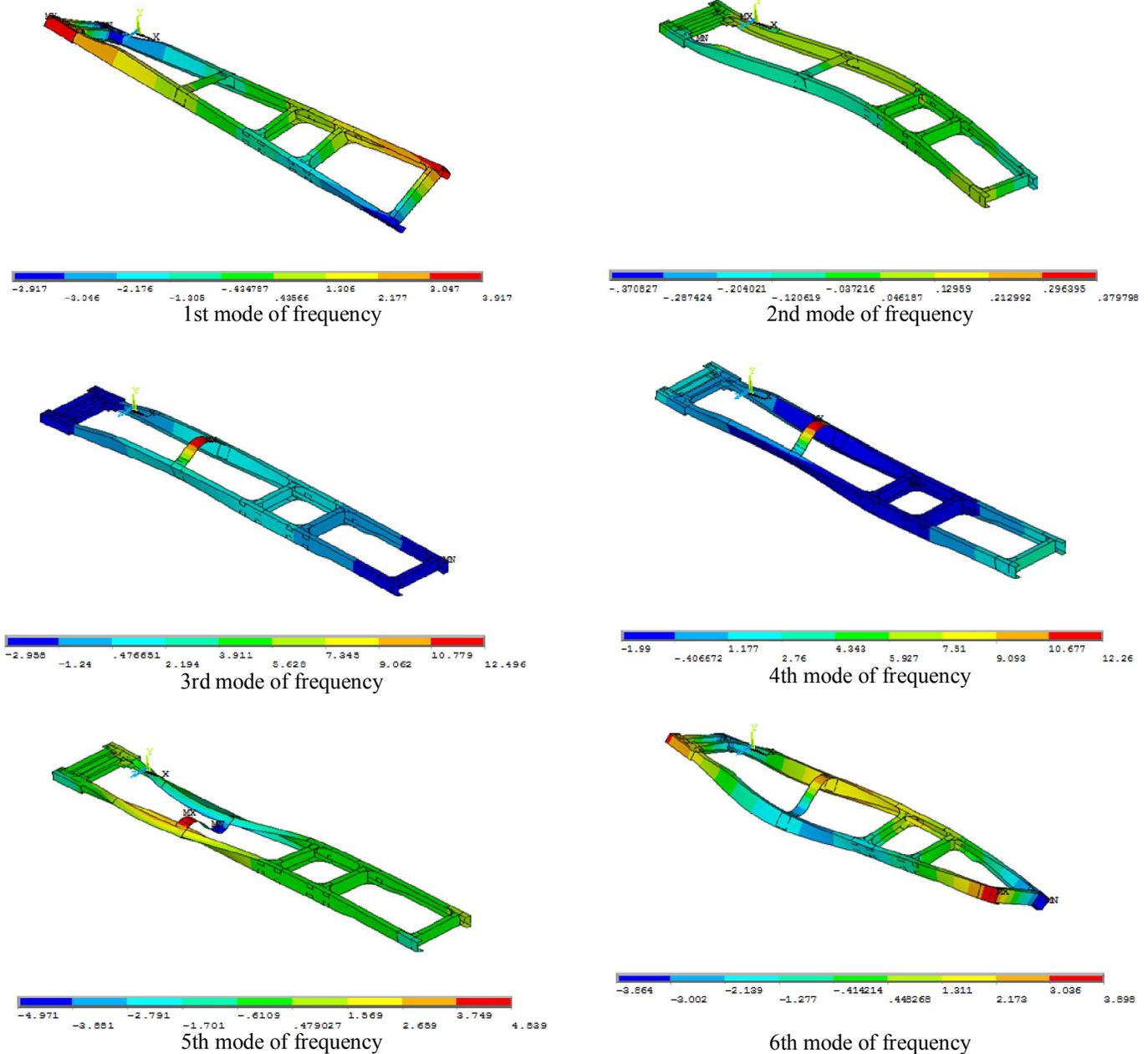


Fig. 8 Mode shapes and natural frequencies of truck chassis.

Because the analysis is in free-free state, the first 6 modes that have zero frequency aren't considered and mode numbers 7 to 12 in table 3 represent the first 6 modes of frequency.

It is necessary to notice that in usual, the first 6 modes of frequency (mode numbers 7 to 12 in Table 3 that have been shown in Fig. 8) play the main role in dynamic behavior of chassis and since the increasing noise effects and limited energy of motor to generate these frequencies, the effects of higher frequencies can be ignored.

Diesel engine is known to have the operating speed varying from 8 to 33 revolutions per second (rps) (Johansson and Edlund, 1993). In low speed idling condition, the speed range is about 8 to 10 rps. This translates into excitation frequencies varying from 24 to 30 Hz [3]. The main excitations are at low speeds, when the truck is in the first gear. At higher gear or speed, the excitations to the chassis are much less. The natural frequency of the truck chassis should not coincide with the frequency range of the axles, because this can cause resonance which may

give rise to high deflection and stresses and poor ride comfort. Excitation from the road is the main disturbance to the truck chassis when the truck travels along the road.

chassis. Figure 9 shows that twisting mode with the frequency of 9.462 Hz is the prevailing mode.

Table 3 Natural frequencies for main chassis.

Mode number	Natural frequency (Hz)
1	0
2	0
3	0
4	0
5	0
6	0
7	7.2195
8	17.153
9	29.612
10	33.517
11	35.161
12	38.475

Table 4 Natural frequencies for modified chassis.

Mode number	Natural frequency (Hz)
1	0
2	0
3	0
4	0
5	0
6	0
7	9.4623
8	16.271
9	27.610
10	31.013
11	37.929
12	39.042

In practice, the road excitation has typical values varying from 0 to 100 Hz. At high speed cruising, the excitation is about 3000 rpm or 50 Hz. Mounting of vibration components of the truck on the nodal point of the chassis is one of the vibration attenuation methods to reduce the transmission of vibration to the truck chassis [3].

The mounting location of the engine and transmission system is along the symmetrical axis of the chassis's first torsion mode where the effect of the first mode is less. However, the mounting of the suspension system on the truck chassis is slightly away from the nodal point of the first vertical bending mode. This might due to the configuration of the static loading on the truck chassis.

In the following modal analyzing has been used for the modified chassis, in order to compare the main chassis and modified chassis. In Fig.9 related natural frequencies and mode shapes for chassis with maximum displacement in y direction in each mode, have been shown. Similarly the first, second and sixth modes are the global vibrations, while the others are local vibrations. Local vibration starts at the third mode at 27.610 Hz. The dominant mode is a torsion which occurred at 9.642 Hz with maximum translation experienced by both ends of the chassis. The second mode is a vertical bending at 16.271 Hz. Similar to the main chassis analysis, at this mode, the maximum translation is at the front part of the chassis. The third and fourth modes are localized bending modes at 27.610 Hz and 31.013 Hz. The maximum translation is experienced by the top hat cross member. The member also experienced big translation at fifth mode which is a localized torsion mode. The sixth mode is the torsion mode at 39.042 Hz with maximum translation at both ends of the

Results of first 12 analyzed modes for modified chassis are shown in Table 4. As a reminder it is mentionable that because the analysis is in free-free state, the first 6 modes that have zero frequency aren't considered and mode numbers 7 to 12 in Table 4 represent the first 6 modes of frequency.

In general the natural frequency can be calculated using the equation (1);

$$\omega_n = \sqrt{\frac{K}{m}} \quad (1)$$

where K and m stand for stiffness and mass respectively.

The equipment installed on the chassis of municipal-service truck increase the chassis mass which leads to the decrease of natural frequencies. Regarding the fact that the chassis stiffness and mass have both increased and considering equation (1) and noticing that the frequencies are in normal range and it has no considerable change, one can state that the mass increase due to the addition of auxiliary chassis is equally efficient on the natural frequencies as the increase in structural stiffness and thus eventually one can hardly find a change in natural frequencies.

By changing the place of gasoline tank and mounted equipments and other such considerations, attempt has been made to prevent coinciding the excitation force frequencies and natural frequencies. Otherwise resonance phenomenon occurs and the chassis undergoes destructive vibrations and if these two frequencies coincide, this phenomenon may lead to the structural failure of the chassis. As a reminder it

is mentionable that validity of the results is verified by comparing the results from a similar model with

the model proposed by Fui and Rahman (2007). Also their results confirm the results of this paper.

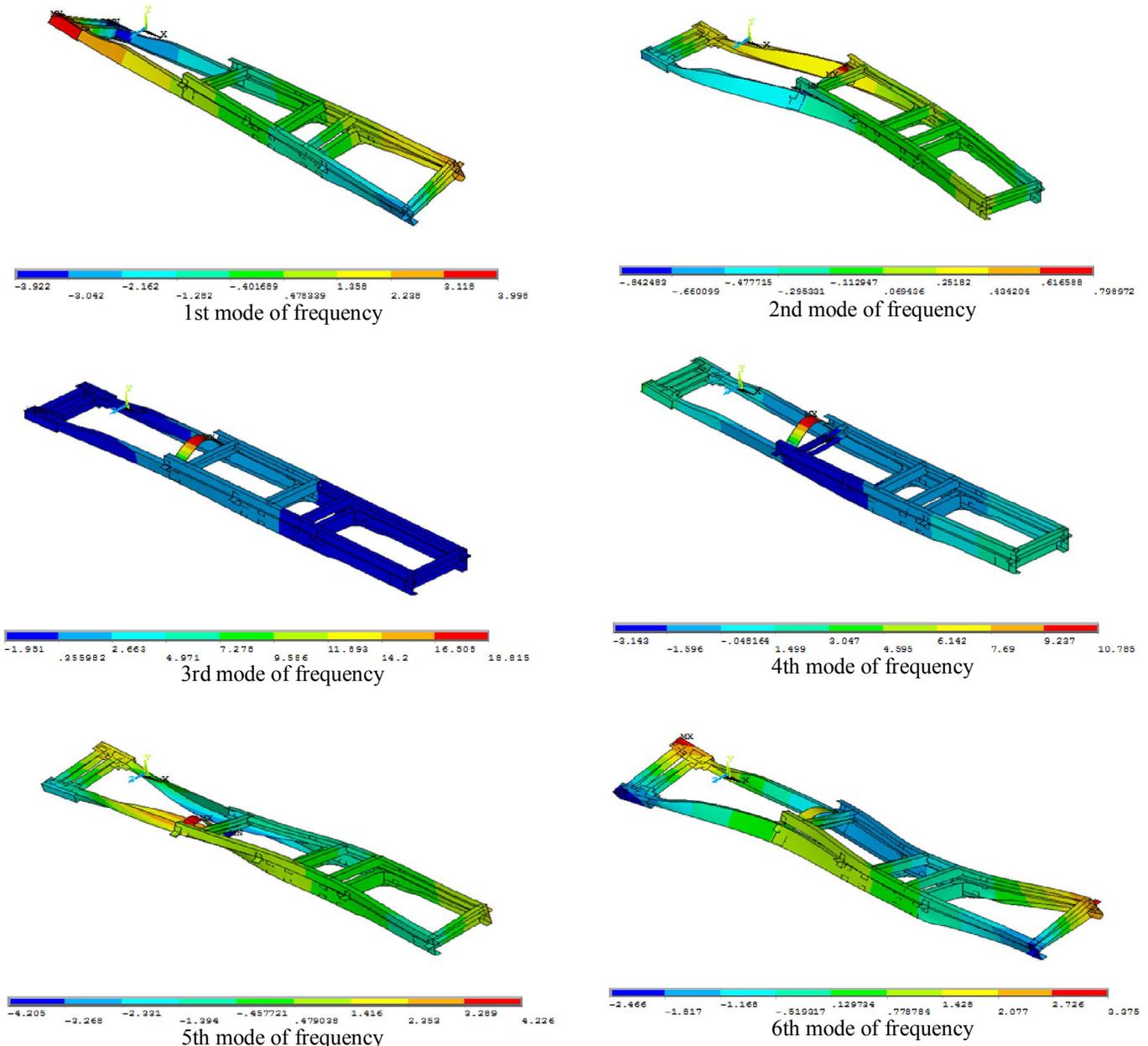


Fig. 9 Mode shapes and natural frequencies of the strengthened truck chassis.

5. Conclusion

The article has looked to changes of chassis dynamic behavior caused by change in usage and adding auxiliary chassis with finite element method. First six frequency modes of the main chassis and modified chassis that determine their dynamic behavior are below 40 Hz. For the main chassis frequencies vary from 7.219 to 38.475 Hz and for the

modified chassis they vary from 9.462 to 39.042 Hz. For the first two modes and sixth mode, the truck chassis experienced global vibration. The global vibrations of the truck chassis include torsion and vertical bending with 2 nodal points. The local bending vibration occurs at the top hat cross member where the gearbox is mounted on it.

Since chassis mass increases due to the installed equipment, the natural frequencies fall out of the natural range that can be compensated with increasing the chassis stiffness. Auxiliary chassis can increase the chassis stiffness. Using this method, we can prevent resonance phenomenon and unusual chassis vibration and place the natural frequencies in natural range.

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Evaluation of Rubisco and PEP-carboxylase Levels as Affected by Salicylhydroxamic Acid within Developing Grains of Wheat

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Abstract: Effects of exogenous application of salicylhydroxamic acid (SHAM) on relative levels of ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco) and phosphoenolpyruvate carboxylase (PEPC) were studied at different grains growing in the same spikelet of wheat (*Triticum aestivum* L. var. *PBW-343*). A concentration of 10 ppm salicylhydroxamic acid was applied at anthesis stage in five replications with the help of cotton plugs, which remained on ears of mother shoots (MS) for 48 hours. The labeled spikes were sampled five times, seven-day intervals started from seventh day after anthesis (DAA) up to 28th DAA, and at maturity. The spikelets were divided into two grain types included basal (bold) and apical (small). The salient point emerging through the use of salicylhydroxamic acid was that both bold and small grains showed an increase in relative levels of Rubisco and PEP-carboxylase at 21st and 28th DAA stages. The behavior of Rubisco in two types of grains showed an increase in its levels upto 14th DAA in bold grains and 21st DAA for smaller grains followed by a gradual decrease towards maturity. The smaller grains possessed a lesser *per se* levels of Rubisco per unit basis with the highest gap at mid ripening stage. The only exception was at maturity which the smaller grains possessed relatively higher levels of Rubisco than the bolder grains. Analysis of data with regard to PEP-carboxylase activity revealed more or less the similar pattern as that of Rubisco activity.

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Keywords: -1,5-bisphosphate carboxylase/oxygenase; CN-resistant respiration; SHAM; phosphoenolpyruvate carboxylase; *Triticum aestivum* L.

1. Introduction

An appraisal of parameters regulating cereals productivity divulges that their full potential to yield is still unrealized. One of the grey areas, which have remained untapped, is the host of physiological and genetical barriers of developing kernels to grow to an optima and their manipulation by desirable traits and methodologies. The potential up gradation of components constituting the total yield in wheat (number of productive tillers m⁻², grains per spike and 1000-grain weight), would help to raise the production substantially. Though, significant milestones have been achieved in the first two parameters the last component, the individual grain weight has eluded scientific investigations and rather paradoxically has declined with the advent of high yielding varieties.

A study into the physiology of grain yield shows the existence of variation among different varieties or genotypes or even the grains developing in the same ear (Asana 1968, Stoy 1969; Nautiyal *et al.* 1999; Yang *et al.* 2003; Gutam *et al.* 2008). It further discloses that the yield may be influenced by the availability of photosynthates to the developing sinks (Yin *et al.* 1998; Ravi *et al.* 2001; Sharma-Natu and Ghildiyal 2005; Foulkes *et al.* 2010). Various

sugar responsive genes in plants potentially affect the partitioning (Geiger *et al.* 1996) and have been stressed to be key determinant of plant productivity (Gifford *et al.* 1984). Dry matter partitioning also plays a paramount role in growth rate of sink organs (Heuvelink and Bertin 1994). Working on the grain growth in wheat and buckwheat variation among varieties was traceable to endogenous hormone production in variety vis-à-vis that in the ear (Dua and Sehgal 1981; Dua *et al.* 1990). A few biochemical components as advocated by Abrol *et al.* (1984), Hakaka (1998) and Hasan and Kamal (1998), might be of significance in determining sink efficiency and/or the grain yield. Since, the harvest index is the culmination of innumerable events, most of the view points on sink efficiency appears to be speculative and need a holistic approach in isolating obligatory events to produce the net assimilates. The revelation that the electron transport chain, in operation during biological oxidation, might find an alternate route without performing the target aim of creating proticity and may downgrade the overall impetus of meristems to grow by 10 to 25 percent (Siedow and Umbach 1995). Indeed, it has been reported that higher alternative respiration could be one of the reasons of lower growth of grains at distal

position in a spikelet (Sunita-Kumari and Ghildiyal 1997). It is, therefore, advocated that any attempt to interrupt this process may prove beneficial in improving productivity.

