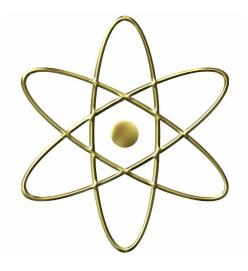
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The Journal of American Science

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CONTENTS No. Titles / Authors page

Indigenous Knowledge: priorities and necessities

¹ Mohammad Abedi, ² Ali Badragheh

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Abstract: Indigenous knowledge owners of world in current age (which known as information age) have valuable experiences from industry age and from inappropriate exploitation of their natural sources. These countries have learned that exporting produced goods is better than selling petroleum. enforcing indigenous productive system at villages and also encouraging youths and teens to learn indigenous knowledge at on hand, and preparing suitable research condition for applied-sciences scholars in order to identify better and increasing applied aptitude of indigenous knowledge at the other hand, is equal to protection and sustainable use of natural resources.

[Mohammad Abedi and Ali Badragheh. Indigenous Knowledge: priorities and necessities. Journal of American Science 2011;7(7):1-6]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: indigenous knowledge

Full Text

A ga algorithm for a two -echelon inventory system with space constraint & compare this with simulated annealing

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Abstract: One of the key areas of operations and supply chain management is inventory control. Inventory control determines which quantity of a product should be ordered when to achieve some objective, such as minimizing cost. This paper presents a two-echelon non-repairable spare parts inventory system that consists of one warehouse with space constraint and m identical retailers and implements the reorder point, order quantity (R, Q) inventory policy. We formulate the policy decision problem in order to minimize the total annual inventory investment subject to average annual ordering frequency and expected number of backorder constraints.

[Geeta Kharkwal, Poonam Mehrotra, Yaswant Singh Rawat. A ga algorithm for a two -echelon inventory system with space constraint & compare this with simulated annealing. Journal of American Science 2011;7(7):7-12]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Two-echelon inventory system, Space constraint, Genetic, Simulated annealing

An efficient method to improve Information Recovery on Web

Full Text

Dr. Muhammad Shahbaz ¹, Dr. Syed Muhammad Ahsen², Farzeen Abbas³, Muhammad Shaheen⁴ Syed Athar Masood⁵ 1,2,3,4 Department of Computer Science & Engg, UET Lahore, Pakistan ⁵Department of Engineering Management, NUST College of E&ME, Rawalpindi Pakistan ,pk, ² Ahsencs@hotmai.com, ³ farzeenabbas@gmail.com, ⁴ shaheen@uet.edu.pk, ⁵ atharmasood2000@hotmail.com

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Abstract: The information content on Web is very large and number of users is interacting with it in diverse manner and is growing fast. Information retrieval on web is concerned to capture precise and accurate content as requested in real time. To enhance the performance of Information Retrieval on web quality metrics are needed to be satisfied. The proposed research deals with introduction of such quality metrics, which can improve Information Retrieval systems on web. Different quality matrices are analyzed that are used for IR system. Information Retrieval metrics are already defined but they still could not make up with the relevancy requirement of users. Proposed Subsumption metrics is based on ontology to improve user query results and enhance the quality of retrieval. IR systems based on ontology are already in practise but they are not using any kind of metrics and they are specific to their respective domain. It is required to introduce such kind of metrics which is generic to all the systems and improves relevancy by incorporating Subsumption metrics. [Dr. Muhammad Shahbaz, Dr. Syed Muhammad Ahsan, Farzeen Abbas, Muhammad Shaheen. An An Efficient Method to Improve Information Recovery on Web. Journal of American Science 2011;7(7):13-23]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Subsumption Metrics, Information Recovery

Full Text

Integrating Orthogonal Frequency Division Multiplexing [Ofdm] And Multiple Input Multiple Output [Mimo] as Joint Transmission Scheme

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Abstract: Wireless medium is a hostile propagation medium suffering from multipath fading and interference from other sources. Time Diversity and Frequency Diversity provide provides effective methods to mitigate fading and interference, this improving link robustness. Spatial Diversity provides link reliability without compromising on spectral efficiency. Space-time-coding provides potentially increased robustness and capacity by exploiting the fact that multiple antennas can be used in both transmitting and receiving equipments. This spatial multiplexing technique is termed as Multiple-Input-Multiple-Out ["MIMO"]. Most of the previous work in the area of "MIMO" wireless has been restricted to narrowband systems. Orthogonal-Frequency-DivisionMultiplexing ["OFDM"] significantly reduces receiver complexity in wireless broadband systems. The use of "MIMO" technology in combination with "OFDM" seems to be an attractive solution for future broadband wireless systems. This paper is aimed at looking at possible integration of "MIMO" with "OFDM" and establishing improvements it has to offer for wireless networks. Various schemes that employ multiple antennas at the transmitter and receiver are being considered to improve the range and performance of communication systems. [Syed Ahsan, Muhammad Shahbaz, Syed Athar Masood. Integrating Orthogonal Frequency Division Multiplexing and Multiple Input Multiple Output as Joint Transmission Scheme. Journal of American Science 2011;7(7):24-27]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Time Diversity, Frequency Diversity, OFDM, MIMO

Full Text

Full Text

Sodium And Potassium Ion Losses In Rabbits Infected With Strains Of Aeromonas Hydrophila: Implication For Its Roles In Diarrhoea

IDONIJE, O.B¹, OKHIAI O² & ASIKA E.C³.

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ABSTRACT: The plasma levels of sodium and potassium ions were periodically (at 12 hourly intervals) estimated in rabbits orally infected with clinical and environmental Isolates of Aeromonas hydrophila. Infections with clinical isolates resulted in a 54.5% and 32.1% losses in Na⁺ and K⁺ ions respectively after 96 hours. Infection with the environmental isolates was however less severe resulting in a 42.7% and 16.2% depletion of plasma Na⁺ and k⁺ respectively 96 hours post oral challenge. It is concluded that A. hydrophila isolates from this locality are capable of causing diarrhoea as evidenced by the results. It is suggested that patients with diarrhoea require prompt treatment in order to avoid allowing decrease in plasma electrolytes which will worsening prognosis thereby increasing morbidity and mortality associated with diarrhoea diseases.

[Idonije O.B., Okhiai O., Asika E.C. Sodium and Potassium ion losses in Rabbits infected with strains of Aeromonas hydrophila: implication for its roles in

diarrhoea. Journal of American Science 2011;7(7):28-33 (ISSN: 1545-1003). http://www.americanscience.org.]

Key words: Enteropathogecity, Aeromonas hydrophila, Diarrhoea, immune suppression, infection.

6 Application and Assessment of Kriging and Cokriging Methods on Groundwater Level Estimation

* 1 Mohsen Moslemzadeh , Meysam Salarijazi , Samere Soleymani

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Abstract: Due to increasing demand for water using and shortage of surface water resources, managed use of groundwater has been so important in recent decades. Understanding spatial and temporal changes in groundwater has very important role in planning the use of groundwater as a one of most valuable water resources in the world. Kriging and cokriging methods are from those statistical categories methods which use magnitude, distance and vectorial information of nearby stations for estimation. In this study, kriging and cokriging methods compared with common arithmetic averaging methods for calculating the monthly average level of ground water in "Mian ab" basin and its changes has been set over the years. Error criteria RMSE and MEE are used for comparing methods. Results indicate that cokriging method's accuracy is higher than kriging in calculating groundwater level and also the arithmetic averaging method (which has lower accuracy) has been led to higher level estimation of groundwater. Journal of American Science 2011;7(7):34-39]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Application and Assessment; Kriging and Cokriging; Groundwater

Full Text

Financial Transmission Rights and Auction Revenue Rights

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Abstract: This paper surveys on two important issues in restructured power systems. One of them is Financial Transmission (FTR). Financial transmission right is a financial instrument which can improve the liquidity of operation in power system from point of view of all decision makers in competitive power systems. Another approach is Auction Revenue Rights (ARR) which ARR allocation consistent with congestion as determined by the FTR Auction. Analysis of these two mechanism and their impacts on long-term operation of power system are considered in this paper. Suppliers and large consumer, therefore, desire to contract in FTR to hedge their long-term risks. The FTR mechanism is based on the after settling market and determination Locational Marginal Price (LMP). In this area, delivery of energy (quantity and price) from the amount of FTRs which supplier is bidding for distinct path, and the price that the supplier is willing to pay for each FTR, are determined. This paper surveys on the long-term conditions of the FTR and mature one. [Mohammad Sadegh Javadi, Amin Javadinasab, Faride Ghanavati. Financial Transmission Rights and Auction Revenue Rights, Journal of American Science 2011;7(7):40-43]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Restructured Power System, Financial Transmission Rights, Auction Revenue Rights, Loacational Marginal Price.

Full Text

Electrochemical degradation of some pesticides in agricultural wastewater by using modified electrode

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Abstract: This work deals with the possibility of using Ti/Rh-modified electrode for the electrocatalytic oxidation process of some pesticides (malathion, imidacloprid and chlorpyrifos). The Ti/Rh-modified electrode was prepared by brushing of rhodium nitrate solution on preanodized titanium substrate and annealing. The results of the electrolytic oxidation were expressed in term of chemical oxygen demand (COD) removal, which was determined instrumentally. For the Ti/Rh-modified electrode (anode), the highest electrocatalytic activity was obtained in the presence of NaCl as conductive electrolyte. The different operating conditions of electrocatalytic oxidation process were studied which include: current density, pH, electrolysis time, initial pesticide concentration and conductive electrolyte concentration. The optimum operating conditions for the above mentioned electrode was determined.

Journal of American Science 2011;7(7):44-50]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Ti/Rh-modified electrode combined electrochemical oxidation, pesticides, chemical oxygen demand (COD).

Full Text

Influences gender on adjustment and self-esteem among adolescents

Armin Mahmoudi

Assistant Professor, Department of Studies in Education, Yasouj branch, Islamic Azad University, Yasouj, Iran Armin Mahmoudi Assistant Professor, Department of Studies in Education, Yasouj branch, Islamic Azad University, Yasouj, Iran. Email: dehlidena@yahoo.com

Abstract: In the present study an attempt is made to see whether male and female adolescents studying in standard 9 differ in their level adjustment and self esteem. A total of 100 adolescent students studying in Yasouj city were randomly selected. They were administered Bell's Adjustment Inventory (1968) (which measured adjustment of an individual in 4 areas-Home, health, social and emotional) and Self esteem inventory developed by Cooper and Smith (1987), which measured self esteem of an individual in 5 areas-general self, social self, home parents, lie scale and school academic. Independent samples 't' test was applied to see the differences between male and female students. Results revealed that male students found to have higher levels of self esteem compared to female students. Further, Gender had no differential influence over adjustment scores in home, health, emotional, and social

[Armin Mahmoudi. **Influences gender on adjustment and self-esteem among adolescents.** Journal of American Science 2011;7(7):51-54]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Adjustment, Self-Esteem, Adolescence, Gender, Inventory

Full Text

The Effect Of Freezing And Heating On The Infectivity Of Sarcocystis fusiformis To Cats and Evaluation Of ELISA For Its Diagnosis
In Water Buffaloes (Bubalus bubalis)

¹El-Kelesh, E.A.M., ²Abdel- Maogood, S. Z., ²Abdel-wahab, A.M.*, ¹Radwan, I.G.H. and ¹Ibrahim, O. ¹Animal Health Research Institute, Dokki, Giza. ²Parasitology Department, Faculty of Veterinary Medicine, Cairo University. *dr.azza1973@yahoo.com

Abstract: One hundred and thirty oesophageal muscles of slaughtered water buffaloes (*Bubalus bubalis*) were examined macroscopically for detection of *Sarcocystis fusiformis* cysts. The prevalence of *S. fusiformis* cysts in the examined buffaloes (3-6 years old) was 65 (50%), their dimensions ranged from 10.0–45.0 mm length & 1.5-7.0 mm width. Cats fed on fresh *S. fusiformis* cysts or those exposed to temperature at 50°C for 15 minutes were infected and shed *Sarcocystis* oocysts and sporocysts. Boiling of *S. fusiformis* cysts for 15 minutes, refrigeration for 3 days at 4°C and freezing for 2-3 months at -18 °C were effective in inactivating the cysts in buffalo meat. The antibodies against *S. fusiformis* were detected in 77 (59.23%) sera of the examined buffaloes by ELISA using bradyzoites of the same species. [Journal of American Science 2011; 7(7):55-57]. (ISSN: 1545-1003). http://www.americanscience.org. **Key words:** Adjustment, Self-Esteem, Adolescence, Gender, Inventory

Key words: Sarcocystis fusiformis, heating, freezing, ELISA.

Effects of 90min Exposure to 8mT Electromagnetic Fields on Memory in Mice

Full Text

Elham Foroozandeh

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Abstract: The aim of this experimental study was to investigate the effect of extremely low frequency electromagnetic fields (ELF EMF) on memory function in mice. Memory function was evaluated with passive avoidance learning in a standard wooden box that despite his natural tendency, mice learns to stay on a small platform to avoidant electric shock. 24h after learning session, laboratory animals were placed in a sinusoidal electromagnetic field created using a round coil, for 90 minutes to exposure to an 8mT, 50Hz. Then animals were placed on small platform again and step-down latency measured as memory index. The results showed that exposure to a 50 Hz, 8mT electromagnetic field for 90 minutes has devastating effects on memory function in male mice. [Parviz Askari. Effects of 90min Exposure to 8mT Electromagnetic Fields on Memory in Mice. Journal of American Science 2011; 7(7):58-61]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: electromagnetic field; memory;cognition;mice

Full Text

The effect of light, tone and movement interferences on selective association behavior in laboratory white rats during day and night

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Abstract

This study investigated the effect of light, tone and movement interference on selective association behavior in laboratory white rats during day and night circle. Subjects included four white laboratory rats (i.e., 2males and 2 females). They were randomly selected and divided into two experimental and control pairs. These pairs were exposed to day and night stimuli such as shock avoidance, and compound antecedent stimuli (i.e., light, tone and movement). Both pairs were exposed to shock avoidance either at nights or during the day to arrive at the level of asymptote. At the next stage, two pairs were exposed to antecedent stimuli by deleting shock reinforcement either at nights or during the daytime to be conditioned during training and reinforcement. The research method was behavior experimental analysis. Test results and observations were analyzed and the findings revealed that there was significant difference between the frequencies of the associations at night or during the daytime (p<.05). However, there was not a significant difference between light, tone, and movement association frequencies at night and daytime in both pairs (p<.050). [Parviz Askari. The effect of light, tone and movement interferences on selective association behavior in laboratory white rats during day and night. Journal of American Science 2011; 7(7):62-67]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: light, tone, movement, interferences, stimuli, rats, avoidance training

Full Text

The study of simple and multiple relationships between the variables of perfectionism and imposture feeling with the mental health of MA students

*Parviz Askary, Alireza Heydarei

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Abstract: The present research investigated the simple and multiple relationships between the variables of perfectionism and imposture feeling with the mental health of MA students of Science and Research University, Ahvaz Branch. In this research, perfectionism and imposture feeling are predictable variables and general mental health is the criterion variable. The examined sample consists of 131 male and 130 female students of Ahvaz Science and Research University who were selected through multi- stage random sampling method. In order to collect data, four questionnaires of Ahvaz reality distortion Scale, Clance's Imposture Feeling Scale, Ahvaz Perfectionism Scale and SCL 25 Scale were used. The present study is a fundamental research of correlation method and in order to analyze data, Pearson Correlation Coefficient and Multi-variable Correlation Coefficient were utilized. The results indicated that there was a significant relationship between perfectionism and imposture feeling was significantly positive.

[Parviz Asgari. The study of simple and multiple relationships between the variables of perfectionism and imposture feeling with the mental health of MA students. Journal of American Science 2011;7(7):68-74]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: perfectionism, imposture feeling, mental health

Evaluation Biochemical of color changes in bean root glands 14

Full Text

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Abstract: Research project as a split plot experiment in randomized block design with four replications in the research farm, Islamic Azad University of Ahvaz were executed. The main treatments include bean plant varieties and different levels of secondary treatments were N fertilizer. about 21-25 knots formed days after sowing on plant roots began in the nodes, which consists of very small (the highest average diameter of 0.21 Cm), mostly green and white had a few that Colors mark the node recently and is also lack of nitrogen fixation. After 35 days of planting the color pink, reddish nodules were marked and there was lag, hemoglobin, and nitrogen fixation was started in the red bean nodules average 10 days after flowering continued. The different levels of nitrogen in terms of value increase be white within the gland more time your showed such treatment 80 kg N fertilizer per hectare, white inside glands 60 days after planting in 64 percent of the nodes was observed But in the 40 kg ha treatment 40 days after planting, only 12 percent of white lumps were observed. Green, white and non-efficient Nitrogenase enzyme that normally expresses the growth was achieved during the primary colors red, pink and biological nitrogen fixation efficiency and the approximately 35 days after planting continued until after flowering, and brown or black aging glands shows that 10 days after flowering, the color nodes showed. [Tayeb Saki Nejad, Alireza Shokoohfar. Evaluation Biochemical of color changes in bean root. http://www.americanscience.org/Journal of American Science 2011; 7(7):75-78]. (ISSN: 1545-1003).

Keywords: Evaluation; Biochemical; color; bean root glands

Full Text

The Importance and the Necessity of "Studying" and the effective factors on its reduction from the viewpoint of the people in East
Azarbayjan province, Iran

Kobra Namvaran¹*, Dr. Sadegh Maleki Avarsin², Rajab Rabavi³

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Abstract: The number of the scientific articles and the rate of reading books and magazines are the most important indicators of scientific, cultural, social and economical growth and development in any country. This study was done in order to examine the importance & necessity of "studying" from the viewpoint of the people in East Azarbaijan. The design of the research was measurative and descriptive. The statistical community was "all the people in East Azarbaijan" (1,846,244 persons); the sample included "660 persons" and the sampling method was multi-phas clustral sampling. The tools for this study, was researcher-made questionair with 0/94 reliability. For the analysis of the datas T-test, Anova, Pierson correlation coefficient, Multi-variable regression and hierarchial evaluation, were used. The results indicated that "studyng" is important in the familial, economic, cultural, social, political and business awareness growth and the most important factors on the reduction of the "studying" respectively were: not having enough opportunity and motivation for studying, the attractive television progrom. It is suggested that the cheap and poket-sized books should be published and the mass media should devote columns or programs for introducing and criticizing of this printed books; in order to make the people familiar with the books and make them pick out suitable books for studying in their short opportunities.

[Kobra Namvaran, Dr. Sadegh Maleki Avarsin, Rajab Rabavi, The Importance and the Necessity of "Studying" and the effective factors on its reduction from the viewpoint of the people in East Azarbayjan province. Journal of American Science 2011;7(7):79-85]. (ISSN: 1545-1003). http://www.americanscience.org

Keywords: studying, book, biblio

16 Effect of irrigation on the yield of mungbean cultivars

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Abstract: In order to study the effect of irrigation on yield quality and quantity and morphological characteristics of mungbean, pilot in the summer 2010 on a farm located in the city *HAMIDIH* using factorial design in randomized complete block with four replications. In this experiment four levels of irrigation 7, 10, 13, and 16-day and three local varieties, and the essence of radiation were studied and evaluated. During different stages of plant growth with eight times the level of field sampling of shoot dry weight, leaf dry weight, and pod dry weight, seed dry weight and leaf area was measured at physiological maturity was produced yield. Studies showed the best yield cultivar associated with the essence of seven-day irrigation (3328 kg ha) was. And most of the biological function associated with a 7 day gem varieties and irrigation amount was 9273 kg ha maximum harvest index to local varieties and 10 days irrigation amount was 49 percent. The results showed that the most appropriate gem varieties and cultivars 7 days irrigation is the most appropriate irrigation. Because the highest grain yield, biological yield the most won. Journal of American Science 2011; 7(7): 86-90].(ISSN: 1545-1003). http://www.americanscience.org.

Key words: mungbean, irrigation, yield

Serum Retinol Level in Patients with Chronic Liver Disease

Mahmoud A. Ashour¹; Ihab Barsoum^{*1}; Amal A. Z. Dewedar¹; Ahmed M. A. El-Fattah¹ and Amal F. Gharib²

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Abstract: Chronic hepatitis C virus (HCV) infection is a major risk factor for hepatocellular carcinoma (HCC). The rate of HCC development among HCV-infected persons ranges between 1% and 3% after 30 years. Retinoids are known to possess an anti-tumor role by suppressing tumor promotion and progression. Retinoid depletion is often observed during pre-malignant status and cancer development. Loss of retinoid activity or responsiveness is closely linked to carcinogenesis in several organs. This work aimed to investigate serum retinol levels in patients with chronic hepatitis C, liver cirrhosis and HCC and to assess its importance as a risk factor for the development of HCC. A total of 90 subjects were included in the study and were assigned to the following 4 groups. Group I included 15 healthy subjects as a control group. Group II included 15 patients presented with chronic hepatitis C infection. Group III included 45 patients with liver cirrhosis, it was further categorized according to Child Pugh classification into three groups; Group III a: It included 15 Child grade A patients. Group III b: It included 15 Child grade B patients. Group III c: It included 15 Child grade C patients. Finally Group IV included 15 patients with hepatocellular carcinoma. Controls had significantly higher serum retinol level than HCV and HCC patients. Higher level of serum retinol was found in Group I, while the lower levels were found in Group IV and Group III c. Serum retinol mean value was significantly higher in patients with HCC on top of apparent normal liver than those on top of cirrhotic liver. Serum retinol was inversely correlated to age. No significant correlation was found between duration of interferon therapy, gender and serum retinol level. A positive correlation was found between serum retinol level and Hb, platelets count and albumin level, while negative correlation was found between serum retinol level and other liver function test parameters & serum creatinine. High significant difference was found between different histopathological grades in liver biopsy and serum retinol level. The highest serum retinol level was associated with normal liver and the lowest was associated with shrunken cirrhotic liver with multifocal lesion. Patients receive interferon therapy had a higher serum retinol level than patients do not receive interferon therapy. We concluded that serum retinol levels are lower in patients with chronic liver disease and is directly related to the severity of liver disease. Serum retinol levels are significantly lower in patients with HCC superimposed on liver cirrhosis compared with patients who have cirrhosis alone. Further studies are needed to elucidate role of retinol levels in the development of HCC and if retinol supplementation will be of help.

[Mahmoud A. Ashour; Ihab Barsoum; Amal A. Z. Dewedar; Ahmed M. A. El-Fattah and Amal F. Gharib. Serum Retinol Level in Patients with Chronic Liver Disease. Journal of American Science 2011; 7(7): 91-102].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Serum Retinol: Patient: Chronic Liver Disease

Dietary supplementation with polyunsaturated fatty acids source and its effects on the native turkey's liver important beneficial fatty

Full Text

Full Text

Full Text

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Abstract: This experiment was conducted to evaluated canola oil on the some of beneficial fatty acids of Iranian native turkey liver. Nine male turkey chicks randomly divided into three experimental treatments (Three levels of canola oil; 0, 2.5 and 5 percent) with three replicates were arranged in a completely randomized design. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. adrenic acid, docosapentaenoic acid and α -linolenic acid significantly affect canola oil and this status show that canola oil could improved liver fatty acids profile.

[Ramin Salamatdoustnobar, Abolfazl Ghorbani, Kambiz Nazer Adl, Seyaed Saied Ghaem Maghami. Dietary supplementation with polyunsaturated fatty acids source and its effects on the native turkey's liver important beneficial fatty acids. Journal of American Science 2011;7(7):103-106]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Canola oil, Iranian native turkey, n-3 fatty acids, liver

Full Text

Physico-chemical properties of tempeh produced from chickpea seeds

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Abstract: Chickpea seeds are rich source of protein (24.63 %), fat (5.62 %), carbohydrates (64.60 %), ash (3.30 %) and fiber (1.85 %). The ant-nutritional factors of raw chickpeas were 7.98, 4.64, 10.96 and 269.38 mg/g dry matter, phytic acid, tannins, trypsin and total phenols, respectively. These seeds are a good source of K (771.77), Ca (156.13), Na (107.34), Mg (152.58), Cu (0.98), Fe (6.85) and Zn (3.83 mg/100 mg). Tempeh was produced from chickpea flour after soaking, blanching (whole seeds), blanching (dehulled) and inoculated with a suspension of *Rizophus oligospours*. The product was evaluated for nutritional quality. Protein in tempeh (28.85 %) was higher than that recorded in raw seeds. However, fat (2.84), ash (2.10) and fiber (1.68 %) were affected due to soaking, blanching and fermentation. Carbohydrates content (64.53 %) was not affected due to the previous treatments. Anti-nutritional factors of tempeh were reduced by 71.18, 73.22, 89.78 and 67.84 % with phytic acid, tannins, trypsin and phenols, respectively compared with this content in raw chickpeas. Protein solubility, water solubility index and water absorption index. In-vitro protein digestibility, in tempeh was higher compared with raw chickpeas. Determination of color showed that ΔE (color difference) of tempeh was high (18.79). Also, essential amino acids reached to their high values in tempeh.

[Ferial, M. Abu-Salem and Esmat A. Abou-Arab. Physico-chemical properties of tempeh produced from chickpea seeds. Journal of American Science 2011; 7(7):107-118],(ISSN: 1545-1003), http://www.americanscience.org.

Key words: Tempeh – blanching – anti-nutritional factors - chickpeas

Full Text

20 Effect of Zataria Multiflora Extract on Degradability Kinetics, of Sunflower Meal

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Abstract: The aim of the present study was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora water extract* (ZMWE) on sunflower meal (SM) degradability were studied by *in vitro* gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for dry matter, crude protein, and Non-Fibrous Carbohydrate 95.88, 30, and 12.73 percent, respectively. The results showed that gas volume at 24 h incubation (for 200 mg dry samples), were 42.40, 41.41 and 40.52 ml/200 mg DM for SM, levels 0.15 ZMWE and 0.3 ZMWE, respectively. the gas production from soluble fraction (a), the gas production from insoluble fraction (b), rate constant of gas production during incubation (c) and the potential gas production (a + b) contents of SM were 3.607 (ml/200 mg DM), 49.32 (ml/200 mg DM), 0.135 (ml/h) and 52.92 (ml/200 mg DM), while for level 0.3 ZMWE were 4.655 (ml/200mg DM), 48.66 (ml/200 mg DM), 0.134 (ml/h) and 53.321 (ml/200mg DM).

[Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. Effect of *Zataria Multiflora Extract* on Degradability Kinetics, of Sunflower Meal. Journal of American Science 2011;7(7):119-122]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Non-Fibrous Carbohydrate; *zataria multiflora*; sunflower meal; gas production technique; crude protein; Taleshi native male cattle

21 The study canola meal degradability with *Zataria Multiflora Extract* Using *in Vitro* Gas Production Technique

Full Text

Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiyani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora* water extract (ZMWE) on canola meal (CM) degradability were studied by in vitro gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for dry matter, crude protein, were and Non-Fibrous Carbohydrate 93.7, 35, and 21.46 percent, respectively. The results showed that gas volume at 24 h incubation (for 200 mg dry samples), were 47.32, 47.30 and 47.12 ml/200 mg DM for CM, levels 0.15 ZMWE and 0.3 ZMWE, respectively the gas production from soluble fraction (a), the gas production from insoluble fraction (b), rate constant of gas production during incubation (c) and the potential gas production (a + b) contents of CM were 2.15 (ml/200 mg DM), 54.96 (ml/200 mg DM), 0.113 (ml/h) and 57.12 (ml/200 mg DM), while for level 0.3 ZMWE were 1.73 (ml/200 mg DM), 54.64 (ml/200 mg DM), 0.112 (ml/h) and 56.37 (ml/200 mg DM).

[Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. The study canola meal degradability with *Zataria Multiflora Extract* Using in Vitro Gas Production Technique. Journal of American Science 2011;7(7):123-126]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: crude protein; Zataria multiflora; canola meal; gas production technique; dry matter; water extract; rumen liquid

Full Text

22 The study Zataria Multiflora Water Extract effects On the Short Chain Fatty Acid, Net Energy, Metobolizable Energy and Organic Matter Digestibility Of Sunflower Meal Using In Vitro Gas Production Technique

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora* water extract (ZMWE) on sunflower meal (SM) degradability were studied by in vitro gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for ether extract , ash, neutral detergent fiber and acid detergent fiber were 5.97, 5.5, 45.8 and 30.6 percent, respectively. The results showed The organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NE₁) contents of SM were 8.36 MJ/kg DM, 0.937 mmol and 4.533 MJ/kg DM, while for level 0.3 ZMWE were 64.76 g/kg DM, 8.04 MJ/kg DM, 0.895 mmol and 4.664 MJ/kg DM. [Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. The study Zataria Multiflora Water Extract effects On the Short Chain Fatty Acid, Net Energy, Metobolizable Energy and Organic Matter Digestibility Of Sunflower Meal Using In Vitro Gas Production Technique. Journal of American Science 2011;7(7):127-130]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: metabolizable energy; zataria multiflora; sunflower meal; gas production technique; neutral detergent fiber; organic matter digestibility

23 Zataria Multiflora Extract could affect Metobolizable Energy and Organic Matter Digestibility of Canola Meal?

Full Text

Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipour

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora* water extract (ZMWE) on canola meal (CM) degradability were studied by *in vitro* gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for ether extract , ash, neutral detergent fiber and acid detergent fiber were 3.4, 7.14, 33 and 22 percent, respectively. The results showed The organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NE) contents of CM were 79.46 g/kg DM, 10.27 MJ/kg DM, 1.046 mmol and 5.28 MJ/kg DM, while for level 0.3 ZMWE were 41.85 g/kg DM, 3.63 MJ/kg DM, 1.047 mmol and 1.22 MJ/kg DM. [Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. Zataria Multiflora Extract could affect Metobolizable Energy and Organic Matter Digestibility of Canola Meal? Journal of American Science 2011;7(7):131-134]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Zataria multiflora; Canola Meal; gas production technique; neutral detergent fiber; organic matter digestibility

24 Integrating Evidence Based Nursing into the Critical Care Nursing Course: Challenges from Students' Perspectives

Full Text

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Abstract: In critical care settings, there is a considerable need for highly experienced and knowledgeable nurses making efficient clinical decisions. Utilization of evidence based nursing (EBN) guides clinical decisions and practices. Therefore, it is important for critical care nurses to receive the necessary education to practice EBN. This begins with the ability to ask a clinical question and search for evidence answering it properly, which were the focus of teaching in this study. Therefore, this study aims to identify challenges to integrating EBN into the critical care nursing (CCN) course from students' perspectives. Undergraduate students who were enrolled into the CCN course on January 2010, Faculty of Nursing, University of Alexandria, were included in the study. Different teaching/learning strategies fostering adult learning were utilized to teach EBN related activities. A questionnaire was developed to identify challenges to integrating EBN into the course. Study findings indicated that about two thirds of total students have a moderate level of negative attitude to integrating EBN in the critical care practice. Most of students have moderate challenges to integrating activities of EBN into the CCN course. Two thirds of the students indicated that challenges related to course coordination are moderate. In relation to practicing EBN related activities, formulating a focused clinical question was moderately or highly challenging to the students. Searching for research evidence was moderately challenging to more than half of students. Time constraint while searching the internet was the highest top reported challenge. In conclusion, integrating EBN into the CCN course was challenging to students in different levels. Most of challenges were related to a lack in background research knowledge and skills and time constraints. So, the current study recommended that students have to receive their research course as one of the fundamental courses. In addition, more time management is required, in which an ar

[Eman Mohamed Zahran and Eman El-Sayed Taha. Integrating Evidence Based Nursing into the Critical Care Nursing Course: Challenges from Students' Perspectives, Journal of American Science 2011; 7(7):135-144].(ISSN: 1545-1003), http://www.americanscience.org.