In the present study, it is proposed to analyze the relative levels of Rubisco and PEP-carboxylase as affected by specific inhibitor of salicylhydroxamic acid in different grains growing in the same spikelet of wheat.

2. Material and Methods

The investigation was conducted with a common bread wheat (*Triticum aestivum* L. var. *PBW-343*), which was sown in circular earthenware pots (50x30x30 cm) containing 35 kg of soil mixed with farmyard manure (4:1). Eight seeds per pot were sown and after 15 days, seedlings were thinned to two. Hoagland's nutrient solution (Hoagland and Arnon, 1939) was supplied to the pots. The plants were grown in a screen covered hall under otherwise natural conditions. A concentration of 10 ppm salicylhydroxamic acid was applied at anthesis stage in five replications with the help of cotton plugs, which remained on ears of mother shoots (MS) for 48 hours. The labeled main spikes were sampled five times, seven-day intervals started from seventh day after anthesis (DAA) up to 28th DAA, and at maturity. Grains were usually taken from three different segments in the ear. The labeled samples of grains were brought to laboratory and separated to two types of grains (small and bold) and the following biochemical analysis was carried out in the above aged grains.

PEPC was studied according to the method of Vance and Stade (1984) with some modifications as follows:

Extraction of the enzyme - Crude extracts were prepared by homogenizing 1 g fresh grain with acid-washed sand in a pre-chilled pestle and mortar in grinding medium (1 ml/1 g tissue) containing 50 mM tris-HCl (pH of 8.0), 50 mM MgCl₂, 5 mM, 2-mercaptoethanol and 1 mM EDTA. The homogenate was passed through four layers of cheese cloth, and filtrate centrifuged at 30,000 g for 30 minutes and the supernatant assayed for enzyme activities of PEPC. All the steps were carried out at 4°C.

Estimation of Enzyme - Phosphoenolpyruvate carboxylase was assayed spectrophotometrically at 30°C and 340 nm for at least 3 min in the assay media with a final volume of 1 ml. For the PEPC, the assay medium consisted of 10 mM NaHCO₃, 10 mM MgCl₂, 0.2 mM NADH and 4 mM PEP in 100 mM bicine-KOH buffer (PH of 8.5) optimized from Vance and Stade (1984).

Before placing samples in spectrophotometer 0.2 mM NADH was added as quickly as possible in to the test tube with a vigorous mixing well and the initial absorbance was recorded and thereafter every 30 sec for at least 3 minutes. Phosphoenolpyruvate carboxylase activity was expressed as $\mu\text{mole per min per gram fresh weight of sample}$. PEPC activity was calculated with decrease in absorbance for one minute and with the following formula:

$$\mu\text{moles per min } 0.2 \text{ ml enzyme extract} = \text{Absorbance decrease/min} \times 0.1613 \times 3 \text{ (volume of the reaction mixture in ml)}$$

Rubisco was studied radiometrically according to the method of Bravdo and Pallas (1982) with some modifications, in terms of stopping the activity by glacial acetic acid. The enzyme is made to utilize labelled CO₂ as the substrate and the radioactivity in the products is counted as a measure of enzyme activity.

Extraction of the enzyme - Grains samples, weighing one gram were homogenized in chilled mortar and pestle. Enzyme was isolated in 8 ml medium of 100 mM tris-HCl buffer (pH of 8.0) containing 5 mM DDT, 20 mM MgCl₂, 0.5g PVP and 0.2 mM EDTA. The crude extract was filtered through four layers of muslin cloth and the filtrate was then centrifuged at 20,000 g for 30 minutes at 4°C. The supernatant was collected as the enzyme source.

Estimation of the enzyme - In a total volume of 250 μl , the assay mixture for Rubisco contained 98 mM tris HCl (pH of 7.8), 20 mM MgCl₂, 20 mM NaH¹⁴CO₃ (specific activity 48.1 mci/m mole, activity 0.5 mci, obtained from BARC; Bombay). 20 μl of crude enzyme was incubated with all components except RuBP for 5 minutes at 30°C and the reaction was initiated by addition of RuBP. After 2 minutes the reaction was stopped by adding 250 μl of glacial acetic acid. Blank reaction mixture was prepared by adding all ingredients except RuBP. The samples were kept overnight in fume hood. Next day known volume was taken and added 10 ml of scintillation medium. Counting was done in liquid scintillation counter (Packard Tricarb, Liquid Scintillation Spectrometer).

Scintillation liquid was prepared by the method of Bray (1960). According to this 4 gm P.P.O., 0.2g PoPoP and 10 g naphthalene were dissolved in 1 liter of toluene. For dilution of NaH¹⁴CO₃ solution, 1.0 ml of NaH¹⁴CO₃ (0.5 mci) was diluted with cold NaHCO₃ solution so

as to give a final concentration of 100 mM. Rubisco activity was estimated as:

$$(\text{CO}_2 \text{ fixed}) \text{ dpm} \text{ g}^{-1} \text{ f.w. h}^{-1} = \frac{\text{dPm} \times V_1 \times 60}{V_2 \times t \times w}$$

Where net dpm is the disintegrations per minutes minus back ground counts, V_1 is the volume of assay system, V_2 is the amount loaded for counting, t is the reaction time and w is the weight of the sample.

3. Results

According to Figure 1, the inhibitor behaved in an enigmatic way and proved to be a promoter when being assessed under the criterion of dry matter accumulation in grains. During the earlier period of grain development, it had no significant effect thereby indicating that the underlying physiological process may not be in operation. Subsequently a significant increase in dry matter accumulation in both the types of grains at 21st DAA onwards up to maturity was noticed at both the concentrations of SHAM. The salient points emerging through the use of salicylhydroxamic acid were that (i) both bold and small grains showed a significant increase in dry matter from 21st DAA stage with its applications and (ii) in spite of the aforementioned increment gathered by grains, they continued to exhibit the disparity between them and at maturity the smaller grains still showed approximately 25 percent lower dry matter than the bolder grains.

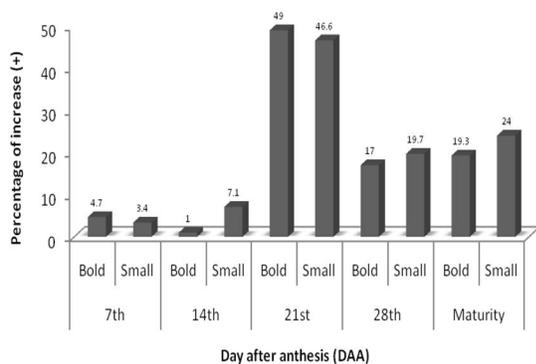


Figure 1. Percentage of increase (+) in dry weight of grains at different location within developing grains of wheat (*Triticum aestivum* L. var. *PBW-343*) as influenced by salicylhydroxamic acid

The scrutiny of the data with regard to the effect of salicylhydroxamic acid on relative levels of Rubisco, the key enzyme regulating C fixation, presented a few interesting correlations. A look into the Figure 2 depicts the behavior of Rubisco in two types of grains

which showed an increase in levels of Rubisco upto 14 days in bold grains and 21 days for smaller grains post-anthesis stages followed by a gradual decrease toward maturity. Following by the application of salicylhydroxamic acid, both bold and small grains showed an increase in relative levels of Rubisco at 21st and 28th DAA stages (Figure 3). The two types of grains significantly possessed its differential levels. Analysis of the data revealed that the smaller grains possessed a lesser *per se* levels of Rubisco per unit basis with the highest gap at mid ripening stage. The exception was at maturity which the smaller grains possessed relatively higher levels of Rubisco than the bolder grains (43.3 percent higher in smaller grains) (Figure 6).

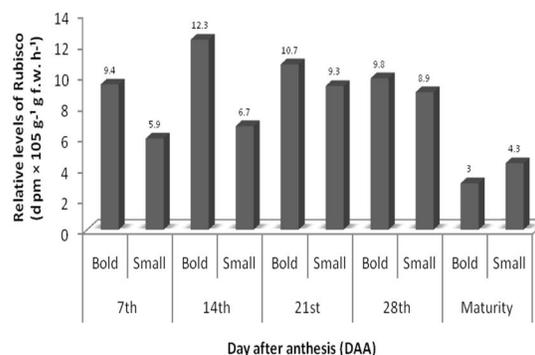


Figure 2. Relative levels of Rubisco ($\text{d pm} \times 105 \text{ g}^{-1} \text{ fresh weight h}^{-1}$) at different location within developing grains of wheat (*Triticum aestivum* L. var. *PBW-343*) as influenced by salicylhydroxamic acid

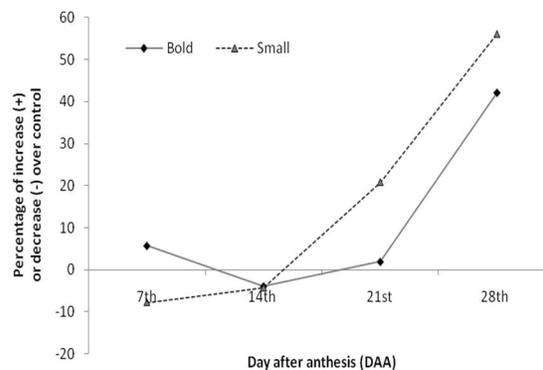


Figure 3. Percentage of increase (+) or decrease (-) in the level of Rubisco over control at different location within developing grains of wheat (*Triticum aestivum* L. var. *PBW-343*) as influenced by salicylhydroxamic acid

Analysis of data with regard to PEP-carboxylase activity revealed more or less the similar pattern as that of Rubisco activity

(Figures 4, 5 and 6). Its levels increased as the grains progressed upto mid ripening stage followed by a gradual decrease towards maturity (Figure 4). Following by the application of salicylhydroxamic acid, both bold and small grains showed an increase in relative levels of PEP-carboxylase at 21st and 28th DAA stages (Figure 5). With regard to its distribution in bold and small grains, was apparent that the bolder grains possessed relatively higher levels of PEP-carboxylase at 7th, 14th, 21st and 28th DAA stages of investigation. The higher quantum of distribution in bold grains was maximum at 14th DAA (44.2 percent lesser in smaller grains) and subsequent differences were to the tune of 11.3 and 8.3 percents short in smaller grains at 21 and 28 days post-anthesis stages respectively. At maturity the smaller grains possessed relatively higher levels of PEP-carboxylase than the bolder grains (20.8 percent higher in smaller grains) (Figure 6).

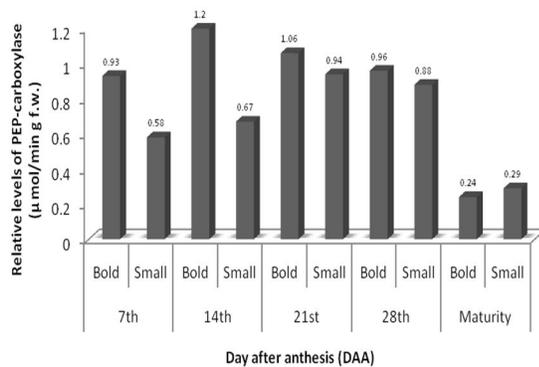


Figure 4. Relative levels of PEP-carboxylase ($\mu\text{mol}/\text{min g}$ fresh weight) at different location within developing grains of wheat (*Triticum aestivum* L. var. *PBW-343*) as influenced by salicylhydroxamic acid

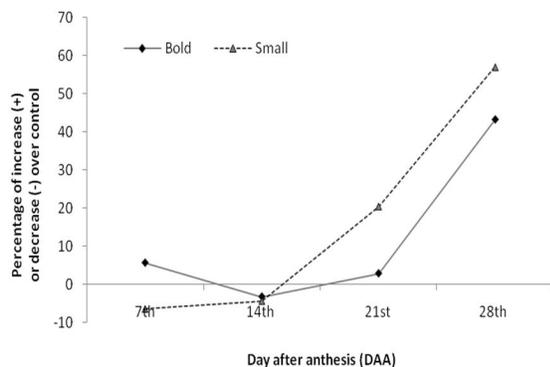


Figure 5. Percentage of increase (+) or decrease (-) in the level of PEP-carboxylase over control at different location within developing grains of wheat

(*Triticum aestivum* L. var. *PBW-343*) as influenced by salicylhydroxamic acid

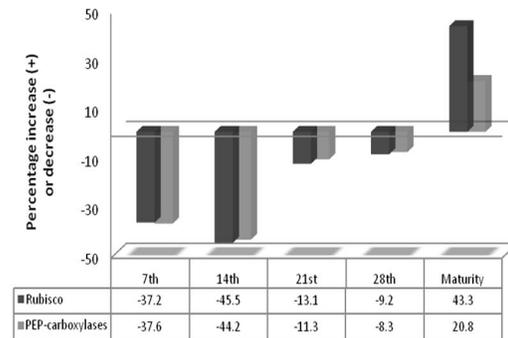


Figure 6. Percentage of increase (+) or decrease (-) in relative levels of Rubisco and PEP-carboxylase in small grains over their counterparts bold grains

4. Discussions

The results bring forth, in no uncertain terms, the findings that the ear of wheat is a developing place for a definite number of grains which intern are separate biological entities endowed with their inherent potentials. This axiom was advocated by Abolina (1959) and is in line with the observations of innumerable workers (Cook and Evans 1978; Larsson and Hensen 1992; Wang *et al.* 1998; Yang *et al.* 2003). Nevertheless, the sequence of events, piloting the yielding ability, is the metabolic profile and if augmented through the use of plant growth regulators (Yang *et al.* 2000; Houshmandfar and Eradatmand-Asli 2011) or by imposing a shift in metabolic events (Dua *et al.* 1990) promotory effects are achievable (Hayashi 1961; Michael and Beringer 1980). In present context, the central point which came to light in the present endeavor is that an unusual path of aerobic respiratory chain (CN-resistant respiration) plausibly switches-on during the grain filling stage and if checked, through the immaculate use of salicylhydroxamic acid, can increase the relative levels of Rubisco and PEP-carboxylase in the grains. Of course, SHAM or regulator of alternate oxidase pathway was not successful in eliminating the disparities between the two types of grains.

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Evaluation of tunnel excavation methods for Neelum Jhelum Hydro Power Project, Pakistan.**Mohammad Saleem Khan *, Syed Tahir Ali Gillani **, Muhammad Waqas Khan**

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Abstract: Pakistan is passing through a phase of severe energy shortage. To meet the challenge, Pakistan has started a couple of hydropower projects. One of these is Neelum Jhelum Hydro Power Project (NJHPP), which consists of three main components, one diversion dam at Nauseri on Neelum River, 2nd 33-km long tunnel of 82 M² cross sectional area for conveying water to obtain 420-M head and 3rd component is power house for generation of 969 MW power. Presently, the major issue of NJHPP is the selection of excavation method which should meet the fast completion of project due to energy crisis in the country & to avoid legal conflict with neighbor country. The selection of excavation method depends upon number of factors such as geology, tectonic setup, strength of rocks, hydro geological conditions of the area, geometry of the tunnel and many other factors. In this study, large number of samples of rocks were collected from the project area and analyzed. On the basis of present work three methods, Drill and blast, excavation through Road Header & excavation through Tunnel Boring Machine (TBM) have been evaluated to determine the suitability for this project. Apparently, the existing status indicates that there is no major problem in the use of drill and blast and road header excavation method except their slow advancement rate. However to meet the fast excavation requirement for achievement of the completion target in 2014, TBM is the only left over option. The results of the strength and the other parameters of rocks are supporting TBM except the disaster expected through the potential fault planes which run along the way of the tunnel & convergence pressures of mud rocks. It is suggested that detail geological investigation should be carried out along the tunnel route to support the final decision for selection of TBM.

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Keywords: Excavation method, geology, tectonic setup, strength of rocks, geological investigation

1. Introduction

Pakistan is facing severe energy crisis due to increase in demand and reduction in storage capacity of hydropower producing reservoirs. After the construction of Tarbela Dam in 1974, no large scale project could be initiated over the passed 35 years except Ghazi Brotha Hydral Power Project in 2003. Due to lack of planning and mismanagement day by day, the demand remained increasing and no cheap electricity project could be started. Few expensive options were adopted by the Government with installing thermal Power Projects. Ultimately, the Government issued vision 2025 program in 2000, wherein the stress was to exploit indigenous resources such as Hydropower and coal. Hence, Neelum Jhelum Hydropower project commenced since 2009 to overcome the power shortage.

Neelum Jhelum Hydropower project is located in Muzaffarabad, Azad Jamu and Kashmir (Figure 1). It is composed of a diversion dam at Neelum River, 33 km long tunnel and a power house at Jhelum River. Approximately 280 m³ per second of water will be utilized from Neelum River through a tunnel of cross sectional area 113.5 m² (revised) which will pass under Jhelum River and again release water into Jhelum

River which meander and gain a total head of 420.5 M from intake.

According to feasibility report by Nonconsult (1996) a concrete gravity dam 135 m Long and 47 m high is being constructed on Neelum River at Nauseri which is designed for over-topping. The dam will create a head pond of 8 million cubic meters which will allow a peaking reservoir of 2.8 million cubic meters to meet daily peaking of power for more than 4 hours.

The total length of head race tunnel is 28.5 km., wherein 15.1 km stretch of the tunnel from the Nauseri be constructed as a twin tunnel system each with x-section of 43 m². The remaining head race tunnel down to the surge chamber will be a single tunnel having x-section of 82m². The tunnels are shot Crete lined with a concrete invert. The tunnel crosses approximately 380 m below river bed.

The present status of the Neelum Jhelum Hydro Power Project is that 7 adits have been completed 80% of designed length and head race tunnel upto 1.5 km by the drill and blast method. Later these adits will be used as access tunnels for removal of excavated material.

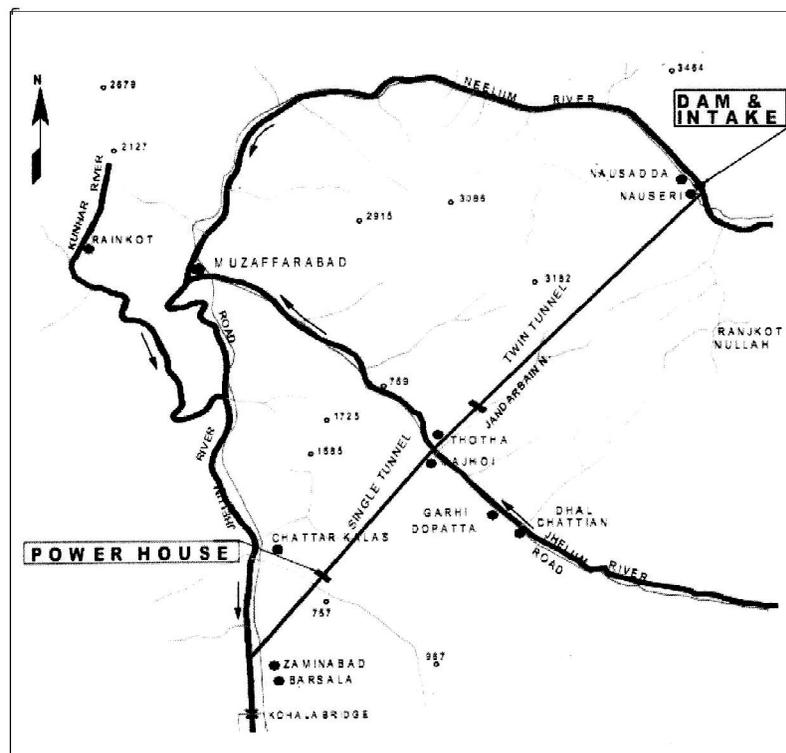


Figure 1: Location map of Neelum Jhelum Hydro Power Project indicating Dam Site, Tunnel Route and Power House (Norconsult, 1996)

The project is required to be completed in 2015 or possibly in 2013 to achieve two targets. Firstly early completion will provide cheap hydropower of 969 MW and secondly to avoid legal complications in the light of Indus Water Treaty.

To achieve the target and objectives of an early completion three tunnel methods in the light of various studies performed by researchers (Doyuran, 1997., Singh, 1998., Dick, 1995., Bell, 2007 & Kaneko, et al., 2002) are being evaluated in this study.

2. Geology

The geology of the project area is predominantly composed of Murree Formation of Miocene age. Shah (1997) reported that, "the formation is composed of a monotonous sequence of dark red and purple clay and purple grey and greenish grey sandstone with subordinate intraformational conglomerate, the basal strata of the formation consist of light greenish grey calcareous sandstone and conglomerates with abundant derived Eocene larger foraminifers". Geologically the project area can be divided into two zones. The dam site and intake reservoir nearby the village of Nauseri is the only area where two formations are exposed. On the right side of Neelum River and intake reservoir Punjal Formation is exposed which is lithologically composed of volcanic elastic rocks. In the rest of

whole Project area the tunnel and power house only one formation is exposed i.e., Murree Formation.

2.1 Punjal Formation

This formation is only exposed in the reservoir area and composed of three rock units, Green Sandstone, Marble and Limestone. Only diversion tunnel has been successfully excavated in this formation by drill & blast method.

2.2 Murree Formation

It is exposed through out the project area except the dam site & reservoir area. The Lithology of the Murree Formation is composed of alternate beds of hard and soft rock. Four major rock units have been identified as sandstone, siltstone, shale and mudstones (Mubashir, et al., 2009, Khan, et al., 2010).

3. METHODOLOGY

As the execution work of the tunnel has already been commenced since 2009, the methodology is comprised of the field data collection through reconnaissance survey and laboratory testing.

3.1 Field Data Collection

Rock samples were collected from the adits where excavation through Drill and Blast Method was under progress. Geological Mapping and

discontinuity survey were also carried out in two adit to assess the field condition and identification of joint pattern.

3.2 Lab Testing

To determine the engineering geological properties of the various rock units through which excavation will be carried out for tunnel, following tests were performed on thirteen samples adopting standard methodology.

Uniaxial compressive strength, dumping constant, slake, durability, Atterberg Limits and clay activity.

4 Criteria adopted for evaluation of Excavation Methods

Generally, the tunnel excavations and other large diameter excavations are based on examination of following parameters:

1. Geology and Tectonics of the area
2. Joint pattern
3. Geometry of the tunnel
4. Strength parameters
5. Porosity and permeability
6. Water conditions
7. Economic parameters

In the light of above parameters, rock samples were collected from the project area and analyzed to find out rock properties necessary for selection of excavation method. Hence, on the basis of various field and laboratory testing, following three excavation methods have been evaluated accordingly.

1. Drill and Blast Method
2. Road Header
3. Tunnel Boring Machine (TBM)

4.1 Drill and Blast (D&B) Method

Presently, Drill and Blast method has been adopted for excavation of tunnels in the Neelum Jhelum Hydro Power Project and approximately 7.3 kms tunnel (in total) have been successfully completed. Our results regarding strength (Table 1) and other parameters given in Tables 2 & 3, are also supporting this method except slow progress.

4.2 Boom Type Machines (Road Header)

A variety of tunnel excavators are available in the market. The selection of tunnel excavation depends on the strength of the rock and diameter of the tunnel to be excavated. Mainly two types of road header are being deployed for tunnel excavation. For medium to hard rocks ripping type road headers are suitable where as for soft geology milling type road headers are used. Generally compared to D&B method for medium size tunnel average rate of progress per day is of 30% more by road headers compared to drill and blast method..

Normally road headers are no good for working in areas where compressive strength of rock is greater than 14 KSI. Some of our rock units have high compressive strength as 94 MPa, where excavation may be problematic through road header.

Table 1: Uniaxial Compressive Strength

Sample No.	Strength (MPa)			Average Value of UCS (MPa)
	First sample	Second sample	Third sample	
A	46.5	57.7	56.5	53.6
B	51.7	54.2	53.3	53.3
E	87.2	88.0	94.5	89.9
F	94.6	99.2	88.6	94.1
G	74.0	90.7	97.0	87.2
H	77.9	74.9	74.9	75.9
I	55.2	52.9	56.9	54.7
J	40.4	42.7	42.67	41.82
K	84.0	72.8	72.4	76.4
L	73.4	63.0	68.0	88.00
M	41.6	40.3	39.1	40.3
N	60.5	68.4	57.7	62.2
O	75.4	64.5	84.3	74.7
P	72.7	72.8	58.5	74.7
Q	17.0	15.6	16.9	16.5
R	53.13	35.5	44.8	44.5

Taheri (2008) reported that, “one of the main limitations for using the boom type machines is high bit consumption according to high abrasive mineral (such as quartz content). Only few authors have worked on the correlation between abrasively and the mineral content of the rocks and the relationship is not fully understood by now.” Our results show that quartz content are in highest ratios upto 85% among all the rock units exposed in the study area. This situation apparently does not favor and suit excavation through road headers. Probably due to this factor the Project Authorities of NJHPP have not considered adaptation of road header for this project.

4.3 Tunnel Boring Machine (TBM)

This method has advantage to achieve fast completion target and safety. The major limitation for the selection of this method is that of convergent soil which may stick the machine. Another potential hazard area for TBM is the presence of a number of faults, through which tunnel has to be crossed which need detailed investigation. The project authorities are actively considering this option to adopt for early completion of the project.

Table 2: Determination of Damping Constant Using Various Resonance Frequencies

Sample	Obs. No	Frequency Range	Resonance Frequency F_r	Low Frequency F_l	High Frequency F_h	Damping Constant Q
A-1	1	2.5-4.5	3.60	3.39	3.89	7.20
	2	3.0-5.0	3.59	3.27	3.89	5.29
	3	3.5-5.5	3.59	3.51	3.88	9.7
	Avg	-	-	-	-	7.39
A-2	1	2.5-4.5	2.54	2.51	2.82	8.19
	2	3.0-5.5	3.55	3.3	4.03	4.86
	3	3.5-5.5	3.54	3.51	3.81	11.8
	Avg	-	-	-	-	8.28
E-1	1	3.0-5.0	3.04	3.01	3.31	10.13
	2	3.5-5.5	3.54	3.51	3.89	9.32
	3	4.0-6.0	4	4	4.29	13.79
	Avg	-	-	-	-	11.08
F-1	1	2.5-4.5	2.54	2.51	2.81	8.47
	2	3.0-5.0	3.84	3.41	4.14	5.26
	3	3.5-5.5	3.54	3.51	4.10	6.00
	Avg	-	-	-	-	6.57
F-2	1	2.5-4.5	3.49	3.3	3.7	7.27
	2	3.0-5.0	3.69	3.49	3.97	7.69
	3	3.5-5.5	3.54	3.51	3.81	11.83
	Avg	-	-	-	-	8.93
H-1	1	2.5-4.5	3.59	3.45	3.88	8.35
	2	3.5-4.5	3.58	3.51	3.86	10.23
	3	3.0-5.0	3.59	3.46	3.88	8.54
	Avg	-	-	-	-	9.04
K-1	1	3.0-5.0	3.04	3.01	3.31	10.13
	2	3.5-5.5	3.63	3.51	3.91	9.07
	3	4.0-5.5	4.40	4.37	4.69	13.75
	4	4.0-6.0	4.39	4.36	4.69	13.30
	Avg	-	-	-	-	11.56
L	1	3.0-5.0	3.04	3.01	3.31	10.13
	2	3.5-5.5	3.62	3.51	3.91	9.05
	3	3.5-6.0	3.7	3.51	4.0	7.55
	4	4.0-6.0	4.04	4.01	4.30	13.9
	Avg	-	-	-	-	10.15
M	1	3.0-5.0	3.04	3.01	3.30	10.48
	2	3.5-5.5	3.54	3.51	3.80	12.21
	3	3.5-6.0	3.54	3.51	3.80	12.29
	4	4.0-6.0	4.04	4.01	4.30	13.93
	Avg	-	-	-	-	12.09
N-1	1	3.0-4.5	3.0	3.0	3.29	10.34
	2	3.0-5.0	3.6	3.5	3.89	9.23
	3	3.5-5.5	3.6	3.5	3.89	9.47
	4	4.0-6.0	4.04	4.01	4.29	14.43
	Avg	-	-	-	-	10.86
N-2	1	3.0-5.0	3.7	3.5	4.08	6.38
	2	3.5-5.5	3.79	3.51	4.18	5.66
	3	3.5-6.0	3.79	3.51	4.19	5.57
	4	4.0-6.0	4.04	4.01	4.29	13.47
	Avg	-	-	-	-	7.77

Table 3: Determination of Slake Durability Index for Two Cycles, on the Rocks Samples Collected from Outcrops and Underground Excavations from the Study Area

Sample No.	Durability Index		
	1 st Cycle (%)	2 nd Cycle (%)	Average (%)
A	97.97	98.79	98.38
B	99.00	99.6	99.3
D	93.38	98.48	98.43
E	99.8	99.6	99.7
F	98.8	98.69	98.7
G	99.8	99.39	99.59
H	98.6	98.4	98.5
I	98.4	98.2	98.3
J	97.6	97.8	97.7
K	97.57	97.26	97.41
L	99.19	98.9	99.09
M	98.4	98.4	98.4
N	98.5	99.1	98.8
R	98.15	98.25	98.20

Table 4: Determination of Clay Activity based on mudstone / clay stone samples.

Samples	Initial Weight (g)	Weight of Clay Particles (g)	Percentage Fraction (P.F.) %	Plasticity Index (PI) %	Clay Activity (A) (PI/P.F.)
B	23.498	6.702	28.52	12.85	0.45
C	17.499	4.903	28.01	7.72	0.27
D	13.253	3.424	25.83	10.40	0.40
J	11.068	2.714	23.3	13.20	0.56
R	12.674	3.502	27.63	12.62	0.45

Table 5: Results of Atterberg's Limits for the Selected Samples of Mudstone/ Clay stone.

Sample No.	Lithology	Average Values for 3 Tests	
		Liquid Limit %	Plastic Limit %
B	Mudstone	24.14	11.25
C	Clay stone	19.52	11.80
D	Mudstone	25.68	15.40
J	Clay stone	27.05	13.85
R	Mudstone (Sheared)	25.97	13.35

The results given in Tables 4 & 5 to determine clay activity indicate that there is no threat of convergence of soft formation during excavation by TBM. These results are based on limited samples collected from adits, however the situation may be quite different where the tunnel passes through over burden of more than 1800 M along the course of tunnels which may increase convergence to

dangerous levels.

Although it is a costly option but the project authorities have recently decided to use TBM for major section of the tunnel to achieve fast completion of the project. Until now no detail geological investigations to meet the requirements for design criteria are available but investigations along the route of the tunnel are under progress.

5 Conclusion and Recommendation

The Drill & Blast method is working well except slow progress which can be accelerated to start tunnel excavation from a number of locations through access tunnels which are already complete. The road header method has not been considered useful by the project authorities due to high ratio of quartz content in sandstone formation.

Recently decision has been made by the project authorities to use TBM which requires detail investigations for its design. Special considerations are required after 2005 earthquake to accommodate the potential hazards associated with active faults through which tunnel will cross.

6 Acknowledgement

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Effects of salicylhydroxamic acid on relative levels of starch and total sugars in different grains growing in the same spikelet of wheat

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Abstract: The effects of salicylhydroxamic acid on relative levels of starch and total sugars were studied in different grains (bold and small) growing in the same spikelet of wheat (*Triticum aestivum* L. var. *PBW-343*). The plants were grown in a screen covered hall under otherwise natural conditions. A concentration of 10 ppm salicylhydroxamic acid was applied at anthesis stage with the help of cotton plugs, which remained on ears of mother shoots (MS) for 48 hours. Labeled spikes were sampled five times, seven-day intervals started from seventh day after anthesis (DAA) up to 28th DAA, and at maturity. The application of salicylhydroxamic acid presented the unique observations. The inhibitor behaved in an enigmatic way and proved to be a promoter when being assessed under the criterion of relative levels of starch and total sugars. The salient points emerging through the use of salicylhydroxamic acid were that (i) both bold and small grains showed an increase in relative levels of starch and total sugars from 14th and 28th DAA stages respectively ($P < 0.01$) and (ii) in spite of aforementioned increment, they continued to exhibit the disparity between them and at maturity the smaller grains still showed lower starch and higher total sugars than the bolder grains.

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1. Introduction

Starch is the major constituent of cereal's end product and is a measure of the activity of processes contributing to its deposition in the grain (Chinnusamy and Khanna-Chopra, 2003). Sucrose, the primary product of photosynthesis and assimilated carbon, acts as the main raw material for its formation (Porter and May, 1955). Berry *et al.* (1971) isolated, studied and compared the output of starch among triticale, rye hard red spring and durum wheat. They reported that the greatest percentage of starch occurred in the triticale flour samples as compared to wheat and rye. Jenner (1980) correlated the starch synthesis in endosperm to concentration of sucrose in tissue. Starch accumulation appeared to cease during development in the oat prior to the total dry weight accumulation, while soluble carbohydrates primarily sucrose and glucose remained at higher levels (Koch and Peterson, 1991). Black *et al.* (1996) studied starch in embryos of wheat and reported that its levels accumulated in the axis and scutella from 20th DAA to reach a maximum at approximately 35th DAA and subsequently it declined to a very low value in late maturation. According to Jeng *et al.* (2003) starch content was initially low but increased rapidly during maturation while reducing sugars, sucrose and fructose decreased

in two spring wheat cultivars. Jenner and Rathjen (1972) concluded that magnitude of photosynthesis is adequate to maintain the flow of sucrose into the wheat grains but flow of sucrose may be limited by the capacity of the processes transporting the sugars during the final stages of its passage into grains. Kumar and Singh (1980) showed that active starch synthesis started from 14th DAA onwards and continued until 35th DAA.