Key words: evidence based nursing (EBN)-critical care nursing (CCN)-teaching/learning approaches.

Full Text

Barriers and facilitators to research utilization in critical care settings

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Abstract: Basing critical care nursing practice on best research evidence is a key issue for the high standard quality care in critical care settings. However, it has been identified that there is a research -practice gap. Thus, the current study aims to identify barriers and facilitators to research utilization (RU) in critical care settings as perceived by the critical care nurses. This study was conducted at eight intensive care units (ICUs), Main University Hospital,

University of Alexandria. Two hundred nurses who were working in these ICUs over the period from 6/ 12/ 2009 to 10/ 1/ 2010 were included in the study. Barriers and facilitators to research utilization questionnaire was used to identify barriers and facilitators to RU in critical care settings. Study findings shows that RU is challenged in critical care setting by several barriers. A number of facilitators to RU are suggested by the research findings to overcome these barriers. RU is affected by several factors, such as; nurses' age, experience, residence, and level of English language. Therefore, improving nurses' research related knowledge and skills, and adequate organizational support from the critical care setting to RU are the main to strategies recommended to overcome barriers to RU in ICUs.

[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(7):145-154].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Barriers and facilitators to research utilization, critical care practice, critical care nursing

Full Text

26 Diet manipulation could influence liver Polyunsaturated and mono unsaturated fatty acids of Azerbaijan native turkeys?

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Abstract: An experiment was performed to study canola oil on the Polyunsaturated and mono unsaturated fatty acids of Iranian native turkey liver. Nine male turkey chicks randomly divided into three experimental treatments (Three levels of canola oil; 0, 2.5 and 5 percent) with three replicates were arranged in a completely randomized design. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. Application of canola oil could decresed mono unsaturated fatty acids and increased Polyunsaturated fatty acids content and usage vegetable oils one of the ways to increased animal tissue quality and this status has direct effects on the human health.

[Ramin Salamatdoustnobar, Abolfazl Ghorbani, Kambiz Nazer Adl, Seyaed Saied Ghaem Maghami. Diet manipulation could influence liver Polyunsaturated and mono unsaturated fatty acids of Azerbaijan native turkeys? Journal of American Science 2011;7(7):155-157]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Canola oil, Iranian native turkey, PUFA, MUFA, liver

Full Text

27 Accountability in public Administration

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Abstract: Nowadays, one of the basic subjects of plans of development in various countries is the development of the Administrative system structure and behavior for performance improvement and the increasing of accountability in public administration. In the recent citizen – oriented world the creation of accountable and efficient government is one of the modern approaches and strategies in public administration. Considering strategic importance of creation and developing accountable government, the present paper at the framework of fundamentals and theories of accountability in public administration, first it presents the Necessity and the importance of developing accountable government and then Explains the definition, the proposes, the approaches, the types, the equipments and the dimensions of accountability in public administration respectively, then accountability in public sector with private sector and also have been compared to accountability in traditional model with new model of public administration and finally the correlation of government accountability with the process of making administrative system democratized and client's satisfaction has been studied.

[Farhad Nejadirani. Accountability in public Administration. Journal of American Science 2011;7(7):158-163]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Accountability, Citizen Focus, Development of Administrative system, Performance Management, Client's satisfaction, Public Organizations. Full Text

28 Evaluation of Abrasion Behaviour of Knitted Fabrics under Different Paths of Martindale Tester

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Abstract: The Martindale tester is used for both the abrasion, pilling resistance of fabrics, and straight line test by adjusting three moving parts, each one has three setting levels; making twenty seven paths possibilities. According to the standards there are only three types of motion to perform different tests. Therefore the aim of this study is to evaluate the effect of other setting possibilities on abrasion behaviour. The Lissajous patterns which consist of the Path traced by the fabric over the abradent in Martindale tester have been drawn in continuously changing directions at different setting. The total numbers of working conditions are sixteen patterns, since some adjustments did not work or gave the same path or lines. Then the areas of all patterns have been calculated and analyzed. Three samples of knitted fabrics produced from three counts have been tested at the combinations of different path of the Martindale tester. Therefore forty eight results of abrasion resistance for all fabrics at different settings have been measured and analyzed. Using Martindale standard testing setting is not enough to determine the actual abrasion behaviour of knitted fabrics. Other probabilities of setting, producing other different patterns in area and shape, could be simulated to the actual abrasion behaviour of fabrics during the end use. It could help the textile designer and producer to understand and improve their products according to the actual performance requirements.

[N. A. Kotb, Z. M. Abdel Megeid. Evaluation of Abrasion Behaviour of Knitted Fabrics under Different Paths of Martindale Tester. Journal of American Science 2011;7(7):164-169]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Lissajous curve figures – Abrasion resistance- Martindale-weft knitted fabric

Full Text

Risk of Bacteremia in Splenectomised Cirrhotic Patients after Elective Oesophageal Injection Sclerotherapy

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¹Internal Medicine Department, ²Clinical pathology Department, Zagazig Faculty of Medicine, Zagazig University, Egypt, *essamabdewahab72@gmail.com Abstract: Injection sclerotherapy still predominant in many Egyptian endoscopic units and is usually associated with transient bacteremia in up to 30 % of upper GI endoscopies. The risk of bacteremia is more common in cirrhotic patients scheduled for injection sclerotherapy. The splenectomised cirrhotic patients are more susceptible to this risk. We aimed to estimate the prevalence of bacteremia in splenectomised cirrhotic patients who underwent injection sclerotherapy in our unit. Patient and Methods: A prospective observation study was conducted in our endoscopy unit, Internal Medicine department, Zagazig University Hospital, Egypt, over a period of six months from December 2009 to May 2010. One hundred and forty cirrhotic patient (78 male and 62 female were included in this study and were classified into two groups (according to absence or presence of the spleen); patient group; included 80 splenectomised cirrhotic patient and control group that included 60 non-splenectomised cirrhotic patient (35 male and 25 female). All patients were cirrhotic (Child A and B), and they were referred for scheduled elective endoscopic injection sclerotherapy. High sensitive CRP (HsCRP) and blood culture 10 minutes before and 20 minute post-endoscopy were taken for all patients. Presence or absence of bacteremia was detected and recorded. Results: No positive blood cultures were detected before the endoscopy for all patients. 20 patients (14.3%) of the whole participants had positive blood culture after injection sclerotherapy, 3 of them (5%) were in non-splenectomised patients (control group) and 17 (21.25%) were in splenectomised patients (patients group). Positive blood cultures were more frequent in Child B patients compared to Child A (13 vs. 7) in both splenctomised and non-splenectomised patients with statistically significant difference. HsCRP was significantly elevated in Child B patient compared to Child A patients (P=0.018), moreover, HsCRP was highly elevated in positive culture cases regardless the Child status of the patients. Six types of micro-organisms were isolated in our study: Actinomyces (3), Candida Albican (2), Salmonella typhi (3), alpha haemolytic Streptococci (4) and coagulase negative Staphylococci (4) and Streptococcus Viridian (4). Conclusion: Prevalence of bacteremia was higher in the injection sclerotherapy splenectomised cirrhotic group compared to non-splenectomised cirrhotic group, and in Child B patients more than Child A ones.

[Essam A.Wahab Mahmoud A.Ashoor and Hanan S.Ahmad. Risk of Bacteremia in Splenectomised Cirrhotic Patients after Elective Oesophageal Injection Sclerotherapy. Journal of American Science 2011; 7(7):170-174].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Risk; Bacteremia; Cirrhosis; Endoscopy; Splenectomy

Full Text

0 Moisture-dependent physical properties of paddy grains

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Abstract: In order to design of harvesting, conveying and processing equipments, it is necessary to determination of physical properties of grains and agricultural commodities. This study was carried out to evaluate the effect of moisture content on some physical properties of paddy grains. Six levels of moisture content ranging from 8 to 24% (d.b.) were used. The average length, width, thickness, equivalent diameter, surface area, sphericity, thousand grain mass, angle of repose and aspect ratio increased from 10.20 to 10.28 mm, 2.31 to 2.42 mm, 1.85 to 1.94 mm, 3.53 to 3.66 mm, 36.87 to 39.16 mm², 34.53 to 35.46 %, 24.43 to 28.27 g, 38.27° to 46.13° and 0.226 to 0.236, respectively, as the moisture content increased from 8 to 24% (d.b.). As the moisture content of paddy grains increased from 8 to 24% (d.b.), the bulk density and true density were found to increase from 381.77 to 428.5 kg/m³, and 1328.65 to 1372.41 kg/m³ respectively, while the porosity was found to decrease from 71.27 to 68.78%. The static coefficient of friction of paddy increased linearly against various surfaces, namely, glass (0.3577-0.4973), galvanized iron sheet (0.4629-0.5295), and plywood (0.4856-0.5830) as the moisture content increased from 8 to 24% (d.b.).

[H. Zareiforoush, B.Hosseinzadeh, M.E.Adabi A.Motavali. **Moisture-dependent physical properties of paddy grains.** Journal of American Science 2011; 7(7):175-182].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Agricultural equipment, design, Moisture content, Paddy grain, Physical properties

Full Text

Counseling for Mothers to Cope with their Autistic Children

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Abstract: This study is an experimental research aiming to evaluate the effect of counseling for mothers to cope with their autistic children (AC), through:

1) Identifying mothers' needs according to physical, social, motor, and emotional coping patterns for their autistic children, and 2) Developing counseling program according to mothers' needs and evaluating the effect of counseling on physical, social, motor, and emotional coping patterns of mothers. This study was conducted at the Special Needs Care Center in the Institute of Post-graduate Childhood Studies, Autistic and Psychiatric Clinics affiliated to Ain Shams University and Egypt Autistic Society. The sample of convenience consisted of 90 mothers providing care for their children suffering from autism. Data were collected through three tools: 1) Interviewing questionnaire to assess children's and their mothers' socio-demographic characteristics and mothers practices. 2) Family Impact of Childhood Disability (FICD) Scale, to assess subjective interpretation or primary appraisal of parent regarding to child with developmental disabilities into family systems and its impact on the family as an entity. 3) Medical records of the studied autistic children to determine the degree of disability. The main results revealed that the children were completely dependent on their mothers in basic daily activities also were prone to moderate and substantial degree of impact. There were statistically significant improvements in mothers' coping with needs of their autistic children. The study recommended that media focuses to increase people awareness with the aid of health team professionals in prompting tolerance and understanding of autism with a clear explanation, so individuals with autism will be better integrated in the society.

[Hanan, T. Elbahnasawy and Naglaa, M. Girgis. Counseling for Mothers to Cope with their Autistic Children. Journal of American Science 2011; 7(7):183-192],(ISSN: 1545-1003). http://www.americanscience.org.

Key words: Autism, Counseling, Mothers, Coping.

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Full Text

Impact Of An Steroidogenesis Inhibitor Drug On Structure And Ultrastructure Of Mammalian Testis

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Abstract: ketoconazole, an imidazole derivative is currently used in the medical fields as an anti-fungal and steroidogenesis inhibitor drug. The present study aimed to investigate the effect of ketoconazole on the structural and ultrastructural characteristics of mammalian testis. So, twenty adult male rats weighing 150-200 g. were divided into two groups; group I were *i.p.* injected with 10mg/100g.b.wt. of ketoconazole dissolved in 1ml physiological saline solution daily for 15 days. Whereas, group II was injected with 1ml saline solution in the same manner. *Histologically*, testes of treated rats were

surrounded by thickened tunica albuginea, and consisted of deformed seminiferous tubules ensheathed by irregular basal lamina and having deformed Sertoli cells, necrotic spermatogonia, primary spermatocytes and rounded spermatids, in addition to, deformed elongated spermatids exhibiting unusual amounts of residual cytoplasm extending from them into the lumen of the tubules. Deformed spermatozoa may be seen in the lumens of some of these affected tubules. Also, the interstitial tissue displayed vacuolation, necrotic Leydig cells and vasodilatation of the blood vessels engorged with stagnant blood cells are seen. *Ultrastructurally*, treated testes showed thickening and irregularity of the surrounding basal lamina, necrotic spermatogonia detached from the basal lamina and having pyknotic nuclei separated from the surrounding cytoplasm leaving clear zones. Primary spermatocytes and rounded spermatids exhibiting signs of necrosis, deformed elongated spermatids and malformed spermatozoa, in addition to, necrotic Leydig cells were frequently observed. In conclusion, the obtained results suggested that the testicular structural and ultrastructural alterations observed following ketoconazole administration may be responsible for the inhibition of the steroidogenesis. This decrease in steroidogenic activity has been suggested as the primary cause of spermatic production failure. Therefore, these destructive impacts of ketoconazole on the rat testes indicates that it should be used under strict medical care

[Waslat W. Elshennawy and Hanaa R. Aboelwafa. IMPACT OF AN STEROIDOGENESIS INHIBITOR DRUG ON STRUCTURE AND ULTRASTRUCTURE OF MAMMALIAN TESTIS. Journal of American Science 2011; 7(7):193-203].(ISSN: 1545-1003). http://www.americanscience.org.

Key words: histology, imidazole, ketoconazole, rat, steroidogenesis, testis, ultrastructure

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33 **Modeling of drying** *Lavandula officinalis* L. leaves
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Abstract: Storage of agricultural crops after harvesting is important to keep quality and quantity of the dried materials in a good level, particularly for medicinal plants and herbs because of reduction of essential oils and changes of qualitative properties such as color, which both of them influence on the economical value of the products. Drying process of *Lavandula officinalis* L. leaves was studied and modeled in this investigation. Independent variables were temperature at three levels (40, 50 and 60°C), air velocity at two levels (0.5 and 1 m/s) and product depth at three levels (1, 2, and 3cm). The experiments were performed as factorial with complete random design in three replications. Seven drying models, namely Yagcioglu, modified Page, Page, Henderson and Pabis, Lewis, two-term and Verma, were examined to fit the data. The Page model was found as the best model with highest R^2 and lowest χ^2 , RMSE and P-values.

[Hossein AhmadiChenarbon, Modeling of drying Lavandula officinalis L. leaves, Journal of American Science 2011;7(7):204-208]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: drying; modeling; *Lavandula officinalis L*.

Full Text

Full Text

Evaluated of Egyptian buffaloes crossing with Italian buffaloes for reproductive traits

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Abstract: In 2003, MoA (Ministry of Agriculture) approved the commercial importation and utilization of Italian buffaloes (IT) semen, which is being uncontrollably spread around the country; a practice needs prior performance and genetic assessment for both milk production and reproduction traits. In a previous publication (Fooda et. al., 2011) the milk productivity was studied, and the current one handles the reproductive traits. Two of the private dairy buffalo farms that utilize Italian semen for obtaining the crossbred along with the native buffalo were selected from two different ecological zones to be included in this study being "Ganat Elreda" farm in Ismaeleia governorate (Newly reclaimed desert area) and "United Group" farm in Qaliobeia governorate (old delta). This study aims to evaluate the Egyptian Italian buffalo crosses (1/2EG.1/2IT) for some reproductive traits, in comparison to their Egyptian contemporaries (EG), to assess the crossing trial. The traits included age at first calving (AFC), number of service per conception (NS), gestation period (GP), calving interval (CI), days open (DO) and service period (SP). A total 177 records, 102 record from Ganat Elreda farm (57 record EG and 46 record ½EG.½IT; and 74 records from United Group farm (26 record EG and 48 record ½EG.½IT) was utilized, covering the period from 2007 to 2009. Results obtained indicate that the Egyptian buffaloes performed better than the crossbreed for (NS), (CI), (DO) and (SP) traits. Since the results for NS, CI, DO and SP were 1.2, 395, 71 and 38 days, respectively for EG, while for crossbred, the results were 1.87, 429, 118 and 76 days, respectively in farm1. And in farm 2, the results were 1.82, 418, 104 and 77 days for EG, but, the results were 2, 433, 119 and 85 days, respectively for crossbred. [Fooda, T. A.; Elbeltagi, A. R.; Laila R. Hassan and SetEl-habaeib S. Awad. Evaluated of Egyptian buffaloes crossing with Italian buffaloes for reproductive traits. Journal of American Science 2011;7(7):209-213]. (ISSN: 1545-100

Keywords: Egyptian and Italian buffaloes, crossing, reproduction traits.

Full Text

35 Genetic Diversity of Some Egyptian Durum Wheat Cultivars

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Abstract: The objective of this investigation was to assess the genetic diversity among three Egyptian durum wheat i.e. Beni Suif 4, Beni Suif 5 and Beni Suif 6 and one bread wheat i.e. Sids 12 cultivars using sodium dodecyle sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and randomly amplified polymorphic (RAPD) markers. Protein electrophoreses showed that Beni Suif 4 was characterized by the absence of band-3 with 41.56 kDa. RAPD analysis showed that the number of polymorphic amplicons was 56 out of a total of 93 amplicons, thus revealing a level of 60.0 % polymorphism. The highest genetic similarity revealed by RAPD analysis (95.0%) was between Beni Suif 5 and Beni suif 6. While, lowest similarity (65 %) was found between Beni Suif 4 and Beni Suif 5. The dendrogram separated Sids 12 from all the other genotypes, thus demonstrating the distinctiveness of the genetic background of this

genotype from all the other genotypes. The three genotypes constituted a subcluster divided into two groups, one group composed of Beni Suif 5 and Beni Suif 6, while the second group comprised Beni Suif 4.

[Fouda, A. H.; Gad, Khaled. I. M.; Diab, A. A.; Safwat, G. and Hussein, M. H. Genetic Diversity of Some Egyptian Durum Wheat Cultivars. Journal of American Science 2011; 7(7):214-221].(ISSN: 1545-1003). http://www.americanscience.org.

Key words: Durum Wheat, RAPD, Dendrogram, Dice coefficient, Polymorphism, Turgidum.

Novel design metrics to measure real time environment application design.

Full Text

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Abstract: In this paper we have defined a set of novel design metrics for measuring the design of specially real time environment applications. The aim of the defined new metrics set is to measure the design before handing over to the implementation team. The errors in the design can cost you money and time. Majority of the methodologies leave the task of managing the issue of task deadlines for software programmers in the implementation phase at the coding language stage. LCSF is measured for various methodologies. A non real time system design is also measured for design metrics. Results are plotted and discussed.

[Mahmood Ahmed, M. Shoaib. Novel design metrics to measure real time environment application design. Journal of American Science 2011;7(7):222-226]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Deadlines, Design Metrics, Teal Time Systems, Design Measurement.

Full Text

Ranking repair and maintenance projects of large bridges in Kurdestan province using fuzzy TOPSIS method

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Abstract: In this paper multi criteria decision making tools have been used for bridge risk assessment and for planning the investigation, repair and maintenance of bridges. For this purpose, at first, risks that influence bridges have been recognized and they have been classified in six groups as risks arising from earthquake and their effect on the sphere, design and traffic insufficiency, flood, structural system, structural resistance against earthquake and different design, building or maintenance problems. The risks have been assessed based on their consequence on four criteria as safety, functionality, cost and environment. Finally, a method has been proposed for planning the bridges repair and maintenance projects using multi criteria decision making tools. In a case study, large bridges in kurdestan province have been ranked based on the intensity of recognized risks using fuzzy TOPSIS method. [Heresh SoltanPanah Hiwa Farughi, Seiran Heshami. Ranking repair and maintenance projects of large bridges in Kurdestan province using fuzzy TOPSIS method. Journal of American Science 2011;7(7):227-233]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: bridge, risk sources, risk assessment, repair and maintenance, Fuzzy TOPSIS

Full Text

Evaluation of soil erosion and sediment yield using semi quantitative models: FSM and MPSIAC in Eivaneki watershed and the sub basins (Southeast of Tehran/Iran)

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Abstract: Soil erosion and sediment yield are the most important environmental problems that should be considered. Erosion is not only cause of soil degradation but also fills dam reservoirs; irrigation structures and decreases their capacity. Because of no sediment reservoir (check dams) at the Eivaneki watershed outlet that can show the yearly sediment yield, both of the semi-quantitative models (FMS and MPSIAC) are used to evaluate the annual rate of sediment in five Eivaneki watershed sub basins. In modified FSM model five factors: topography, vegetation, gully erosion, lithology and watershed shape with the score range of 1 to 3 were studied and scored. The nine MPSIAC model factors consist of: lithology, soil, climate, run off, topography, vegetation cover, land use, surface erosion and channel erosion. The specific sediment yields that were evaluated by using FSM model are 0.91 ton/ha/y and 3.21ton/ha/y with MPSIAC. Also rainfall simulator was used in order to classify the erodible formation in Eivaneki watershed. After evaluating the rate of sediment in Eivaneki watershed, these quantitative values compared with each other and the result of Eivaneki gauging station (0.93 t/ha/y). Results showed that FSM evaluation was nearer to SSY than MPSIAC.

[Shirin Mohamadiha, Hamid Reza Peyrowan, Reza Mousavi Harami, Sadat Feiznia. Evaluation of soil erosion and sediment yield using semi quantitative models: FSM and MPSIAC in Eivaneki watershed and the sub basins(Southeast of Tehran/Iran). Journal of American Science 2011;7(7):234-239]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Sedimentyield, FSM, MPSIAC, Rainfall simulator, Eivaneki watershed

Full Text

39 [Journal of American Science 2011; 7(7):240-251]. (ISSN: 1545-1003). http://www.americanscience.org. 12

Full Text

40 [Journal of American Science 2011; 7(7):252-261]. (ISSN: 1545-1003). http://www.americanscience.org. 10

Full Text

The comparative investigation of the customer's and manager's views of the Non-profit employment agencies about the relationship of the mixed factors of marketing of the services with customer attraction

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Abstract: Today, paying deep attention to customers and customer-centered centers is the secret of employment market. The purpose of this investigation is to do a comparative investigation about the customers' views and managers of the non-profit employment offices about the relationship between the mixed factors of the marketing of services in order to improve the performance of non-profit employment offices to satisfy customers and attract them more. The investigation sample includes managers and customers of the non-profit employment offices of Khuzestan province (N=260). According to the resources existing in the special quarries, the effect of the mixed factors of the marketing of services with customers attraction and the characteristics of non-profit employment offices, the researcher-made quarry has been used. Two tests have been used in this research. The test of the total ranks and that of Fredman, according to the fact that there are two types of independent statistic societies (statistic society of managers and customers) exist, these tests have been used to test these tests. The results show that there is a meaningful disagreement between the viewpoints of customers and managers of non-profit employment offices about the mixed factors of marketing of the services.

[Fereydoun Omidi. The comparative investigation of the customer's and manager's views of the Non-profit employment agencies about the relationship of the mixed factors of marketing of the services with customer attraction. Journal of American Science 2011;7(7):262-265]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Mixed marketing of the services; customer; marketing of the services; Employment Services

The role of soft power in foreign policy of Islamic Republic of Iran

Full Text

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Abstract: Since the ideological elements entered into Iranian's orientation and guideline, the Islamic revolution of Iran brought Iran's foreign policy to a paradigmatic shift. After this revolution, the secular and west-driven Iran changed into an ideologic and independent player, so that it has defined its orientations, aims, and national benefits in an Islamic ideological framework to a great extent. As far as religion is concerned, Islamic revelation of Iran has a lot in common with many countries in the Middle East, and these common aspects have made Iran more influential among Shiites and Islamic movements. This article intends to study and examine the effect of ideology on foreign policy of Iran and that how this ideology has formed the frame of Iran's foreign policy as a source of soft power.

[Ebrahim Anousheh. The role of soft power in foreign policy of Islamic Republic of Iran. Journal of American Science 2011;7(7):266-270]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Islamic Republic of Iran; Ideology; Shiism; Middle East; Soft power

Full Text

43 Comparing the behavior of reinforced HSC beams with AFRP bars and confined HSC beams with AFRP sheets under bending

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Abstract: By increasing the use of FRP composites in civil engineering, they seem highly essential to be studied. The purpose of the study is comparison of the behavior of AFRP reinforced HSC beams (reinforced with AFRP bars) and steel reinforced HSC beams which confined with AFRP sheets under bending. Eighteen beams have been modeled with ANSYS. Three beams are HSC which reinforced with AFRP bars. After modeling, the results have been compared with experimental results and then software has been calibrated. Then twelve steel reinforced HSC beams which confined with AFRP sheets (with different number of laminates) have been modeled. In addition three simple steel reinforced HSC beams have been modeled as the base of comparison. At the end behavior of aforementioned beams has been compared and corresponding graphs have been sketched.

[R. Rahgozar, M. Ghalehnovi, E. Adili. Comparing the behavior of reinforced HSC beams with AFRP bars and confined HSC beams with AFRP

sheets under bending. Journal of American Science 2011;7(7):271-275]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: HSC beams; AFRP bars; bending; modeling; ANSYS

Full Text

4 Environmental Factors in Iranian Architecture

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Abstract: Evolution of architecture is influenced by many external factors including environmental, ethnical, demographical, cultural, and religious factors. Among these, we consider environmental factor as the most active and powerful factor considering its objectivity and remaining constant. This article deals with the environmental conditions of Iran by zoning its territory and considering that the traditional principles in Iranian architecture and urbanism is directly connected with the country's nature, as well as regional characteristics of individual regions. Moreover, problems of construction design zoning, and also traditional designs and materials in architecture of civil buildings depending on climatic, seismic, wind conditions and other objective factors are discussed. Predominant influence of the spiritual Islamic culture on traditions of Iranian architecture is addressed. The author concludes that the coincident use of modern Iranian architecture, just like other countries, and the traditional principles and the forms is not anachronism, and the organic continuity of architecture development is historically justified, functionally useful, and compositionally effective. Naturally, this provision does not preclude the active search for improvement of these guidelines and forms, while maintaining their unity with the natural and climatic conditions.

[Abdolbaghi Moradchelleh. Environmental Factors in Iranian Architecture. Journal of American Science 2011;7(7):276-287]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Climate and environment of Iran; Construction design zone; Traditional architecture

Full Text

The effect of yoga training with different sessions on mental health and some blood factors in non-athlete women

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Abstract: This research was done to investigate the effect of 6 weeks yoga training with different sessions on mental health and some blood factors (Glucose, Cholesterol, LDL, HDL and Triglycerides) of female teachers in Avaz. 100 female non-athlete and healthy teachers with the mean age of (35±2.5) were divided into 4 groups randomly. The first group was session yoga training in a week group, the second were 2 sessions yoga training in a week, the third group were 3 sessions' yoga trainings in a week and the forth group was the people without yoga training or control group. Every yoga session is taking 90 minutes (including Asana, Pranayama and Shavasana training). The survey instruments were international questionnaire of SF36 used for measuring mental health, related components and the required equipments for blood test to measure blood factors measured as pre-test and post-test. In the statistical analysis at first one-way ANCOVA and Sequential Bonferroni test were used and for all the hypotheses significance level was used 0.05. The results showed a significant difference between the studied blood factors and mental health eight components in the third group with the control group. The current data can be effective in the design of yoga trainings programs to improve mental health and life quality and improving blood factors for different people.

[Zahra Mojirzadeh. The effect of yoga training with different sessions on mental health and some blood factors in non-athlete women. Journal of American Science 2011;7(7):288-294]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Mental health; Yoga trainings; Glucose; Cholesterol; HDL; LDL

Full Text

Effect of honey bee venom on Lewis rats with experimental allergic encephalomyelitis as regards changes of GABA and glutamate

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Abstract: Multiple sclerosis (MS) is a progressive, neurodegenerative disease of central nervous system (CNS). Experimental allergic encephalomyelitis (EAE) is a widely accepted animal model for MS. Honey bee venom (Apis mellifera) contains a variety of different low and high molecular weight peptides and proteins including melittin, apamin, adolapin, mast cell degranulating peptide and phospholipase A2. Bee venom (BV) also could exert anti-inflammatory and antinociceptive effects on the inflammatory reactions. Glotamic acid and γ -aminobutyric acid (GABA) are among neurotransmitters of central nervous system and participated in excitatory and inhibitory processes. In EAE the amount of GABA reduces and the level of glutamate will increase. Tracing them in brain could useful in monitoring the influences of drugs. In this research, hematoxylin and eosin methods for inflammation, ELISA to study tumor necrosis factor-alpha (TNF- α) and HPLC, to study the amount of GABA and glutamate were used for assessment. In this study, we showed that in EAE level of GABA has reduced and the amount of glutamate has increased and bee venom decreases pathological changes and the level of serum TNF- α , and level of glutamate and increases the level of GABA in EAE rats induced by spinal cord of guinea pig.

[Akbar Karimi, Kazem Parivar, Mohammad Nabiuni, Saied Haghighi, Sohrab Imani], Hosein Afrozi. Effect of honey bee venom on Lewis rats with experimental allergic encephalomyelitis as regards changes of GABA and glutamate. Journal of American Science 2011;7(7):295-300]. (ISSN: 1545-1003). http://www.americanscience.org

Keywords: Bee venom; Experimental allergic encephalomyelitis; GABA; glutamate

Full Text

Relations of serum aldosterone and microalbuminuria to left ventricular hypertrophy in patients with essential hypertension

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Abstract: Background: The identification of risk factors for the initiation of left ventricle hypertrophy (LVH), which is an independent risk factor for cardiovascular mortality and morbidity in hypertensive patients, is very important. The present study examined the role of aldosterone and microalbuminuria in LVH and geometry in patients with essential hypertension (EHT), and investigated the contribution of myocardial fibrosis to the process of LVH. Methods: The relationship of the plasma aldosterone concentration (PAC) to LVH and left ventricular (LV) geometry was investigated in 57 patients with EHT; mean age, 51 ± 10.2 years. Twenty-five had LVH. When evaluated according to the geometrical patterns of LVH, 14 patients had concentric LVH (CH), 11 had eccentric LVH (EH), and 12 had concentric remodeling. Twenty patients had normal left ventricle geometry. Two weeks after the cessation of antihypertensive medications, sodium, potassium, total protein and microalbumin in 24-hour urine samples and plasma aldosterone levels, plasma renin activity and serum procollagen type III amino-terminal peptide (PIIINP) were measured. Results: PAC of the patients with LVH was found to be significantly higher (23.0±5.6 versus 12.9±3.72 ng/dl, p=0.0001) than those without LVH. The difference between plasma renin activities was not statistically significant. Linear regression analysis revealed that plasma aldosterone level and age were independent parameters increasing left ventricle mass index (LVMI). PAC correlated with both LVMI (r=0.913, P=0.0001) and relative wall thickness (RWT: r=0.744, P=0.0001). In patients with LVH (LVMI ≥134 g/m²), the serum concentration of PIIINP, a marker of myocardial fibrosis, correlated with RWT (r=0.422, p=0.001) and LVMI (r= 0.664, P=0.0001). The serum PIIINP concentration was significantly higher in the CH group than in the EH group (0.74±0.11 vs 0.66±0.19 ng/ml, respectively; p<0.05). Twenty-four hour urine microalbumin concentrations of the patients with LVH were found to be significantly higher (P=0.003) and positively correlated with LVMI and PAC (P=0.0001). Conclusions: Aldosterone may be involved in LVH and LV geometry, particularly in the development of CH. Myocardial fibrosis seems more strongly involved in the hypertrophic geometry of CH than with EH. A strong relation between microalbuminuria with aldosterone and LVMI was detected. The value of selective aldosterone blockers in preventing target organ damage awaits further investigations. [Soma Sh Abd El Gawad, Mohamed A Helaly, Ayman Ahmed Abd-Elaziz, Ahmed W Soliman, Nader Elshahat, Wael R Rifaie, Eid M Daoud, and Amal Kamel Selim: Relations of serum aldosterone and microalbuminuria to left ventricular hypertrophy in patients with essential hypertension. [Journal of American Science 2011;7(7):301-312]. (ISSN: 1545-1003).http://www.americanscience.org

Key Words: Aldosterone; Essential hypertension; Left ventricular hypertrophy; Left ventricular geometry; Procollagen type III amino-terminal peptide; Microalbuminuria.

Full Text

48 Correlates of Physical and Psychosocial Functioning Among Burn Patients

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Abstract: The burn injury can one of the most serious and devastating injuries among people of all ages. The aim of the study was to identify correlates of physical and psychosocial functioning among burn patients. The study was conducted at the burn units of El-Mansoura University Hospital. Design: descriptive correlational design was used. Tools which were used for data collection: 1) Sociodemographic data and clinical data. 2) Brief Burn Specific Health Scale is adopted from (Kildal et al., 2001), to assess physical and psychosocial function in individual suffering from burn injury. The results of this study showed a statistically significant improvement in the physical and psychological functioning scores among patients from admission to discharge from hospital. This study concluded that Patients with burn injury suffer from a multitude of physical problems that alter their physical and psychosocial functional. Consequently, regular and comprehensive nursing intervention for follow up of these patients is necessary for life saving. Burn patients experience low functional outcome on the admission of hospital, which slightly improves during, by the discharge from hospital. This study recommended replication of the study on a larger probability sample from different geographical areas, to achieve more generalizable results.

[Salwa A. Mohamed and Hanan Soliman. Correlates of Physical and Psychosocial Functioning Among Burn Patients. Journal of American Science 2011; 7(7): 313-318]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Burn injury, Physical, Psychological functioning

Effect of Soybean on Bone Health of Male and Female Albino Rats

Full Text

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Abstract: Litanies of health benefits are frequently attributed to soy but it's also considered as endocrine disruptors, indicating that it has the potential to cause adverse health effects as well. Consequently the present study investigated whether consumption of soybean has health benefits or adverse effects on bone health. Each sex was randomly divided into 4 groups, control group fed on the basal diet (AIN93 G), and three treated groups given 30, 60 and 90 g cooked soybeans/70 kg human body weight (b.w.) for three months . Female and Male rats showed that soybean increased serum parathyroid hormone (PTH) and decreased calcium (Ca) level in bone and serum. In the present study found that soybean have adverse effects on bone of male and female [Serag El Din, O. S; Batta, H. Abd El Azim; Abd El Fattah, N.Effect of Soybean on Bone Health of Male and Female Albino Rats. Journal of American Science 2011; 7(7): 319-324].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Soybean, bone PTH, Ca, rats.

Full Text

Institutional Governance Effect on the Shadow Economy in Asia

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Abstract: This paper analyses how institutional governance, affect the shadow economy, using an Asian country data. The literature strongly emphasizes the quantitative importance of these factors to understand the level and changes of shadow economy. However, the limited number of studies uses cross-sectional country data with a relatively few number of observations, and hardly any paper has investigated governance and provides evidence using within country data. Using more than 35 proxies that measure institutional governance factors and political behavior we find strong support that its increase leads to a smaller shadow economy. Furthermore, an increase in poverty and political stability increases the size of the shadow economy.

[Arash Jamalmanesh, Noor Aini Khalifah. Institutional Governance Effect on the Shadow Economy in Developing Countries: A Panel Data Analysis. Journal of American Science 2011; 7(7):325-333] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Institutional Governance, Shadow Economy, Poverty, Asian Countries, Political Stability, Panel Data Analysis

Clinical utility of plasma NT-proBNP in ruling out heart failure among Egyptian patients

Full Text

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Abstract: Natriuretic peptides (BNP and NT-pro-BNP) represent useful biomarkers in heart failure diagnosis. So the aim of the present study was designed to assess the diagnostic and prognostic value of serum concentrations of NT-proBNP relative to cardiac troponin T (cTnT) and creatine kinase isoenzyme MB (CK-MB) determined on admission in patients with acute heart failure and with chronic heart failure at different clinical stages of severity. The mean levels of CK-MB, ctn-land plasma concentration of NT- proBNP were significantly increased (p<0.05) in chronic heart failure group. The mean levels of CK-MB, ctn-land plasma concentration of NT- proBNP were significantly increased (p<0.05) in chronic heart failure group as compared to the acute heart failure group. Plasma NT-pro-BNP levels are related with chronic heart failure severity; they are particularly increased in more advanced New York Heart Association (NYHA) classes (stage II, III, IV), these increments were matched with the increased serum levels of CK-MB and ctn-l with the advance of disease severity. In conclusion in heart failure, measurement of NT-proBNP is among the diagnostic biomarkers of all relevant clinical diagnostic aids and is useful across the whole spectrum of heart failure disease severity. High NT-proBNP evaluated to chronic heart failure stages, their increase is directly related to more advanced NYHA classes and to poor prognosis. So NT-proBNP can facilitate diagnosis and can be used as a guide for heart failure therapy.

[Magda S. Mahmoud, Mie A. Mohammed, Abeer A. khayyal, Olfat M. Fawzy, Amer Elhammdy. Clinical utility of plasma NT-proBNP in ruling out heart failure among Egyptian patients. Journal of American Science, 2011;7(7):334-342]. (ISSN:1545-0740). http://www.americanscience.org

Keywords: heart failure, diagnosis, echocardiography, NT-proBNP

Full Text

Serum Neopterin Level in Early Onset Neonatal Sepsis

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Abstract: Background: Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30-50% of the total neonatal deaths each year in developing countries. Diagnosis of neonatal sepsis remains a major challenge, as early signs of sepsis are often non-specific and the laboratory criteria are also not fully reliable. This leads to unnecessary exposure to antibiotics before the presence of sepsis has been proven with potentially poor outcomes. Several attempts have been made to use physiologic parameters, hematologic indices, and cytokine profiles, at the time of onset of the suspected sepsis episode to identify accurately neonates with sepsis. Elevated serum level of neopterin has been shown to be an early specific and sensitive marker responsible for activation of the cellular immune system and has also been proposed to aid in the diagnosis of bacterial infection. Objective: To evaluate the usefulness of serum neopterin level as an accurate diagnostic tool for neonatal sepsis and compare it with Rodwell's hematological sepsis score and Creactive protein for predicting infection and outcome in neonates with sepsis. Methods: The study comprised 20 neonates with a clinical proven sepsis, 20 neonates with a clinical suspicion of sepsis and 20 healthy neonates of matched gestational age who were considered as the normal control group. All groups were subjected to full history taking and clinical examination. Laboratory investigations done were complete blood count, total and differential leucocytic count, blood culture, serum levels of CRP and neopterin. Results: Serum neopterin levels were significantly higher in the infected and suspected groups compared with the control group (p = 0.0001) and correlated positively with both CRP levels (r=0.8, p = 0.0001) and the Hematological Sepsis Score (r=0.5, p=0.04). Significant positive correlations were detected between serum neopterin level, maternal age (r=0.5, p=0.02), gravidity(r=0.5, p=0.01), respiratory distress (r=-0.5, p=0.03), and lethargy (r= 0.2, p=0.05) in septic neonates. Conclusion: Serum neopterin may be used as an early diagnostic tool with high sensitivity (78.09%), specificity (85%), positive predictive value (93.8%), negative predictive value (82.6%) in neonates with suspicion of sepsis especially when combined with routine hematological sepsis score and C-reactive protein.

[Samia Boseila, Iman Seoud, Gamal Samy, Hanan El-Gamal, Tarek S. Ibrahim, Amira Ahmed, Mona R. El Kafoury and Ahmed Fathy. Serum Neopterin Level in Early Onset Neonatal Sepsis. Journal of American Science 2011;7(7):343-352].(ISSN: 1545-1003). http://www.americanscience.org.

Key word: Neonatal sepsis – neopterin level – hematological sepsis

Full Text

Contourlet Features Extraction and AdaBoost Classification for Palmprint Verification

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Abstract: Biometrics-based personal verification is a powerful security features in technology era. Palmprint is an important complement and reliable biometric that can be used for identity verification because it is stable and unique for every individual. This paper presents a new palmprint verification method by using the contourlet features and AdaBoost classification. The contourlet transform is a new two dimensional extension of the wavelet transform using multi-scale and directional filter banks. It can effectively capture smooth contours that are the dominant features in palmprint images. AdaBoost is used as a classifier in the experiments. Experimental results shows that the contourlet features when classify by using AdaBoost (α -Type) classifier are very suitable for invariant palmprint verification. The experimental results illustrate the effectiveness of the method proposed.

[Eisa Rezazadeh Ardabili, Keivan Maghooli, Emad Fatemizadeh. Contourlet features extraction and AdaBoost classification for palmprint verification. Journal of American Science 2011;7(7):353-362]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Palmprint, verification, Contourlet, AdaBoost, Biometrics.

Full Text

Spectrophotometric Studies on Antioxidants-Doped Liposomes

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Abstract: Antioxidants are the effective modulators of physical properties of model and natural membranes as a scavenger of what called free radical. To demonstrate the relationship between the structure of antioxidants and their effect on the molecular dynamics of membranes, UV spectroscopy is applied to investigate the influence of three structurally different antioxidants: Ascorbic acid (vitamin C), vitamin E and Zinc, on the behavior of dipalmitoylphosphatidylcholine (DPPC) multilamellar vesicles. The results obtained indicate that positively charged liposomes doped with each of vitamin C and vitamin E or negatively charged liposomes doped with zinc contribute to membrane fluidity changes as they have been shown to decrease membrane fluidity. The results suggest that the hydrophobic core of the membrane is poorly affected by these three structurally different antioxidants molecules and, consequently, they cannot insert deeply into the bilayer and the interaction is mainly localized at the polar head level which strongly influences membrane stability and lipid dynamics.

[Samaa M. Elfaramawy^{1*}, Rizk A. Rizk Spectrophotometric Studies on Antioxidants-Doped Liposomes. Journal of American Science 2011; 7(7):363-369].(ISSN: 1545-1003), http://www.americanscience.org.

Keywords: Antioxidant; Liposome; UV spectroscopy.

Full Text

Eastern nations in Ferdowsi thoughts

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Abstract: The western culture has always kept a close eye on eastern civilization throughout the history. Toward making a survey and getting an understanding of the eastern knowledge, customs, and conventions, a new field of study was created called orientalistic. The dawn of eastern civilization was much sooner than the western one. The oldest city of the ancient world in Mesopotamia in Iraq, Jiroft in Iran, and Mohenjo-Daro in India were of

incredible civilization. Formation of great empires in Iran, China and India were concomitant to stating of city dwelling in other parts of the world, so it puts us to shame to look into ourselves from western outlook.

[Omid Shiva Eastern nations in Ferdowsi thoughts; Journal of American Science 2011;7(7):370-375]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Eastern nations; Ferdowsi; history; Iran

Full Text

Detection of red ripe tomatoes on stem using Image Processing Techniques

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Abstract: Image Processing Techniques are being used increasingly in the field of agricultural and food products for quality assurance purpose. The system offers the generation of precise descriptive data and reduction of tedious human involvement. Image segmentation based on color difference between mature fruits and backgrounds under natural illumination condition is a difficult task. By processing images in three color space of RGB, HSI and YC_bC_r from CCD camera, tomato fruit, stems, leaves and a stem-supporting pole were recognized. Then the processed images were compared in three color spaces in order to identify ripe tomatoes with more than 50% redness. The average of error between actual number of red tomatoes and estimated number in 3 images of each 28 tomato trees was 3.85%.

[H. Mohamadi M.,R. Alimardani, M. Omid. Detection of red ripe tomatoes on stem using Image Processing Techniques. Journal of American Science 2011;7(7):376-379]. (ISSN: 1545-1003). https://www.americanscience.org.

Keywords: Image processing; ripe tomato; natural illumination.

Full Text

Study of the relationship between parenting style, and children's emotional intelligence and self-efficacy

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Abstract: This project is performed with the aim of studying the relationships between the parenting style on the one hand, and children's emotional intelligence and self-efficacy on the other hand. Regarding the importance of parenting style and its influence on children the question that arises that; what is the effect of the type of parenting style on children's emotional intelligence and self-efficacy? This study aims to find the answer. The statistical samples of the study were 110 students of middle school (62 boys and 48 girls) and their parents in Gonbad-Kavoos city, Golestan Province, Iran. They were chosen by cluster sampling method. To evaluate the parenting style, children's emotional intelligence, and children's self-efficacy, Baumrind parenting styles questionnaire, the 32-item Shrink's questionnaire, and the 10-item Schwarzer & Jerusalem Generalized Self-Efficacy scale questionnaire were used, respectively. The results obtained indicated that there is a significant statistical relationship between parenting style and emotional intelligence. However, there was not any significant statistical relationship between parenting style and children's self-efficacy.

[Mojtaba Aghili , Mojtaba Kashani; Study of the relationship between parenting style, and children's emotional intelligence and self-efficacy; Journal of American Science 2011;7(7):380-384]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Parenting style; emotional intelligence; self-efficacy

Full Text

The new approach to study of relationship between Tughrul and Caliph Alqayem (in in the second half of the forth Hijri century)

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Abstract: In the second half of the forth Hijra century, the Seljuks government was recognized. It was historically the most important and valid Turkmen tribes. With the emergence of Seljuk dynasty, a new era began in the history of Islam. For the first time, the Turkish tribes dominated southwest of Asia and possessed the political power of Caliphate system. At the same time, it was the source of happiness for Abbasids that Saljuks were devout Sunnis and remained Sunni. Thus, they were the pioneers of a proactive cooperation with Caliphs and forcefully prevented the Ismaili conspirators. The military expedition of Tughrul to Iraq not only saved the Caliph from his enemies, but also caused a new division of power and brought a definitive shape of influence in the central territories of Darulislam. In the present study, we have tried to depict the relations of Tughrul, as the first king of Seljuks, and Caliph Alqayem. We also addressed the ups and downs of Caliph and Sultan relations and the formation of these relationships.

[Abolhasan Shahvari; The new approach to study of relationship between Tughrul and Caliph Alqayem (in in the second half of the forth Hijri century); Journal of American Science 2011;7(7):385-391]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Call; Alqayem; Basasyry; Shahneh; Naan pareh; Marriage; Minister

Full Text

59 Bower

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Abstract: Undoubtedly, the most basic needs of human being for survival or comfortable life are food, clothing and house. After providing good food, cloth, and house, he can have a higher quality of life. Nowadays the house matter is one of the most basic discussions of nations and governments. From some people's point of view, house is prior to other needs of human beings, because with the house one can dispense with eating good food and wearing good cloth and spending his day. In history different tribes have used various architectural methods and houses. Iranian Turkmen tribe, who constantly migrate to find better pastures, because of their tribal life style, use an especial kind of house that is unique; called Turkmen language "Bower". These Turkmen houses have attracted many people including anthropologists. So, in the current article it is tried to completely describe the bower.

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[Aghil Taghavi Bower; Journal of American Science 2011;7(7):392-396]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Turkmen: Iran: Bower

60 Turkmens' History

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Abstract: Getting acquaintance with background and history of different tribes is so attractive and can learn some lessons from it to achieve life aims. Turkmen tribe has one of the most attractive historical background that in this assay it is tried to investigate about this by reference to the books and works that describe Turkmen's history, generally Turkmens' history is divided to two parts. One is the mythical and fabulous period of Turkmens that considered the pedigree of this tribe from Adam to Oghuz Khan, who is the common ancestor of all Turkmens, and the second historical period is divided to three periods of nomadism, migration to Turkmenistan and Iran's Turkmen Sahara and the period after formal delimitation between Iran and Russia, Turkmens' condition in each of these periods is considered and turned into the today geographical condition. Generally Turkmens don't have a very unsuitable condition during the history and they were migrating constantly.

[Aghil Taghavi Turkmens' History; Journal of American Science 2011;7(7):397-401]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Turk; Turkmen; Oghuz Khan; history; period; migration

Full Text

Full Text

Biology of the Hairy Mangrove Crab, Sersema Huzardii (Decapoda: Graspidae) from a Tropical Estuarine Lagoon.

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Abstract: The size composition, growth pattern, food habits, reproductive biology and feedstuff preferences of the mangrove crab, Sesarma huzardii in a tropical estuarine lagoon were investigated. The carapace length ranged from 1.5cm to 4.7cm and weight from 4.5g to 27.8g. The crab exhibited negative allometric growth. The condition factor ranged between 3.6 and 13.5 and decreased with size. The crab fed mainly on diatoms, algae, higher plants and insect parts. The sex ratio was 1: 0.6 (male/female) which was significantly different from the expected 1:1 ratio. The fecundity ranged between 1.2 and 3.5 million eggs. The average fecundity was 2.5million eggs. Egg diameter ranged from 0.21 to 0.33mm with a mean diameter of 0.24mm. The crab had the highest gain in weight when fed with white mangrove leaves and least with animal food.

[Aderonke Omolara Lawal-Are* and Hilary Nwankwo; Biology of the Hairy Mangrove Crab, Sersema Huzardii (Decapoda: Graspidae) from a Tropical Estuarine Lagoon. Journal of American Science 2011;7(7):402-408]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Mangrove crab, growth, feeding habits, reproductive biology

Full Text

A qualitative study of effectiveness of clinical teaching

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Abstract: Clinical experience has been always an integral part of nursing education. It prepares student nurses to be able of "doing" as well as "knowing" the clinical principles in practice. Clinical experience is one of the most anxiety producing components of the nursing program which has been identified by nursing students. The educational process is unique in the practice professions because being able to perform the activities of the profession in live situations as opposed to simply being able to express understanding of principles is a requisite competency of graduation. Despite a wealth of research on clinical teaching, the criteria for determining what constitutes effective clinical teaching remain poorly defined. Therefore, the aim of this study is to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in critical care nursing courses. Material and Method; A descriptive qualitative research design was used. Setting: The study was conducted at the Critical Care & Emergency Nursing Department, Faculty of Nursing, Alexandria University. Subjects: consisted of two groups. The first group included nursing students and the second group consisted of critical care clinical instructors. Clinical Teaching opinionnaire tool was developed to elicit the nursing students and the second group consisted of critical care clinical instructors. Clinical Teaching opinionnaire tool was developed to elicit the nursing students are under stress because of a lot of work and duties. The ratio of instructors to students (1:6) is adequate. The instructors' agreed with the students on the duration of clinical training is not enough. Students and log book. Students and instructors don't like portfolio and log book. Students like their clinical instructors they see them role models Conclusion; the findings of this study and the literature support the need to rethink about the clinical skills training in nursing education. Recommendation; Longitudinal studies to investigate the nursing

[Hayam I. Asfour and Azza H. El-Soussi. A qualitative study of effectiveness of clinical teaching; Journal of American Science 2011;7(7):409-420].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: qualitative; study; effectiveness; clinical; teaching.

Full Text

The Effect of Consuming a Cake Containing Propolis on Gut Micro flora and Toxicity.

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Abstract: This work was done to study the effect of crude propolis and its extracts (water and ethanol) on modulation of micro flora in the gut and protection against toxicity with aflatoxin. Experiment was done on Sprague Dawley white Albino rats that were divided into 9 groups. Group 1 was fed on basal diet, group 2 was fed on a cake, groups 3, 4 & 5 each was fed on either cake fortified with crude, water or ethanol extract of propolis. Group 6 was fed on the cake but contaminated with aflatoxins, then, groups 7, 8 & 9 each was fed on cake contaminated with aflatoxins and either crude, water or ethanol extract of propolis. All groups continued for eight weeks. Feces were collected during the experiment and the secum was isolated at the end of the

feeding period for assaying the pattern of micro flora either the beneficial bacteria or the harmful ones. The Results showed that the microbial count of the *Bifidobacterum* increased by addition of propolis to the cake. The value obtained in case of control rats was 50×10^4 , this value was 77×10^4 , in case of rats fed on the cake. Addition of propolis crude, the water or ethanol extract raised the count of bifidobacterium. The value obtained for ethanol extract was 30×10^6 . Addition of aflatoxin to the cake markedly increased the count of coilform in feces. Adding propolis to aflatoxins contaminated cake caused a reduction in enumerated colony of coliform. The values obtained were 25×10^4 , 48×10^4 and 33×10^4 for crude, water, and ethanol extract of propolis respectively. The activities of the liver enzymes, namely AST and ALT were markedly increased in rats fed on the aflatoxin contaminated cake. Adding propolis to the cake caused a return to normal values of the activities of these enzymes. Conclusion is that supplementation of food with propolis can promote growth of the beneficial bifidobacterium and inhibit that of the harmful coliorm type present in the gastrointestinal tract. In addition, it can protect against toxicity.

[F.A. El-Shobaki; Omnia G. Refaat; Zeinab A. Saleh; Abou-Bakr S. Abd-Elfatah and Eman F. El-Hagar. The Effect of Consuming a Cake Containing Propolis on Gut Micro flora and Toxicity. Journal of American Science, 2011;7(7):421-429]. (ISSN:1545-0740). http://www.americanscience.org

Keywords: Propolis, Aflatoxins, Bifidobacteria, Coilform, Toxicity

A nucleotide sequencing of foot-and-mouth disease virus Egyptian strains

Full Text

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Abstract: Foot and mouth disease virus (FMDV) has been annually isolated during the recent years in Egypt. There is no sufficient local data about the genetic changes occurred in the virus, which makes tracing its origin difficult. In this work, FMDV serotype O and A were isolated from bovine clinical samples, collected from Ismailia, Dakhlia, Monoufia and Sharkia during 2010. RNA extracted from either clinical or cell culture grown virus was subjected to RT-PCR. Nucleotide sequencing of FMDV 1D gene was determined using standard automated sequencing technique. Phylogenetic analysis revealed that the isolated serotype O viruses were closely related to O1/Sharquia/EGY/72 and had same lineage with the O Turkish Manisa strains. Deduced amino acids of 2009 and 2010 Egyptian A isolates in relation to the Egyptian A 2006 strains showed several replacement (I42V, N43S, S44N, L45Q, P141S and A156P). From the obtained result, it was clear that FMDV serotypes O and A isolated in 2010 were closely related to the Egyptian FMDV vaccinal strains and they emerged from the same ancestor.

[Laila ÉL-Shehawy, Abu-Elnaga H, Talat A, El-Garf E, Zakria A and Azab A. A nucleotide sequencing of foot-and-mouth disease virus Egyptian strains. Journal of American Science 2011;7(7):430-435].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: nucleotide; sequence foot-and-mouth disease; virus; Egyptian

Full Text

Effect of fringing filed on the internal stress field of nano cantilever beams in the presence of van der waals attractions

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Abstract: In this paper, effect of fringing filed on the internal stress field of nano cantilever beams is studied using Adomian decomposition method. The nano cantilever beam is considered as a distributed parameter model including intermolecular forces, electrostatic forces and fringing filed effects. In the modelling of intermolecular forces the van der Waals force and in the modelling of electrostatic forces, the fringing field effect is taken into account. By using the obtained polynomial solution, bending moment and shear force are calculated, for narrow and wide nano beam types.

[Mohammad Ghalambaz, Aminreza Noghrehabadi, Mohamadreza Abadyan, Amir Vosoogh. Effect of fringing filed on the internal stress field of nano cantilever beams in the presence of van der waals attractions. Journal of American Science 2011;7(7):436-439]. (ISSN: 1545-1003).

Keywords: Nano, Cantilever, Adomian, Stress, Van der Waals.

66 Optimising Client Side Data Entry Process

Full Text

1

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Abstract: Loss of data during data entry either by crashing or freezing is a common problem encountered in database data insert especially when there are many rows and columns of data to deal with and also when it is not appropriate to bind the data directly to the database. Techniques used in inserting data to the database include bulk load, row by row looping and the use of dataset together with data adapter. The dataset and looping techniques have been studied by comparing the time for data insertion. From the results it is concluded that the dataset technique should be used when the number of rows and columns grow beyond a threshold and below this threshold the row by row data insertion method marginally performs better.

Journal of American Science 2011;7(7):440-444]. (ISSN: 1545-1003). http://www.americanscience.org.

Key Words: Dataset, Data adapter, AJAX, OPENXML, Bulk load, Constraint, Data integrity, Primary key.

Full Text

Physico- chemical properties of natural pigments (anthocyanin) extracted from Roselle calyces (Hibiscus subdariffa)

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Abstract: Physico-chemical properties of Roselle calyces (*Hibiscus subdariffa*) indicated that moisture content, protein, fat, fiber and ash were 12.81 %, 7.51%, 0.46 %, 11.17 % and 11.24 %, respectively. Mineral contents of K, P, Na Ca, Mg, Fe, Zn, Cu and Mn were detected at different levels. The results showed that the Roselle calyces powder more the red color. Besides, contained ascorbic acid (140.13 mg/100g), total anthocyanins (622.91 mg/100g) and total phenolics (37.42 mg/g dry weight). The DPPH scavenging capacity obtained from raw dried Roselle was 36.53 µ/ml. The extraction of natural pigments (anthocyanins) from Roselle calyces by different solvents (ethanol acidified with 1.5N/L HCl (85:15, v/v), ethanol acidified with 1% citric acid, citric acid, solution of 2% concentration and distilled water) were applied and pigments were analyzed for color, pH, total acidity, total soluble solids (T.S.S), total anthocyanins, total phenolic and antioxidants activity. The obtained results indicated that the highest yield of pigment recovered is considered the main goal in the extraction process. In addition to economic considerations, safety should be considered. Accordingly, water acidified with citric acid 2% indicating anthocyanins yield of 1063 mg/100 g might be the best choice and the more preferable solvent compared with ethanol acidified with HCl which showed the highest yield i.e. 1386 mg/100 g dry weight. The results from this study showed that the greater the Roselle extracted by 2 % citric acid solution the more the red color intensity observed (a* 5.25). Results of these studies can be used to determine application of Roselle anthocyanins in a variety of food products as food colourants such as confectionery products, gelatin desserts, snacks, cake, pudding, ice cream and beverages. [Azza A. Abou-Arab, Ferial M. Abu-Salem and Esmat A. Abou-Arab. **Physico-chemical properties of natural pigments (anthocyanin) extracted from**

Roselle calyces (*Hibiscus subdariffa*). Journal of American Science 2011;7(7):445-456].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Roselle calyces, extraction, anthocyanins, Physical properties, chemical properties.

Full Text

Can the freshwater crayfish eradicate schistosomiasis in Egypt and Africa?

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Abstract: Schistosomiasis is a chronic, parasitic disease, infecting more than 207 million people, mostly from Africa, with an estimated 700 million people at risk in 74 endemic countries. One of strategies to eradicate this disease is biocontrol of its vector snail. Lab experiments and field survey have been carried out to investigate the impact and the relationship between the exotic crayfish; *Procambarus clarkii* and *Schistosoma* vector snails in Egypt. In the Lab, several species of freshwater snails, fish and aquatic plants were reported to serve as food for the freshwater crayfish. In the field, a survey for the crayfish and freshwater snails has been conducted at several irrigation channels in Qalyobiya, Ismailia and Behera governorates, which had been previously surveyed during 1990s. The results of the experimental Lab indicated that the vector snails; *Biomphalaria alexandrina*, *Bulinus truncatus* and *Limnaea natalensis* were the preys of first choice for the crayfish. The fields surveys showed high reduction and sometimes complete disappearance of vector snails in irrigation channels, which have been invaded by *Procambarus clarkii*, while in water courses which do not harbor the crayfish, such as El Manayef drain and Fayed canal (West of Suez Canal), high densities of these vector snails were recorded. The present study is providing encouraging indication of the possible overcoming schistosomiasis and fascioliasis in Egypt and whole Africa by the freshwater crayfish *Procombarus clarkii*. New estimates of the Egyptian Ministry of Health indicated that the percent of infected people decreased significantly to only 4% comparing to 45% during 1960s. [Magdy T. Khalil & Setaita H. Sleem. **Can the freshwater crayfish eradicate schistosomiasis in Egypt and Africa?**. Journal of American Science 2011;7(7):457-462]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Procambarus clarkii, Biomphalaria alexandrina, Bulinus truncatus, Limnaea natalensis, crayfish, schistosomiasis, fascioliasis, Egypt, Africa.

Designing Customer Loyalty Model in Insurance Industry (A study of insurance sector in Iran)

Full Text

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Abstract: This study explores customer loyalty model at the level of specific dimensions drawing from insurance of Iran. The purpose of this article is to explain the customer loyalty model at the level of constructs, drawing from the insurance industry of Iran. A SERVQUAL type service-quality instruments is developed for insurance of Iran. Path analysis is utilized to examine a model linking service quality, customer satisfaction and loyalty at the level of individual insurance. It is found that the quality of services and customer's satisfaction, are highly correlated. Furthermore the relationship between quality of tangible or intangible services with the customer's satisfaction is approved. Insurance managers must improve both tangible and intangible elements of services to have loyal customers. The proposed model can be used to provide comparable findings across sectors, countries and similar service industries. This study suffers the limitation that it tests the fit of the model within the limits of a single service industry. Another limitation is availability sampling, however the appropriated fit of the estimated model allows for the study to be a reliable comparison basis for further research.

[Mohsen Moradi, Mohammad Mousavi, Rasoul Amirzadeh. Designing Customer Loyalty Model in Insurance Industry (A study of insurance sector in Iran).

Journal of American Science 2011;7(7):463-469].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Customer loyalty; Customer satisfaction; Insurance; SERVQUAL

Full Text

70 The chaotic ε-constraint approach

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Abstract: in this paper, we try to tackle the drawbacks of the well-known Multi-Objective technique ϵ -constraint method, namely the computational difficulties and obtaining proper efficient solutions. We incorporate a well-known chaotic function, so-called the logistic map to the classical ϵ -constraint method for improving its results. A well known bench-mark test function is adopted for validation of the new approach, showing its ability to explore various areas of the pareto-optimal front in an efficient way. The chaotic ϵ -constraint approach obtains diversified as well as well representative solutions. [Mohamed F. El-Santawy and A. N. Ahmed. **The chaotic** ϵ -constraint approach. Journal of American Science 2011;7(7):470-472].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Chaos, ε-constraint method, Logistic Map, Multi-Objective Optimization

Full Text

Effect of Tramadol and Ropivacaine Infiltration on Plasma Catecholamine and Postoperative Pain

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Abstract: A long acting local anesthetic; ropivacaine and a synthetic opioid; tramadol were used to improve pain relief and decrease postoperative systemic analgesic requirement after total thyroidectomy in patients with thyroid cancer. The study also assesses the effect of local infiltration with ropivacaine and tramadol on plasma catecholamine levels. Methods: Ninety six patients underwent thyroid surgery were randomly assigned to 3 groups. Before skin closure, tissues were infiltrated 10 ml of ropivacaine 0.75% plus 5 ml saline in Group R, with 1.5 mg/kg of tramadol in 15 ml saline in Group T, and with 15 ml containing 10 mL ropivacaine 0.75% plus tramadol 1.5mg/kg in Group RT. Plasma epinephrine and nor-epinephrine were recorded at preoperative (0), 1, 5, 15, 30min, 1, 2 and 4 h postoperative. Pain scores at min, 0.1/2, 1,2,4,6, 12, 18, and 24 hr post-operatively; time to first analgesic, number and % of patients requiring rescue analgesia, number of rescue analgesia and total dose of analgesic were recorded. Results; The pain scores in group RT were significantly lower in the first 24 hours than in groups R and T. Time to first analgesic (hrs) in group RT was significantly more than in either group R or group T. The percentage of patients in group RT requiring rescue analgesia was significantly less than the percentage of patients in other groups. Also, the numbers of rescue analgesia requests and the cumulative 24 h analgesic consumption were significantly smaller in group RT than other groups. The plasma epinephrine and nor-epinephrine increased significantly in three groups at 5 and 15 min when compared with the baseline then returned to near baseline value at 30 min 1,2 and 4 hrs. There was significantly decrease in plasma concentration of epinephrine and nor-epinephrine in group RT than R or T groups. The aim of this study is to evaluate wound infiltration with ropivacaine, tramadol or their combination on plasma catecholamine levels and post-operative pain following thyroid surgery.