Many plant developmental, physiological and metabolic processes are regulated, at least in part, by nutrient availability. In particular, alteration in the availability of soluble sugars, such as glucose and sucrose, help regulate a diverse array of processes (Gibson, 2004). The accumulation of sugars in the storage cells is crucial for the size of grain. According to Sterans (1970) sugars constituted nearly 10 percent of dry matter of wheat aleurone cells. Paul *et al.* (1971) reported that reducing sugars were gradually converted into non-reducing forms during development in developing seeds of rice. Kerepesi *et al.* (2002) reported that the contents of reducing and non-reducing sugars decreased as grains matured and the contents of non-reducing sugars were higher than reducing at maturity stages in hard red spring wheat. They reported that the concentration of glucose and fructose decreased

while raffinose which appeared at later stages increased with maturity. Duffus and Rosie (1973) found changes in soluble reducing sugars and studied that reducing sugars remained low throughout development.

Singh and Singh (1982) noticed that total soluble sugars decreased during course of grain development in rice treated with IAA, GA₃ and kinetin. Caputo and Barneix (1999) have studied the relationship between amino acids and sugars export to the phloem in wheat. They showed that the sugar concentration in the phloem exudates was increased by higher light intensities, but there was no difference in the amino acid concentration of the phloem exudates and thus the amino acid to sugar ratio in the phloem decreased under high illumination. The present results suggest that amino acids can be exported to the phloem independently of the export of sugars.

In addition to affecting a number of developmental processes, sugars have been implicated in the regulation of a large number of genes (Koch, 1996). The α -amylase gene family provides a particularly well-characterized example of sugar-regulated gene expression. Given their biological function, it is, perhaps, not surprising that the expression of many α -amylase genes has been shown to be repressed by soluble sugars, such as glucose and sucrose, thus providing a mechanism by which starch breakdown may be regulated to provide an adequate supply of soluble sugars (Gibson, 2004). The regulation of α -amylase expression by sugars is complicated, occurring at multiple levels as well as via multiple response pathways that can be dependent on sugar concentration or its fluxes. The comprehensive works of Liang *et al.* (2001) and Gibson (2004) have shown that α -amylase expression has been regulated by sugars at both the transcriptional and post-transcriptional levels.

The alternative oxidising pathway is a non-proton motive 'bye-pass' to main electron transport otherwise in operation through the cytochrome pathway. Despite its wasteful nature, in terms of energy conservation, the pathway is ubiquitous throughout the plant kingdom. A small alternative oxidising gene family probably exists and its members are differentially expressed in response to environmental, developmental and other cell signals. The alternative oxidising pathway enzymes possesses tight biochemical regulatory properties that determine its ability to compete with the cytochrome pathway for electrons.

Studies show that alternative oxidising pathway can be a prominent component of total respiration in important crop species. All these characteristics suggest that this pathway plays an important role in metabolism and/or other aspects of cell physiology (McDonald *et al.*, 2002).

Depending on the plant species and growth conditions, 30 to 70 percent carbohydrates fixed in photosynthesis get respired on the day of its synthesis (McDonald *et al.*, 2002). The terminal part of the respiratory path, which starts with glycolysis, consists of the mitochondrial electron transport pathway, in which, among other components, two terminal oxidizing systems, cytochrome C oxidase or alternative oxidase may operate. The later branches from the main electron transport pathway at the ubiquinone pool and beyond the branch point, unfortunately does not contribute to ATP production. The energy conservation is less than maximal if a part of the respiration proceeds via this non-phosphorylating (alternative) pathway. Because of its energy wasting nature, it is most interesting (scientifically, as well as economically) to investigate under which conditions and to what extent alternative respiration is used, and how its activity is regulated.

Many reports have appeared, in which the activity of the alternative oxidase entity was assessed with the use of specific inhibitors of the cytochrome (e.g., CN⁻, azide, antimycin) or (e.g., SHAM, benzhydroxamic acid, propyl gallate) pathways (Lambers, 1997). It was shown that the alternative pathway became active at very high reduction levels of the Q pool (Dry *et al.*, 1989). There have been a few reports of this alternate oxidative pathway from some angiosperms and its values have been correlated with a few physiological parameters directly or indirectly associated with yield e.g., in *Vigna radiata* grown at 19°C the concentration of the alternative oxidase component increased over two-fold in both hypocotyls and leaves as compared to 28°C. This response could not be carried to *Glycine max* cotyledons (Gonzalez-Meler *et al.*, 1999). Ribas-Carbo *et al.* (2000) reported that in a chilling-sensitive maize cultivar, the activity of the alternative pathway was higher during the recovery period than in a less chilling-sensitive cultivar. According to Millenaar and Lambers (2003) the alternative pathway is inhibited more at low oxygen concentrations compared with the cytochrome pathway. Therefore, the alternative pathway

does not have a function at low oxygen concentrations.

The activity of the cytochrome pathway depends on the availability of inorganic phosphate and ADP. If plants are exposed to very low phosphorus supply, its concentration along with that of ADP may become very low. Therefore, it has been postulated that under these conditions the activity of the alternative pathway is increased relative to that of the cytochrome pathway (Gonzalez-Meler *et al.*, 2001). Some oxygen free radical scavenger enzymes (catalase and total peroxidase) are more active in P-deficient plants, while others do not change (ascorbate peroxidase and superoxide dismutase) (Juszczuk *et al.*, 2001). Restriction of the cytochrome pathway by phosphorus limitation causes an increase in the formation of oxygen free radicals, which can be prevented (partly) by more active alternative oxidase pathway.

While studying the development of grains at basal and distal positions within a middle spikelet of mother shoot of wheat, Kumari and Ghildiyal (1998) observed that lesser growth of distal grains was associated with higher rate of alternative respiration compared to proximal grains, thereby inferring that lesser growth at distal position in a spikelet may be linked to high alternate oxidase system. Gonzalez-Meler *et al.* (1996) reported elevated CO₂ concentration inhibited the salicylhydroxamic acid-resistant cytochrome pathway, but had no direct effect on the cyanide-resistant alternative pathway. This response may be indicative of a shift in plant metabolism and the increased energy demand resulting from higher photosynthetic rates under CO₂ enrichment (Woodward, 2002).

In the present study, it is proposed to analyze the relative levels of starch and total sugars as affected by specific inhibitor of salicylhydroxamic acid in basal and apical grains growing in the same spikelet of wheat.

2. Material and Methods

2.1. Experimental setup

The investigation was conducted with a common bread wheat (*Triticum aestivum* L. var. *PBW-343*), which was sown in circular earthenware pots (50x30x30 cm) containing 35 kg of soil mixed with farmyard manure (4:1). Eight seeds per pot were sown and after 15 days, seedlings were thinned to two. Hoagland's nutrient solution (1939) was supplied to the pots. The plants were grown in a screen covered hall under otherwise natural

conditions. A concentration of 10 ppm salicylhydroxamic acid was applied at anthesis stage with the help of cotton plugs, which remained on ears of mother shoots (MS) for 48 hours. Labeled main spikes were sampled five times, seven-day intervals started from seventh day after anthesis (DAA) up to 28th DAA, and at maturity. Grains were usually taken from three different segments in the ear. The labeled samples of grains were brought to laboratory and separated to two types of grains (small and bold) and the following biochemical analysis was carried out in the above aged grains.

2.2. Starch analysis

Starch contents were estimated by the method described by Hodge and Hofreiter (1962). The brief procedure is as follows:

(i) Extraction of Starch - One gram of powdered dry sample of grains was transferred to 100 ml of volumetric flask. The material was hydrated and gelatinised with 30 ml of distilled water by keeping the flask over boiling water bath for 30 minutes. The flasks were well stoppered so as to prevent any loss of water by evaporation. The flasks were cooled under running cold water for 10 minutes and 60 ml of 60 percent perchloric acid was added slowly with thorough agitation so as to avoid any momentary high concentration of acid. The mixture was allowed to stand, with occasional stirring, for 15 minutes and the volume were made up with distilled water. After shaking, the contents were allowed to settle. The supernatant was used for starch estimation.

(ii) Estimation of Starch - 5 ml of the above supernatant solution was pipetted out into 100 ml volumetric flask. To this, 6 ml of cold distilled water was added. The solution was made incipient alkaline with a few drops of 2N NaOH with the use of phenolphthalein as an indicator. The solution was made just acidic with a drop of 2N acetic acid till the pink colour disappears and to this, 2.5 of 2N acetic acid, 0.5 ml of 10 percent potassium iodide and 5 ml of 0.01 N potassium iodate were added for the colour to develop. The volume was raised to 100 ml and intensity of the colour was measured at 650 nm in a Bausch and Lomb Spectronic 20 using red filter. A single blank containing all the reagents was used to adjust the absorbance at zero. The unknown quantity was estimated from the standard curve prepared with tomato starch and results expressed as mg per grain.

2.3. Total sugars analysis

Total sugars were estimated by the method of Dubois *et al.* (1956) with some

modifications as follows:

(i) Extraction of total sugars - Fresh grains weighing 1 g at different intervals of time after anthesis were cut into small cubes of 1 sq. mm and taken into a vial containing 5 ml of 80 percent ethanol and stored overnight. The samples were extracted with boiling ethanol the next day. The supernatant was decanted into 50 ml beaker. The residue was repeatedly extracted 4 times with 80 percent boiling ethanol. The volume of the combined supernatant was made upto 25 ml with 80 percent ethanol and then centrifuged at 6000 g for 20 minutes. The supernatant so obtained was used for the estimation of total sugars.

(ii) Estimation of total sugars - Total sugars were estimated using the reagents included phenol 5 percent and concentrated H₂SO₄. A suitable amount of the supernatant (0.2 – 0.5 ml) was taken in a test tube and to this 1 ml of phenol reagent and 5 ml of concentrated H₂SO₄ were added and mixed thoroughly. The absorbance was recorded after 20 minutes of colour development at 490 nm. The total sugars content were calculated from a calibration curve prepared with glucose and expressed as mg per grain.

3. Results

3.1. Relative levels of starch and total sugars

All the grains, irrespective of their size or positions in an ear, revealed a positive correlation between their ages and the levels of starch (Table 1). The first five spikelets, constituting as proximal, the next ten and the last five spikelets as middle and distal segments respectively had their own characteristic variations with a common generalization that the bolder grains possessed a higher levels of starch than the smaller grains at all the stages of grain development. The disparity between the bold and small grains in the levels of starch was maximum at 7th DAA in all the three segments (44.8, 30.0 and 55.6 percents lesser in smaller grains than bolder grains in proximal, middle and distal segments respectively) and further the disparity tended to taper with maturity. Interestingly, during the initial phases of grain growth, there were significant disparities within the smaller grains amongst themselves whether growing at proximal, middle or distal segments, while on the other hand, bolder grains reflected insignificant differences amongst them.

The data on total sugars are also presented in Table 1. The total sugars increased upto third week after anthesis in small grains in

the proximal, middle or distal spikelets, while its values enhanced upto fourth week in the bolder grains in the same segments. Their values were significantly lower in the bolder grains as compared to smaller grains in all the segments by a margin ranging from 8.1 to 46.9 percents. These disparities were maximum around three weeks after anthesis and this generalization was true for all the three segments under (45.6, 46.9 and 46.3 percents higher in smaller than bolder grains in proximal, middle and distal segments respectively). Interestingly the gap amongst the bold and small grains tended to taper with the grains' progression to maturity.

Table 1. Levels of starch and total sugars (mg grain⁻¹) at different location within developing grains of wheat (*Triticum aestivum* L. var. *PBW-343*) as influenced by SHAM

Relative levels (mg grain ⁻¹)	Grain type	Day after anthesis (DAA)				Maturity
		7 th	14 th	21 st	28 th	
Starch	Bold	2.0 (+5.3)	12.8 (+39.1)	21.9 (+23.7)	31.2 (+20.5)	32.7 (+18.5)
	Small	1.4 (+7.7)	9.1 (+35.8)	17.9 (+27.0)	26.9 (+24.5)	28.3 (+22.5)
Total sugars	Bold	3.48 (+1.8)	4.26 (+2.2)	4.86 (+4.1)	4.64 (+10.0)	4.62 (+14.9)
	Small	4.74 (+1.9)	6.04 (+3.1)	7.08 (+6.9)	6.54 (+14.9)	6.10 (+18.9)

Values within parenthesis indicate percentage of increase (+) in the level of starch/total sugars over control

3.2. SHAM effects on relative levels of starch and total sugars

The application of salicylhydroxamic acid presented the unique observations. Ironically, the inhibitor behaved in an enigmatic way and proved to be a promoter when being assessed under the criterion of relative levels of starch and total sugars.

The salient points emerging through the use of salicylhydroxamic acid were that (i) both bold and small grains showed an increase in relative levels of starch and total sugars from 14th and 28th DAA stages respectively (Table 1) and (ii) in spite of the aforementioned increment, they continued to exhibit the disparity between them and at maturity the smaller grains still showed lower starch and higher total sugars than the bolder grains (Figures 1 and 2).

As apparent from the Figure 1, the relative levels of starch in bold and small grains showed a significant disparity with respect to its distribution in the two types of grains. In comparison to bolder grains, the smaller grains possessed significantly low levels of starch. The disparity was sustainable throughout the ontogeny of grains development with maximum gap at 21st DAA (30.0 percent lower than bold grains) with a recorded gap of 28.9, 18.3 and 13.8 percent at 7th, 14th and 28th DAA and

ending up with a final disparity of 13.4 percent at maturity, respectively.

Furthermore, as apparent from the Figure 2, the relative levels of total sugars in bold and small grains also showed a significant disparity with respect to its distribution in the two types of grains. In comparison to bolder grains, the smaller grains possessed significantly high levels of total sugars. The disparity was sustainable throughout the ontogeny of grains development with maximum gap at 21st DAA (55.7 percent higher than bold grains) with a recorded gap of 36.2, 41.7, 40.9 and 32.6 percent at 7th, 14th, 28th DAA and maturity, respectively.

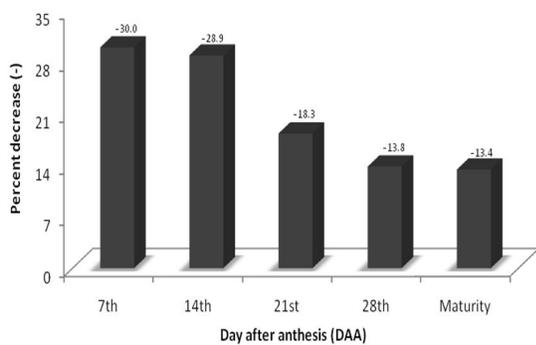


Figure 1. Percentage decrease (-) in relative levels of starch in small grains over their counterparts bold grains as affected by SHAM

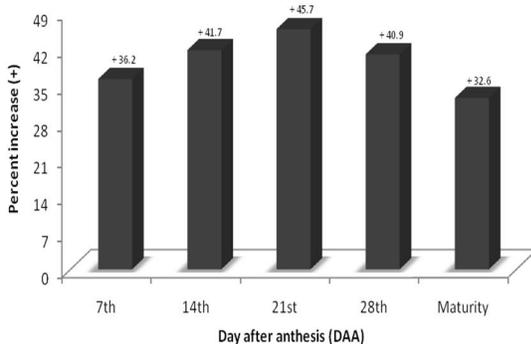


Figure 2. Percentage increase (+) in relative levels of total sugars in small grains over their counterparts bold grains as affected by SHAM

4. Discussions

We have investigated the relative levels of starch and total sugars as affected by salicylhydroxamic acid in basal and apical grains growing in the same spikelet of wheat. The results bring forth, in no uncertain terms, the findings that the ear of wheat is a developing place for a definite

number of grains which intern are separate biological entities endowed with their inherent potentials. This axiom was advocated by Abolina (1959) and is in line with the observations of innumerable workers (Cook and Evans 1978; Larsson and Hensen 1992; Wang *et al.* 1998; Yang *et al.* 2003). Nevertheless, the sequence of events, piloting the yielding ability, is the metabolic profile and if augmented through the use of plant growth regulators (Yang *et al.* 2000; Houshmandfar and Eradatmand-Asli 2011) or by imposing a shift in metabolic events (Dua *et al.* 1990) promotory effects are achievable (Hayashi 1961; Michael and Beringer 1980).