[Mostafa Galal Mostafa, Mohamad F. Mohamad, Ranya M.Bakry² and Waleed S.H.Farrag. Effect of Tramadol and Ropivacaine Infiltration on Plasma Catecholamine and Postoperative Pain. Journal of American Science 2011; 7(7): 473-479]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Tramadol, Ropivacaine, local infiltration, catecholamine.

Full Text

Which Has Greater Analgesic Effect: Intrathecal Nalbuphine or Intrathecal Tramadol?

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Abstract: Nalbuphine and tramadol administered epidurally has been demonstrated to decrease postoperative analgesic requirements. However, its effect on postoperative analgesia after intrathecal administration has not will be established. In this double-blind, the effect of intrathecal tramadol and nalbuphine administration on pain control after gynecological surgery was studied. Sixty patients undergoing Transurethral resection of the bladder tumor were studied and randomized to receive bupivacaine 0.5% 3 ml intrathecally premixed with either tramadol 50mg [1ml], or nalbuphine 2mg[1ml]. After operation, paracetamol IV (1gm) was administered as needed for analgesia. Postoperative analgesic requirements, visual analogue scale for pain (VAS) and sedation scores, times to first analgesic, haemodynamic parameters and side effects were recorded by a blinded observe. There were no differences between the groups with regard to postoperative requirements in the first 24hours. Also there were no significant differences as regard sensory level, duration of motor block in hours and time to receive first analgesic between the two groups. Sedation scores in tramadol group were significantly higher than nalbuphine group. The homodynamic changes were similar in both groups and the incidence of nausea and vomiting was higher in tramadol group. On conclusion, the intrathecal administration of 50 mg tramadol and intrathecal 2 mg nalbuphine when used with 0.5% bupivacaine had a similar the postoperative analgesia in the patients without producing significant related side effects like nausea, vomiting, pruritus and respiratory depression.

[Mostafa Galal Mostafa, Mohamad F. Mohamad and Waleed S.H.Farrag. Which Has Greater Analgesic Effect: Intrathecal Nalbuphine or Intrathecal

Keywords: Analgesic Effect; Intrathecal Nalbuphine; Intrathecal Tramadol

Tramadol?. Journal of American Science 2011;7(7):480-484].(ISSN: 1545-1003). http://www.americanscience.org.

Full Text

73 Possible Synergistic Therapeutic Role of Taurine and Curcumin on Cerulein-Induced Acute Pancreatitis in Rats

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Abstract: Acute pancreatitis is an inflammatory condition of the pancreas characterized clinically by abdominal pain and elevated levels of pancreatic enzymes in the blood. A number of conditions are known to induce this disorder with varying degrees of certainty. However, the pathogenesis of this disorder is not fully understood. The current study comprised two experiments; the first was carried out to compare the levels of pancreas tumor markers and pancreas function as a result of cerulein treatment which experimentally induced acute pancreatitis. In the second experiment, pancreatitis rats groups were treated with taruine or curcumin and their mixture. A significant elevation in pancreatic tumor markers profile (CEA, CA19.9, CA72.4 and CA242) was occurred as a result of cerulein treatment which experimentally induced acute pancreatitis. Also, a significant increment in the activities of \(\alpha - \text{anylase} \) and lipase accompanied with a significant elevation in the concentration of TAP was pronounced in pancreatitis rats group. On the other hand, a significant reduce in the content of glutathione (GSH) and in the activity of glutathione peroxidase (GpX) occurred. The concentration of thiobarbituric acid reactive substances (TBARS) and MOP in pancreatic tissue was elevated as a result of cerulean treatment. In the second experiment, all pervious parameters were corrected as a result of taruine or curcumine administration dependent on time of treatment. The best ameliorating effect occurred in all previous parameters in rats group which treated with both antioxidants (taruine & curcumin) dependent on time of administration. These findings are consistent with the concept that taruine, curcumin or their mixture is an antipancreatitis agent. The underlying mechanisms of these effects were discussed according to variable researches.

[Walaa A. M. El-Nahrawy and Mohamed Islam A. H.Possible Synergistic Therapeutic Role of Taurine and Curcumin on Cerulein-Induced Acute Pancreatitis in Rats. Journal of American Science 2011;7(7):485-495].(ISSN: 1545-1003). http://www.americanscience.org.

Key word : Cerulein , Acute Pancreatitis, Curcumin , Taurine , pancreatic tumor marker.

Full Text

The Curative Role of Taurine or Zinc and their Mixture on the Harmful Effects of Genistein Administration in Male Rats

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Abstract: The current study was designed to reveal the curative effects of taurine or zinc and their mixture against hazardous effects of genistein. Sixty male albino rats ($160 \pm 10g$) were divided into two main groups, the first group of rats (n=15 rats) acts as normal control. The second group of animals (n=45 rats) was daily injected with 500 mg genistein/ kg b.wt. for one month of injection. The last group (G. gr.) was divided into 3 subgroups each one 15 rats. The first subgroup of rats (genistein) was treated with 500 mg taurine while the second one was received 200 mg of ZnSO₄ was added to each Kg,diet for 60 days and the third subgroup was treated with both antioxidant agents for 30 and 60 days after one month of genistein administration. The blood samples and parts of testis were collected after 0, 30 and 60 days of treatment to estimate the physiological and biochemical parameters. Treatment animals with genistein led to a significantly elevation in the total number of abnormal sperms, sperm malformed head & tail, serum LH and FSH and serum mallondialdehyde levels. On the other hand, the obtained data recorded a numerical decrease in total number of sperms associated with a remarkable reduction in the serum testosterone level. Moreover, significant decreases were pronounced in serum TAC level, testes GSH content and testes GP_x activity.

Treatment of the rats with taurine or zinc showed a significant amelioration in all previous biochemical parameters which estimated in this study. The maximum correction was reached in rats which received the both antioxidants dependent on the time of treatment. These results my be due to the synergistic effects of both taurine and zinc.

[Magda Sayed Hassannin. The Curative Role of Taurine or Zinc and their Mixture on the Harmful Effects of Genistein Administration in Male Rats. Journal of American Science 2011;7(7):496-503].(ISSN: 1545-1003). http://www.americanscience.org.

Key Words: Genistein - Taurine - Zinc - Male Rats - Antioxidants- Phytoestrogens

Full Text

Evaluating Management Effectiveness of in-service Training Programs in Human Resources Development Office at Ministry Of Road and Transportation

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Abstract: The main purpose of this study was to evaluate of effectiveness of management of in-service training programs in Human Resources Development Office (HRDO) at Ministry of Road and Transportation. The target population includes: 1) Total number of Chief Executive Officers (CEO's) was 116, 2) Total number of personnel include 290 personnel members. To conduct the study two measurement scales were designed: (a) Task Performance Quality Scale, (b) Organizational Effectiveness Scale. The validity and reliability of each scale was tested and approved. A random sample of 86 CEO's and personnel participated in the study by fill out both scales. The collected data was analyzed through descriptive statistics, t-test and multi-variate regression procedures. The following results were concluded: Both group, the CEO's and personnel evaluated the quality of the performance of HRDO personnel at median level. The personnel evaluated the effectiveness of HRDO personnel at low level. No meaningful difference was observed between the viewpoints of CEO's and personnel about the quality of task performance of HRDO personnel. A meaningful difference was observed between the viewpoints of CEO's and personnel on the effectiveness of the HRDO. The CEO's participants evaluated the effectiveness of the HRDO lower than personnel participants. Both variables "Organizational Effectiveness" and "Task Performance Quality" of personnel can be predicted by the "training evaluation" variable.

[Sadeghi, Z.; Mohtashami, R. Evaluating Management Effectiveness of in-service Training Programs in Human Resources Development Office at Ministry Of Road and Transportation. Journal of American Science 2011;7(7):504-512] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Performance Evaluation, Program Evaluation, Human Resource Development Office, Ministry of Road and Transportation

Full Text

Study of different concentration of sodium alginate as a coating film on the shelf- life of frozen dressed kilka (Clupeonella cultriventiris)

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Abstract: The aim of the present study was to investigate the impact of sodium alginate coating on quality and shelf life of frozen dressed kilka fish. Sodium alginate edible coating was prepared in four different concentrations, including 0.25, 0.75, 1.25, 1.75 %. Then dressed kilka were coated for 1h, packed in polyethylene dishes with cellophane blanket and stored at -18 °C. Percentage of moisture and protein, Peroxide value and total microbial count were performed within 0, 1, 2, 3 and 4 months (sample size: 120 packs of 250 g). SPSS Statistical Software, One Way ANOVA test, Turkey test with the 5% significant level (significance level of 5%) have been used as for data analysis. Significant reduction was found in moisture value with increase of Sodiume Alginate concentration during the study (P<0.05). There were no significant differences in protein content (P>0.05). Results showed that there was significant difference between peroxide and total microbial count samples (P<0.05). Use of sodium alginate due to decrease peroxide production and slowing microbial growth speed, can increase shelf life of kilka in storage of freezing up to 4 months.

[Nasrin Khanehdan. Study of different concentration of sodium alginate as an coating film on the shelf- life of frozen dressed kilka (Clupeonella cultriventiris). Journal of American Science 2011;7(7):513-518] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Kilka, edible coatings, sodium alginate, shelf life

Full Text

77 Active contours in Brain tumor segmentation

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Abstract: Image segmentation plays a central role in biomedical imageprocessing. Tumor segmentation from MRI data is an important but time consuming task performed manually by medical experts. Automating this process is challenging due to the high diversity in appearance of tumor tissue, among different patients and in many cases, similarity between tumor and normal tissue. Parametric active contour method is one of many segmentation approaches. In this paper we used four type of parametric active contour (snake) for Brain tumor segmentation.

[Ali Elyasi, Mehdi Hosseini, Marzieh Esfanyari. Active contours in Brain tumor segmentation. Journal of American Science 2011;7(7):519-524]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Image segmentation; Brain tumor; snake; GVF.

Fault Detection using ANFIS for the Magnetically Saturated Induction Motor

Full Text

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Abstract: The problem of fault detection of the π -model induction motor with magnetic saturation is considered in this paper. In this paper we use a new technique which is the Adaptive Neuro Fuzzy Inference Systems (ANFIS) technique for online identification of the different motor fault conditions. A simulation study is illustrated using MATLAB simulink depending on stator currents measurement only for online detection of the motor faults. The proposed technique shows promising results using the simulation model.

[Mohamed Mahmoud Ismail. Fault Detection using ANFIS for the Magnetically Saturated Induction Motor Journal of American Science 2011;7(7):530-537].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Fault detection, ANFIS, saturated model and induction motor

Full Text

9 Effect of Adding Green Tea Extract, Thyme Oil and/or their Combination to Luncheon Roll Meat during Refrigerate Storage

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Abstract: Green tea extract (GTE) and thyme oil extract (TOE) were added individually and/or in combination during the preparation of luncheon roll meat. Some chemical and sensory attributes of the prepared luncheon were investigated during storage at 4 °C for 4 months. Luncheon samples with (GTE) and (TOE) realized significant reduction towards lowering biogenic amines (BAs) formation, thiobarbituric acid reactive substances (TBARS) levels, volatile basic nitrogen (VBN) and total acidity % relative to control sample. Reduction effect was ranked as: combination of GTE and TOE > GTE > TOE. Phenolic content in green tea extract was significantly higher than in thyme oil extract. Antioxidant activities of (GTE) and (TOE) were evaluated using DPPH radical scavenging assay. Sensory evaluation was acceptable with good scores for luncheon samples. This study indicated that the addition of natural antioxidant extracts (GTE and TOE) during luncheon meat processing could enhance quality and provide safer product.

[Ferial M. Abu-Salem, Esmat A. Abou-Arab, Hayam M. Ibrahim and Azza A. Abou-Arab. Effect of Adding Green Tea Extract, Thyme Oil and/or their Combination to Luncheon Roll Meat during Refrigerate Storage. Journal of American Science 2011; 7(7):538-548]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Green tea extract-thyme oil extract-antioxidant-luncheon roll meat-chemical and sensory attributes-refrigerated storage.

Full Text

Onshore and Offshore Pile Installation in Dense Soils

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Abstract: Open-ended pipe piles are often used for the foundations of both on-land and offshore structures because of their relatively low driving resistance. Piles are usually subjected to the highest level of stresses during installation. Three case histories for overwater bridge pile damage during installation are presented in detail. Also, several case studies for onshore and offshore piles installed in dense soils are compiled and analyzed in an attempt to improve the available guidelines. Based on field data analyses for many case studies of piles installed in dense soils, a limitation for pile diameter to thickness ratio adjusted for driving energy is proposed. A maximum driving stress at the pile head and toe of about 50% of the steel yield stress should be considered for piles installed into very dense soils. Also, general guidelines and recommendations from a design and construction prospective are provided.

[Yasser E. Mostafa. Onshore and Offshore Pile Installation in Dense Soils. Journal of American Science 2011; 7(7):549-563]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: pile driving; dense soils; pile damage; pile installation

Full Text

Effect of Osmo-Dehydration on the Rehydration Properties Structural Aspects and Antioxidant Activity of Banana and Tomato Rings

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Abstract: The objectives of this research were mainly directed towards microstructure and the influence of different osmotic solutions on the rehydration capacity. In banana rings, it is indicated that using sucrose: glucose as an osmotic solution with different concentration gave the highest rehydration ratio. Regarding tomato, the osmosed solutions were different concentrations of NaCl and NaCl: Sucrose; they gave an inversely proportional relationship with rehydration capacity. Antioxidant activity was measured by conjugated diene method, and it is strongly affected by the type of pre-treatments applied. Regarding the microstructure, this study showed important changes in the cell wall cytoplasm and the intercellular spaces

[Gamal. H. Ragab, Mostafa T. Ramadan, Hesham. A. Moharram and Hatem. S. Ali. Effect of Osmo-Dehydration on the Rehydration Properties Structural Aspects and Antioxidant Activity of Banana and Tomato Rings. Journal of American Science 2011;7(7):564-568]. (ISSN: 1545-1003). http://www.americanscience.org.

Keyword: Banana rings - Tomato halves - Osmotic dehydration solutions - Antioxidant activity - Conjugated diene method.

Full Text

REUSE OF WATER TREATMENT SLUDGE AND SILICA FUME IN BRICK MANUFACTURING

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Abstract: The work done in this study was devoted to the development of a procedure to produce brick from water treatment plant sludge and silica fume as a modern way for sludge reuse. Disposing the sludge to the nearest watercourse is the common practice all over the world, which accumulatively rise the aluminum concentrations in water and consequently in human bodies. This practice has been linked to occurrence of Alzheimer's disease. Landfill disposal of the sludge is impractical because of the high cost of transportation and it depletes the capacity of the landfill. The use of sludge in construction industry is considered to be the most economic and environmentally sound option. Due to the similar mineralogical composition of brick clay and water treatment plant sludge, this study focused on the reuse of sludge incorporated with silica fume in brick making through the sintering process. The study investigated the complete substitution of brick clay by water treatment plant sludge incorporated with silica fume (SF). In this study, three different series of sludge to silica fume (SF) proportions were studied, which exclusively involved the addition of sludge with ratios 25, 50, and 75% of the total weight of sludge-SF mixture. Each brick series was fired at 900, 1000, 1100, and 1200 °C. The physical and mechanical properties of the produced bricks were then determined and evaluated according to Egyptian Standard Specifications (E.S.S.) and compared to control brick made entirely from clay. From the obtained results, it was concluded that by operating at the temperature commonly practiced in the brick kiln, 50 % was the optimum sludge addition to produce brick from sludge-SF mixture. The produced bricks properties were obviously superior to the 100 % clay control-brick and to those available in the Egyptian market. [Badr El-Din E. Hegazy, Hanan A. Fouad, and Ahmed M. Hassanain. REUSE OF WATER TREATMENT SLUDGE AND SILICA FUME IN BRICK MANUFACTURING. Journal of American Science, 2011;7(7):569-576]. (ISSN:1545-07

 $\textbf{Keywords:} \ \text{Water treatment sludge} - \text{sludge disposal} - \text{clay} - \text{brick} - \text{silica fume}$

Full Text

Effect of Nigella Sativa Supplementation in Diet on Metabolic Syndrome in Aged Rats

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Abstract: Metabolic syndrome is a serious health problem that is increasing worldwide particularly in aged people due to increased fructose intake in processed foods as well as physical inactivity. The present study was conducted to investigate the effect of dietary supplementation with ground seeds of Nigella sativa on the criteria of metabolic syndrome in aged rats. The present study was carried out on 52 aged Wistar albino rats (18-20 months). Rats were allocated into the following 3 groups: Control rats C (n=20) fed standard rat diet; metabolic syndrome group M (n=14) fed high fructose diet comprised of 60 % of energy pure fructose and metabolic syndrome/Nigella sativa group M/NS (n=18) fed high fructose diet as M group but mixed with ground seeds of Nigella sativa to achieve daily intake of Nigella sativa 180 mg /Kg b.w. After 4 weeks, rats were subjected to estimation of the following parameters; initial and final body weights, body mass index (BMI), daily food intake and serum levels of glucose, insulin, total cholesterol, HDL-c, LDL-c and adiponectin. Insulin resistance was estimated by calculating HOMA-R. Histopathological examination of rat livers, kidneys and brains was also done. Obtained results revealed that visceral fat weight increased significantly in M group compared to C group and decreased significantly in NS/M group compared to M group. Both M and M/NS groups had significant increase in serum levels of fasting glucose, insulin, total cholesterol, LDL-c c. VLDL-c and HOMA-R as well as significant decrease in serum adiponectin compared to C group. However M/NS group showed significant decrease of serum levels of fasting glucose, insulin, total cholesterol, LDL-c and HOMA-R as well as significant increase of serum adiponectin compared to M group. However M/NS group showed significant decrease of serum levels of fasting glucose, insulin, total cholesterol, LDL-c and HOMA-R as well as significant increase of serum adiponectin compared to M group.

[Nehal M. B. Gamil and Ghada Z.A. Soliman Effect of *Nigella Sativa* Supplementation in Diet on Metabolic Syndrome in Aged Rats. Journal of American Science 2011;7(7):577-583]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: HOMA-R, metabolic syndrome, dyslipidemia, fatty liver, adiponectin, visceral adiposity.

Full Text

A Critical Analysis of the Existing Ontology Evolution Approaches

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Abstract: Because of the rapid improvements occurring in the dynamic environment of web applications, ontologies have to be modified to reflect the changes made to the applications. Management of the changes within ontologies is one of the most crucial tasks that needs to be resolved. Various approaches and frameworks have been devised by the researchers to handle it. Despite all the efforts made in this direction, the problem still requires to be researched. To address the problem, we have critically analyzed a number of existing ontology evolution approaches against a criterion we have defined in this paper. Having identified the limitations and weaknesses along with their strengths, we have proposed some requirements that must be incorporated in the design of ontology management approaches.

[Khadim H. Asif, Syed Muhammad Ahsan. A Critical Analysis of the Existing Ontology Evolution Approaches. Journal of American Science 2011;7(7):584-588]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Ontology, Semantic Web, Evolution, management.

Full Text

Broadcast Story Genre Survey in Television

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Abstract: Present article is taken away of a research about practical analysis of Genres of journalism that has made don by relying on Post-consultative science, in this research because of closeness of some Genres with literary text, researcher particularly, has tried to pay surveying Genre of broadcast story writing which is named Ucherck. Investigating model of this research is chronological order of events model and in this angle it is paid to influence of literary Genres on mind of viewers and their memorization. On this basis of texts of some broadcast story in visual angle of an individual (individual-based) and on the basis of occurrence time (time-based) has been written and then into rate of perception and memorizing information issued in news, the addresses were assessed. Results of this research is showing the matter that story news writing by observance of sequence of occurrence in news stories in comparison with non-time-based does not result to perception and understanding and better memorizing of realities information existent in broadcast story.

[Maryam Alidaei. Broadcast Story genre Survey in Television. Journal of American Science 2011;7(7):589-596] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Publicity Genres, Ucherk Genre, chronological story structure, non-chronological story structure, individual story structure, non-individual story structure.

Full Text

6 Television, Election, Political Impartiality

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Abstract: Interviews and television debates among political faces has important rule in manner of audiences taking of candidates and finally is influenced on voting of audiences. With regard to placement of medias as public and operation of television in the form of special and it important on elections, present article by utilization of performed research texture about role of television (visual media) in trend of elections has paid to impartial survey of media in current of presidential election from people insight and intend to find response to this question that: In covering of television, 10th Period of Election Campaign program whether any support is seen on behalf of television? In order to impartial weighing of media on behalf of people, we pay to survey media trust index in 10th Period of Presidential Election debates and for this purpose behavior of television and speaker of debates in regard to accurate, justice and balance in transfer of message to audience is being assessed and analyzed. Results of this research is explanatory of lack of television bias in 10th period of presidential election program and being index of media credit higher than average in both political group.

[Reza Hadi. Television, Election, Political Impartiality. Journal of American Science 2011;7(7):597-608] (ISSN: 1545-1003).

Keywords: Fundamentalist, reformist, index of television validity, accurate, equity, election bias

87 Effect of Ultrafiltration Permeate on the Quality of Chocolate Milk

Full Text

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Abstract: The present study provides a new version of chocolate milk from a dairy liquid originated from skim milk and ultrafiltration (UF) milk permeate. The mixtures of chocolate milk containing milk permeate at different levels, were manufactured and stored at 4°C for 2 weeks. Physicochemical, color characteristics, viscosity and sensory properties of various formulations were evaluated. Most of physico-chemical analysis did not change before and after storage of chocolate milk with milk permeate. Results showed that the highest score of color was recorded for the (B4-B6) sample followed by (C7-C9) then (A1-A3) samples. The highest score of appearance was recorded for the (B4-B6) followed by (C7-C9) then (A1-A3) samples. Also, the highest score of viscosity were recorded for the (B4-B6) followed by (C7-C9) then (A1-A3) samples. From the previous results, it is obvious that results showed a decrease at the following order B6 > B5 > C9 > C8 > C7 > B4 > A3 > A2 > A1 regarding to L*, a*, b*, C*, H*, BI-values, physicochemical, viscosity and sensory evaluation. Finally, using milk permeate was able to produce a good quality chocolate milk.

[Hala M. Bayoumy, A. G. Mohamed, M. M. El-Sheikh, A. F. Farrag and Hesham A. Eissa. Effect of Ultrafiltration Permeate on the Quality of Chocolate

Key words: Skim milk, Chocolate milk, milk permeate, ultrafiltration, viscosity and color.

Milk. Journal of American Science 2011;7(7):609-615] (ISSN: 1545-1003). http://www.americanscience.org.

Full Text

88 Utilization of Goats Milk in Manufacture of Processed Cheese

Mohamed, A.G.; Fatma, A.M.Hassan; Hala M. Bayoumi and Ali. K. Enab

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Abstract: Two Formulas Of Different Blends Are Used For Manufacture Processed Cheesed. First Formula, F₁; (Cow. Processed Cheese) Consist Of 38.44% Ras Cheese, 12.80% Cheddar Cheese, 10.26% Butter, 5.12% Skim Milk Powder, 2.50% Emulsifying Salts And 30.88% Water. Second Formula; F₂ (Goats Processed Cheese) Consist Of Goats Cheese Base 66.40%, 19.92% Butter, 6.64% Skim Milk Powder, 2.00% Emulsifying Salts And 5.04% Water. Both Processed Cheeses Were Storage At 7°C For 3 Months. Organoleptical, Chemical And Physical Properties Were Studied. Obtained Results Showed That Processed Cheese That Made From Goats Base (F₂) Had Gained A Higher Scores For The Breakdown Properties, Spreading Quality And Free From Gumminess Than Control (F₁) And Had Lower Soluble Nitrogen As Well As TVFA Than Control Either Fresh Or During Storage. Also F₂ Had A Higher Values In Penterometer Reading And Meltability While Lower In Oil Separation. The Colour Of Treatment (F₂) Is Prefer Than F₁. [Mohamed, A. G.; Fatma, A. M. Hassan; Hala M. Bayoumi and Ali. K. Enab. Utilization of Goats Milk in Manufacture of Processed Cheese. Journal of American Science 2011;7(7):616-621].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Cheese; Milk; Powder; Salt; Water; Nitrogen; Storage.

Full Text

Utilization Of Microcrystalline Cellulose Prepared From Rice Straw In Manufacture Of Low Fat Soft White Cheese.

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Abstract: Micro crystalline cellulose was prepared from rice straw. Different concentration of resultant Micro crystalline cellulose (% 0.1, 0.2, 0.3, 0.4, 0.5, 1) were used in manufacture of low fat soft white cheese. Organo lepticall and chemical properties of resultant cheese were studied fresh and during storage 5°c± 1° for 45 days. Results showed that low soft cheese manufactured by using 0.1 % microcrystalline cellulose had a good flavour, body and texture and appearance than control and gained higher score fresh and during storage 5°c± 1° than control. Treatment had a higher content of tyrosine and tryptophan and total volatile fatty acids and total carbonyl compounds than control. Treatment had a higher content of alanine acid whereas control had a higher content of aspartic acid. Glutamic acid recorded a high percentage either control or treatment than other acids. Microcrystalline cellulose at 0.1 % lead to increase cheese yield, improving body, texture, appearance and flavor.

[Fatma Abdelfatah Mohamed Hassan, Galal A.M. Nawar, Ali Kamal Enab, Faten Lotfi Select and Ashraf Gaber Mohamed. Utilization Of Microcrystalline Cellulose Prepared From Rice Straw In Manufacture Of Low Fat Soft White Cheese. Journal of American Science 2011;7(7):622-625]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Cheese, Stabilizer, Microcrystalline cellulose.

Modeling Underground Water Reservoir

Full Text

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Abstract: In this paper a simple model for underground water is constructed. The supply to the reservoir is from one side with variable water level from rain and flood, in the meantime water escapes outside from the other side. The soil forming the reservoir is porous and water movement inside is according to Darcy's flow. The bottom of the reservoir is impermeable to water, whereas, the top of the rectangular reservoir is exposed to a steady pressure depending on the atmospheric pressure. The differential equation of the flow in the model is solved by the method of Green's function. Inlet and exit velocity distribution is obtained and is integrated to give the capacity as a function of time.

[B.B. El-Naggar and I. A.Kholief . Modeling Underground Water Reservoir. Journal of American Science 2011;7(7):626-630] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: water reservoir, pressure gradient, porosity, compressibility, green function, Darcy's law

Processed Cheese Spreads Fortified With Oat

Full Text

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Abstract: Processed cheese spreads (PCSs) were prepared by fortification with different ratios of oat (0, 2.5, 5, and 7.5%). Three batches were produced. Control and tested PCSc were freshly analyzed for TS, protein, fat, total carbohydrate contents and pH values. Potassium, Sodium, Zinc, Iron and Selenium were also determined. Penetrometer reading, oiling off and melting index were estimated as well as color properties (L, A and B). Another batch from each treatment was stored at room temperature (20-22°C) for 3 months to study the changes in penetrometer reading, oil separation, melting index and color properties as a result of oat fortification. Sensory evaluation of all batches was also performed. Processed cheese produced by adding oat had slightly high content of TS, protein contents and pH value, while it had a pronounced high content of total carbohydrates, K⁺, zinc, Iron and Selenium. Oat fortification improved the physical properties of the cheese spreads as well as their organoleptic properties. During storage, oat enhanced the physical properties of cheese spreads, especially their color properties

[A. G. Mohamed, Hayam M. Abbas, Hala M. Bayoumi, Jihan M. Kassem and Ali K. Enab Processed Cheese Spreads Fortified With Oat. Journal of American Science 2011;7(7):631-637]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: cheese; spread; oat; protein; fat; carbohydrate; Potassium; Sodium; Zinc; Iron; Selenium

Full Text

Investigating the Ghaznavid Relations with Abbasian's Succession (Caliphate)

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Abstract: Ghaznavides (582-351 A.H.) were the first Turk Race Government who appeared in eastern part of Iran and for a period had ruled in greater part of Iran. They were pioneer of Turk families who about next thousand years more and less ruled on Iran. In the time of existence of this government, in the scope of their changeable territory historical, historical fait making events in process of their relation with adjacent governments and system of Abbasi Caliphate appeared. Ghaznavides in their governance period in eastern part of Islam World specially first periods of this government since 351 up to 431 A.H. they had very effort for making close relation with Abbasi's Caliphate System. These efforts also in second period of this government (since 431 up to 582 A.H.) were continued. This article intend by research relation between institute of monarchy (Ghaznavian and Abbasis Caliphate) pay to cause and factors of making this relations and investigate about manner of process of these relations in between connection clear role of these relations in continuation of Ghaznavides life and Abbasian.

[Iraj Jalali. Investigating the Ghaznavid Relations with Abbasian's Succession (Caliphate). Journal of American Science 2011;7(7):638-645] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Ghaznavides, Abbassides, foreign relations, the Caliphs, Sultans, Fatemiyan religious politics.

Full Text

The effects of applying different levels of nitrogen and the plant growth regulator Pix on the morphological features of the cotton cultivar Sahel

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Abstract: In order to study the effects of the application of various amounts of nitrogen fertilizers and Pix 35% growth regulator on the morphological features of the Sahel cultivar of cotton (Gossypium hirsutum L.), and on the unginned cotton yield of this cultivar, an experiment was carried out in the factorial design in the randomized complete block format with three replications at the Bayekola Agronomical Research Station in 2009. The factors studied included the amounts of nitrogen fertilizers and of the cotton growth regulator Pix 35% used in the experiment. Results obtained showed that the minimum plant height was obtained in the control treatment (72.93 cm), and that plant height increased with nitrogen application and reached its maximum

(77.59 cm) when 225 Kg.h of nitrogen was used. The analysis of the variance of the data indicated that the effects of applying various levels of Pix were very significantly different, so that the greatest plant height was observed in the Pix control treatment (90.94 cm), and it significantly decreased by Pix application and reached 65 cm when 300 g.h of Pix was applied (which was an almost 40% reduction). Furthermore, when nitrogen fertilizers were applied, the unginned cotton yield significantly went up, and this increase in yield continued up to the level of using 150 Kg.h nitrogen, however, when the level of nitrogen application reached 225 Kg.h, the yield started to go down. As a whole, the lowest yield was obtained when nitrogen was not applied (which was the control with a yield of 1469 Kg of unginned cotton per hectare), and the maximum yield (2825 Kg.h of unginned cotton per hectare) was achieved when 150 Kg of nitrogen per hectare was used _ i.e., the unginned cotton yield went up by 14% when 150 Kg of nitrogen per hectare was applied. In our study, it was observed that Pix did not have much influence on increasing yield: the minimum yield (2529 Kg of unginned cotton per hectare) was observed in the treatment of applying 100 g.h of Pix, and the maximum yield (2669 K.g of unginned cotton per hectare) by using 200 g.h of Pix. Comparison of the interaction effects of the level of Pix and nitrogen application indicated that, among all the treatments, the maximum yield of unginned cotton (3010 K.h) was achieved when 150 Kg.h of nitrogen and 200 g.h Pix were applied. These results also showed that in the treatments of using 150 K.g nitrogen per hectare, and applying 150 Kg. nitrogen plus 300 g Pix per hectare also, high yield potentials (close to 3 tons per hectare) were created. The minimum yield of unginned cotton (2230 Kg.h) belonged to the treatment of using 200 grams of Pix per hectare.