In present context, the central point which came to light in the present endeavor is that an unusual path of aerobic respiratory chain (CN-resistant respiration) plausibly switches-on during the grain filling stage and if checked, through the immaculate use of salicylhydroxamic acid, can increase the relative levels of starch and total sugars in the grains. Of course, SHAM or regulator of alternate oxidase pathway was not successful in eliminating the disparities between the two types of grains.

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Light Weight Distributed QoS Adapter in Large-Scale Ad hoc Networks

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Abstract: Considering the comfortably establishing ad hoc networks, the use of this type of network is increasing day to day. On the other side, it is predicted that using multimedia applications will be more public in these network. As it is known, in contrary to best-effort flows, the transmission of multimedia flows in any network need support from QoS. However, the wireless ad hoc networks are severely affected by bandwidth, and establishing a QoS in these networks face problems. In this paper, we have proposed a thoroughly distributed algorithm to support the QoS in ad hoc networks. This algorithm guarantees the QoS of the real-time applications vis-a-vis each other and best-effort flows as well. The algorithm suggested in this paper dynamically regulates the Contention Window of the flows and serves the flows in terms of their requests QoS choosing the smallest CW in every node. This algorithm also uses the fixed and/or less stationary nodes for the transmission of real-time flows by increasing the QoS of the multimedia flows. This algorithm is preferred because it prioritizes the flows that are of the same class but have not obtained favorite QoS compared to other flows of the same class in addition to classifying the flows in the network and offering better services to the classes of higher priority. All this occur without the controlled packets forwarding and resource reserving and freeing method. We have proved the correctness of this algorithm using Markov's mathematical model.

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1. Introduction

A wireless ad hoc network consists of a number of nodes communicating with each other on wireless links without infrastructure support. A multi hop ad hoc network is an ad hoc network in which the packets of a traffic flow are relayed by one or more intermediate nodes before they reach the destination. To support different types of real time applications, providing various quality of service (QoS) guarantees for multi-hop flows is an important issue in wireless ad hoc networks.

Many routing schemes and frameworks have been proposed to provide QoS support for ad hoc networks [1, 2, 3, 4, 5]. Among them, INSIGNIA [1] uses an in-band signaling protocol for distribution of QoS information. The term in-band signaling means that the control information is carried with data, and there is no separate control channel as opposed to another type of signaling called out-of-band signaling. INSIGNIA's architecture has several modules that are routing, in-band signaling, admission control, packet forwarding or scheduling, MAC protocol, etc. However, it is a stateful architecture because it uses soft state resource management scheme to utilize the resources.

SWAN [2] improves INSIGNIA by introducing an Additive Increase Multiplicative Decrease (AIMD)-based rate control algorithm. It supports service differentiation for real-time and

best-effort traffic. The SWAN's architecture handles both the real-time traffic and the best-effort traffic. Local rate control is used for handling the best-effort traffic of TCP, and a sender-based admission control is used for the real-time traffic of UDP.

Both [3] and [4] utilize a distance vector protocol to collect end-to-end QoS information via either flooding or hop-by-hop propagation. CEDAR[5] proposes a core-extraction distributed routing algorithm that maintains a self-organizing routing infrastructure, called the "core".

Most of the available algorithms do not have any control over the reception of the new flows. And some algorithms control the reception of the flows by exerting overhead on the network and exchanging control messages between the nodes in the path. These protocols do not attend to the fact that the transmission of the flows in a node may decrease the bandwidth of the available nodes in the scope of the node transmission. Therefore, these protocols only guarantee that the new flows will reach the desired QoS, but do not deed the point that the reception of the new flow may cause decrease in the QoS of the current flows. A solution to this problem is that the effort rate of the nodes in the path of the new flow transmission to obtain an environment be taken into account in deciding about the reception of the new flow. However, it is possible for some nodes in the

path not to be directly accessible for the decision-making nodes and to need multi-hop facilities. As it is seen, this method can exert too much overhead on the network. On the other hand, this method will not have desirable results for high rate of packets loss and movement of the nodes in the ad hoc networks. As such, the algorithms supporting the QoS must not be sensitive to the packet loss and must not exert much overhead on the network, which have been taken into account in our method.

Recently, other works have been proposed to improve the performance of MAC protocols and the support of service differentiation. Many of these approaches specifically target IEEE 802.11 [6]. For example, studies in [7,8,9,10] propose to tune the contention windows sizes or the inter-frame spacing values to improve network throughput, while studies in [7,11,12,13,14] propose priority-based scheduling to provide service differentiation. Most of this work utilizes different back-off mechanisms, different DIFS lengths, or different maximum frame lengths, based on the priority of the traffic.

However, the current status of the network and the QoS acquired by the flows are not given attention when these values are considered. In other words, these algorithms do not act fully automatically when priorities are given to the flows.

In this paper, a fully distributed algorithm is proposed for supporting the QoS of the flows in the network. Classifying the flows to delay-sensitive, bandwidth-sensitive and best effort, this algorithm differentiates the flows in the network in order to offer services.

This algorithm is preferred to others because, without any control packet, it gives much priority to the flows which are of the same class but have not obtained favorable QoS compared to other peer flows and tries to remove lagged QoS in these flows in addition to classifying the flows in the network. To put it another way, in addition to the type of the flows it attaches attention to the QoS different flows have acquired.

The rest of the paper is organized as follow. Section 2 is concerned with the QoS framework, algorithms and works done to classify the flows and support the flow QoS. In Section 3, the validity and properness of the suggested model is proved through Markov's Chain, and Section 4 is associated with conclusion.

2. QoS Framework

2.1. Desirable Network Modification

Our aim is to realize the QoS of the real time flows in the ad hoc networks vis-à-vis best-effort flows.

Many routing protocols in the ad hoc networks do not differentiate between fixed nodes, less mobile and mobile nodes for the transmission of the flows in multi-hop environment. In other words, there is an equal chance for the fixed, less mobile and mobile nodes to be chosen in the flow transmission though the fixed nodes and/or less mobile nodes offer better quality in the flow transmission. Thus, it is suggested fixed routers and/or less mobile routers be taken into account in special places of vast environments so that the transmission can be done with better quality. While best-effort traffic may be more tolerant to node mobility, the quality of real-time traffic will be significantly degraded and is likely to become unacceptable. The utilization of fixed wireless routers in these networks will greatly improve the quality of real-time traffic by the elimination of intermediate link breaks.

2.2. Find_Fix_Routers for real-time traffics

When a node wants to send a real-time flow, it must, first of all, call for Find_Fix_Router process in order to find a valid path. By a valid path, it is meant a path which is composed of fixed nodes and/or less mobile nodes and provides for the QoS of the desirable flow.

Find_Fix_Router process based on the modified AODV routing protocol. The modified protocol reflect the selection of stationary routes for real-time traffics. When a source node initiates route discovery for real-time traffic with strict quality requirements, only the fixed routers respond to the control packets by either forwarding the RREQ, or unicasting a RREP. The mobile nodes do not respond to these packets, unless they are the destination.

Find_Fix_Router also enables effective admission control when the network utilization is saturated. This requires accurate estimation of channel utilization and prediction of flow quality, i.e., throughput or transmission delay. The proposed QoS approach is based on model-based resource estimation mechanism, called MBRP[17]. By modeling the node back-off behavior of the MAC protocol and analyzing the channel utilization, MBRP provides both per-flow and aggregated system wide throughput and delay [16].

2.3. Prioritized medium access

In Ad hoc networks, priority scheduling algorithms are based on IEEE 802.11[6]. Currently, there are several approaches that propose to provide service differentiation to different types of traffic based on 802.11, by either assigning different minimum contention window sizes (CW_{min}),

Arbitrary Inter Frame Spacings (AIFS), or back-off ratios.

There are algorithms that differentiate between different flows through these techniques, but this differentiation is static. That is to say, it does not heed the network current status and current status of flows. Therefore reduces the usage efficiency of the network. So, we propose an adaptive scheme to manage trade-off. The basic idea is that, because the state of ad hoc networks can vary greatly due to mobility and channel interference, it is advantageous to adjust the back-off behavior according to the current channel condition and current QoS of flows.

To achieve service differentiation, as well as to adapt to the current network usage, we combine the collision rate and current QoS of flows with the exponential back-off mechanism in IEEE802.11. To do it, classifies flows into three types: delay-sensitive flows, bandwidth sensitive flows and best effort flows. Upon receiving the first packet from the flow related to one of the three classes, each node in the network builds a queue for that flow locally and without any overhead. Then it inserts this packet and subsequent packets related to that flow in this queue. The purpose of queuing each special flow is to manage and control the QoS obtained by each flow in every node and in the whole system consequently. The proposed algorithm does not let a flow obtain a quality higher than the requested quality. On the other hand, it tries to provide the quality requested by each flow. It is noted that contrary to real-time flows where a separate queue is built in every node for each flow, only a queue is built for all best-effort flows in every node. Figure 1 shows the queues built in each node to manage different flows.

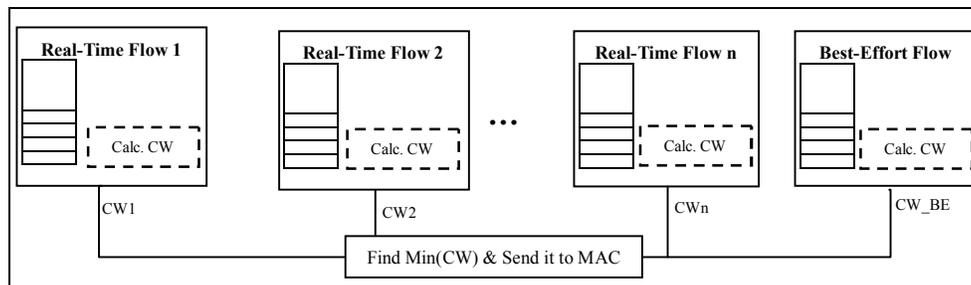


Figure 1. Queues in each node (Network Layer)

2.4 Algorithms Used to Control QoS of Flows

In the algorithm proposed in this paper, the flows in the network are divided to three different

classes in order to differentiate the flows. As such, the level of offering services to the flows in the network is personalized with consideration of the type of the flow class and the QoS they have obtained. These three classes and the algorithms used to regulate the level of the service offered to the flows are discussed in this Section.

The delay-sensitive flows, such as conversational audio/video conferencing, require that packets arrive at the destination within a certain delay bound. The bandwidth-sensitive flows, such as on-demand multimedia retrieval, require a certain throughput. The best effort flows, such as file transfer, can adapt to changes in bandwidth and delay. Due to the different requirements of flows, each type of flows has its own contention window adaptation rule, as flows:

1) *Delay-Sensitive Flows*: For a delay-sensitive flow, the essential QoS requirement is end-to-end packet delay, which we call d .

To control delay, the d must be broken down into per-hop delay requirements. To maintain the aggregated end-to-end delay below d , each hop locally limits packet delay below its per-hop requirement. For this paper, each node is assigned with the same per-hop delay requirement, d/m , where m is the hop count of the flow. It is noted that the value of m is calculated through AODV routing algorithm.

$$CW^{(n+1)} = CW^{(n)} * \left(1 + \alpha \frac{d/m - D^{(n)}}{d/m}\right) \quad (1)$$

Where the superscript n represents the n^{th} update iteration, D denotes the actual peak packet delay at the node during a update period and α is a small positive constant ($\alpha=0.1$).

2) *Bandwidth-Sensitive Flows*: For a bandwidth sensitive flow, the essential QoS requirement is throughput. For control throughput it

is requires that at each node along the flow's route, the packet arrival rate of the flow should match the packet departure rate of the flow. In order for the rate of packet input to the node to be equal to the rate of packet output from the node, a queue must be used and its length must be managed. Therefore, it is suggested CW of the flows sensitive to bandwidth be calculated as follows:

$$CW^{(n+1)} = CW^{(n)} + \beta(q - Q^{(n)}) \quad (2)$$

Where q is a threshold value of the queue length that is smaller than the maximum capacity of the queue, Q represents the actual queue length and β is a positive constant ($\beta=1$). If Q is larger than q , the algorithm decreases CW to increase the packet departure rate to decrease queue length. If Q is smaller than q , the algorithm increases CW to decrease the packet departure rate and free up resources for other flows. As the queue size varies around the threshold value q , the average throughput of the flow matches its requirement.

3) *Best Effort Flows*: Best effort flows are tolerant to changes in service levels and do not have any hard requirements about bandwidth or packet delay. The purpose of updating the contention window size of best effort flows is to prevent best effort flows from congesting the network and degrading the service level of real-time flows and this is done by controlling the network congestion.

$$CW^{(n+1)} = CW^{(n)} \times (1 + \gamma(f - F^{(n)})) \quad (3)$$

Where f is a *congestion threshold* for idle channel time, F is the actual idle channel time and γ is a positive constant ($\gamma=0.1$).

When the average idle channel time F is smaller than the threshold value f , the network is considered congested and the contention window size of the best effort traffic is increased to avoid decreasing the service level of real-time traffic. On the other hand, if the network is lightly loaded so that the idle channel time is larger than f , the contention window size of best effort traffic is decreased so that the idle bandwidth can be utilized.

Later on, pseudo-codes related to the packet forwarding, packet receiving, CW calculation and back-off computation will be discussed.

When a node receives a packet do the following:

```

Receive_Packet(P)
{
  If (TypeOf(P)='Best-Effort') then
    If (there is no queue for Best-Effort flow) then
      Create a queue for Best-effort flow;
    Else if (p is the 1th packet of non B_E flow) then
      Create a queue for this flow;

```

```

  Add packet in specific queue;
}
  When a node want to send a packet do as
  following:

```

```

Packet_Send()
{
  Indicated which flow the smallest CW relates to.
  If (TypeOf(flow)='Real-Time') then
    Find_Fix_Routers();
    Remove a packet from queue;
    Send packet;
    Update queue pointers;
}

```

Each of nodes performs following instructions to calculating CW for each flow.

```

Calc_CW ()
{
  If (TypeOf(flow) = 'delay-sensitive' then
    
$$CW^{(n+1)} = CW^{(n)} * (1 + a \frac{d/m - D^{(n)}}{d/m})$$

  elseif TypeOf(flow) = 'bandwidth-sensitive' then
    
$$CW^{(n+1)} = CW^{(n)} + \beta(q - Q^{(n)})$$

  elseif TypeOf(flow) = 'best-effort' then
    
$$CW^{(n+1)} = CW^{(n)} \times (1 + \gamma(f - F^{(n)}))$$

}

```

The IEEE 802.11 use the following formula to compute the back-off related to each node:

$$Back-off = Rand[0, CW] * Slot_Time, \quad CW_{min} < CW < CW_{max}$$

In order to compute the value of back-off for each node in this proposed algorithm, the rate of collision in the network besides the smallest CW must be taken into account. Thus, to compute the back-off, the equation (4) is proposed.

$$Back-off = Rand[0, (2^r + R_{col}) * CW_{min}] * Slot_Time \quad (4)$$

```

Back-off_Time()
{

```

```

  Get minimum CW( $CW_{min}$ ) from network layer.

```

```

  Calculate Back-off time according to

```

$$Back-off = Rand[0, (2^r + R_{col}) * CW_{min}] * Slot_Time$$

```

}

```

Where R_{col} denotes the collision rate between a station's two successful frame transmissions and r is a positive number.

By applying Eq. (4), all flows dynamically manage their contention parameters to meet their own QoS needs. A real-time flow that did not get its required QoS in the past due to competition from other flows

decreases its contention window size so that statistically it will have a higher chance to obtain the channel in the future(Eq.(1),(2)). A best effort flow, on the other hand, increases its contention window size when the network is considered busy and hence releases the channel to the real-time flows(Eq.(3)). The random generated back-off counter ensures that the channel access attempts from different flows are spread out and do not cause a lot of collision. More importantly with attention to flow's current status, traffics with same class will have different back-off value when collisions occur. Specifically, after a collision occurs, low priority traffic will back-off for longer, and subsequently high priority traffic will have a better chance of accessing the channel. Contrary to [12], [15], in our proposed algorithm, no piggy-backed schedule information and neighborhood scheduling tables are needed. Therefore, there is no control message overhead imposed by our proposed algorithm.

In next section, the correct function of the proposed algorithm is proved.

3- Model Validation

In this section, we study the behavior of a single station with a Markov model, and we obtain the stationary probability π that the station transmits a packet in a generic (i.e., randomly chosen) slot time.

Bianchi uses a two-dimensional Markov chain of $m + 1$ back-off stages in which each stage represents the back-off time counter of a node, see Figure 2. A transition takes place upon collision and successful transmission, to a "higher" stage (e.g., from stage $i-1$ to stage i in Figure 3) and to the lowest stage (i.e., stage 0) respectively.

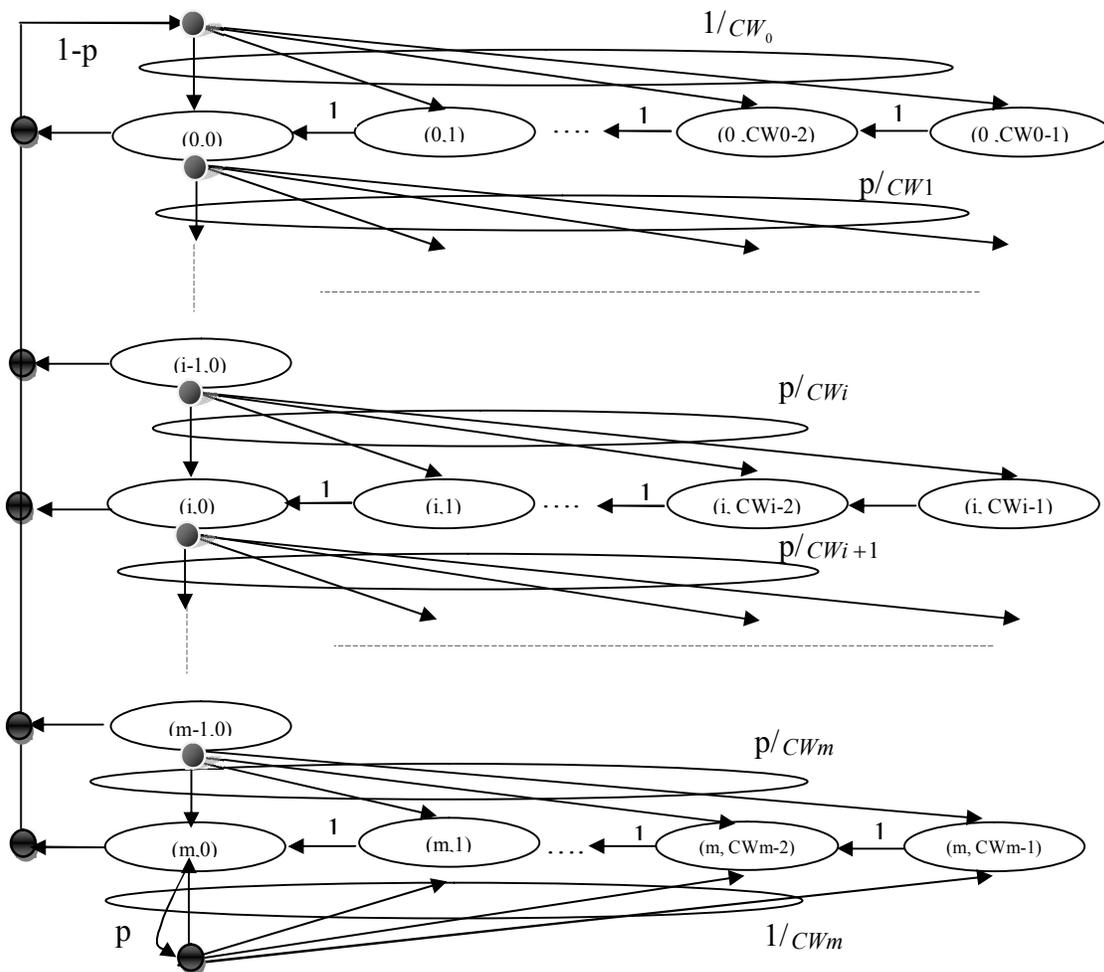


Figure 2. Markov chain model of back-off window size

Each state of this bi-dimensional Markov process is represented by $\{s(t), b(t)\}$, where $b(t)$ is the stochastic process representing the back-off time counter for a given station and $s(t)$ is the stochastic process representing the back-off stage $(0, 1, \dots, m)$ of the station at time t . This model assumes that in each transmission attempt, each packet collides with constant and independent probability p . In other words, p is the probability that, in a slot time, at least one of the $N - 1$ remaining stations transmits as well. If at steady state each remaining station transmits a packet with probability π , p can be written as:

$$p = 1 - (1 - \pi)^{N-1} \tag{5}$$

Let $\begin{cases} b_{i,k} = \lim_{t \rightarrow \infty} P\{s(t) = i, b(t) = k\} \\ i \in (0, m), k \in (0, CW_i - 1) \end{cases}$ be the

stationary distribution of the chain. A transmission occurs when the back-off time counter is equal to zero. Thus, we can write the probability that a station transmits in a randomly chosen slot time as:

$$\pi = \sum_{i=0}^m b_{i,0} \tag{6}$$

For the above Markov chain, it is easy to obtain a closed-form solution for $b_{i,0}$ as a function of p .

First, we can write the stationary distribution of the chain for $b_{i,0}$, $b_{m,0}$ and $b_{i,k}$:

$$\begin{cases} b_{i,0} = p^i b_{0,0} & 0 < i < m \\ b_{m,0} = \frac{p^m}{1-p} b_{0,0} \\ b_{i,k} = \frac{CW_i - k}{CW_i} b_{i,0} & 0 \leq i \leq m, 0 < k < CW_i - 1 \end{cases} \tag{7}$$

The first and second expressions in (7) account from the fact that $b_{i-1,0} \times p = b_{i,0}$ for $0 < i < m$ and $b_{m-1,0} \times p = (1-p)b_{m,0}$. The third equation can be

obtained considering the fact that $\sum_{i=0}^m b_{i,0} = \frac{b_{0,0}}{1-p}$

and taking the chain regularities into account (for $k \in (1, CW_i - 1)$), that is:

$$b_{i,k} = \frac{CW_i - k}{CW_i} \begin{cases} (1-p) \sum_{j=0}^m b_{j,0} & i = 0 \\ p \times b_{i-1,0} & 0 < i < m \\ p \times (b_{m-1,0} + b_{m,0}) & i = m \end{cases} \tag{8}$$

By imposing the normalization condition and considering Equation (7), we can obtain $b_{0,0}$ as function of p :

$$1 = \sum_{i=0}^m \sum_{k=0}^{CW_i-1} b_{i,k} = \sum_{i=0}^m b_{i,0} \sum_{k=0}^{CW_i-1} \frac{CW_i - k}{CW_i} = \sum_{i=0}^m b_{i,0} \frac{CW_i + 1}{2} = \sum_{i=0}^m b_{i,0} \frac{2^i W_{\min} + 1}{2} \tag{9}$$

$$= b_{0,0} \frac{W_{\min} + 1}{2} + \sum_{i=0}^{m-1} (b_{0,0} p^i \left(\frac{2^i W_{\min} + 1}{2} \right)) + \left(\frac{b_{0,0} p^m}{1-p} \right) \left(\frac{2^m W_{\min} + 1}{2} \right) = \frac{b_{0,0}}{2} \left[W_{\min} + 1 + \sum_{i=0}^{m-1} ((2p)^i W_{\min} + p^i) + \frac{p^m}{1-p} (2^m W_{\min} + 1) \right] = \frac{b_{0,0}}{2} \left[W_{\min} \left(\sum_{i=0}^{m-1} (2p)^i + \frac{(2p)^m}{1-p} \right) + \frac{1}{1-p} \right]$$

Thus $b_{0,0}$ can be written as:

$$b_{0,0} = \frac{2(1-2p)(1-p)}{(1-2p)(W_{\min} + 1) + pW_{\min}(1-(2p)^m)} \tag{10}$$

Finally, considering equations (6), (7) and (10), the channel access probability π of a node is derived as a function of the number of back-off stage levels m , the minimum contention window value W_{\min} , and the collision probability p :

$$\pi = \sum_{i=0}^m b_{i,0} = \frac{b_{0,0}}{1-p} = \frac{2(1-2p)}{(1-2p)(W_{\min} + 1) + pW_{\min}(1-(2p)^m)} = \frac{2}{1 + W_{\min} + pW_{\min} \sum_{k=0}^{m-1} (2p)^k} \quad (11)$$

Considering equation 11, how a node obtains a channel and transmits a flow depends upon the rate of collision and CW in each node. That is to say, any node that faces less collision and has the smallest CW obtains the channel with high probability and embarks upon the transmission of its flows. For this reason, nodes can regulate the CWs related to their own flows and provide the desirable QoS. In the proposed, the CW related to the flows is regulated by means of Eq. (1,2,3). These algorithms are regulated such that they will increase its CW value quickly and provide other flows with the resources existing in the system if a flow obtains a resource more than the required resource at a time and obtains a QoS higher than the desirable QoS. Consequently, other flows will not face any limitations in obtaining resources. On other hand, any node which does not obtain it required resources and QoS at a point in time make much efforts to obtain the resources and compensate for the damages by decreasing its own CW and acquiring much back-off in order to obtain its desirable QoS.

Therefore, it is seen that the algorithm proposed in this paper shows a correct function in different conditions, in this algorithm, the flows help each other under some circumstances besides quarreling with each other for obtaining resources in order for all the flows in the network to obtaining required QoS.

4- Discussions

In this paper we introduce a new QoS support protocol that could be run in large-scale ad hoc networks, which this protocol is simple, fully distributed and use no control packets. An important benefit of this protocol is that it does not need resource reservation and therefore, it does not have the problems related to the use of in-bound and out-bound signals to reserve and free the resources, and the network bandwidth is not occupied by reserving and freeing the resources. This has caused this protocol be a light weight protocol that could be used in multi-hop ad hoc networks.

In the future, we will investigate the effect of different values α, β, f, r on the throughput and delay related to different classes.

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Study of the Effects of Micronutrient Application on the absorption of macro- and micronutrients in the Soybean Cultivar Telar in the North of Iran

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Abstract: In order to study the effects of applying the micronutrients zinc, boron, and manganese (which are added to the soil and sprayed on the crop) on the absorption of the macro- and micronutrients in soybean seeds, an experiment was carried out using the factorial design with the two factors of adding the micronutrients zinc, manganese, and boron to the soil and spraying them on the crop, with 16 treatments and four replications (a total of 64 trials). On the basis of the soil test which had been conducted, the required amounts of the micronutrients (40, 30, and 10 Kg.h of zinc sulphate, manganese sulphate, and boric acid, respectively) were added to the soil before seeding. In the spray treatments, zinc and manganese (0.30 %) and boron (0.20 %) were sprayed on the crop at the start of stem elongation and at flower bud formation. Results of the comparison of the means showed that the highest concentration of nitrogen (6.65 %) and phosphorous (0.18 %) in the seeds were obtained when zinc was sprayed on the crop, the highest potassium concentration in the seeds (0.92 %) was achieved when manganese was added to the soil, and the highest zinc concentration in the seeds (52.5 ppm) was observed when zinc was applied to the soil. These results also indicated that, among the treatments of spraying the micronutrients on the crop, the highest manganese concentration in the seeds (24.77 ppm) was obtained when manganese was sprayed on the crop, that the highest boron concentration in the seeds (46.58 ppm) was achieved when boron was added to the soil (and that this boron treatment had a statistically significant difference with the others). Comparison of the interaction effects of the data showed that the highest seed nitrogen concentration (6.72 %) was observed when zinc was sprayed on the crop, that the highest seed phosphorous concentration (0.22 %) was obtained when boron was added to the soil, that the highest seed potassium concentrations (0.93 % and 0.94 %) were achieved when zinc and manganese were sprayed on the crop, respectively, that the highest seed zinc concentrations were observed by adding manganese to the soil plus spraying zinc on the crop (55.33 ppm) and by adding zinc to the soil plus spraying zinc on the crop (55 ppm), that the highest seed manganese concentration (23.67 ppm) was obtained by adding zinc to the soil plus spraying manganese on the crop or by adding manganese to the soil plus spraying boron on the crop, and, finally, that the highest seed boron concentrations (44 and 41.67 ppm) were achieved by spraying boron on the crop and by adding manganese to the soil plus spraying boron on the crop, respectively

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Keywords: B, Cultivar, Mn, Soybean, Zn

1. Introduction

Oil crops are among the important crop plants and their products form a part of daily food for people and feed for stock. Considering our population of 70 million, we need more than 1.1 million tons of edible oil each year. However, less than 14% of our annual oil consumption is produced in the country, and the rest must be imported from abroad (Anonymous, 2006).

Soybean (*Glycine max* [Merrill]) is one of the most important oil crops, and it has played an undeniable role in the production of edible oil in our country, especially in the province of Mazandaran. Soybean is planted in rotation after canola, wheat, and other fall crops, and produces a considerable quantity of good quality oil (seed oil content of 18 to 25%) and protein (seed protein content of 30 to 50 pp%) (Khajeh Pour, 2006). Optimal application of

plant nutrients has a considerable role in increasing the yield of soybean, and in improving its quality and the quality of its oil. Zinc deficiency is one of the most important and widespread micronutrient deficiencies in the world, and it causes a reduction in the yield of crop plants (Grewal et al., 1997; Cakmak, 2000). Soybean is also sensitive to boron deficiency (Victor et al., 1990), and this micronutrient plays a very important role in soybean seed formation and in increasing its oil content (Grant and Baily, 1992). Soybean is very sensitive to manganese deficiency as well, a condition common in neutral and alkali soils with high pH, and manganese deficiency causes soybean plants to be short and to have yellow leaves. Alley et al. (2008) reported that manganese absorption by soybean and soybean seed and oil yields increase when manganese is added to the soil and sprayed on the crop; and that manganese

deficiency has a negative influence on soybean seed oil content. Undoubtedly, optimal application of plant nutrients has a significant role in improving the yield and quality of soybean and of its oil. Since Mazandaran is the center of soybean production in the north of the country, the study of the way the application of micronutrients (added to the soil or sprayed on the crop) influences the absorption of macronutrients, such as nitrogen and phosphorous and potassium, and micronutrients, such as zinc and manganese and boron, is very important. Therefore, this study was conducted in the region of Dasht-e-Naz in Sari (in the province of Mazandaran) to investigate the effects of the application of the micronutrients zinc, manganese, and boron (and to compare the effects of their mode of application – i.e., whether they are added to the soil or sprayed on the crop) on the way macro- and micronutrients are absorbed by soybean.

2. Material and Methods

In order to investigate the effects of the application of zinc, boron, and manganese (added to the soil and sprayed on the crop) on the extent of absorption of macro- and micronutrients in soybean seeds, an experiment in the factorial design with the two factors of adding the micronutrients to the soil and of spraying them on the crop was conducted in 16 treatments with four replications (a total of 64 trials). The treatments were as follows: T1=control; T2= Zn; T3= Mn; T4= B; T5=Zn; T6=Zn+B; T7= Zn+Mn; T8=Zn+B; T9=Mn; T10=Mn+B; T11=Mn+Mn; T12=Mn+B; T13=B; T14=B+B; T15= B+Mn ;T16=B+B. Based on the soil test carried out, the required amounts of the micronutrients (40, 30, and 10 Kg.h of zinc sulphate, manganese sulphate, and boric acid, respectively) were added to the soil before seeding. The spray treatments were carried out using zinc (0.3%), manganese (0.30%), and boron (0.20%) at the start of stem elongation and at flower bud formation. Leaf samples at flowering and seed samples at seed maturity were taken and sent to the laboratory for analysis and determination of the concentrations of the elements.

3. Results

Seed Nitrogen Concentration

Results of the analysis of the variance of the data showed that the effects of adding different levels of the micronutrients to the soil (Factor A), at five percent probability, and the effects of spraying different levels of the micronutrients on the crop (Factor B) and the interaction effects of adding the micronutrients to the soil and spraying them on the crop (AB), at one percent probability, on seed

nitrogen percentage were significant (Table 1). Results of the comparison of the means indicated that, among the treatments of adding the micronutrients to the soil, the highest seed nitrogen concentration (6.57%) was achieved when manganese was added to the soil, and that this treatment had a statistically significant difference with the others. The treatment of adding boron to the soil came second with 6.33%, and the lowest seed oil concentration (6.29%) was that of the control. These results also showed that, among the treatments of spraying the micronutrients on the crop, the highest seed oil concentration (6.65%) was obtained when zinc was sprayed on the crop, and that this treatment was statistically different from the others. The lowest seed oil concentration (6.06%) was observed in the control (Table 3). Results of the interaction effects of the data indicated that the highest seed oil concentration (6.72%) was obtained by spraying zinc on the crop, and that the lowest seed oil concentration (5.65%) was observed in the control (Fig 1).