[Abed vahedi. The effects of applying different levels of nitrogen and the plant growth regulator Pix on the morphological features of the cotton cultivar Sahel. Journal of American Science 2011;7(7):646-650]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Cotton, Nitrogen, Pix, Morphological Features

Full Text

Operational planning Role in Organizations Based on Strategy (Case Study: Saipa Co.)

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Abstract: Mission-driven organizations plan and implement the projects in order to achieve strategic objectives. Thus the effectiveness of project implementation in different levels should be reviewed. This research intends to evaluate the effectiveness of implementing operational planning system which is one of the strategic projects in Saipa Co. by evaluating two strategic goals of achieving production plan and cost reduction. In this context regarding the aim of achieving production plan, the impacts of this system on the total volume and production models and also in cost reduction target, the costs due to stopping route, late delivery penalties and cost of product warehousing will be investigated and the accuracy of assumptions by using organization documentary / real data - descriptive inferential analysis and statistics will be tested. The findings suggest the significant effect of implementing the system on production plan increase and cost reduction achievement, so in mission- based organizations which are acting based on customer needs and flexible mass production system, the implementation of this system will have significant impact on achieving strategic objectives.

[Mohammad Mahmoudi Maymand, Mohammad Zare. Operational planning Role in Organizations Based on Strategy (Case Study: Saipa Co.).

Journal of American Science 2011;7(7):651-658]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Operational planning; strategic objectives; production management; delays

Viability model and effect of two drying procedures.

Full Text

Viability model and effect of two drying procedures on seed longevity of Secale montanum seeds

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Abstract: This experiment was conducted to evaluate the ability of the Ellis and Roberts seed deterioration model to predict the longevity of *Secale montanum* seeds under different storage conditions. Seed lots used in this investigation were dried in two different methods including sun and shade drying, immediately after harvest. The seed moisture content of both seed lots was adjusted to 11, 13 and 15% by humidification above water in a closed container at 20°C. After equilibrium had been achieved for 3 days at 5 °C in a sealed container, seed moisture content was determined. In each seed lot and samples of about 200 seeds were sealed hermetically in aluminum packets. Storage temperatures were 25, 35 and 45. The interval of sampling depended on the storage conditions. Seed survival curves were then fitted to the observations by probit analysis. In each seed lot dried seed survival curves conformed to cumulative negative normal distributions and the results showed that survival curves could be constrained to a common origin. The results of this research showed that the standard deviation of the subsequent survival curves was unaffected by drying treatments. Seed viability constants to predict seed longevity in this species was estimated.

[Marzieh Dehghan, Farzad Sharif-Zadeh. Viability model and effect of two drying procedures on seed longevity of *Secale montanum* seeds. Journal of American Science 2011;7(7):659-663]. (ISSN: 1545-1003).

Keywords: drying, Secale montanum, seed longevity, seed viability constants, viability model

Full Text

The role of tourist attractions on change of the traditional dwellings of mountain and mountainside villages (Dohezaar rural district,
Tonekabon Township)

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Abstract: In this article, the researcher does her best to study the impacts and outcomes of this industry on the development of local and traditional dwellings from various dimensions and aspects, including form, architecture, function, etc. The data collected for this study are based on information, statistics, and also experts' opinions. The results of the present study can help us to evaluate, plan, and fulfill the development of rural tourism on the area under study, so it will provide a good background to reach the goals of tourism in the process of rural tourism development.

[Masoumeh Hasannezhad, Nasrollah Molaei Hashjin, Karine Danielyan. The role of tourist attractions on change of the traditional dwellings of mountain and mountainside villages (Dohezaar rural district, Tonekabon Township). Journal of American Science 2011;7(7):664-673]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Rural tourism; Dohezaar rural district; Traditional dwellings; Mountainous and mountainside villages; Sustainable development

Full Text

97 Evaluating Competition of the *Phalaric minor* in Wheat

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Abstract: to competitive effects of wheat and *p minor* in densities and different use values of Nitrogen in plan frame of random blocks repeating 4 times perfectly. The test factorials included Nitrogen value in level (100,150 and 225 kg/ha) and *p minor* density in 5 levels (0, 20, 40, 80 and 160 bones per square meter). Results of the test showed that height of *p minor* per three values of Nitrogen was less in initial processes of growth and more than wheat in final processes of growth. Increasing Nitrogen value has caused to increase leaf and biomass of *p minor* and increasing *p minor* density causes area of leaf and biomass of wheat to decrease. Time of closing canopy in *p minor* is more rapidly than in wheat. The most value of decreasing operation of wheat seed was about 48 percent while was observed in density of 160 bones of *p minor* in 225 kg/ha of Nitrogen. Average relative growth velocities of wheat and *p minor* were 0.073 and 0.028 g/dag during growth cycle, respectively. Little use value of Nitrogen fertilizer, reason of more decrease of wheat operation was existence of *p minor* grass.

[Einallah Hesammi Faculty member, Department of Agronomy, Islamic Azad University, Shoushtar Branch. Iran. Journal of American Science 2011; 7(7):674-678]. (ISSN: 1545-1003). http://www.americanscience.org

Keywords: Wheat, p minor, Competition, Nitrogen, Density

The effect of Urea fertilizer drilling on yield of sugar beet

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Abstract: To determine the optimum level of nitrogen intake, assessment methods and nitrogen fertilizer application partitioning, a randomized complete block design with three replications in Agricultural Research Center of Hamedan in 1999 for two years was carried out. Fertilizer levels were (0 kg) as control ,120 ,180 and 240 kg/ha N for fertilizer drilling method in both sides of seedlings , and 240 kg/ha for fertilizer drilling in rills and surface broadcasting of 240 kg/ha. All treatments had two partitioning of 3 and 4 which were used. In 2001 the method of fertilizer falling in rills and consumption rate of 204.07 kg Urea per ha created the highest income. Results of ANOVA and Duncan mean comparison method showed that during two years of project implementation, the effect of N fertilizer level on root yield, sugar and sugar can be obtained ,at 5 percent level were significant and levels of N application as non-linear increased These components. Effect of method of fertilizer application on the above components is significant and by using the equipment of fertilizer drilling machine nitrogen consumption can be reduced and that and by creasing levels of fertilizer, yield of sugar beet increased compared to broadcast method to the surface. Effect of number of fertilizing stages (3 and 4 times) on root yield, income, gross and white sugar is not significant

[Geeta Kharkwal, Poonam Mehrotra, Yaswant Singh Rawat. Taxonomic Diversity of Understorey Vegetation in Kumaun Himalayan Forests. Journal of American Science 2011;7(7):679-683]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: optimization, nitrogen, economic evaluation, fertilizer drilling, sugar beet

Full Text

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99 Improving the Wetability and Oxidation Resistance of Graphite by Coating

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Abstract: In this research, the graphite powders were coated with Al_2O_3 by hydrolysis of an Aluminum nitrate aqueous solution. The surface of the graphite particles coated with Al_2O_3 was investigated by XRD and the quality of Al_2O_3 coating on the surface of graphite was observed by SEM and investigated by EDS. For detail investigation on the surface of coated graphite TEM was used and then wetability and oxidation resistance were investigated. To compare the effect of coating and antioxidant on oxidation resistance of graphite, Al and SiC were used as antioxidant. The results showed that the surface of graphite flakes was successfully coated and modified so that wetability and oxidation resistance of graphite greatly improved and the amount of antioxidant needed for application of graphite in the refractory decreased.

[H. Rastegar, M. Khoeini, H.R. Hafizpour, A.Nemati. Improving the Wetability and Oxidation Resistance of Graphite by Coating. Journal of American Science 2011;7(7):684-688]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: coated graphite, wetability, oxidation resistance, aluminum-nitrate.

Molecular and morphological characterization of various Artemia strains from tropical saltpans in South East Coast of India

Full Text

Full Text

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Abstract: The present study documents the morphological and molecular characteristics of *Artemia* strains in four main ecological regions from South East Coast of India. Samples from tropical saltpans such as Kelambakkam (KBM), Vedaranyam (VDM), Tuticorin (TCN) and Thamaraikulam (TKM) and reference samples from GSL strain (Great Salt Lake, Utah) were analysed. Biometry of cysts, furcal morphology and molecular genetic relatedness analysed the technique of random amplified polymorphic DNA (RAPD-PCR) finger printing analysis were done with four *Artemia* strains. The biometry results revealed that the KBM cyst diameter was similar to GSL cyst and compared to other strains. Scanning electron micrographs (SEM) of hydrated

Artemia cysts showed a smooth outer membrane with granular surface topography without much variation. However, the SEM structures of fractured cysts showed variation in the inner architecture patterns and includes egg membranes. The discrimination on furcal fin shape and its numbers of setae were more evident to distinguish Artemia strains studied. The TKM strain showed wide furcal groove compared to other strains. RAPD-PCR analysis showed consistent genetic differences between the VDM and TKM strains. The DNA polymorphisms were evident in all the Artemia strains examined and the highest percentage of polymorphic bands was found in TKM and TCN Artemia strains. The obtained results obviously showed that, within the collection of South Indian Artemia cyst samples examined, the two different groups seem to exist. The morphological and molecular analysis revealed a greatest genetic difference between the Artemia strains in order to provide the genetic relatedness and the specific status of Artemia strains confined to South India. [Manavalan Vetriselvan and Natesan Munuswamy. Molecular and morphological characterization of various Artemia strains from tropical saltpans in South East Coast of India. Journal of American Science 2011;7(7):689-695] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Artemia strains, Cyst biometry, Cyst SEM structure, furcal morphology and RAPD-PCR analysis

Application of Protein Engineering Strategies in Structural Biology for Enhancing Protein Crystallization

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Abstract: Structural biology is one of the most important areas in biological sciences since detailed 3-D atomic protein structure not only gives direct information on protein function, but also provides useful knowledge on protein engineering and drug design. X-ray crystallography is one of the most powerful tools for high-resolution protein structure determination. It requires growth of protein crystals, which is extremely challenging for some proteins and usually pose it the most rate-limiting step for protein structure determination. However, protein engineering methods improving the entropy of crystallization sometimes enhance protein crystallization. In this review, we summarized the most commonly used protein engineering strategies for improve the chance of protein crystallization.

[Xiaoli Gao, Yanfeng Zhang, Yixiao Shen, Xiangqun Shen. Application of Protein Engineering Strategies in Structural Biology for Enhancing Protein Crystallization. Journal of American Science 2011;7(7):696-699] (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Protein engineering, crystallization, X-ray crystallography, limited proteolysis, MBP, surface entropy reduction

102 Taxonomic Diversity of Understorey Vegetation in Kumaun Himalayan Forests

Full Text

Full Text

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Abstract: Taxonomic diversity of understorey vegetation (herb species) was studied in two evergreen forests, viz. oak and pine in the Kumaun Himalaya. In terms of taxonomic diversity, Asteraceae and Lamiaceae were the two dominant families in the sampling forest types. Maximum number of species was found at hill base and minimum at hill top in both the forests. The number of families, genera and species ratio observed for pine forest was of course higher with compared to the oak forest showed about the higher taxonomic diversity. Perennials form had higher contribution as compared to annuals forms indicated better ability to store up soil. Very few species (9 species) were found to be common indicates higher dissimilarity in both type of forests. Species richness (per m2) was higher in the pine forest than the oak forest. A high value of beta-diversity in the oak forest point out that the species composition varied from one stand to another. However, low concentration of dominance value in the pine forest with compare to the oak forest point towards the dominance, which is shared by many species.

[Geeta Kharkwal, Poonam Mehrotra, Yaswant Singh Rawat. Taxonomic Diversity of Understorey Vegetation in Kumaun Himalayan Forests. Journal of American Science 2011;7(7):700-704]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Species richness; beta-diversity; taxonomic diversity; forest

Full Text

THE INFLUENCE OF DIFFERENT SURFACE PRETREATMENTS ON THE SHEAR BOND STRENGTH OF REPAIRED COMPOSITE

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ABSTRACT: The purpose of this study was to investigate the effect of surface pretreatment protocols and different aging periods on the shear bond strength of the repaired composite. One hundred and fifty specimens were prepared from Silorane Filtek P90 (3M, USA) resin composite material. The specimens were divided into five main groups (thirty each) according to the followed surface pretreatment protocols. The surface of the first group was pretreated with acid etching by 37% phosphoric acid etching, in the second group the surface was pretreated with carbide finishing bur. while in the third group the surface was pretreated with air abrasion of Al₂O₃ powder. A thin of Silorane Filtek P90 bond (3M, USA) was applied over the treated surface then the repaired composite resin material was packed. The remaining two groups were considered as two different control groups, either cohesive or incremental control. Both of the control groups were prepared without addition of the bonding agent. Each of the previously mentioned groups was divided into three subgroups, ten each, according to the aging period (24 hours, one month and three months). All the specimens were subjected to shear bond strength using a universal testing machine at a cross head speed of 0.5 mm/min. The data were analyzed with three-way ANOVA and the means were compared by Tukey's post-hoc test and the significance level was set at P≤0.05 (=0.05). The results showed air abrasion provided higher composite—composite repair bond strength followed by adhesive resin applications while acid etching of the substrate Silorane composite resin material failed to improve the repaired shear bond strength; meanwhile it had a cleansing effect. Aging the repaired composite for three months significantly reduced the shear bond strength.

[Reham.S. Saleh, Omaima, H. Gallab, Mohamed, H. Zaazou, Hanan, A. Niazi, THE INFLUENCE OF DIFFERENT SURFACE PRETREATMENTS ON THE SHEAR BOND STRENGTH OF REPAIRED COMPOSITE. Journal of American Science 2011;7(7):705-711] (ISSN: 1545-1003). http://www.americanscience.org.

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Abstract. Grain refinement plays a crucial role in improving characteristics and properties of cast and wrought aluminum alloys. Generally Al-Ti and Al-Ti-B master alloys are added to the aluminum alloys to grain refine the solidified product. The mechanism of grain refinement is of considerable controversy in the scientific literatures and has been the subject of intensive research. There is common question for all producer of aluminum castings that how they can be sure about the quality of nucleation. Thermal analysis is an important tool to answer this question. In this research, different types of inoculants were used to investigation of nucleation in A356 aluminum alloy. The cooling curve of each sample was recorded and by using a special computer program, the first derivative was calculated. By calculating zero curve and analyzing the cooling curve, it is possible to predict the quality of nucleation and calculation fraction of solids, latent heat and other information. The result of this research have shown that if maximum undercooling of nucleation was approximately 3.8 C, the quality of nucleation process will be more reliable.

[Najmeddin Arab. Effect of Inoculant Composition on Grain Refining Process in Aluminum Casting Alloys, Journal of American Science 2011;7(7):712-716] (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Thermal Analysis, Grain Refining, Nucleation, A-356 Aluminum.

Full Text

Effect of Magnesium and Nickel on the Wear and Mechanical Properties of Casting Bronzes

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Abstract: Investigation on tribological properties of cast metals is a most attractive research subject in recent years. Aluminum-Bronze cast alloys demonstrate proper mechanical and wear properties for this application. In this research, the effects of magnesium and nickel on tribological properties of cast Aluminum-Bronzes have been investigated. After the casting, the samples were heat treated, quenching and aging. The wear test conducted by pin-ondisk apparatus and wear mechanisms and microstructure of the specimens were studied by a scanning electron microscopy. It was shown that addition of

magnesium and nickel reduces the size of α and β phases. Increasing the amount of magnesium and nickel to 10%, improves the mechanical and tribological properties of the alloys. When the alloying elements are low, the wear mechanism are lamination and abrasive. Increase alloying elements decrease these wear mechanisms

[M. Moradlou N. Arab, R. Emadi, M. Meratian. Effect of Magnesium and Nickel on the Wear and Mechanical Properties of Casting Bronzes. Journal of American Science 2011;7(7):717-722] (ISSN: 1545-1003). http://www.americanscience.org

Keywords: Aluminum-Bronze alloy, Tribology, Wear test, Wear mechanisms, Mechanical properties

Full Text

Potential Impact of Zinc Hazardous Effect of Pesticides In Male Rats

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Abstract: In the present study, fifty male rats (weighted 150 - 170 g) were divided into five groups(n=10), the first group served as control, the second group was received acute dose of Azinphos methyl (4 mg/kg. b.wt./orally) and the fourth group was treated with Caprolin at dose of 100 mg / kg b. wt./orally. The third and fifth groups were treated orally with Zn So₄ (400 µ mol / kg b. wt.) daily for 6 weeks before pesticides treatment. Blood samples were collected at fixed time intervals of 72 hrs, 7, 15 and 21 days after treatment with pesticides. The results of the current study showed deleterious damage due to Azinphos methyl and Caprolin administration ,represented in a significant decrease in serum zinc concentration , total proteins and albumin and significant increases in copper, iron, y-glutamyl transferase, aspartate aminotransferase (AST) and alanin aminotransferase (ALT) levels, while the data revealed imbalance in thyroid function as a result of both pesticides administrations, which was showed in the enhancement of free T4 level and significant decrease in free T₃ activity at 1 week (day 7) post-administration. Treatment of zinc sulphate (Zn So₄) pre-administration with Azinphos methyl or Caprolin attenuates to a great extent the damaging effects of two previous doses of pesticides on the assayed parameters except the thyroid hormones. Accordingly, Zinc treatment at the used dose may have indirect physiological effect on thyroid function.

[Magda Sayed Hassanin, Potential Impact of Zinc Hazardous Effect of Pesticides In Male Rats, Journal of American Science 2011;7(7):723-732]. (ISSN: 1545-1003). http://www.americanscience.org...

Key words: Zinc supplementation, Pesticides toxicity, Azinphos methyl toxicity, Caprolin toxicity

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Full Text

Defensive Effect of Garlic as revealed by Molecular, Biochemical and Ultra Structure Print after Toluene Stress on Mice

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Abstract: The present study represents a trial for using the natural garlic extract (Tomox) as a treatment for the asthma caused by the organic chemical (Toluene). Twenty four mice were divided into four groups; group I kept as control, untreated animals, group II included animals treated daily with 2.5 mg/kg b.w. garlic for one week via oral gavage, group III included animals treated daily with toluene as a spray all over the body for 10 min 3 times/day for one week and group IV included animals treated with toluene followed by garlic. IgE levels were measured as an indicator for the immune response. Toluene increased the level of IgE (4.2 μg/ml), while treatment with garlic decreased its level to 3.7 μg/ml compared with 3.2 μg/ml in control animals. Transmission electron microscopic examinations were performed to reveal the effect of toluene on lung tissues. A marked changes has been observed after the treatment with toluene. These changes were represented by vacuolations, ill-defined mitochondria, fragmented rough endoplasmic reticulum and pyknotic nuclei of type I and II. Macrophage with pyknotic nuclei and condensed heterochromatin on the inner surface of the nuclear envelope and rupture nuclear envelope in some spaces. Molecular genetic analysis has been performed for the F1 to assess the genetic changes occurred in the offspring due to the treatments. There was no an observable variation on the RAPD-PCR level using 5 random primers O6 (5'- CCC AGT CAC T-3'), C10 (5'- TGT CTG GGT G-3') and C 14 (5'- AAG CCT CGT C-3'). The results showed that, toluene induced damage in lung tissue and immunosuppressive effects in adult animals. In spite of that, toluene did not induce genetic variation in DNA of babies of treated females as revealed by RAPD-PCR.

[Sahar A. Mosallam and Hussein Sabit. Defensive Effect of Garlic as revealed by Molecular, Ultra Structure and Immunological Changes after Toluene Stress on Mice. Journal of American Science 2011:7(7):733-740]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Asthma, Garlic, Genetic fingerprint, IgE, Toluene.

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Full Text

The Protective effect of Ginger and N- Acetyl Cysteine on Ciprofloxacin-Induced Reproductive Toxicity in Male Rats

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Abstract: This study was conducted to evaluate the possible reproductive toxicity induced by ciprofloxacin antibiotic and the protective effect of ginger and/or N-acetyl cysteine. For this purpose, forty- nine rats were divided into 7 groups (7 rats/group). Group (1) was orally given distilled water (solvent of the used drugs) and kept as a control. Group (2) was daily administered ginger at a dose of 100 mg/kg.b.wt. by a stomach tube for 65 days (5 days/week). Group (3) was daily administered N-acetyl cysteine (NAC) at a dose of 50 mg/kg.b.wt., by a stomach tube for 65 days (5 days/week). Group (4) was orally administered ciprofloxacin (CPX) at a dose of 12.5 mg/kg. b.wt. for 65 days (5 days/week). Group (5) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt) with ginger (100 mg/kg.b.wt.) by a stomach tube for 65 days (5 days/week). Group (6) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt) with N-acetyl cysteine (50 mg/kg.b.wt) by a stomach tube for 65 days. Group (7) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt.) with ginger (100mg/kg.b.wt.) and N- acetyl cysteine (50 mg/kg.b.wt) by a stomach tube for 65 days. Semen samples were collected and used for sperm functions analysis. Blood samples were collected to separate serum for biochemical and hormonal studies. Testes homogenate was used for oxidative stress biomarkers (lipid peroxidation (TBARS), reduced glutathione (GSH) and DNA fragmentation test). Testes, epididymis and seminal vesicles were collected for histopathological study. The obtained data revealed that CPX promotes reproductive toxicity in rats through generating oxidative damage. It induces an adverse effect on reproductive organs weight, sperm parameters (sperm count, sperm motility and viability), reproductive hormones (testosterone, LH, and FSH) and histopathological alterations. Ginger and/or NAC have an important role in ameliorating reproductive toxicity induced by CPX through restoring the oxidant-antioxidant balance.

[Nashwa, A. Abu-Aita, Kawkab, A. Ahmed and Samar M Mouneir. The protective effect of Ginger and N- Acetyl Cysteine on Ciprofloxacin-Induced Reproductive Toxicity in Male Rats. Journal of American Science 2011;7(7):741-752]. (ISSN: 1545-1003), http://www.americanscience.org.

 Full Text

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Abstract: The compressibility behavior of particulate reinforced aluminum matrix composite powders was examined under uniaxial cold compaction. The effect of SiC volume fraction (up to 20%) with varying particle size (ranging from 50 nm to 40 μ m) on the plastic deformation capacity of aluminum matrix was analyzed by using linear compaction equations. It was found that with increasing the volume fraction or decreasing the particle size of reinforcement, the densification coefficient decreases that means the less ability of material to deformation. Particularly, nano scaled inclusions impose higher influence on yield pressure of composite compacts. It was also shown that the effect of reinforcement size ratio on densification coefficient is more profound up to 10 vol.%. This article addresses the mechanisms involve in the densification of aluminum matrix nano-micro composites by using linear and non linear compaction equations.

[H.R. Hafizpour, M. Khoeini. Compaction Behavior of Aluminum Matrix Composites Reinforced with nano/micro Scale SiC Particulates. Journal of American Science 2011;7(7):753-759]. (ISSN: 1545-1003). http://www.americanscience.org.

 $\textbf{Keywords:} \ Composite \ powder; \ Densification \ coefficient; \ Al-SiC; \ Linear \ Compaction \ equation$

Full Text

Gastroprotective effect of simvastatin against experimentally induced gastric ulcers in rats: Role of ATP-sensitive K+ channels

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Abstract: Simvastatin appeared to have additional benefits beyond their lipid lowering effects, which has led to interest in the use of this class of drugs outside the field of cardiovascular disease. Aim: This study aimed to investigate the possible gastroprotective effect of simvastatin against both indomethacin and cold restraint stress (CRS) induced gastric ulcers in rats and to study its effect on gastric mucosal malonaldehyde (MDA) ,nitric oxide (NO)and prostaglandin E2(PGE₂) levels in both ulcer models. Exploration of the possible contribution of ATP-sensitive K⁺ channels in this action.

Design: 72 healthy, adult male albino rats were used. The rats were randomly assigned to vehicle (distilled water or carboxymethylcellulose (0.5%), simvastatin, simvastatin +glibenclamide (ATP-sensitive K⁺ channels blocker), pretreated groups for 7 days then ulcers were induced using oral indomethacin or cold restraint stress. Assessment of gastric lesions was done, gastric juice parameters (total acid output, pepsin activity and mucin content) were determined for each group using pyloric ligation method .Rats from simvastatin pretreated groups in both ulcer models were used for determination of gastric mucosal level of MDA (as indicator of lipid peroxidation), nitrite (as indicator of NO) and PGE₂ levels. Results: Simvastatin

displayed significant (P< 0.05) protection against gastric lesions induced by either indomethacin or exposure to cold restraint stress by correction of both ulcer score and the measured gastric juice parameters. This effect was partially blocked by coadministration of glibenclamide. Simvastatin significantly (P< 0.05) reduced gastric mucosal MDA; significantly (P< 0.05) increased in PGE₂ levels and corrected nitrite to near normal levels in both ulcer models. Conclusion: This study confirmed the gastroprotective effect of simvastatin in indomethacin induced ulcer in rats and proved it in CRS induced ulcer. The gastroprotective effect of simvastatin is mediated through opening of ATP sensitive K^+ channels, free radical scavenging, increase in gastric mucosal PGE₂ and normalization of gastric mucosal NO in both ulcer models.

[Dalia M. Abd El Motteleb, Mai M. Hasan . Gastroprotective effect of simvastatin against experimentally induced gastric ulcers in rats: Role of ATP-sensitive K⁺ channels. Journal of American Science 2011;7(7):760-768]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: indomethacin; cold restraint stress; NO; simvastatin; ATP-sensitive K⁺ channels and ulcer

Fmcdm Evaluation Of Teachers Performance 1

Full Text

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Abstract:One of the most important functions of management is to evaluate the performance of the organizations' employees (Stoner and Freeman, 1992). For increase efficiency and effectiveness education performance we must assessment it. Article purpose is determine and identified instructor's performance dimensions and indicator's performance. In this study, we have aggregated and identified five instructor's performance dimensions and 19 indicators of that performance we use fuzzy logic for the measurement of performance and apply Analytical Hierarchy Process(AHP) in criteria weight and TOPSIS in ranking. A FMCDM(Fuzzy multi criteria decision making) is an approach for evaluating decision obtaining alternatives involving subjective judgments made by a group of decision makers. A pair wise comparison process is used to help individual decision makers make comparative judgments, and a linguistic rating method is used for making absolute judgments. An empirical study of instructors Performance evaluation in one of the branches of PNU (Payame Noor University) that is presented to illustrate the effectiveness of the approach.

[Mohamad.R.Sarmady, Mehran.Frajolahi and Ardavan.Mirzaie. Fmcdm Evaluation Of Teachers Performance Journal of American Science 2011;7(7):769-782]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords; Performance- evaluation-Fuzzy multi criteria decision making (FMCDM) - AHP- TOPSIS

Full Text

112 Sequencing of Cytochrome C Oxidase Subunit I Gene of Mitochondrial DNA from Chelonia mydas in Qatar.

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Abstract: DNA of Qatari *C. mydas* samples were successfully sequenced using the Folmer forward and reverse primers. The identification with BOLD of approximately 688 base pairs sequence revealed maximum homology (99.84%) with *C. mydas*, which is a species of turtle has been declared "extinct in wild" by IUCN. The next closest species 93.79%, was *N. depressa* which has a restricted geographical distribution and was reported to be endemic to the Australian continental shelf. The finding of characteristic species-specific COI sequences offers the prospect of identifying marine turtle species by using DNA barcode methodology as an auxiliary tool for taxonomy. This can also be used during field work, when identifying lost nests, animals stranded on beaches or those killed as part of the by catch in fishery nets. A further use is in forensic litigation when turtle eggs or meat are the only available material and for the development of Qatar gene bank information.

[Khaled Elmeer, Paul McCormick and Ameenah Almalki. Sequencing of Cytochrome C Oxidase Subunit I Gene of Mitochondrial DNA from Chelonia mydas in Qatar.Journal of American Science 2011;7(7):783-788]. (ISSN: 1545-1003). http://www.americanscience.org.

Key word: DNA Barcoding, Green sea turtle, Cytochrome Oxidase, and COI sequencing.

Full Text

Determination of degradability of whole seeds Safflower and its proteins fractions

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Abstract: This study was carried out to determine whole seed Safflower (WSS) crud protein (CP) degradation characteristics by using nylon bags. The rumen degradability of WSS CP at ruminal outflow rate of 0.02/h, 0.05/h and 0.08/h were 84.8, 77.5 and 71.7, respectively. Crud protein degradability of WSS at 0, 2, 4, 8, 16, 24 and 48 h incubation were 16.87, 42.62, 58.1, 83.79, 85.8, 88.21 and 92.58 percent.

[Hamed Amini Pour, Naser Maheri Sis, Ramin Salamatdust Nobar, Saeid Najafyar Razlighi, Mohammad Salamatazar, Mohammad Hasan Babazadeh, Mohammad Taher Maddah. Determination of degradability of whole seeds Safflower and its proteins fractions. Journal of American Science 2011; 7(7):789-791]. (ISSN: 1545-1003). http://www.americanscience.org.

 $\textbf{Keywords:} \ \textbf{Whole seed Safflower, Protein degradation, in situ, crud protein}$

Full Text

114 Assessment model of E-learning for higher education

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Abstract: In this article, to evaluate the effective factors on the quality of E-learning, some researches are carried out on assessment of E-learning during 2001-2009 and the effective factors on the quality of E-learning are identified and extracted. Human factor, infrastructural, cultural, legal, economical and political, management and leadership, support and international factors as the effective factors on the quality of education, evaluate the quality of E-learning by 85 codes. Also, in this quality research, the important degree, influence of each factor and the effect of factors on E-learning quality are defined. The results of this research define the quality of the university E-learning quality and determine the merits and demerits of each part separately.

[Z. Golzari, A.R. Kiamanesh, N.G. Ghourchian, P. Jaafari. Assessment model of E-learning for higher education. Journal of American Science 2011;7(7):792-799]. (ISSN: 1545-1003). http://www.americanscience.org.

 $\textbf{Keywords:} \ \text{Higher education; the quality of E-learning; assessment model; the effective factors on quality} \\$

115 Inconsistencies in Ontologies

Full Text

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Abstract: Ontologies are the building blocks of semantic web. In recent year's further advancements in the area of semantic web has led to refinement and specialization of the existing frameworks for ontological development. These advancements include merging, alignment, unification, mapping etc. of ontologies usually belonging to similar domains. These operations are useful in their own respect but also bring along many inconsistencies in the ontological information. The removal of these inconsistencies is in itself an open horizon for researchers of semantic web and ontologies. In this paper, we review the different issues causing inconsistencies and some frameworks used for handling inconsistencies.

[Amjad Farooq, M. Junaid Arshad, Aslam Muhamamd, Saba Sana. Inconsistencies in Ontologies Journal of American Science 2011;7(7):800-803]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Ontologies, inconsistency, Mapping and Merging.