Seed Phosphorous Concentration

Results of the analysis of the variance of the data showed that the effects of adding the micronutrients to the soil (Factor A), the effects of spraying the micronutrients on the crop (Factor B), and the interaction effects of adding the micronutrients to the soil plus spraying them on the crop (AB) on the phosphorous concentration were not significant (Table 1). Results of the comparison of the means indicated that, among the treatments of adding the micronutrients to the soil, the highest seed phosphorous concentration (0.177%) was obtained when boron was applied to the soil, and that this treatment was not statistically different from the others. The treatments of adding zinc and manganese to the soil came second and third, respectively. The lowest seed phosphorous concentration (0.156%) was that of the control (Table 2). These results also showed that, among the treatments of spraying the micronutrients on the crop, the highest seed phosphorous concentration (0.183%) was achieved when zinc was sprayed on the crop, and that this treatment was not statistically different from the others. The lowest seed phosphorous concentration (0.175%) belonged to the control (Table 3). Results of the interaction effects of the data showed that the highest seed phosphorous concentration (0.225%) was observed when boron was added to the soil, and that the lowest seed phosphorous concentration (0.139%) was that of the control (Fig 2).

Seed Potassium Concentration

Results of the analysis of the variance of the data showed that the effects of applying the different

levels of the micronutrients to the soil (Factor A), and the effects of adding the micronutrients to the soil plus spraying them on the crop (AB) on the seed potassium concentration were significant at the five percent probability level, while the effects of spraying the different levels of the micronutrients on the crop (Factor B) on the seed potassium concentration were significant at the one percent probability level (Table 1). Results of the comparison of the means indicated that, among the treatments of applying the micronutrients to the soil, the highest seed potassium concentration (0.926%) was obtained when manganese was added to the soil, and that this treatment was not statistically different from the others. The lowest seed potassium concentration (0.839%) was that of the control (Table 2). Among the treatments of spraying the micronutrients on the crop, the highest seed potassium concentration (0.915%) was observed when zinc was sprayed on the crop; and this treatment did not have a significant difference with any other treatment except the control, in which the seed potassium concentration was 0.843 percent. In the treatments of spraying manganese and boron on the crop also, the seed potassium concentration was higher than 0.9 percent (Table 3). Results of the comparison of the interaction effects of the data showed that the highest seed potassium concentrations (0.930 and 0.945%) were obtained when zinc and manganese were sprayed on the crop, respectively. The lowest seed potassium concentration (0.631%) was observed when manganese was added to the soil (Fig 3).

Seed Zinc Concentration

Results of the analysis of the variance of the data showed that the effects of adding the different levels of the micronutrients to the soil (Factor A) on the seed zinc concentration were significant at the level of one percent probability, while the effects of spraying the different levels of the micronutrients on the crop (Factor B), and adding the micronutrients to the soil plus spraying them on the crop (AB) on seed zinc concentration were significant at the level of five percent probability (Table 1). Results of the comparison of the means indicated that, among the treatments of applying the micronutrients to the soil, the highest seed zinc concentration (52.5ppm) was obtained when zinc was added to the soil, and that this treatment was statistically different from the others. The treatments of applying manganese and boron to the soil came second and third with 45.92 and 45.58 ppm, respectively. The lowest seed zinc concentration (42.5ppm) was that of the control (Table 2). These results also showed that, among the treatments of spraying the micronutrients on the crop, the highest seed zinc concentration (51ppm) was

achieved when zinc was sprayed on the crop, and that this treatment had a statistically significant difference with the others. The lowest seed zinc concentration (44.42ppm) was also observed in the control (Table 3). Results of the comparison of the interaction effects of the data indicated that the highest seed zinc concentrations (55.33 and 55ppm) were obtained by adding manganese to the soil plus spraying it on the crop, and by adding zinc to the soil plus spraying it on the crop, respectively. The lowest seed zinc concentrations (29.33 and 30.1ppm) were observed in the treatment of adding manganese to the soil and in the control, respectively (Fig 4).

Seed Manganese Concentration

Results of the analysis of the variance of the data showed that the effects of the different levels of applying the micronutrients to the soil (Factor A) at the probability level of five percent, and the effects of spraying the different levels of the micronutrients on the crop (Factor B), and the interaction effects of adding the micronutrients to the soil plus spraying them on the crop (AB) at the probability level of one percent on the seed manganese concentration were significant (Table 1). Results of the comparison of the means indicated that, among the treatments of adding the micronutrients to the soil, the highest seed manganese concentration (23.08ppm) was obtained when manganese was applied to the soil, and that this treatment had a statistically significant difference with the others. The treatments of adding boron and zinc to the soil, with 22.5 and 21.75ppm, respectively, came second and third. The lowest seed manganese concentration (20.17ppm) belonged to the control (Table 2). These results also showed that, among the treatments of spraying the micronutrients on the crop, the highest seed manganese concentration (24.77ppm) was observed when manganese was sprayed on the crop, and that this treatment had a statistically significant difference with the others. The lowest seed manganese concentration (20.58ppm) was obtained in the control (Table 3). Results of the interaction effects of the data indicated that the highest seed manganese concentration (23.67ppm) was achieved by adding zinc to the soil plus spraying manganese on the crop, and by adding manganese to the soil plus spraying boron on the crop. These results also showed that the seed manganese concentration was observed to be 23ppm by applying boron to the soil plus spraying manganese on the crop, or by adding manganese to the soil plus spraying it on the crop. The lowest seed manganese concentration belonged to the treatment of adding boron to the soil (Fig 5).

Seed Boron Concentration

Results of the analysis of the variance of the data indicated that the effects of applying the different levels of the micronutrients to the soil (Factor A) at the probability level of five percent, and the effects of spraying the different levels of the micronutrients (Factor B) and the interaction effects of adding the micronutrients to the soil plus spraying them on the crop (AB) at the level of probability of one percent on seed boron concentration were significant (Table 1). Results of the comparison of the means showed that, among the treatments of applying the micronutrients to the soil, the highest seed boron concentration (46.58ppm) was achieved when boron was added to the soil, and that this treatment had a statistically significant difference with the others. The treatments of applying zinc and manganese to the soil, with seed boron concentrations of 36.67 and 36.83 ppm, respectively, came second and third. The lowest seed boron concentration (36.5ppm) belonged to the control (Table 2). These results also indicated that, among the treatments of spraying the micronutrients on the crop, the highest seed boron concentration (40.33ppm) was achieved when boron was sprayed on the crop, and that this treatment had a statistically significant difference with the others. The lowest seed boron concentration (34.92ppm) was observed in the control (Table 3). Results of the interaction effects of the data indicated that the highest seed boron concentrations (44 and 41.67 ppm) were obtained by spraying boron on the crop, and by adding manganese to the soil plus spraying boron on the crop, respectively. The lowest seed boron concentration (29.67ppm) was that of the control (Fig 6).

Table 1. Analysis of variation of the elements concentration

SOV	DOF	Mean Square					
		N	P	K	Zn	Mn	B
Replication	3	Ns	Ns	Ns	Ns	Ns	*
Basal Application (A)	3	*	Ns	*	**	*	*
Spray Application (B)	3	**	Ns	**	*	**	**
AXB	9	**	Ns	*	*	**	**
Error	30	0.004	0.001	0.001	0.326	0.178	0.151
CV (%)		0.96	1.95	0.095	1.23	1.93	1.02

* and ** show the least differences at 1 and 5 level of probability respectively and ns shows none significant difference

Table 2- Comparison of the means of the data related to the addition of zinc, manganese, and boron to the soil on nutrient concentration in seed.

Treatment	N (%)	P (%)	K (%)	Z (ppm)	Mn (ppm)	B (ppm)
Control	6.298 B	0.156 A	0.839 C	42.50 C	20.17 C	36.50 B
Zn to Soil	6.249 B	0.169 A	0.913 AB	52.50 A	21.75 B	36.67 B
Mn to Soil	6.574 A	0.170 A	0.926 A	45.92 B	23.08 A	36.83 B
B to Soil	6.331 B	0.177 A	0.901 B	45.38 B	22.50 B	46.58 A
LSD (0.05)	0.105	0.052	0.016	0.952	0.703	0.648

Numbers having common letters in each column are not significantly different at the probability level of 5 percent

Table 3- Comparison of the means of the data related to spraying the micronutrients zinc, manganese, and boron on nutrient concentration in seed.

Treatment	N (%)	P (%)	K (%)	Z (ppm)	Mn (ppm)	B (ppm)
Control	6.064 C	0.175 A	0.843 B	44.42 C	20.58 B	34.92 C
Zn Foliar	6.656 A	0.183 A	0.915 A	51.00 A	21.25 B	38.83 B
Mn Foliar	6.393 B	0.175 A	0.913 A	45.67 B	24.77 A	35.50 B
B Foliar	6.339 B	0.179 A	0.907 A	45.42 B	21.50 B	40.33 A
LSD (0.05)	0.105	0.052	0.016	0.952	0.703	0.648

Numbers having common letters in each column are not significantly different at the probability level of 5 percent.

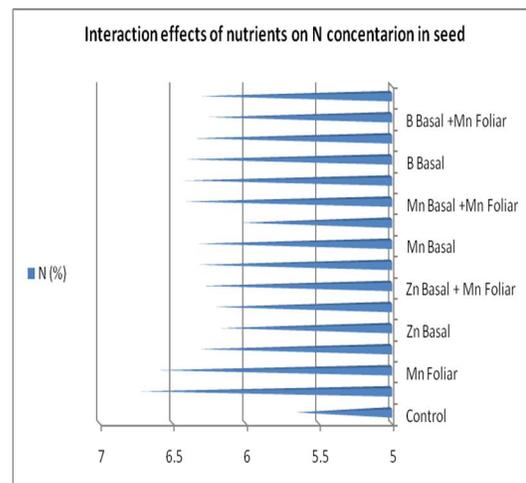


Fig 1. Interaction effects of nutrient application on N concentration in seed

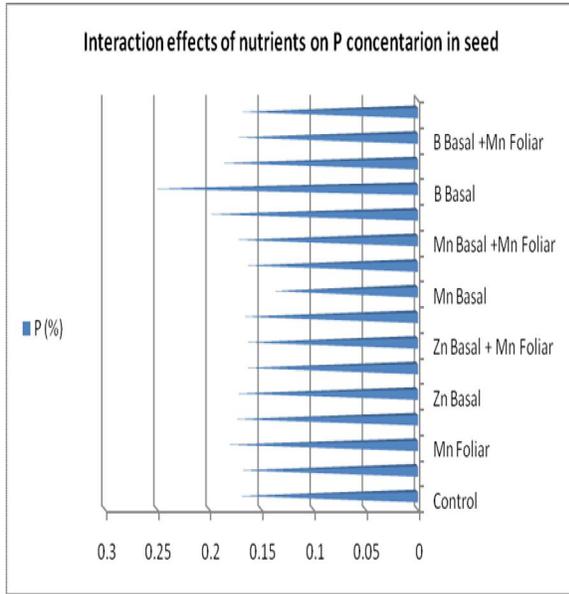


Fig 2. Interaction effects of nutrient application on P concentration in seed

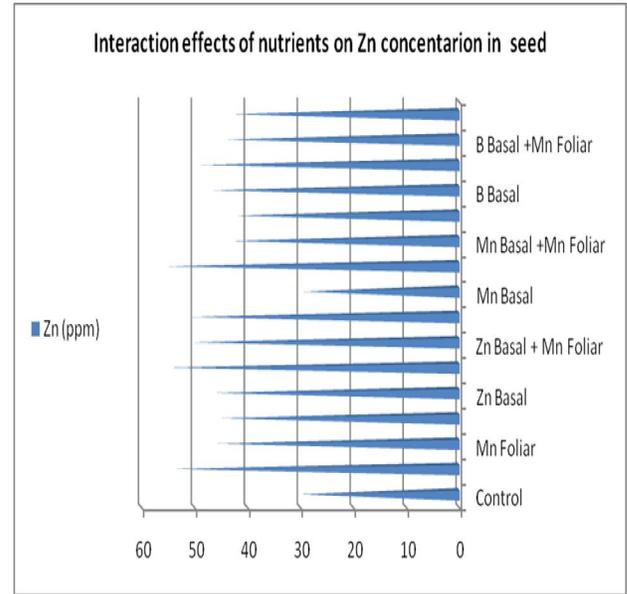


Fig 4. Interaction effects of nutrient application on Zn concentration in seed

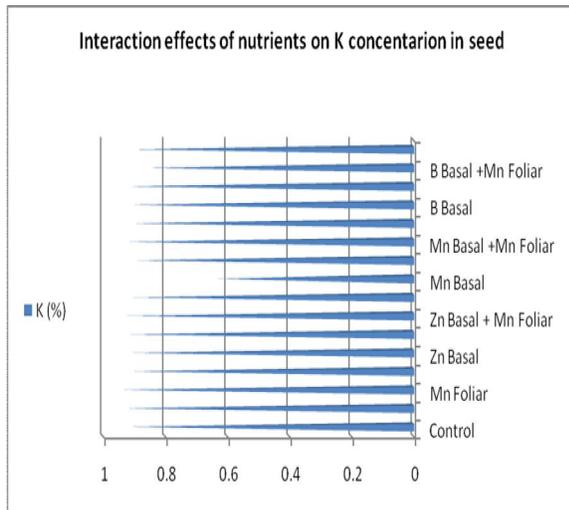


Fig 3. Interaction effects of nutrient application on K concentration in seed

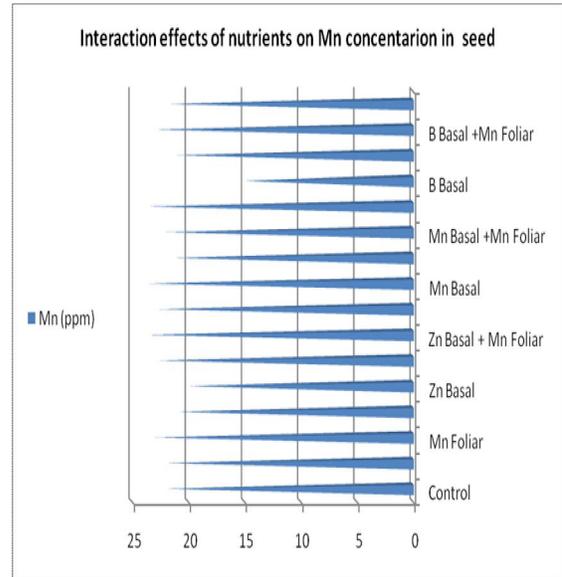


Fig 5. Interaction effects of nutrient application on Mn concentration in seed

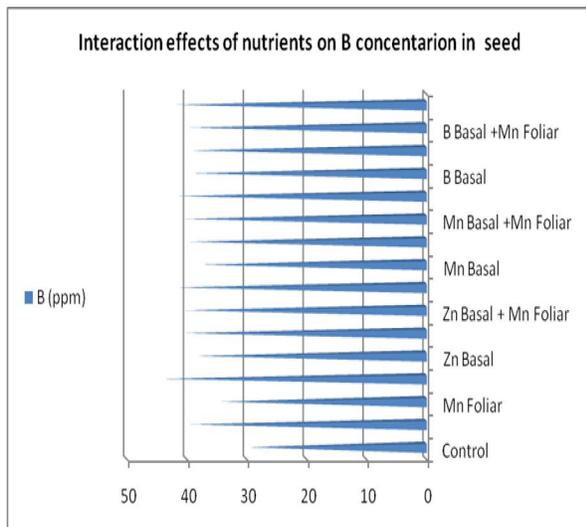


Fig 6. Interaction effects of nutrient application on B concentration in seed

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Investigation on the Consolidation Behaviour of Aluminium/nano-SiC Composite Powders Using Non-Linear Compaction Equation

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Abstract: The densification response of aluminium powder reinforced with nanometric SiC particles (50 nm) during uniaxial compaction was studied. To determine the effect of SiC nanoparticles on the compressibility of the matrix, monolithic Al powder was also examined. The effect of SiC nanoparticles on the densification mechanisms, i.e. particle rearrangement and plastic deformation, was analysed using modified Cooper–Eaton equation. The results showed that with increasing the reinforcement volume fraction (up to 20 vol.-%), the contribution of particle rearrangement increases whilst the plastic deformation is limited. At high compaction pressures, the reinforcement particles significantly influence the yield pressure of the composite powder, retarding the densification. The influence of the reinforcement particle size is discussed in this paper.

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Keywords: Densification; Nanocomposite; Al/n-SiC; Non linear Compaction equation

1. Introduction

Discontinuously reinforced aluminium matrix composites have been developed and used for various applications, owing to their unique properties such as excellent wear resistance, high specific strength and thermal conductivity [1, 2]. Currently new development and research are focusing on the developing metal matrix nanocomposites with outstanding mechanical properties such as high yield strength and enhanced ductility [3-8]. In powder metallurgy techniques, the matrix and reinforcement particles are mixed and consolidated by various methods, e.g. hot deformation to fabricate almost full density products. Meanwhile, Kang et al. [9] have reported that the mechanical properties such as yield strength and hardness can be degraded by the reinforcement clustering, particularly at high volume fractions. Nevertheless, the compressibility of composite powders is remarkably lower than that of unreinforced matrixes [10]. In the past decades, considerable effort has been devoted to the development of empirical and theoretical compaction equations to describe the density–pressure relationships. By using linear compaction equations, such as Heckel[11], Panelli-Filho[12] and Ge[13], one can only study the role of plastic deformation (PD) on the densification response of composite powders. In order to study the role of particle rearrangement (PR), the non-linear equation proposed by Cooper and Eaton [14] was utilized [15]:

$$V^* = a_R \exp\left(\frac{-k_R}{P}\right) + a_P \exp\left(\frac{-k_P}{P}\right) \quad (1)$$

where V^* is the total fractional volume compaction, a_R and a_P are dimensional coefficients which indicate the fraction of theoretical compaction achieved at infinite pressure by each particle rearrangement (PR) and plastic deformation (PD) process, k_R and k_P are constants with units of pressure. The contribution of each mechanism on the densification can thus be evaluated by comparison between the magnitudes of the constants. Also, there are a number of valuable analytical and numerical models, for example Martin and Bouvard [16] and Kim et al. [17], which enable prediction of the compaction behaviour of composite powders.

So far, it is known that the densification of composite powders is similar to that of unreinforced metals, but they exhibit lower densification rate due to stress partitioning effect. The consolidation of Al matrix blended with hard nanoparticles have scarcely been studied and the densification mechanism is not well understood. Recently, the effect of nanoscaled reinforcement particles on the compaction behavior of Al-5vol. %Al₂O₃ has been reported by Simchi and co-workers [18]. The aim of present work is to study the effect of nano scaled SiC particles in a wide range of volume fractions on the consolidation behaviour of Al powder.

2. Experimental

Gas atomized aluminum powder with an average particle size of 40 μm was used as the starting matrix material. Nanometric SiC particles with the mean diameter of 40 nm was supplied from Alfa Aesar (Ward Hill, MA, USA). Different batches of Al-SiC

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composite blends with varying volume fractions of 5, 10 and 20% were prepared. A Turbula mixer was employed for 30 min to prepare the blends. The tap density of powders was determined according to the ISO Standard 3953. The prepared powder blends were compacted in a cylindrical die with diameter of 15 mm using Teflon spray as die wall lubricant. In each run, 3 g powder was poured inside the die, taped and uniaxially compacted by using an AMSLER tensile/compression test instrument. The compacting pressure was varied between 10 to 400 MPa. The punch crosshead speed was 0.12 mm s^{-1} . Monolithic Al powder was also examined as the reference sample.

After ejection of compacts from the die, the density was measured by volumetric method. This method was employed through measuring the weight and dimensions of the compacts by using an accurate balance ($\pm 0.1 \text{ mg}$) and a micrometer ($\pm 0.1 \text{ mm}$). When the compaction pressure was low (for example $< 50 \text{ MPa}$) and a powder compact could not be attained, the in-die density was measured according to the mass and volume of the powder inside the die. Note that at such a low compaction pressure, the spring back is fairly low, thereby the difference between the in-die density and the out-die density is negligible. To investigate the consolidation mechanisms of matrix powder, the fracture surface of compacts were studied along the load direction. To prepare the suitable fracture surface, the compacts were sunk in liquid nitrogen. After bringing out the samples, they were immediately fixed and impacted to fracture. In order to fracture the specimens, a notch was prepared on the surfaces of each sample. Cooling the sample in liquid nitrogen results in brittle samples due to restriction of plastic deformation. The fracture surfaces were studied by SEM.

3. Results and Discussion

The Relative density of composite powders containing nanometric SiC particles at different compaction pressures is shown in Fig. 1. It is seen that, generally the addition of SiC particles decreases the compressibility of the Al matrix, so that compacts with lower relative density were obtained. Nevertheless, the densification of the composite powders at low pressure region ($< 50 \text{ MPa}$) is slightly higher than that of plain Al powder. This effect is more profound as the fraction of SiC increases. This can be attributed to the movement of SiC clusters to fill the interparticle pores. However, at high compaction pressures, the ceramic clusters and networks decrease the plastic deformability of the Al matrix, and thus retard the densification.

As it is seen in Fig. 1, at concentration $> 10 \text{ vol\%}$ SiC, the densification curves approach a plateau at

relatively moderate compacting pressures, indicating a high yield pressure of the nanocomposite powder.

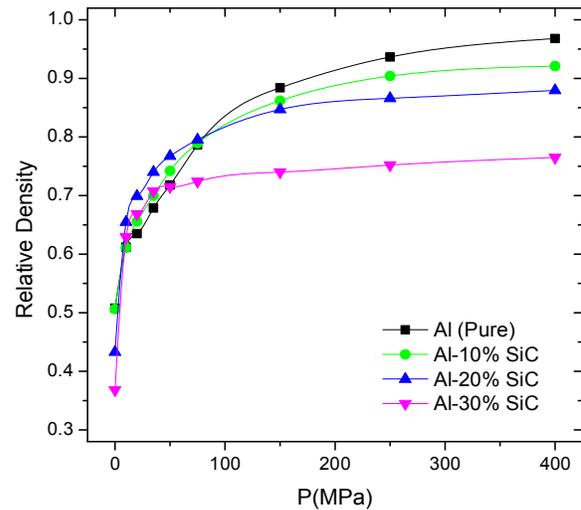


Figure 1. Relative density of nanocomposite powders at various SiC volume fractions.

3.1. Analysis of compaction behavior using Cooper-Eaton equation

In order to investigate the role of SiC particulates on densification behavior of Al matrix powder, modified Cooper-Eaton equation in which, V^* is replaced by the porosity (ϵ) changes during compacting process [15], was used. The experimental results were evaluated according to equation (1), by means of non-linear least square method to determine the constants of the equation. The results are presented in Table I. It is noticeable that the correlation coefficient (R) is very close to unity, which indicates accuracy of the analysis.

Table 1. The compaction coefficients of Al-SiC nanocomposite powders calculated by modified Cooper-Eaton equation

SiC Fraction%	a_R	a_P	k_R [MPa]	k_P [MPa]	R
0	0.31	0.78	3.7	83.62	0.999
5	0.36	0.58	5.2	70.2	0.999
10	0.48	0.35	2.5	53.9	0.999
20	0.58	0.07	3.8	154.1	0.999

The results indicate a remarkable effect of nanometric particles on rearrangement and plastic deformation coefficients. Also it is worthy to point

out that the consistently higher values for k_P compared with k_R , are an indication that filling of voids in second stage of consolidation (plastic deformation), needs considerably higher pressures. According to experimental results presented in Table 1, it is apparent that the addition of nanosized inclusions, imposes a higher influence on the consolidation behavior of composite powders. To highlight this observation, the compaction behavior of Al-SiC composite powders containing nanometric SiC particles was analyzed.

The result of calculations is demonstrated in Fig. 2 that shows the contribution of PR and PD on the deformation capacity of Al matrix. It appears that with increasing the volume fraction of reinforcement, the contribution of PR on the densification was increased, whilst the contribution of PD was decreased. This effect is very pronounced, particularly when high amount of the reinforcement particles were introduced. The results indicate that when the fraction of nanometric particles is relatively high ($\geq 10\%$), the contribution of PD decreases significantly.

In this circumstance, plastic deformation has a very small contribution in compaction process and densification is mainly induced by PR rather than PD. For instance, the contribution of plastic deformation in total densification of composite compacts at volume fraction of 10 and 20% is about 42 and 10%, respectively.

Fig. 3 shows the relationship between the coefficients of Cooper-Eaton equation and the volume fraction of reinforcements. One can notice the great influence of the nanometric reinforcement particles on the tap density of the composite powder. This effect is marginal at the low volume fraction of 5%, but at higher percentages, a remarkable decrease in tap density is observed. Thus, the lower tap density provides greater space for particle sliding at the early stage of compaction [10]. Consequently, higher a_R values are calculated at higher volume fractions of SiC nanoparticles.

It is noteworthy that the clusters and agglomerates of nanoparticles can be disintegrated under the applied pressure to fill the interparticle voids. On the other hand, at high compacting pressures a_P decreases with increasing the SiC content, indicating a reduced contribution of plastic deformation on densification of the nanocomposite powder. In fact, it becomes difficult for the Al matrix to deform and fill the gaps between the ultra-fine particles; so, lower density is achieved.

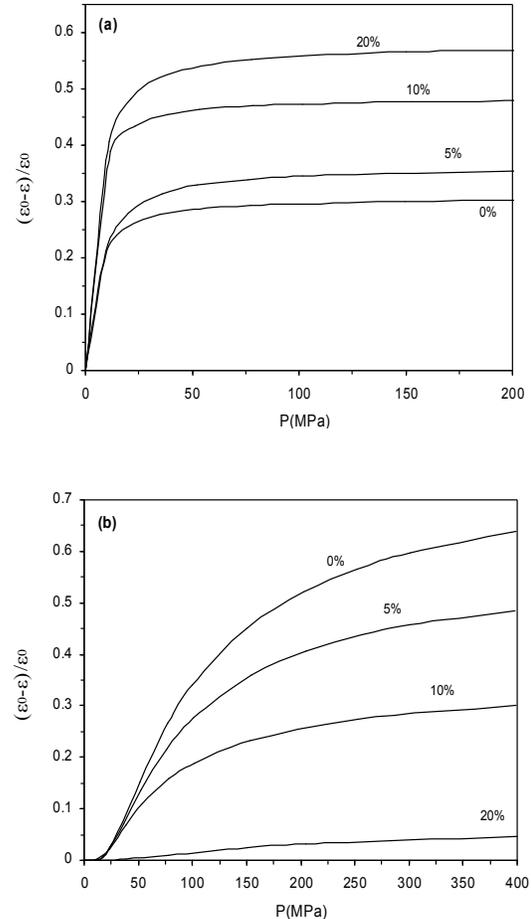


Figure 2. Effect of nano-sized SiC volume fraction on the contribution of particle rearrangement (a) and plastic deformation (b)

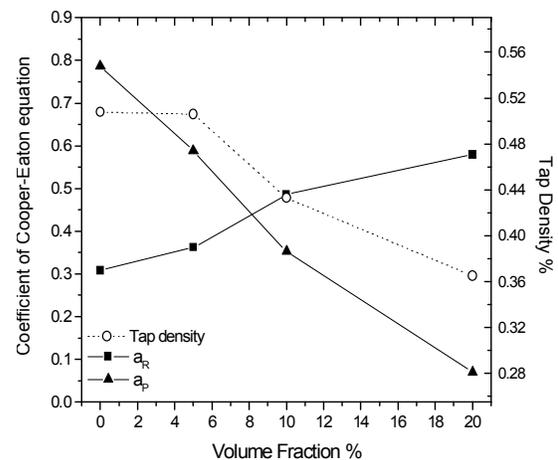


Figure 3. Effect of SiC nanoparticles on the tap density of Al powder and the coefficients of Cooper-Eaton equation.

Fig.4 indicates a profound effect of nanometric hard particles (Size ratio of 0.0025) on the tap density of composite powders. The ratio of the average size of SiC particles to the mean diameter of the Al particles are designated as the 'size ratio'. While this effect is marginal at low volume fraction of 5%, a significant decrease in the fractional density was observed at higher percentages. It is noticeable that with increasing reinforcement volume fraction, the detrimental influence of the nanoparticles increases.

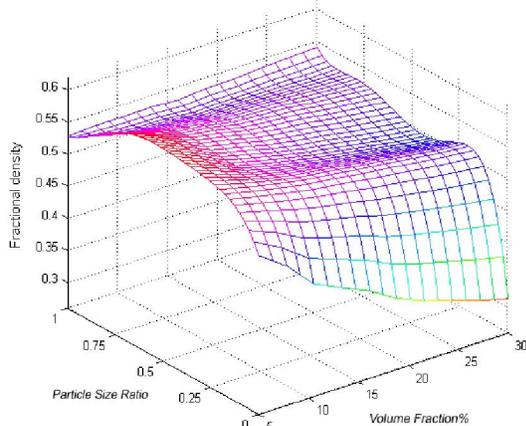


Figure 4. Effect of reinforcement size and volume fraction on the tap density of composite powders.

The bilateral effect of the reinforcement size and volume fraction on densification of the composite powders is shown in Figure 5. As it is seen, the highest density is achieved at higher size ratios when the fraction of SiC is relatively low (<10 vol%). It means that above the percolation threshold (10 vol%), the size ratio should be increased; otherwise, the densification is significantly retarded.

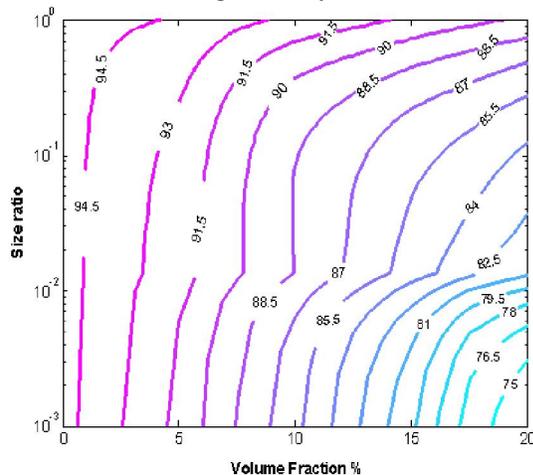


Figure 5. Effect of size ratio and volume fraction of the reinforcement on the density of composite powder at 300 MPa compacting pressure.

Fig 6. shows the representative SEM micrographs taken from the fracture surfaces of the Al powder compacted at 300 MPa. No evidence of ductile rupture, which is an indicator of the formation of large metal-metal contacts during pressing, is seen. The presence of the finer particles between the larger ones reveals that the applied load forced the spherical particles to move and fill the voids between the larger particles.

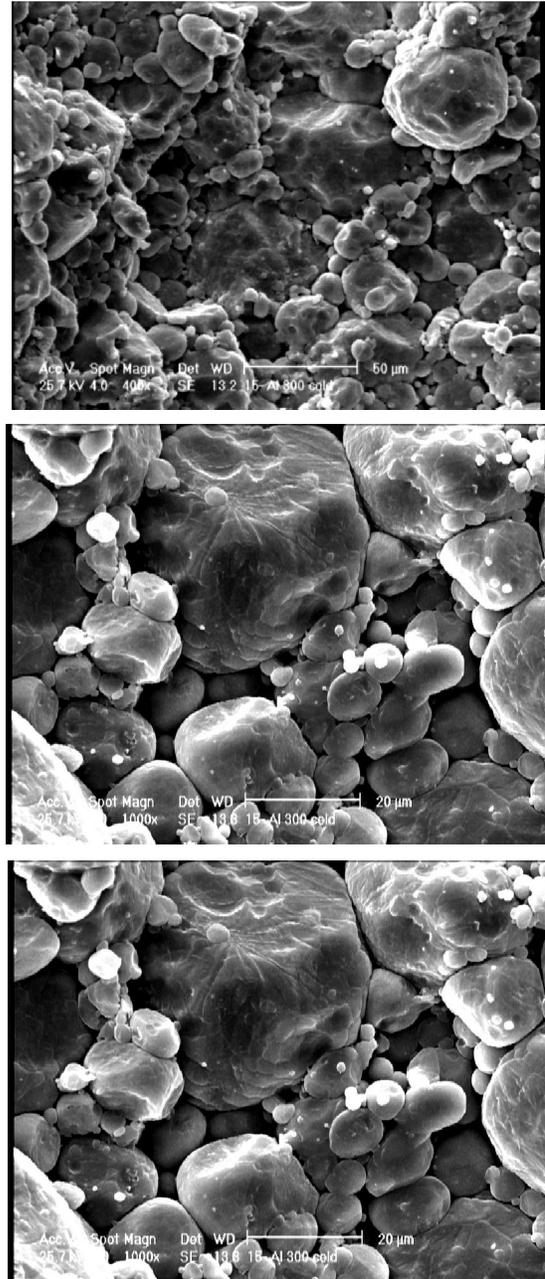


Figure 6. Fracture surface of Al powder compacted at 300 Mpa.

4. Conclusion

The consolidation behaviour of Al-SiC nanocomposite powders with varying reinforcement volume fraction during cold uniaxial compaction was studied. The results of Cooper-Eaton equation showed that with increasing the SiC content, the contribution of PR compared to PD increases. Meantime, the higher values for k_p compared with k_R , indicates that the filling of large holes (rearrangement stage) in the first stage of compaction, needs considerably lower pressures. This behavior is more pronounced in the case of composite compacts containing nanoscale SiC particles. This is owing to the low packing density, disintegration of clusters and the presence of particle size distribution in these composites. It was shown that at nano-scaled SiC concentration of ~ 8 vol%, the plastic deformation of aluminium particles is the important mechanism of the densification. At higher concentration of nano-sized SiC, the particle rearrangement was found to be the dominant mechanism of consolidation.

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