Full Text

116 Performance Metrics for Multiagent Systems

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Abstract: Multi agent systems (MAS) bring about a change in the globe by making agents work together in a group achieving common goals and casting away monolithic paradigm. Proper understanding of the metrics that impact performance of MAS can help in employing the distinctive abilities of agents to its maximum. In this paper, we discuss various performance metrics that target an agents' role and environment and can help in accomplishing goals in optimum time. We also present an example that takes these performance metrics to account. We then move to case studies and draw attention to the best and worst cases for agents' performance against the metrics we gathered

[Aslam Muhammad, M. Junaid Arshad, Amjad Farooq, Rubab Fatima, Khair-ul-Nisa. **Performance Metrics for Multiagent Systems.** Journal of American Science 2011;7(7):804-810].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Multiagents, Metrics, Performance, Response time.

Full Text

117 A GUI-Based Easy Web Hosting System

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Abstract: This project is to design and development of a web host that can facilitate remote users to build, host, monitor and manage their website. Different tools like interactive file and folder managers, website statistic analyzer, web site builder and user administration. The administrator of the site can also create user to share work load by assigning directories among different users. Administrator can manage their database online by running online queries and can also view user log files to get information about total logs, to see how many users are currently online and how many users are not yet logged-in.

[M. Junaid Arshad, Amjad Farooq, M. Aslam, Nasir Ahmad. A GUI-Based Easy Web Hosting System. Journal of American Science 2011;7(7):811-817]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Web Host, Easy Host, File Manager, Web site Builder, Web site Statistics.

118 Two Robust Meta-Heuristic Approaches for a New Modeling of S

Full Text

Two Robust Meta-Heuristic Approaches for a New Modeling of Single Machine Scheduling Problem with Multiple Criteria

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Abstract: The aim of this paper is to propose a new model for a single machine-scheduling problem. According to just in time (JIT) approach, production managers should consider more than one criterion in scheduling problems. However, three criteria, including minimizing the number of tardy jobs, total weighted earliness and total weighted tardiness, are considered in this proposed model. To solve the model, firstly, branch and bound (BBA) method is applied, because it can solve the small size problems. Furthermore, the results obtained from this algorithm, are good measurement to test effectiveness of proposed meta-heuristic algorithms. In the literature, this problem is classified in the NP-hard class. Hence, two well-known meta-heuristic methods, including genetic algorithm (GA), simulated annealing (SA), are applied to tackle large scale problems. Finally, heuristic solutions were compared with the global optimum which is obtained by (BBA) method. Computational results showed that both the heuristic algorithms yield good quality solutions using reasonable computation time.

[Kiarash Poursalik, Sina Miri-Nargesi. Two Robust Meta-Heuristic Approaches for New Modeling of Single Machine Scheduling With Multiple Criteria. Journal of American Science 2011;7(7):818-825]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Single machine; branch and bound algorithm; genetic algorithm; simulated annealing

Full Text

119 Comprehensive Evaluation of Probabilistic Seismic Risk Methodology for Port Structures

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Abstract: Ports have long been the gateway for commodities and people to transport into cities and countries. In fact, ports are very important link in the total maritime transportation chain. Past experience has shown that ports are often susceptible to severe damage during earthquakes. So evaluation of direct and indirect consequence of earthquake in ports and harbors is an essential problem. Probabilistic method for this problem is introduced briefly to be used in comprehensive seismic risk management. At first, reliability of ports is evaluated in this methodology through estimation of component direct and induced damage probability. Afterwards direct economic loss of earthquake estimate with damage probability from direct and followed by sequence and consequence analysis for assessment of induced damages. Finally indirect economic impacts of direct loss are estimated using economic links between the harbor and society. Outputs of the methodology can be used in different stages of seismic risk management from risk financing to proposing mitigation measures. Effects of rehabilitation of equipments and structures, prevention and suppression systems as well as management type of mitigation actions can be estimated by this methodology in preparedness, emergency response and recovery phases.

[Rouhollah Amirabadi, Prof. Khosrow Bargi, Dr. Moharam Dolatshahi Piroz and Payam Amirian. Comprehensive Evaluation of Probabilistic Seismic Risk Methodology for Port Structures. Journal of American Science 2011;7(7):826-834]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: seismic risk, direct economic loss, indirect economic loss, port structures, probability.

Full Text

120 Genetic relation of the Zagros thrust and Sanandaj-Sirjan zone

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Abstract: the Zagros thrust (crush zone) and the Sanandaj-Sirjan zone separat the Zagros Fold belt from Central Iran. The Zagros passive continental margin setting of the Jurassic-Middle Cretaceous was followed in the Upper Cretaceous by arc collision linked to the closing of the Neo-Tethys and the collision of the Arabian and Iranian plates. The northwest-southeast trending Sanandaj-Sirjan Zone consists of several elongate sub-zones and much of the orogenic activity in the Sanandaj-Sirjan Zone is now related to closing of Tethys. Therfore the Zagros thrust and the Sanandaj-Sirjan zone provide a unique opportunity within the Alpine system to evaluate the interplay between a young Tertiary collision,volcanism,metamorphism and earlier subduction/obduction processes. This article detects genetic relation of The Zagros Thrusting System and properties of the Sanandaj-Sirjan zone. Investigations show two area have related evolutionary history from cretaceous to recent.

[Mostafa Yousefirad.Genetic relation of the Zagros thrust and Sanandaj-Sirjan zone. Journal of American Science 2011;7(7):835-841]. (ISSN: 1545-1003). http://www.americanscience.org.

Key word: Zagros thrust, Sanandaj-sirjan zone, Collision, Crush zone.

Full Text

121 World Trade Organization (WTO) and its challenges with OPEC

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Abstract: Crude oil is the stimulating engine of world industry and has directly or indirectly dedicated a big deal of international trades to itself. The Group of Petroleum-Exporting Countries (OPEC) is in charge of the control of the main portion of the production and export of this product. On the other hand through its regulations and multi-aspect rules, the WTO supervises the trade of this product as well as the services between the OPEC members. However, the role of this organization in world trade of crude oil and its relations with OPEC is unclear. Today, both OPEC and WTO are eminent international financial organizations. WTO and OPEC each play a completely distinct role in the global financial stage. The former plays this role through its harsh and rigid regulations and the latter by its constant change in the oil price. Things which develop the complex issues of international laws and their related policies are the major position of OPEC in making negotiations regarding the production and procurement of crude oil and finally appraising to on one hand and the position of WTO in making rules of international trades regarding all trading goods on the other. This will raise questions such as: What is the effect of WTO on oil?, Can OPEC and WTO coexist?, is it possible that a country be satisfied of its simultaneous membership of both organizations? [Rasoul Abafat, Ali Abbasi Abkhareh and Nader FuladPanjeh. World Trade Organization (WTO) and its challenges with OPEC. Journal of American Science 2011;7(7):842-847]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: World trade organization; Antiy Dumping; Agreement; Privilege; Global Market; Consigne

Recognizing Operative Factors on Agroforestry Effective Extension

Full Text

Recognizing Operative Factors on Agroforestry Effective Extension in Guilan Province, Iran

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Abstract: Making economic, environmental and social benefits along with preservation, revival, development and appropriate exploiting from renewing natural resources is the main subject for a sustainable development in 3rd millennium that Agroforestry is trying to reach. While inhabitants of forests and its outskirts inhabitant's way of life is in contrast with natural resources improvement. The general aim of research is recognizing affective factors in presenting Agroforestry effective extension. This research in aspect of an applying proposes and correlation way is based on collecting non-experimental data's. Validity of questionnaire as a research tool confirmed by experts panel and its reliability of α = 0.885 is emphasized. Statistic society of existing research includes 230 people of extension experts in Guilan. For analyzing the data, deductive statistic is used. Results from stepwise regression shows 7 factors include extension agent's personal characteristics, way of presenting the service, economical characteristics, requirement, personal characteristics of clientele, cultural and social features of the area and policy making particulars, explained 86% variance of Agroforestry effective extension.

[Rezvan Enshieyeh, Seyed Mahdi Mirdamadi, Maryam Omidi Najafabadi. Recognizing Operative Factors on Agroforestry Effective Extension in Guilan province, Iran. Journal of American Science 2011;7(7):848-853]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Operative factors; Agroforestry extension; Inhabitants of forests; Extension agents

Destruction Efficacy on the Change of Dynamic Behavior in Structural Elements Using Finite Elements Method

Full Text

Mahdi Koohdaragh¹, Farid Hosseini Mansoub²

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Abstract: Structures are exposed to main threats such as structure efficiency decrease and its destruction. These problems are intensified along natural or man-made threats like earthquake and sever explosion. Since the earthquake is implemented dynamically and in small distance in terms of time on the structure dynamic analyses is of high importance. In this paper, the structure is put under modal analyses via ANSYS5.4 finite elements software and natural and mode-shaped frequencies of healthy and damage samples are resulted. The results show that frequency is decreased in damage samples. As following by utilizing impact load of structure is put under dynamic nonlinear analyses and through investigating displacement-time, velocity-time, acceleration-time and moment-time graphs destruction effect on acceleration and moment-time graphs can be identified as the form of amplitude changes. [Mahdi Koohdaragh, Farid Hosseini Mansoub. **Destruction Efficacy on the Change of Dynamic Behavior in Structural Elements Using Finite Elements Method.** Journal of American Science 2011;7(7):854-857]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Modal Analyses, Dynamic Analyses, Crack and Frequency

Full Text

Utilizing Dynamical Loading Nondestructive Identification of Structural Damages via Wavelet Transform

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Abstract: Different methods are represented in order to investigate and identification of damages that each one has some advantages and disadvantages. For example, Fourier Transform which represents related information over frequencies of a signal while no information is in access about the time of a frequency's creation. For identifying the place of damage, knowing the time of frequency creation is of high importance. On this base Fourier Transform encounters problem. Modern and efficient methods which are placed in signal analyses field and are in favor of researchers are wavelet transforms. The most important advantage of using wavelet is its ability in analyzing a signal place in every time or place domain. In this paper, a method for identification of damage in a beam via wavelet transform is represented. In this method beam identification is possible without dynamic parameters of healthy structure. At first, the structure is put under harmonic analyses through Finite Element Software (ANSYS5.4) and then it is put under wavelet analyses in wavelet box by (MATLAB7.1) Software and at the end the results are observable on two dimensional coefficient-location graphs which indicate high ability of wavelet theory in response analyses of a structure and disharmonic identifications in structural systems.

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Keywords: Wavelet Transform, Harmonic Analyses, Signal and Damage

Full Text

125 Design of an On-demand Routing Protocol for MANET

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Abstract: An ad-hoc network consists of a set of mobile nodes which are connected with each other by using radio waves. These networks do not need any predetermined structure or central management system and all nodes work as routers. These days the scalability of ad-hoc networks has interested some scholars. Scalability of most of on-demand routing protocols has become limited because of increasing the nodes' population and movement in network. In this paper an on-demand routing algorithm for MANET networks will be presented which aims at creating an algorithm with a high scalability. The effect of network size (number of nodes), nodes' movement, and data traffic on the efficiency of the proposed algorithm and other principal algorithms which have been utilized to create the present algorithm will be studied and their simulation results will be compared. The simulation results show that the proposed algorithm has more efficiency than the present standard algorithms.

[Seyed Hossein Hosseini Nazhad. Design of an On-demand Routeing Protocol for MANET Networks. Journal of American Science 2011;7(7):863-869]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: MANET network, Routeing Protocol, Scalability, Simulation

Full Text

The review of functioning of industries' privatization policy in Iran from 2003 to 2008

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Abstract: Privatization is a necessary and inevitable issue for efficient and optimum allocation of productive resources of the society. With a glance at its approach in Iran, it seems essential to observe a number of things like; opting for sound ways of transferring owing to non-productive properties and costs and profitable enterprises with providing conditions like supplying complete information, freedom of admission to and exit from markets, establishing a discipline and security and lawful ownership, clarity of investments, removing discriminating behaviors resulting from information abuse, approving facilitating rules for foreign investments and giving an assurance for not sudden change in regulations and public availability for information formats and providing timely information where needed.

[Seyyed Jamal Hosseini and L.Hojagani. The review of functioning of industries' privatization policy in Iran from 2003 to 2008. Journal of American Science 2011;7(7):870-875]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Allocation of resources - information abuse - lawful ownership - ways of transferring - timely information

A Comparison between Initial and Effective Fundamental Period of RC Frames with Steel Eccentric Bracing

Full Text

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Abstract: In earthquake resistant designs the value of fundamental period needs to be set close to reality. Special emphasis can be placed on designs which are based either on static equivalent method or performance level. The static equivalent method employs the seismic factor which is strongly dependant on fundamental period. Also during the later design, target displacement is directly connected with square of fundamental period. In this connection most of seismic codes (including Iranian National Seismic Standard) offer an experimental equation distributed for different structural systems to present fundamental period. To make sure for required modifications on seismic design codes, one hundred eighty concrete moment resisting frames with steel eccentric braces has been considered to capture vibration period by performing two-dimensional nonlinear pushover analyses. Pushover Analyses have been conducted using SAP-2000 program, which can consider material nonlinearities almost near reality. In this case the applied forces have been considered as the lateral forces of the Seismic Standard. At the end, fundamental period and effective fundamental period both derived by analysis and the experimental has been discussed concerning bracing kind of spans, length of link beam and height of structure. Analytical results confirm the validity of the experimental equation for presenting fundamental period in the case of reminded frames.

[Mohammad Reza Hoseinzadeh, Ali Edalatbehbahani, Mojtaba Labibzadeh. A Comparison between Initial and Effective Fundamental Period of RC Frames with Steel Eccentric Bracing. Journal of American Science 2011; 7(7):876-881]. (ISSN: 1545-1003). http://www.americanscience.org

Keywords: Vibration, Fundamental period, Reflection factor, Earthquake

The Influence of Emotional Intelligence of Secondary School Teachers on Classroom Discipline Strategies

Full Text

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Abstract: The purpose of the study is to analyze level of emotional intelligence among teachers employed in government secondary schools based on selected demographic variable. The sample of the study comprised 203 teachers. The findings of the study showed that there was a significant difference in the teachers' races (Malay, Indian and Chinese) and their emotional intelligence. The study also revealed that there were significant differences between teachers with high and moderate level of emotional intelligence in five strategies of classroom discipline used i.e. teachers with high level of emotional intelligence scored higher in the classroom discipline strategies of discussion, recognition, involvement, and hinting, whereas teachers with moderate level of emotional intelligence scored higher in the use of aggression and no significant relationship with one strategy (punishment) of classroom discipline. Solicinan Yahyazadeh Jeloudar, Aida Suraya Md Yunus, Samsilah Roslan², Sharifah Md. Nor. The Influence of Emotional Intelligence of Secondary School Teachers on Classroom Discipline Strategies. Journal of American Science 2011; 7(7):882-889]. (ISSN: 1545-1003). http://www.americanscience.org

Keywords: Emotional intelligence, classroom discipline, race.

Full Text

129 Review and Discussion of Theories related to Dynamic Model of World Class Manufacturing Strategy

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Abstract: World Class Manufacturing (WCM) has attracted so many manufacturing industries and operation strategists' attention. The expansion of this issue gets back to using "Best Techniques" of the companies with "Best Performance". In this study through provision of a definition for WCM we have addressed the lack of identifying WCM factors by using several different criteria and experimental of the relations between techniques and WCM performance. Studying different perspectives for acquiring a dynamic model which is capable of covering all the aspects and primary/secondary factors including the internal and external ones, strategies, objectives and policies is highly important. Therefore, determining the relations between mentioned factors can bring about a systemic motivation which helps specify the World Class Manufacturing level of performance status and devising an appropriate mental/conceptual model in a way that it involves the effective key causes and factors is in fact the preliminary stage of implementation and institutionalization of a dynamic model. In this paper by reviewing sources, viewpoints, definitions, attitudes, and WCM causes and factors, the research carried out in this regard, the conceptual model and WCM dynamic elements and the relations between them have been discussed. Finally, the dynamic model conceptual paradigm of WCM strategy is presented.

[Mohammad Seyedhoseini, Alireza Soloukdar, Review and Discussion of Theories related to Dynamic Model of World Class Manufacturing Strategy, Journal of American Science 2011;7(7):890-896]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Dynamic Model, World Class Manufacturing, Strategy, Conceptual Paradigm.

Full Text

Studying role of Organizational justice and Organizational health personality in Deputy of Research and Technology, Ministry of Health and Medical Education, Tehran, Iran

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Abstract: This study has been done in Iranian Deputy of Research and Technology, Ministry of Health and Medical Education to gather information about the MS degree of Public Management that describes a Psychological Problem between staff of case. This study is case study/descriptive in the field of research and is of correlation type. In this study the five aspects of an Organizational Citizenship Behavior through an organization's point of view has been assessed. Then, organizational justice was assessed in 3 aspects and finally the effects of the Health of an Organization or Organizational Healthy Personality with an emphasis from the 11 branches from the point of views of Lynden and Klingle's were analyzes with personnel's concept in the case study. Data were based on using a structural questionnaire that contained 3 standard questionnaires. Then we have analyzed data by SPSS. Results from data analysis showed that there exist a 95% relationship between Organizational Justice and Organizational Citizenship Behavior and as a result, the more the personnel have positive concept about the organization's justice, the more the Organizational Citizenship Behavior increases. And with the same confidence coefficient between Organizational Justice and Organizational Citizenship Behavior with the intervention of the Organizational Health Behavior, a relationship exists; meaning that, in each organization, there is an Organizational Health Personality. Effects of the personnel's positive concept of an Organization's Justice through Organizational Citizenship Behavior will be more increased. Research findings showed that strengthening the Organizational Citizenship Behavior of which is the goal of an organization is dependent on the Organization's Justice with the mediation of the Organization's Health Personality.

[S. Motevallizadeh, S.H. Zakiani. Studying role of Organizational justice and Organizational health personality in Deputy of Research and Technology, Ministry of Health and Medical Education, Tehran, Iran

Journal of American Science 2011;7(7):897-905]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Iranian Ministry of Health and Medical Education; Organizational Citizenship Behavior; Organizational Justice; Organizational Health Personality Full Text

131 Pattern of Breast Cancer Metastasis at the Radiotherapy Clinic, Ibadan - A Ten Year Review.

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ABSRACT: Introduction: - Breast cancer is the commonest cancer among Nigerian women. In Nigeria and indeed Africa and most underdeveloped countries, majority of patients with breast cancer present to the Hospital late with advanced disease. At this stage, the cancer involves the axillary nodes, it may be attached to the underlying muscles and distant metastases are almost certainly present. The primary treatment intent therefore is palliative. Objective: The aim of this study is to determine the pattern of metastasis of breast cancer among patients treated at Radiotherapy Department, University College Hospital, Ibadan. Methodology: Five hundred and eighteen patients with histological diagnosis of breast cancer seen between 2000 and 2009 were studied. Results: There 5 were Males and 513 Females. The mean age was 48.15 years and 63.5% were between the ages of 30 and 50 years. Fifty eight percent of the women were premenopausal while 42% were postmenopausal. The percentage of patients that presented with stages 1, 11, 111 & 1V diseases were 6.2%, 24.7%, 38.8% and 30.3% respectively. The overall incidence of metastasis to distant organs were lung 25.7%, bone 24.1%, liver 7.7%, brain 5.8%, contra lateral breast 0.6% and kidney 0.2%. Conclusion: Based on the data obtained from this study, breast cancer mostly occurred among young women. Compared to earlier studies in Nigeria, breast cancer patients still present late with advanced stage disease with distant metastasis. Baseline bone scan, chest X-ray and abdominopelvic ultrasound scan are recommended for breast cancer patients before commencing treatment to enhance early detection of metastasis. Efforts should be increased towards early detection and treatment.

[T.N. Elumelu, A.A. Adenipekun, A.A. Abdus-salam, A.D. Bojude. Pattern of Breast Cancer Metastasis at the Radiotherapy Clinic, Ibadan - A Ten Year Review Journal of American Science 2011; 7(7):906-912]. (ISSN: 1545-1003). http://www.americanscience.org

Key words: Breast cancer, ten years review, advanced disease, distant metastasis, pattern of metastasis

The Effect of CO₂ Emission on Agricultural Sector Value Added; Evidence from G8 Countries

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Abstract: In this paper, we investigate the relationship between carbon emissions and Agricultural Sector Value Added in G8 countries for the period of 2000-2007. Employing the panel regression approach, we find that the effect of CO₂ emissions on Agricultural Sector Value Added is negative. So, the G8 group should decrease CO₂ Emission by necessary policies.

[Esmaiel Abounoori, Younes Nademi, Hanieh Sedaghat Kalmarzi. The Effect of CO2 Emission on Agricultural Sector Value Added; Evidence from G8 Countries. Journal of American Science 2011;7(7):913-915]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: CO₂ Emission, Agricultural Sector, Value Added, G8 Countries

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Indigenous Knowledge: priorities and necessities

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Abstract: Indigenous knowledge owners of world in current age (which known as information age) have valuable experiences from industry age and from inappropriate exploitation of their natural sources. These countries have learned that exporting produced goods is better than selling petroleum. enforcing indigenous productive system at villages and also encouraging youths and teens to learn indigenous knowledge at on hand, and preparing suitable research condition for applied-sciences scholars in order to identify better and increasing applied aptitude of indigenous knowledge at the other hand, is equal to protection and sustainable use of natural resources.

[Mohammad Abedi and Ali Badragheh. **Indigenous Knowledge: priorities and necessities.** Journal of American Science 2011;7(7):1-6]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: indigenous knowledge

Introduction:

Imbalance population growth, non-sustainable efficiency of natural sources and unequal distribution of resources, goods and services made involved societies in confusing issues and impasses. In these countries , inappropriate sampling of abroad countries and inordinate imports (e.g. heterogeneous and non-indigenous technology) devastated independent collection of micro local systems, and instead has established heterogeneous and dependent system to global economy system, that obviously couldn't supply people's needs. Since , this development process is formed without considering social, cultural and environmental consequents so isn't continuing and human have to find strategies which can make development sustainable and humane(Popzan, 2002).

Indigenous knowledge owners of world in current age (which known as information age) have valuable experiences from industry age and from inappropriate exploitation of their natural sources. These countries have learned that exporting produced goods is better than selling petroleum. enforcing indigenous productive system at villages and also encouraging youths and teens to learn indigenous knowledge at on hand, and preparing suitable research condition for applied-sciences scholars in order to identify better and increasing applied aptitude of indigenous knowledge at the other hand, is equal to protection and sustainable use of natural resources(Zare, H and Yaghoubi, 2003).

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(Azkia, M and Imani, 2008) .

Features of indigenous knowledge

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 is 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

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 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 needs and agriculture 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 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).

reaching to sustainable development through native knowledge:

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 fallow:

- 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

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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 and discussion:

In order to develop agriculture extension activities, considering indigenous knowledge is critical because, sense of self-esteem and reliance on local sources would be reinforced by citing of vast application of Iranian indigenous knowledge and others ancient culture of world at sustainable development of industrial countries.

also, necessity of considering indigenous knowledge at developing extension programs is emanated from where that is considered as principal components and sustainable human development items is emanated from same sources. 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 multidimensional 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.

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.

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A ga algorithm for a two-echelon inventory system with space constraint & compare this with simulated annealing

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Abstract: One of the key areas of operations and supply chain management is inventory control. Inventory control determines which quantity of a product should be ordered when to achieve some objective, such as minimizing cost. This paper presents a two-echelon non-repairable spare parts inventory system that consists of one warehouse with space constraint and m identical retailers and implements the reorder point, order quantity (R, Q) inventory policy. We formulate the policy decision problem in order to minimize the total annual inventory investment subject to average annual ordering frequency and expected number of backorder constraints.

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Keywords: Two -echelon inventory system, Space constraint, Genetic, Simulated annealing

1. Introduction

Research on inventory control can be traced back to Harris, who developed the well-known economic-order-quantity (EOQ) model in 1915. Since then, hundreds of papers on inventory control have been published. Most of these papers essentially follow the same approach.

First, the inventory-control problem is translated into a mathematical model. Second, an inventory-control policy that optimizes mathematical model is derived. Third, an algorithm for finding the optimal values of the decision variables of the inventory-control policy is developed. The modeling, the optimization, and the development of the algorithm are performed by highly skilled experts and can be quite time consuming. Since skilled experts are expensive and sought after for a variety of projects in any institution, it would be beneficial to have an alternative approach that requires less expert involvement than the traditional approach.

2. Literature review

One of the most important multi-echelon, multi- item inventory models for spare parts management is METRIC. METRIC is the Multi-Echelon Tech- nique for Recoverable Items Control, developed by Sherbrooke (1968)[10] and it is used for setting repairable items inventory control policies using the base stock model. The base stock model is a special case of the reorder point, order quantity inventory policy, where the reorder quantity Q=1 and it is usually used with expensive, slow moving items, and when the holding and back order costs dominate. The objective function in METRIC is minimizing the expected number of backorders at the

base level, subject to budget constraints while setting optimal inventory policy parameters. In the case of low or medium cost items with medium to high demand rates, the (R, Q) policy may be more appropriate. Many inventory models have been developed for expensive, low demand, and repairable spare parts (e.g. Sherbroo ke, 1968; Grave s, 1985; d Fu, 1997; Diaz an Caglar 2004[10],[5],[4],[1]), where the base stock model is implemented at least at one echelon of the supply network. In other research, rosetti in [14]research about two-echelon non-repairable spare parts inventory system that consists of one warehouse and m identical retailers and implements the reorder point, order quantity (R, O) inventory policy.

3. Problem definition and model formulation

We have a two-echelon inventory system that consists of an external supplier that can supply any item with a given lead time and a single warehouse that supplies any number of independent identical retailers. Under this system, the retailers are faced with demands that are generated by random failures of the spare parts at the customer's sites according to a Poisson process. Since the demand process at each retailer for each item is a Poisson process, the demand process at any warehouse is a superposition of the retailer's ordering processes. Specifically, it is a superposition of renewal processes each with an Erlang inter renewal processes time with Qri stages and rate per state λ_{ri} (Svoronos and Zipkin, 1988[11]).

The above two-echelon (R, Q) inventory system operates as follows. When a retailer is faced

with a demand, the demand is satisfied from shelves if the amount demanded is less or equal to the number of units available. Otherwise, the demand is backordered. Under an (R, Q) policy, item i's inventory position at retailer r is checked continuously, if it drops to or below its reorder point R is placed at the warehouse. The inventory position is defined as the on-hand inventory plus the on-order inventory minus the number of outstanding backorders. After receiving the replenishment order, the outstanding backorders at the retailer are immediately satisfied according to a first-in-first-out (FIFO) policy. Since the same policy is followed at the warehouse. Before proceeding in developing the model, we state our assumptions as follows. We model a two echelon inventory system, where each retailer is replenished by only one warehouse. The demand process at each retailer occurs according to a Poisson process. All orders that are not satisfied from function on hand inventory are backordered (i.e. lost sales are not considered). The warehouse's supplier has infinite capacity with a fixed lead time, the warehouse with space constraint has limited supply, delay time in warehouse (because of shortage) is considered zero and no lateral shipments are permitted between the retailers.

We do not model the delivery process from the retailer to the end customer. The following is a list of the notation that we will use throughout the paper:

w warehouse index

r retailer index

i item index

m number of retailers

N number of items

 F_r target order frequency at retailer r (orders per year)

 $F_{\rm w}$ target order frequency at the ware house (orders per year)

B_r target number of backorders at retailer r

B_w target number of backorders ast the ware house

 λ_{ri} Item i demand rate at retailer r (unit/year)

 λ_{wi} Item i demand rate at the ware house (in units of item i batch size at retailer per year)

 L_{ri} item i lead time (ordering and transportation)at retailer r (year)

 L_{wi} item i lead time (ordering and transportation)at the warehouse (years)

 ℓ_{ri} Item i effective lead time at retailer r (years)

C_i total inventory investment at both echelons(\$)

C superscript that represents the current value

P superscript that represents the previous value

Qri item i replenishment batch size at retailer r(units)

Rri item i reorder point at retailer r(units)

Qwi item i replenishment batch size at the warehouse(in units of Qri)

Rwi item i reorder point at the ware house (in units of Ori)

Ī ri(Rri,Qri) item i expected on-hand inventory at retailer r(units)

Īwi(Rwi, Qwi) item i expected on-hand inventory at the ware house (in units of Qri)

Item i expected number of backorders at retailer

r(units).Also,Bri
$$\overline{B}_{ri}(\overline{R}_{ri}Q_{ri})$$

 $\overline{B}_{\mathit{Wi}}(R_{\mathit{wi}}Q_{\mathit{wi}})$ Item i expected number of backorders at warehouse(in units of Qri)). Also Bwi $\phi(X)$ the pdf of the standard normal distribution

the cdf of the standard normal distribution function $\Phi(X)$

the inverse of the standard normal distribution function $\Phi^{-1}(X)$

Fri item i average order frequency at retailer r Fwi item i average order frequency at the ware house

x_i item i spaceX warehouse space

We assumed identical retailers and formulate the two-echelon (R,Q)policy problem in order to minimize the total annual inventory investment at both echelons subject to the following average annual order frequency and average number of backorder constraint:

Average annual order frequency at each retailer \leq Fri,

Average annual order frequency at the ware house $\leq Fw$, (2)

Total expected number of back orders at each retailer \leq Br, (3)

Total expected number of backorders at the ware house \leq Bw. (4)

We represent the above model mathematically as follows:

Souse (years)
$$\underset{\text{Item i effective lead time at retailer r}}{Minimize}C = m \sum_{i=1}^{N} c_i \bar{I}_{ri}(R_{ri}, Q_{ri}) + \sum_{i=1}^{N} c_i Q_{ri} \bar{I}_{wi}(R_{wi}, Q_{wi})$$
(5)

Subject to
$$\frac{1}{N} \sum_{i=1}^{N} \frac{\lambda_{wi}}{Owi} \le F_{w}, \tag{6}$$

$$\frac{1}{N} \sum_{i=1}^{N} \frac{\lambda_{ri}}{Q_{ri}} \le F_r, \tag{7}$$

$$\sum_{i=1}^{N} \overline{B}_{ri} \left(R_{ri}, Q_{ri} \right) \le B_{r} \tag{8}$$

$$\sum_{i=1}^{N} \overline{B}_{wi}(R_{wi}, Q_{w}) \le B_{w}$$

$$(9)$$

$$\sum_{i=1}^{N} Xi Qwi = X$$
 (10)

$$R_{ri} \ge Q_{ri}$$
 $i = 1.2..., N.$ (11)

$$R_{wi} \ge Q_{wi}$$
 $i = 1.2..., N.$ (12)

$$Q_{ri} \ge 1$$
 $i = 1.2..., N.$ (13)

$$Q_{wi} \ge 1$$
 $i = 1, 2, ..., N.$ (14)

$$Q_{ri}R_{ri}, Q_{wi}, \& R_{wi}$$
: Integers, $i=1,2,...,N$ (15)

Constraint (11) and(12) are used to make sure that the outstanding backorders are satisfied when a replenishment order is received.. Constraints (13) and (14) are used to make sure that the mini mum allow able replenishment order size is one. Constraint (15) is necessary, since in real life no partial parts are ordered. Later on, in order to simplify the problem, constraint (15) will be relaxed to allow for continuous values. Under an(R, Q) policy the expected on-hand inventory for item i at any location when the demand during lead time is modeled using a discrete distribution (under which the inventory level declines in discrete steps) is defined as follows (Hadley and Whitin, 1963 [6]):

$$\bar{I}_i = \bar{B}_i(R_i Q_i) + R_i + \frac{Q_i + 1}{2} - E[D_i]$$
 (16)

Where E[Di] is item i expected lead time demand and $B_i(R_i,Q_{ri})$ is item i expected number of backorders at any time. Since almost all real- world systems involve discrete inventory, it generally makes sense to use the discrete inventory formula (Eq. (16)) even when a continuous model is used to

compute the policy parameters(hopp and spearman, 2001[8]).

Hence, we evaluate the inventory level using Eq.(16). Since the demand process for item i at retailer r is a simple poisson process with an annual rate is:

$$E[Dr_i] = \lambda_{ri} \times \ell_{ri} \tag{17}$$

$$\ell_{ri} = L_{ri} + d_{ri} \tag{18}$$

The first part of Eq.(18), specifically Lri, represents item i's transportation time from the warehouse to retailer r. Since non-repairable spare parts are considered, no parts are shipped back to the warehouse. Hence, no explicit assumption is made on the transportation time from any retailer to the warehouse. Also, ordering times are assumed to be negligible and transportation times are assumed to be deterministic.

Since the demand process at each retailer is a poisson process and an (R,Q) policy is implemented at each retailer, the demand process at the warehouse is a super position of independent renewal processes each with an erlang inter-renewal time with Qri stages and rate per state λri (svoronos and zipkin, 1988[11]). Item i's order frequency at retailer r is:

$$Fri = \frac{\lambda ri}{Ori} \tag{19}$$

Under the assumption of identical retailers item i's demand rate at the warehouse (λ wi) is:

$$\lambda_{wi} = mf_{ri} = \frac{m\lambda_{ri}}{Q_{ri}} \tag{20}$$

Svoronos and zipkin (1988)[11], derived the following expressions for the mean and variance of the warehouse lead time demand under the assumption of identical independent retailers:

$$E[D_{wi}] = \frac{m\lambda_{ri}L_{wi}}{Q_{ri}}$$
(21)

Where E[Di] is item i expected lead time
$$\frac{\lambda L_m}{vi} + \frac{m}{Q^2} + \frac{m}{\sum_{ri}^{2} (\frac{-1 \left[1 - \exp(-\alpha k \lambda L_r) \cos(\beta \lambda L_r)\right]}{\alpha k}) \cos(\beta \lambda L_r)}{2}$$
 (22) and B_i(R_i,Q_{ri}) is item i expected number of $Q^2 = Q^2 =$

Where

$$\alpha_k = 1 - \cos(\frac{2\pi k}{Q_{ri}}),\tag{23}$$

$$\beta_k = \sin(\frac{2\pi k}{Q_{ri}}) \tag{24}$$

We use the normal approximation to the poisson distribution to approximate the distribution of the retailer's lead time demand in addition, We approximate the distribution of the warehouse leadtime demand using a normal distribution with mean and variance as given by eqs.(21) and (22).

Underan (R, Q) policy, item i's expected number of backorders is (see Hopp and Spearman, 2001,[8])

$$\overline{B}_{i}(R_{i}, Q_{i}) = \frac{1}{Q_{i}} [B(R_{i}) - B(R_{i} + Q_{i})]$$
 (25)

$$\beta(x) = \frac{\sigma^2}{2} \{ (z^2 + 1)[1 - I(z)] - z\phi(z) \},$$
 (26)

$$z = \frac{(x - \theta)}{\sigma} \tag{27}$$

Where θ and δ are the mean and standard deviation of the demand during replenishment lead time, respectively. Eq. (26) is the continuous analog of the second-order loss function $\beta(x)$ (Hopp and Spearman, 2001[8]). The second-order loss function represents the time -weighted backorders arising from lead time demand in excess of x (Hopp et al., 1997).

4. Solution Procedure

The above two-echelon (R, Q) optimization model is a large-scale, non-linear, integer optimization problem (M.H.Al-rafai,M.D.Rossetti, 2007[14]).

Under the above assumptions, modeling each echelon independent of the other echelons is not attainable due to the dependency between them. In order to model the warehouse, the retailer's order batch size must be known a priori. To solve the above two-echelon inventory system, we assumed identical retailers and decomposed the problem into two levels; the retailer and the warehouse.

Decomposition has been used widely in many areas such as inventory management and queuing systems (e.g. Cohen et al.1990 [2]).

To solve the problem, we have used two algorithms: genetic and simulated annealing.

Finally we have compared these two algorithms, to introduce a proper solution algorithm.

5. Experimentation and Analysis

In order to asses the quality of the solutions obtained via the above heuristic optimization algorithm we compared the solutions obtained using algorithm genetic with the solutions obtained using algorithm simulated annealing.

For the sake of experimentation, we set the following target values of the order frequency and the expected number of back order constraints at the retailer and the warehouse ($F_r = 10, F_w = 15, B_r = 15$, $B_w = 10$).

also, we set the number of retailers equals to three.

The data of tens sample has been shown in table1:

Table 1

λ_{1}	λ_2	\mathbf{x}_1	X ₂	C_1	C_2
200	250	10	20	120	140

In table2, we have presented ten time repetition results of above sample in both algorithms and their runtimes :

Table 2: ten time repetition results

	First response			•	Improvement in GA				Improvement in SA					
Row	Q1	Q2	K	c	Q1	Q2	k	c	Runtime(s)	Q1	Q2	K	С	Runtime(s)
1	37	30	2	3.03e5	17	42	7	302520	61.33	49	224	15	1002200	61.59
2	28	24	2	270.84e5	33	28	1	270870	68.67	32	494	3	138400	93.28
3	499	23	3	0.482e5	499	23	3	482000	58.85	29	31	4	481960	52.32
4	40	34	2	366e5	20	39	1	365720	54.89	90	20	3	145300	123.16
5	31	30	2	255e5	32	29	7	408310	60.36	107	21	59	856100	48.98
6	27	30	2	203e5	17	42	7	302520	58.03	49	224	15	100220	58.61
7	28	34	2	271e5	33	28	1	270870	66.55	32	494	3	138400	91.71
8	29	31	4	482e5	29	31	4	481960	55.55	499	23	3	482000	41.05
9	40	34	2	366e5	20	39	1	365720	53.22	90	20	3	145300	123.9
10	37	30	2	255e5	17	42	7	302520	58.97	49	224	15	1002200	57.6

5.1 .comparison of two solution algorithms

In this paper, we compare GA algorithm with SA algorithm according to reply quality and problem solving's time.

At first, following supposition tests is used to compare reply quality and run time:

H0: $\mu(fitnessGA) = \mu(fitnessSA)$

H1: $\mu(fitnessGA) \neq \mu(fitnessSA)$

H0: $\mu(RuntimeGA) = \mu(RuntimeSA)$

H1: $\mu(RuntimeGA) \neq \mu(RuntimeSA)$

By t-student test in SPSS software, we analyze our data . in two following tables, analysis results of the first supposition test and the second supposition test have been presented separately: 1)

Table 3: Paired Samples Statistics

		Mean	N	Std.	Std. Error
				Deviatio	Mean
				n	
Pair 1	cost ga	2.4000	10	2.36643	.74833
	cost sa	5.1000	10	3.60401	1.13969

TABLE 4: Paired Samples Correlations

		*****		- 0 0
			Correlation	Sig.
Paoir 1	Cost ga & Cost Sa	10	435	.209

TABLE 5: Paired Samples Test

			Paired Differences							
		Mean	Std. Deviat	Std. Error Mean	Interva	nfidence I of the rence Upper	t	df	Sig. (2- tailed)	
Pair 1	cost ga - cost sa	-2.70000	5.100 11	1.6128 0	6.34840	.94840	- 1.674	9	.128	

TABLE : Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 2	time ga	63.6000	10	35.14478	11.11376
Pall 2	time sa	63.9000	10	17.89755	5.65970

Table 7: Paired Samples Correlations

		N	Correlation	Sig.
Pair 2	time ga & time sa	10	.441	.202

Table 8: Paired Samples Test

			Paired Differences									
					95% Cor							
					Interval of the				Sig.			
			Std.	Std. Error	Difference				(2-			
		Mean	Deviation	Mean	Lower	Upper	t	Df	tailed)			
Pair 2	time											
	ga- time	30000	31.62647	10.00117	-22.92421	22.32421	030	9	.977			
	sa											

According to the results, in both tests zero supposition is rejected . now we should examine two following tests:

3) H0: $\mu(fitnessGA) \succ \mu(fitnessSA)$ H1: $\mu(fitnessGA \prec \mu(fitnessSA))$

4) H0: $\mu(timeGA) \succ \mu(timeSA)$ H1: $\mu(timeGA) \prec \mu(timeSA)$

To doing these tests, we use Minitab software.software output for both tests has been presented:

3) Two-sample T for FITNESS(COST) GA vs FITNESS(COST)SA

N Mean StDev SE Mean COST GA 10 355301 80095 25328 COST SA 10 449208 376980 119212

Difference = mu (COST GA) - mu (COST SA) Estimate for difference: -93907

95% lower bound for difference: -317313

T-Test of difference = 0 (vs >): T-Value = -0.77 P-Value = 0.770 DF = 9

4) Two-sample T for RUN TIME GA vs RUNTIME SA

N Mean StDev SE Mean
RUNTIME GA 10 59,70 5,01 1,6
RUNTIME SA 10 75,3 30,5 9,7
Difference = mu (RUN TIME GA) - mu (RUNTIME SA)
Estimate for difference: -15,60
95% lower bound for difference: -33,54
T-Test of difference = 0 (vs >): T-Value = -1,59 P-Value = 0,927 DF = 9

According to the analysis results, zero supposition of the third test is acceoted . so reply quality of SA algorithm is better than that of GA algorithm . And zero supposition of the forth test is accepted, there fore Run time of SA algorithm is less than Runtime of GA algorithm .

6.Conclusion and future work

We modeled a two – echelon inventory system that implements (R,Q) policies at each facility. In order to solve the two-echelon inventory system we decomposed it by echelon . by GA and SA algorithms, we have solved the model . the results shows that reply quality of SA algorithm is better than that of GA algorithm and SA algorithm reach to reply in short of time.

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An efficient method to improve Information Recovery on Web

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Abstract: The information content on Web is very large and number of users is interacting with it in diverse manner and is growing fast. Information retrieval on web is concerned to capture precise and accurate content as requested in real time. To enhance the performance of Information Retrieval on web quality metrics are needed to be satisfied. The proposed research deals with introduction of such quality metrics, which can improve Information Retrieval systems on web. Different quality matrices are analyzed that are used for IR system. Information Retrieval metrics are already defined but they still could not make up with the relevancy requirement of users. Proposed Subsumption metrics is based on ontology to improve user query results and enhance the quality of retrieval. IR systems based on ontology are already in practise but they are not using any kind of metrics and they are specific to their respective domain. It is required to introduce such kind of metrics which is generic to all the systems and improves relevancy by incorporating Subsumption metrics. [Dr. Muhammad Shahbaz, Dr. Syed Muhammad Ahsan, Farzeen Abbas, Muhammad Shaheen. An An Efficient Method to Improve Information Recovery on Web. Journal of American Science 2011;7(7):13-23]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Subsumption Metrics, Information Recovery

Introduction

World Wide Web is a very diverse environment unlike usual situation, where traditional information retrieval systems function. Conventional IR systems function in extremely controlled, central and comparatively stable environment. New documents are added in the system, but in a restricted fashion. At times previous documents are detached or moved (for instance in case the "contemporary" database of a bibliographic IR system maintains documents from the last two years only, and older ones are saved to an archive). Also documents or their representations might change and mistakes could be corrected and problems could be solved. The major issue is that there ought to be quality metrics available to estimate and evaluate the performance of IR system based on web

A classical IR system designed for Web based retrieval has to face different challenges correlated to the *functionalities and requirements* as following.

- Comprehensive coverage: Since the size of web is very large comprising of huge information base; the system must have the capability to retrieve data as required by user from all of the recourses within a complex structure of web.
- Effective discovery: The IR system must be efficient, fast and effective in order to respond significance relevance & ranking necessities and give valuable and useful search results.
- Contextual: The system must be capable to hold partial, imprecise, incomplete data & frequently depends on contextual info.

- Adaptive: The system must be adaptive in a sense of query updation & modifications, and also query interface and usability.
- Ability to learn: The system must have a learning element in order to obtain information regarding the user, the information content and structure, and user and system's interactions.
- Effective content delivery: The system must be capable to rank, recapitulate, and personalize information content for correctness in delivery.
- Easy to use: It must be robust, easy and flexible in order to use with greatly developed and smart, intelligent and simple user interfaces.

Consequently, quality metrics are required in order to provide proficient and effective parameters & measures for IR system based on web.

Evolutionary and Adaptive Web Based Information Retrieval System

The Internet and World Wide Web (WWW) are continuously becoming more dynamic and active in terms of information content and use. Information retrieval (IR) aims to keep up with this environment by manipulative intelligent systems that can deliver Web information content in real time to variety of wired and wireless devices. Evolutionary & adaptive systems are emerging as classical examples of such kind of systems. This paper gives one of attempts to collect and evaluate the type and nature of recent research on Web based IR using evolutionary & adaptive systems and proposes research incentives in

parallel to advancement and developments in Web environments. [1]

Criteria for Evaluating Information Retrieval Systems in Highly Dynamic Environments

The World Wide Web is complex environment as compared to usual setting, where typical information retrieval (IR) systems work or operate. Classical information retrieval systems operate in a well controlled, central and comparatively stable environment. Documents could be added, but in a controlled manner. Old documents are moved (such as in case of "current" database tables of a bibliographic information retrieval system maintains documents from previous two years, and the older are saved in an archive); also documents representations might change such as correction of mistakes and so on. The main point is that all of the processes functions in highly controlled manner. [2]

Semantic Metrics, Conceptual Metrics, and Ontology Metrics

Resemblances and diverseness b/w "semantic metrics" (i.e. metrics defined on a knowledge based IR system) & "conceptual metrics" (i.e. metrics defined based on a Latent Semantic Indexing IR system) are discussed in the paper. Prospective collaboration areas among research groups are recognized. Prospective application and cooperation areas of research area known as "ontology metrics" metrics computed on the base of ontologies that constitutes the part of an ontology software system, are also discussed. At present ontology metrics are considered using techniques that are similar to semantic metrics, but there are other semantic based extensions similar to conceptual metrics. [3]

Ontology based Web Crawler

The constraint of a web Crawler to facilitate downloading of relevant pages is a major confront in field of Information Retrieval (IR) Systems. Usage of link analysis algo such as page rank and Importance metrics have shown a novel move toward prioritizing URL queue to download highly relevant pages. In current paper, the amalgamation of above metrics along with latest metric known as association metric has been proposed. The association metric approximates the semantic substance of the URL that is based on domain based ontology; that in return reinforces the metric used for recommending URL queue. Proposed metric would solve the main problem of discovery the relevancy of pages prior to procedure of crawling to the best possible and optimal level. [4]

Problem Statement:

Keeping in view the swiftly increasing rate of web and also its applications; is creating a lot of aspects underneath contemplation. To deal with

dynamically budding technology, it has turn out to be indispensable to enhance IR systems based on web.

I am interested here to propose metrics that will increase the quality of web-based IR Systems. This proposed research deals with the problem of introducing such metrics, which will be used to improve the quality of web-based IR Systems.

Methodologies:

Following activity plan is laid to accomplish the required objective

- 1. Extensive review of the existing IR matrices required for non-web based system.
- 2. Review of methods/models used to maintain information in www.
- 3. Formalization to use non-web based IR matrices for web based IR systems
- 4. Case-study, evaluation and validation of metrics.
- 5. Development, testing and verifications of purposed solution.
- 6. Comparison between existing IR metrics and proposed metrics.
- 7. Conclusions over comparison results.

Proposed Solution

Metrics are set of variables or methods of quantitative and occasional evaluation of a process including the events to perform measurement. Metrics are specific to a domain and that is why they are only applicable in particular field of study for which they are designed. [5]

Since we are concerned about metrics of Information Retrieval System, first have a look at Information retrieval System. Information Retrieval System is the discipline for extracting information from documents that includes searching of documents and the meta data which explains the documents and also searching through databases that might be Relational databases or Hypertext as in case of World Wide Web. However, there is mystification among the terms document retrieval, text retrieval, information retrieval, data retrieval. Each of these disciplines is based on its own theory and technology. Information Retrieval is the most promising and emerging field that is interdisciplinary and have overlapping of computer science, maths, statistics, physics, linguistics and information sciences. [6]

Information Retrieval Systems based on ontology is of prime concern to get more structured and meaningful data or result. Ontology is a term originated from Philosophy. In computer sciences ontology is being used as a model for description of types, properties and relationships of objects. Though provided definition of ontology do varies, but it is assumed that real world and ontology features are analogous. [7]

Ontology based Information retrieval systems are already in practise now.

For geographical information retrieval of place by means of place name, ontology based Information retrieval system was developed which returns the results in form of documents images and records of the desired geographical place.[8]

Textpresso is text mining IR system for biological data using biological concepts e.g. genes, cell, cell group and biological processes that relate the objects. [9]

David Vallet, Miriam Fernández, and Pablo Castells proposed ontology based retrieval model for exploitation of ontologies in knowledge bases to imply semantic search. [10]

All of the IR systems discussed above are based on ontology but they are not using any kind of metrics and they are specific to their respective domain. It is required to introduce such kind of metrics which is generic to all the systems and improves relevancy by incorporating ontology in Information Retrieval Systems. Also ontologies introduced must be refined. For this purpose normalization techniques are employed.

Normalization is being used to discover attributes of semantics of ontology in the manuscript constitution. Five normalization forms are introduced to identify each and every class / subclass of ontology, eliminate redundancy and materialize each property instance.

SubSumption Metric

World Wide Web is a major interactive source of business & daily life information. The information content on Web is very large and number of users is interacting with it in diverse manner and is growing fast. Information retrieval on web is concerned to capture precise and accurate content as requested in real time. To enhance the performance of Information Retrieval on web quality metrics are needed to be satisfied. The proposed research deals with introduction of such quality metrics, which can improve Information Retrieval systems on web. Different quality matrices are analyzed that are used for IR system. Information Retrieval metrics are already defined but they still could not make up with the relevancy requirement of users. Proposed metrics is based on ontology to improve user query results and enhance the quality of retrieval. Hence ontology is essential part of projected subsumption metrics.

What ontology has in common in both computer science and in philosophy is the representation of entities, ideas, and events, along with their properties and relations, according to a system of categories. In both fields, one finds considerable work on problems of ontological relativity. Ontologies are used in Artificial Intelligence, the Semantic Web, Software Engineering, Biomedical Informatics, Library Science, and Information Architecture as a form of knowledge representation about the world or some part of it.

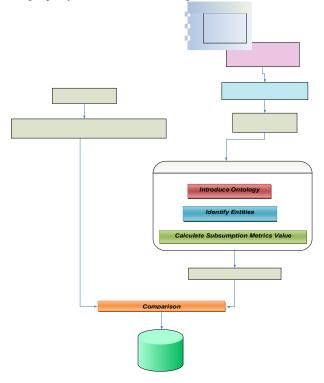


Figure 1 Subsumption metrics based information retrieval system

Following is the high level diagram of the information retrieval system with Subsumption metrics introduced.

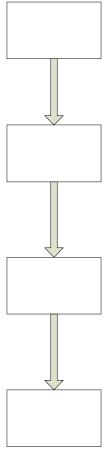


Figure 2: Information Retrieval System, High level diagram

Following are the steps needed to follow in order to get the value of SubSumption metric.

Step 1. Normalization of Ontological Metrics

Now it will be discussed that how normalization can be achieved. The basic purpose of normalization is to find the features of semantics of ontology within the document structure. [11]

The following normalization steps are applied:

- 1. Name all significant classes, so no unknown composite class descriptions are left
- 2. Name unidentified individuals
- 3. Turn up the subsumption hierarchy & normalize names/labels
- 4. Detect and find the deepest/cordial potential class or property
- 5. Normalize property instances

In the **first normalization** attempt is made to liberate unknown multipart class descriptions Keep in the view that it is likely to set up named classes that are insatiable. This is not the idea that the ontology

becomes insatiable, but exclusively these recently introduced classes.

The **second normalization** removes unidentified individuals. It is assumed that every empty node that is of (declared or secondary) category individual requires to be regenerated with a Uniform Resource Identifier (URI) reference.

The **third normal form** turns up the subsumption hierarchy & normalizes labels. The subsumption formation now shapes a directed acyclic graph so as to signify the whole subsumption hierarchy of novel ontology.

So set of normal classes of ontology can be defined as following:

Every class that contributes in a subsumption axiom following the 3rd normalization of ontology is basically normal class of respective ontology. In case a property has more than one name, we choose one (or bring in a new name & position the equality). Each and every normal property names needed to be declared clearly to be equal to the entire additional property names they are equivalent to (so as to is, we materialize the sameness relations linking the normal property names & the non-normal ones). All incidences of non normal property names (also contained by axiom giving equality by means of normal property name, and in addition in annotation property occurrences) are substituted by normal property name. Similar is the case with the individuals. If there is a scenario that an individual has multiple names, we make a decision to introduce a normal one & describe explicitly equality or correspondence to the normal name, and then substitute every single instances of non-normal entity names by normal names (moreover inside the axiom giving sameness in the company of normal individual name, and as well as inside annotation property occurrences).

The **fourth normalization** intend towards touching the instantiations or occurrences to the deepest achievable level, since this suggests nearly all information explicitly (and obtaining instantiations and occurrences of upper levels is very economical for the reason of declared explicitness of hierarchy owing to 3rd normal form). This is not the reason that each occurrence or instance will fit in only one class, several instantiations will be essential in wideranging.

The **fifth normalization** concludes normalization of properties i.e. turns up property instances of symmetric & opposite properties, also removes the transitivity connection. This can be completed alike to the formation of subsumption hierarchy in 3rd normalization: following materializing every one of property instances, eliminate every unnecessary and

redundant in sub ontology, that includes just the property instances of each and every transitive properties, also the axioms giving the transitivity of respective properties. It is significant to state that normalization does not guide to canonical or basic normalized edition. Which represents that there might be a good deal of ontology that comes as a result of normalization of ontology. Frequently normalizations do not result in canonical or simple, unique results. There might be conjunctive normal forms.

Step 2. Identify Entities

Once ontology is defined in the system by normalization, System would identify the unique entities/ classes based upon their subsumption hierarchy.

Step 3. Calculate the Value of Subsumption Metrics Subsumption metrics consist of two values i.e.

- 1. Number of classes or entities found in particular document
- Frequency of occurrence of each of the class or entity found in the document based on ontology.

Step 4. Find Results

So end result of normalization would be subsumption metrics which defines number of classes identified after normalization. The more the number of classes/ entities; the less specific or irrelevant is the document or document is more generic. The lesser the number of classes/ entities the more specific is the document. By comparing the value of classes to the given search term in the query; we can find the desired document. Also if in any document there is only a single entity/ class and also its frequency is very less say one or two, these kinds of documents are treated as documents that only contain the definitions. They are relevant to user query but of less importance than the documents which have smaller the no. of entities and greater the no. of frequency of that particular entity/ class.

Proposed Information Retrieval System with improved relevancy

Following are the steps that are followed to in order to implement the design of proposed subsumption metric based information retrieval system. Here I have used GATE software in order to give the overview of proposed information retrieval system.

GATE [12] as architecture proposes that the modules

GATE [12] as architecture proposes that the modules of software systems which develops natural language could suitably be broken down hooked on variety of elements, identified as resources. Elements are reusable software lumps with distinct interfaces, and are accepted architectural form, that is being used in Sun's Java Beans & Microsoft's .Net, for instance.

GATE components are specific kinds of Java Bean, and they come in three flavors:

- LanguageResources (LRs) correspond to entities e.g. lexicons, corpora or the ontologies;
- ProcessingResources (PRs) symbolize entities that are for the most part algorithmic, e.g. parsers, generators or ngram modellers; VisualResources (VRs) characterizes visualisation and editing components that play a part
- in GUIs.

These classifications can be indistinct in practice as required.

Jointly, the group of resources incorporated with GATE is known as CREOLE: Collection of REusable Objects for Language Engineering. All the resources are wraped up as Java Archive or 'JAR' files, Also several XML pattern data. The JAR & XML files are prepared so that they are available to GATE by placing them on a web server, or merely setting them in confined file space. While using GATE to build up language processing functionality for specific application, the developer exploits the development environment & the framework to assemble resources of the above mentioned three types. This possibly will involve programming, or the expansion of Language Resources e.g. grammars that are used by presented Processing Resources, or a combination of both can also be employed. The purpose of using development environment is to visualize the data structures created and consumed throughout processing, and also for the sake of debugging and performance measurement.

The GATE development environment is similar to systems akin to Mathematica for Mathematicians and JBuilder for Java programmers i.e. it gives a well-situated graphical environment for examining and expansion of language processing software.

When a suitable set of resources are developed, they could be entrenched in the target client application with the help of GATE framework.

a) Add required plug-in. In current scenario I have added Ontology Plug-In

1. Plug-in ontology

OWL file .ontology

OWL is a file required when the information in documents needs to be processed by machine/applications, as compared to scenarios where the information only needs to be given to humans. OWL is used to (explicitly) signify the meaning of terms in glossary and also relationships among those terms. This presentation of terms/keywords and their interrelationships is known as ontology. OWL has

facilities to express syntax and semantics as compared to XML, RDF, and RDF-S, therefore OWL ability to characterize machine interpretable data on Web. OWL is a modification of DAML+OIL web ontology language which incorporates features and improvements DAML+OIL.

OWL has been developed to convene the requirements for a Web Ontology Language.OWL is component of W3C recommendations stack linked to the Semantic Web:

- XML gives syntax for structured web pages/ documents, but does not impose any semantic limitation on documents meaning.
- XML Schema is a used to restrict structure of XML documents and extend XML with data types.
- RDF is a data-model for objects known as resources and relations among them, gives a simple semantics model for this data.
- RDF Schema is basically vocabulary for explaining properties and also classes of RDF resources, along with semantics for generalization hierarchies of these properties and classes.
- OWL gives addition to more vocabulary for properties discripption and classes, relations between classes, cardinality, equality, properties, characteristics of properties and last but not the least enumerated classes.

2. Identify Entities Example of Ontology

<rdf:RDF

xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"

xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"

xmlns:owl

xmins:owi

="http://www.w3.org/2002/07/owl#"

xmlns="http://www.mydomain.org/african">

<owl: Ontology rdf:about="">

<owl:VersionInfo>

Server load management example version 1.2, 20 April 2010

</owl:VersionInfo>

</owl:Ontology>

<owl:Class rdf:ID="server load management">
<rdfs:comment>load management of server is a

class</rdfs:comment>

</owl:Class>

<owl:Class rdf:ID="layer 4 load balancing">

<rd>fs:comment> layer 4 load balancing is type of server load management </rdfs:comment>

<rdfs:subClassOf rdf:resource="#server load
management"/>

</owl:Class>

<owl:Class rdf:ID="layer 7 load balancing">

<rdfs:comment> layer 7 load balancing is type of server load management </rdfs:comment>

<rdfs:subClassOf rdf:resource="#server load management"/>

</owl:Class>

<owl:Class rdf:ID="Global server load
balancing">

<rdfs:comment> Global server load balancing
is part of Server load management
</rdfs:comment>

<rdfs:subClassOf>

<owl:Restriction>

<owl:onProperty rdf:resource="#is-part-of"/>

<ow:allValuesFrom rdf:resource="# Server
load management "/>

</owl:Restriction>

</rdfs:subClassOf>

</owl>

<owl:Class rdf:ID="Application acceleration">

Web Ontology Language: OWL 19

<rdfs:comment>

Application acceleration steps up application delivery

</rdfs:comment>

<owl:intersectionOf

rdf:parsetype="Collection">

<owl:Class rdf:about="#application delivery"/>

<owl:Restriction>

<owl:onProperty rdf:resource="#steps up"/>

<owl:allValuesFrom>

<owl:unionOf rdf:parsetype="Collection">

<owl:Class rdf:about="#application delivery"/>

<owl:Restriction>

<owl:onProperty rdf:resource="#is-part-of"/>

<owl:allValuesFrom rdf:resource="#Server</pre>

load management"/>

</owl:Restriction>

</owl>

</owl>

</owl>

</owl:intersectionOf>

</owl:Class>

</rdf:RDF>

b) Add the document that is needed to be processed such as we can consider a text document but it is required that document must be of .txt format.

3. Apply rule in order to calculate subsumption metrics values.

JAPE – Java Annotation Patterns Engine is basically used to insert various rules in GATE plugIn. JAPE gives finite state transfer over annotations that are based on standard expressions. Regular expressions are used to character strings, but here they are applied

to a much more complex data structures. The result is in many cases matching procedure in non-deterministic: when structure in the graph being matched requires more as compared to regular automaton to recognize, the JAPE selects a substitute at random.

A JAPE grammar is comprised of set of phases. Each of phrases is composed of a set of pattern/ action rules. Also the phases run in sequence and form a flow of finite state transformers over annotations. The left hand side (LHS) of rules is comprised of an annotation pattern which have regular expression operators e.g. *, ?, +. The right hand side (RHS) is made up of annotation operation statements. Comments/ Annotations are matched on LHS of a rule and can be referred to on the RHS with the help of tags which are attached to pattern essentials.

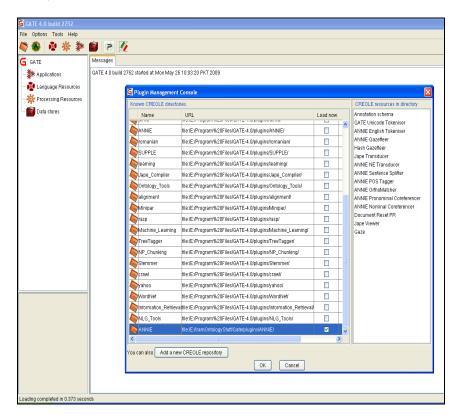
At the start of each grammar, quite a few options can be placed:

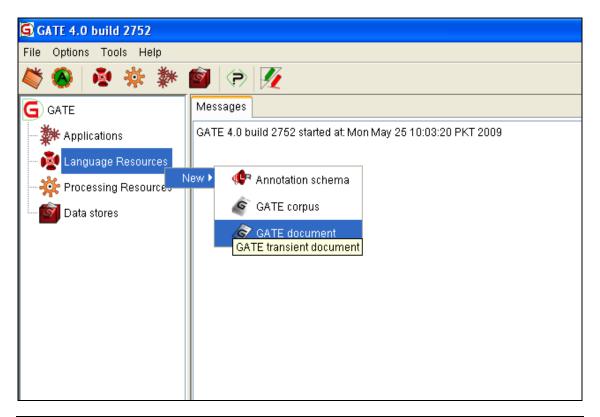
- Control: defines the techniques of rule matching
- Debug: when it is set to true and the grammar is working in Appelt mode. If there is more than one match than conflicts will be presented.
- c) Input annotations are defined at the beginning of each grammar. If no comments/ annotations are clear, all annotations will be

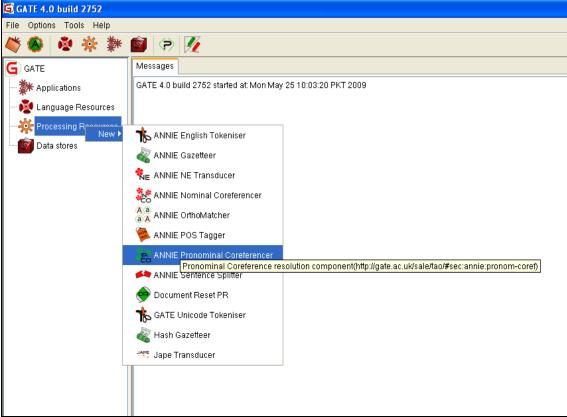
matched. There are three ways in which pattern can be defined:

- Define a string of text, for example. {Token.string == "the"}
- Identify an annotation formerly assigned from gazetteer, lookup, tokeniser, or other module.
- give the attributes of annotation),that is .
 {Token.kind == string}

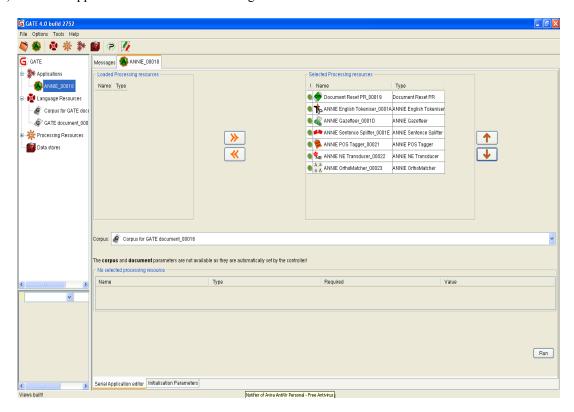
d) Add the required Processing Resources from the list.





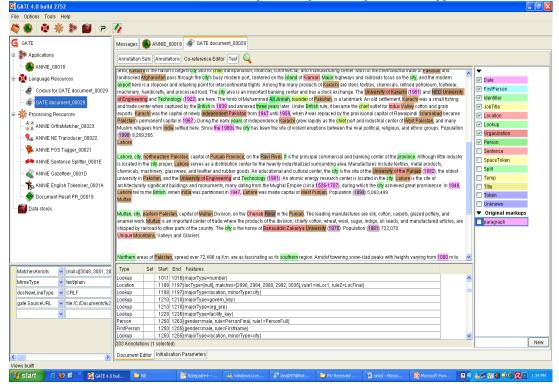


e) Add the application and run the Processing Resources.



4. Results

The results are shown after whole document processing according to the rule applied.



As case study five documents were processed [13], [14], [15], [16], [17], [18].

Then the value of subsumption metrics was calculated which included no. of entities/ classes in each document and their respective frequencies. Based upon the achieved results from subsumption metrics value, relevancy ranking was made. Then results were obtained by quering the google search engine.

Finally documents were given to MS students to evaluate the document relevancy against the query. It was found that documents relevancy ranking based on subsumption metrics were more according to user's requirements as compared to the one found using traditional search system e.g. google.

Table 6.1 Subsumption metrics values of five documents

Document	Document 1	Document 2	Document 3	Document 4	Document 5
Entitity:Frequency					
$E_1:F_1$	$D_1E_1:2$	$D_2E_1:4$	$D_3E_1:1$	$D_4E_1:1$	$D_5E_1:1$
$E_2:F_2$	$D_1E_2:3$	$D_2E_2:1$	$D_3E_2:1$	$D_4E_2:1$	$D_5E_2:5$
$E_3:F_3$	$D_1E_3:1$	$D_2E_3:1$	$D_3E_3:1$		$D_5E_3:1$
$E_4:F_4$	$D_1E_4:1$	$D_2E_4:1$	$D_3E_4:1$		$D_5E_4:1$
$E_5:F_5$	$D_1E_5:1$	$D_2E_5:1$	$D_3E_5:1$		
$E_6:F_6$	$D_1E_6:2$		$D_3E_6:1$		
$E_7: F_7$	$D_1E_7:1$		$D_3E_7:1$		
$E_8:F_8$	$D_1E_8:1$				

Highlighted row shows the frequency of desired entity in respective documents.

As shown in the table; Document 5 is the most revelant document retrieved against the user query when subsumption metrics was introduced in the system. While in case of simple search Document 1 was graded as the most promising result, Document 2 as 2nd and so on upto Document 5 as shown in the table 1. But by implying proposed system Document 1 was ranked at the 2nd position, Document 4 at 3rd, Document 3 at 3rd, Document 2 at 4th and Document 5 at 1st position. This shows by introducing subsumption merics in the Information Retrieval systems, quality of retrieval can be improved greatly.

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1/3/2011

Integrating Orthogonal Frequency Division Multiplexing [Ofdm] And Multiple Input Multiple Output [Mimo] as Joint Transmission Scheme

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Abstract: Wireless medium is a hostile propagation medium suffering from multipath fading and interference from other sources. Time Diversity and Frequency Diversity provide provides effective methods to mitigate fading and interference, this improving link robustness. Spatial Diversity provides link reliability without compromising on spectral efficiency. Space-time-coding provides potentially increased robustness and capacity by exploiting the fact that multiple antennas can be used in both transmitting and receiving equipments. This spatial multiplexing technique is termed as Multiple-Input-Multiple-Out ["MIMO"]. Most of the previous work in the area of "MIMO" wireless has been restricted to narrowband systems. Orthogonal-Frequency-Division-Multiplexing ["OFDM"] significantly reduces receiver complexity in wireless broadband systems. The use of "MIMO" technology in combination with "OFDM" seems to be an attractive solution for future broadband wireless systems. This paper is aimed at looking at possible integration of "MIMO" with "OFDM" and establishing improvements it has to offer for wireless networks. Various schemes that employ multiple antennas at the transmitter and receiver are being considered to improve the range and performance of communication systems. [Syed Ahsan, Muhammad Shahbaz, Syed Athar Masood. Integrating Orthogonal Frequency Division Multiplexing and Multiple Input Multiple Output as Joint Transmission Scheme. Journal of American Science 2011;7(7):24-27]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Time Diversity, Frequency Diversity, OFDM, MIMO

1. Introduction:

"MIMO" happens to be the most suitable multiple antenna technology for large deployments of commercial networks. It offers a linear increase in throughput with every pair of antennas added at transmit and receive ends of the system. It increases throughput simply by exploiting spatial dimension by increasing number of unique spatial paths between the two ends of a wireless network. An environment rich in multipath (like dense urban morphology and in-building coverage) makes it most appropriate for multiple antenna array implementations.

"OFDM" is a significantly efficient modulation scheme. It ensures spectral efficiency by dividing a broadband channel into multiple sub-channels. Each of the frequencies is an integer multiple of a fundamental frequency. This ensures that even though the sub-channels overlap they do not interfere with each other. The use of IFFT and FFT for modulation and demodulation results in computationally efficient "OFDM" modems.

"MIMO-OFDM" combines "OFDM" and "MIMO" techniques thereby achieving spectral efficiency and increased throughput. A "MIMO-OFDM" system transmits independent "OFDM" modulated data from multiple antennas simultaneously. At the receiver, after "OFDM" demodulation, "MIMO" decoding on each of the sub-

channels extracts the data from all the transmit antennas on all the sub-channels. This paper provides a focus on various aspects of their integration.

Although both "MIMO" and "smart antenna" systems employ multiple antennas spaced as far apart as practical but "MIMO" and smart antenna systems are fundamentally different.

Smart antennas enhance conventional, onedimensional radio systems. Commonly they use dynamic / static beam-forming to concentrate the signal energy on the main path and receive diversity to capture the strongest signal at any given moment. Note that beam-forming and receive combining are only multipath mitigation techniques, and do not multiply data throughput over the wireless channel. Both have demonstrated improvements performance incrementally in point-to-point applications. "MIMO" is a paradigm shift, dramatically changing responses to multipath propagation. While receive-combining and beamforming increase spectral efficiency one or two b/s/Hz at a time; "MIMO" multiplies the b/s/Hz.

"MIMO-B" has following key characteristics:

- Higher throughput
- Improvement in Spectral Efficiency
- Higher Frame / Slot Utilization
- It is based on Spatial Multiplexing [SM]

SM achieves higher throughput by transmitting independent data streams on different transmit branches simultaneously and at the same carrier

frequency. Receiver equipment recovers parallel streams of data. This technique requires multiple antennas at receiving end to ensure adequate performance.

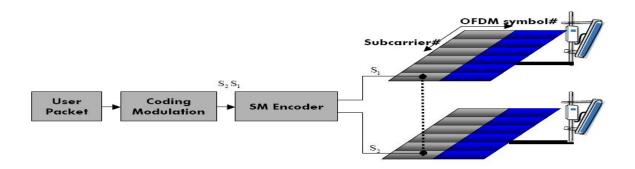


Fig-1: "MIMO-B": SM Architecture [5]

2. COMPARATIVE STUDY: MIMO-B vs. Channel-Bonding [CB]

Channel-bonding is one of the most direct methods of increasing throughput. It multiplies throughput by combining two or more radio channels. But this technique consumes increased bandwidth. In some cases, lack of available bandwidth can limit the use of this technique. Also that use of increased bandwidth can cause interference on air-interface. In other cases, benefits may be reduced due to technical challenges.

Although both "MIMO" and CB can multiply throughput but there are two key differences between the approaches. Although CB increases throughput and capacity, it may reduce range slightly whereas "MIMO" enhances all three performance attributes simultaneously. And while CB increases throughput by consuming more bandwidth, it results may result in higher interference to other channels. On the contrary, "MIMO" increases spectral efficiency by multiplying throughput in the same bandwidth. [6]

"MIMO" based products will outperform smart-antenna and CB based products. ""MIMO"" based products can make judicious use of smart antennas and CB to offer even more benefits.

MIMO – OFDM INTEGRATION

"MIMO" can be used with any modulation or access technique. Today, most digital radio systems use TDMA, CDMA, or ""OFDM"".

TDMA systems transmit bits over a narrowband channel using time slots to segregate bits

for different users. CDMA systems transmit bits over a wideband channel using codes to segregate bits for different users. "OFDM" is also a wideband system, but unlike CDMA which spreads the signal continuously over the entire channel, "OFDM" employs multiple, discrete, lower data rate subchannels.

"MIMO" can be used with any of above mentioned access techniques. However research shows that implementation is much simpler—particularly at high data rates—for "MIMO-OFDM".

Most of the previous work in the area of "MIMO" wireless has been restricted to narrowband systems. Broadband "MIMO" channels offer higher capacity and frequency diversity due to delay spread apart from spatial diversity. "OFDM" significantly reduces receiver complexity in wireless broadband systems. Thus integration of "MIMO" and "OFDM" seems to be an efficient method of achieving higher data rates and robustness for future broadband wireless systems.

3. WORKING PRINCIPLE OF MIMO-OFDM INTEGRATION

Up-link:

- Mobile Subscriber Station [MSS] starts by transmitting pilot sequences for the channel estimation.
- The scheduler in Base Station [BS] assigns the required resources in the spacefrequency domain to MSS such that the

- desired quality-of-service requirements can be met. Each spatial and frequency channel should at least have individual modulation, steered by the link adaptation unit.
- Power control is realized using the joint space-frequency pre-processing after modulation.
- Finally, the signals are passed through an IFFT, modulated onto the carrier and transmitted over the air. In principle, the corresponding units are used in reversed order at the BS.
- Following the classical system approach, most of signal processing efforts in "MIMO" systems except power control and rate adaptation are performed by BS.

Down-link:

• BS requests MSS to transmit in uplink direction pilot sequences for the channel

- estimation and interference scenario faced by MSS.
- Using channel reciprocity, the channel state information from the up-link is then correspondingly used to steer the space-frequency pre-coding and to schedule the data transport in the space-frequency domain at BS. This maximize throughput and to minimize latency of the individual users
- The data is pre-coded, which means that the "MIMO" processing is already done at BS, so that only minor post-processing is required at the MSS, such as scaling, demodulation and decoding.
- The data streams to be multiplexed in space shall already arrive spatially separated at the MSS antennas.

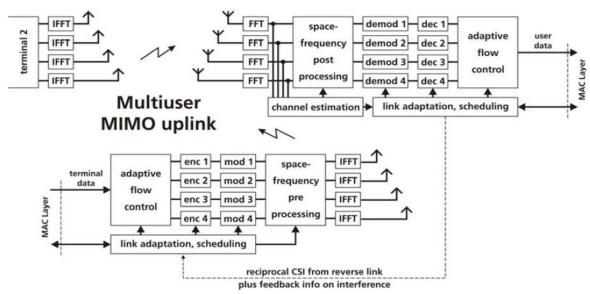


Fig-3.1: "MIMO-OFDM" Transceiver Block Diagram [8]

Duplex Recommendation:

Time Division Duplex (TDD) mode allows reusing channel state information from downlink to uplink and vice versa. Thus offering flexibility in terms of signal processing shifting. This enables design of user terminals with high data rates offered at lower costs. Moreover, link adaptation becomes more optimal.

Hence it is recommended to use TDD for all "MIMO-OFDM".

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Sodium And Potassium Ion Losses In Rabbits Infected With Strains Of Aeromonas Hydrophila: Implication For Its Roles In Diarrhoea

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ABSTRACT: The plasma levels of sodium and potassium ions were periodically (at 12 hourly intervals) estimated in rabbits orally infected with clinical and environmental Isolates of Aeromonas hydrophila. Infections with clinical isolates resulted in a 54.5% and 32.1% losses in Na⁺ and K⁺ ions respectively after 96 hours. Infection with the environmental isolates was however less severe resulting in a 42.7% and 16.2% depletion of plasma Na⁺ and k⁺ respectively 96 hours post oral challenge. It is concluded that A. hydrophila isolates from this locality are capable of causing diarrhoea as evidenced by the results. It is suggested that patients with diarrhoea require prompt treatment in order to avoid allowing decrease in plasma electrolytes which will worsening prognosis thereby increasing morbidity and mortality associated with diarrhoea diseases.

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Key words: Enteropathogecity, Aeromonas hydrophila, Diarrhoea, immune suppression, infection.

Introduction

Aeromonas hydrophila has been implicated in both human and animal infections alike. Red leg disease of frogs, development of furunculosis or hemorrhagic septicemia in fishes, acute septicemia characterized by lethargy in snakes and lizards, pneumonia and ulcerative stomatitis which are known to cause considerable mortality in colonies have been documented in humans; and nosocomial infections have been reported in immunosuppressed patients and patients receiving antibiotic therapy (Daley et al 1981, Gracrenits and Bucher, 1983).

The enteropathogenic nature of Aeromonas strains was proposed based on the observation that patients who took antibiotics to which aeromonas strains were susceptible experienced alleviation of their gastrointestinal symptoms and that the organisms were acquired by drinking untreated water, (Holmber, et al, 1986). In some cases, the factors correlated with infections were consumption of uncooked shell fish, raw oyster; and foreign travelers gastrointestinal infections are usually self limiting in normal individuals and remains localized (singh and sanyal, 1993). Blood and mucus in the stool and other clinical implications suggested enteroinvasiveness of the organism. Besides gastrointestinal infections, eye, urinary tract infections meningitis osteomyelitis, septic arthritis, endocarditis, peritonitis among others are common human infections caused by Aeromonas species. It is the aim of this study to establish the

values of sodium and potassium ion losses in rabbits infected with strains of *Aeromonas hydrophia*.

MATERIALS AND METHODS

Equipment: The equipment used in the course of this study include Autoclave, Aluminium toil, Beakers Bursen Burner, centrifuge, spectrophotometer, flame photometer, cotton wool, refrigerator, wire loop, measuring cylinder, incubator, Hot air oven, reagent bottles, Pasteur pipette, sterile petridishes, weighing Balance.

Chemicals: The following chemicals and reagents were used:

Heparinated tubes, Distilled water, nutrient agar base, phosphate Buffered saline (PBS), sodium dihydrogen monophosphate (NaH₂, P04.2H_{2O}) disodium hydrogen monophosphate (Na₂HP04), blood agar base.

SOURCE OF ORGANISM

The clinical and environmental isolates of Aeromonas hydrophila employed for this study were obtained from the microbiology department, Faculty of Natural sciences, Ambrose Alli University Ekpoma. The clinical isolates were obtained from the faece of an adult patient with diarrhoea visiting the health services division, Ambrose Alli University, Ekpoma. The environmental strains however were isolated from water obtained from an underground reservoir.

PREPARATION OF NUTRIENT AGAR PLATES

Six grams (6g) of nutrient agar base were measured and dissolved into 250ml of distilled water and allowed to stand. This was then heated for two minutes with occasional agitation until it was completely dissolved. The mixture was then sterilized in an autoclave at 121°C for 30 mins.

The nutrient agar was thereafter allowed to cool to about 42^oC before pouring into plates.

PREPARATION OF BACTERIAL SUSPENSION

The slopes containing isolates were subcultured onto nutrient agar plates, using a red hot wire lop near a flame. These plates were incubated for 24 hours at 37°c. Growth was observed and the cells were harvested using sterile phosphate buffered saline. Cells of *A. Hydrophila* was washed thrice in phosphate buffered saline and finally resuspended and adjusted to give a transmission of approximately 40% at 540nm using a spectrophotometer.

SOURCE AND INFECTION OF RABBITS

Ten albino rabbits weighing 2.5-3.2g were obtained from a local breeder in Ekpoma. They were fed with commercial diet and tap water ad initial. The rabbits were divided into two groups of 5 five each. The first experimental group received 5ml of the bacterial suspension from clinical origin, while the second group was treated similarly with bacterial suspension

from environmental origin. The suspension was orally administered using a fine catheter with an external diameter of 2.5mm fitted with a syringe.

COLLECTION AND TREATMENT OF BLOOD Blood was obtained from the marginal ear vein before *A. hydrophila* infection (0 hour) and at twelve hourly intervals up to 96 hours post oral challenge and transferred into heparinized tubes. The blood samples were centrifuged at 4000rpm for about 5 minutes. In all the cases the plasma samples were separated with the aid of a pastuer pipette, stored in plain sterile tubes and refrigerated at 4°c. The Na⁺ and K⁺ concentrations were analyzed using the flame photometric method described by Thaly (1995).

METHOD USED: PREPARATION OF STANDARD CURVE FOR SODIUM ION:

A stock solution (0.5mg/ml) was prepared by dissolving 0.634g of NaCl and making up to 500ml with distilled water. From the stock solution, different working standards were prepared by pipetting different volumes into test tubes and subsequently making up to 20ml with distilled water. A blank containing 20ml distilled water was also obtained. The concentration of Na $^+$ in the tubes ranged from 0.1-0.5mg/ml (table 1). The flame photometer readings were obtained using a sodium filter in a digital flame photometer. The flame readings in nm were then plotted against the concentration of Na $^+$ (fig 1).

Table 1: Assay table for Na⁺ standard curve

Tubes	Stock solution (ml)	Distilled water (ml)	Assay volume (ml)	Na ⁺ concentration
				(mg/ml)
1	20	0	20	0.5
2	16	4	20	0.4
3	12	8	20	0.3
4	8	12	20	0.2
5	4	16	20	0.1
6	Blank	20	20	0

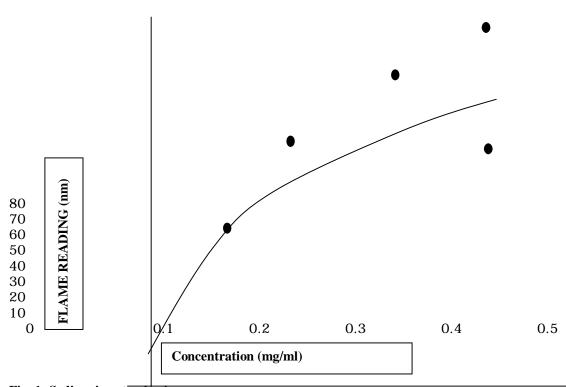


Fig. 1: Sodium ion standard curve

SODIUM (Na^+) ESTIMATED IN PLASMA SAMPLES

The plasma samples to be analyzed were diluted 100times by adding 9.9ml distilled water to 0.1ml of plasma. This diluent was analyzed for sodium using the sodium filter in the flame photometer against the distilled water blank.

PREPARATION OF STANDARD CURVE FOR POTASSIUM ION:

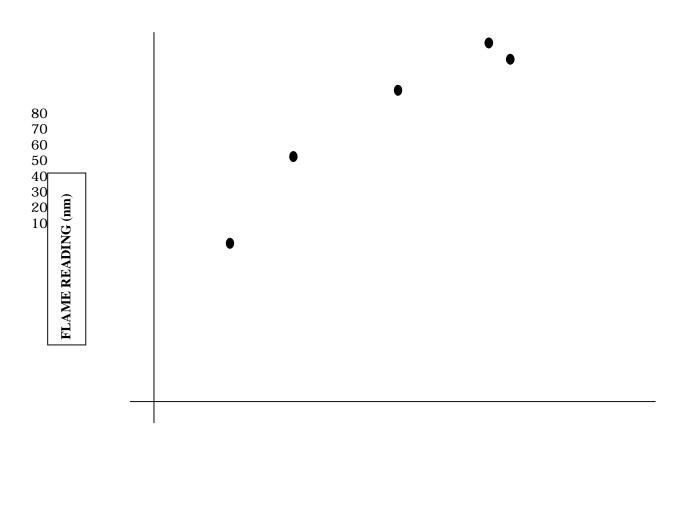
Table 2: Assay table for Na⁺ standard curve

A stock solution (0.5mg/ml) was prepared by dissolving 0.477g of KCl and making up to 500ml with distilled water. Five (5) working standards were thereafter prepared with concentrations ranging from 0.1-0.5mg/ml K⁺. Each tube was made up to 20ml with distilled water (table 2). The flame readings were then obtained from each tube after zeroing the instrument with a blank containing 20ml distilled water. The flame readings were subsequently used to plot a standard curve (figure 2).

Tubes	Stock solution (ml)	Distilled water (ml)	Assay volume (ml)	Na ⁺ concentration (mg/ml)
1	20	0	20	0.5
2	16	4	20	0.4
3	12	8	20	0.3
4	8	12	20	0.2
5	4	16	20	0.1
6	Blank	20	20	0

0.4

0.5



0.3

Fig. 2: Potassium ion standard curve

0.1

0.2

0

POTASSIUM ION (K⁺) ESTIMATION IN PLASMA SAMPLES

A 1 in 500 dilution was made by the addition of 0.1ml plasma to 49.9ml of distilled water. The potassium filter was used; the flame photometer was zeroed using the distilled water blank and the values of the samples determined by extrapolation from the standard curve.

RESULTS:

Oral administration of clinical and environmental strains of *A. hydrophila* caused a general decline with time in the concentrations of

plasma sodium and potassium ions in rabbits (table 3, 4). The plasma sodium ion concentration dropped from 139.6mEg/L for uninfected rabbits (0 hour) to 63.5 mmol/L 96 hours post oral challenge with the clinical strains of *A. hydrophila*. This represents a 54.54% loss of plasma sodium in the animals (table 3). The environmental strains however caused a 42.7% loss in plasma sodium ion after 96 hours.

The plasma potassium ion concentration also decreased from 7.1 to 4.8 mmol/L representing a 32.1% loss after 96 hours in rabbits infected with clinical strains of *A. hydrophila* (table3) environmental strains on the other hand caused a lesser depletion of plasma potassium ion, which feel from a control (0 hour) level of 7.1 to 5.9 mmol/L 96 hours post- oral challenge (tables 3 and 4).

TABLE 3: CONCENTRATION OF SODIUM ION IN PLASMA OF RABBITS ORALLY CHALLENGED WITH CLINICAL AND ENVIRONMENTAL ISOLATES OF *A HYDROPHILA*.

Concentration of Na⁺ ions (% loss)^a in mmol/l

Time (hrs)	Clinical isolates	Environmental isolates	
12	124.7(10.7)	127.9(8.4)	
24	120.6(13.6)	119.6(14.3)	
36	99.5(28.7)	113.8(18.5)	
48	88.9(36.4)	105.7(24.3)	
60	82.1(41.2)	99.7(28.6)	
72	76.2(45.2)	95.9(31.3)	
84	72.2(48.3)	86.8(37.8)	
96	63.5(54.5)	80.0(24.7)	

^a = % loss in Na⁺ concentrate with reference to the conc. In plasma at 0 hour (control) which is 139.6mmol/L.

TABLE 4: CONCENTRATION OF POTASSIUM ION IN PLASMA OF RABBITS ORALLY CHALLENGED WITH CLINICAL AND ENVIRONMENTAL ISOLATES OF *A HYDROPHILA*. Concentration of K⁺ ions (% loss)^b in mmol/L

Time (hrs)	Clinical isolates	Environmental isolates	
12	6.7(5.0)	6.9(2.5)	
24	6.3(11.5)	6.8(4.7)	
36	5.6(2.8)	6.6(6.8)	
48	5.4(24.4)	6.5(8.9)	
60	5.3(25.6)	6.4(9.7)	
72	5.0(29.6)	6.3(11.7)	
84	4.9(30.4)	6.0(14.9)	
96	4.8(32.1)	5.9(16.2)	

^b = loss in K⁺ conc. With reference to the concentration in plasma at 0 hour (control) which is 7.1mmol/L.

DISCUSSION

The role of *A. hydrophila* in gastrointestinal diseases is controversial. This is because of the considerable difficulty in correlating enterotoxin and other virulence properties with specific symptoms of disease (Chopra et al, 1986, Holmberg et al, 1986).

Epidemiological studies, (_Pitarangsi et al, 1982; Janda et al 1983, Isis et al 2000) have shown that the organism's ability to cause diarrhoea in previously healthy adults varies geographically. In Nigeria, the role of *A. hydrophila* in diarrhoea cases has been documented (Alabi and Odugbemi, 2000). In this

study, the ability of A hydrophila from clinical and environmental sources to cause diarrhea was determined indirectly by periodically estimating the sodium and potassium ion concentrations in plasma following oral infection of rabbits.

The rather high loss (54.5%) of Na⁺, the main extracellular cation after 96 hours caused by the clinical isolates is clinically significant as diarrhoea has been indicated as one of the major causes of hyponatremia (Healy, 2000). The fact that environmental isolates caused a 42.7% loss of plasma Na⁺ indicates their enterotoxigenicity and untreated water could be a considerable source of acquisition of the clinical strains (Burke et al, 1984, Millership and chattopadhyay, 1985). Potassium ions which are mainly intracellular are also lost in rabbits infected with both clinical and environmental strains of A. hydrophila. Over 30% is lost after 96 hours when clinical isolates were administered; while a 16.2% loss was recorded using the environmental isolates. observed in this study, is alarming and points to the epidemiological significance of environmental isolates in diarrhoea cases in our locality.

CONCLUSION AND RECOMMENDATIONS

It appears thus from this study that DaAey.O.P: Joseph, S. W and Coolbaugh J.C (1981). Association hydrophila isolates from this locality are associated with diarrhoea it is therefore recommended that further studies be carried out to confirm Htblenberg. observation here. Epidemiological study however is unlikely to give a clear-cut answer to the question of whether A. hydrophila and its surrogates are likely T. (2000). Diagnosis in Africa. Electrolytes: Role and enteric pathogens or not in the absence of a detailed analysis of the virulence factors involved.

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The report of Healy (2000) which showed that hypokalemia could result from diarrhoea supports these observations. The observation that the clinical strains caused significantly more electrolyte losses than their water counterparts simulates the finding of Paniagua et al (1990), who observed that isolates of A. hydrophila from water exhibited low virulence compared to clinical isolates. It is possible that most of the genes coding for virulence factors in this organism were particularly or fully silenced because the water environment provides very little nutrient for the organism to thrive. This view is in agreement with the report of Singh and Sanyal (1993) who showed that enterotoxin gene of environmental strains of A. hydrophila was induced on successive passage through rabbit ileal loop.

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Application and Assessment of Kriging and Cokriging Methods on Groundwater Level Estimation

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Abstract: Due to increasing demand for water using and shortage of surface water resources, managed use of groundwater has been so important in recent decades. Understanding spatial and temporal changes in groundwater has very important role in planning the use of groundwater as a one of most valuable water resources in the world. Kriging and cokriging methods are from those statistical categories methods which use magnitude, distance and vectorial information of nearby stations for estimation. In this study, kriging and cokriging methods compared with common arithmetic averaging methods for calculating the monthly average level of ground water in "Mian ab" basin and its changes has been set over the years. Error criteria RMSE and MEE are used for comparing methods. Results indicate that cokriging method's accuracy is higher than kriging in calculating groundwater level and also the arithmetic averaging method (which has lower accuracy) has been led to higher level estimation of groundwater. Journal of American Science 2011;7(7):34-39]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Application and Assessment; Kriging and Cokriging; Groundwater

1. Introduction

Groundwater is one of the main water resources. Due to increasing demand for water in different purposes these resources management is very important. Determine the average groundwater level over time in a basin led to groundwater balance estimation and also estimate the amount of extractable groundwater. So the good estimation of the average groundwater level is important. Groundwater level estimation is done using the observation wells data which is the most important information sources for groundwater resources studying.

In the arithmetic averaging method which is a common method, the average of water level in observation wells is considered as average groundwater level in the basin. This way considers a constant value for the whole basin which not matches reality in practice. The arithmetic averaging method is a method from classical statistics methods class.

The difference between classical statistics and geostatistics is that in classical statistics the method assumes that samples (groundwater level here) are independent of each other, so any sample can present no information about the next sample. But in geostatistics the samples are not considered independent from each other, rather according to this theory adjacent samples have dependence in a certain distance of the space. Overall, the geostatistical estimation is a process which on its during the amount

of a variable in known coordinates can be achieved by using the same variable values in other points with known coordinates. To do this networking is done. Networking means creating a continues numeral model of an area using limited data points that are placed on that page which in this case data includes longitude(X), latitude(Y) and the depth of groundwater level(Z).

Many researchers have studied geostatistics for keeping and sustainable development of groundwater resources. Kumar and Emaderi(2006) in the interpolation of groundwater level for a region evaluated simple kriging method in West India. In this study different models of Spherical, Gaussian and Exponential curve fitted to the experimental variogram and the best model was identified ultimately by the variance of estimation. Ahmadi and Sedghamiz (2007) have used kriging for evaluating spatial and temporal changes in water level of 39 observation wells. They have shown that changes in groundwater level have a strong spatial and temporal structure. Olea and Davis (1999) in a conceptual study have used kriging method for groundwater level estimation in observation wells by cross validation. They also suggested few new observation wells based on the kriging standard deviation. Christakos (2000) has done a statistical analysis of groundwater level for 70 wells in Kansas. The water level measurement has been observed regularly during the period. Due to some uncertainty and error in the water level reading, he used

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geostatistics method to simulate those unreliable values. He also drew annual simulated water level and geographic direction of water level reduction mapped.

Nowadays, the kriging methods are widely used for interpolation of groundwater depth or elevation (Desbarats et al. 2002; Sharda et al. 2006;). Desbarats et al. (2002) defined the depth of water table as a linear function of a deterministic trend, given by TOPMODEL topographic index (Beven and Kirkby 1979) and the residual random error. Rivest et al. (2008) estimated the hydraulic head field by utilizing kriging with external drift method. He used the conceptual model results to approximate the external drift in hydraulic heads. Abedini et al. (2008) predicted the piezometric head in west Texas/New Mexico by utilizing the ordinary kriging on clustered piezometric head data. Hoeksema et al. (1989) used cokriging method to estimate water level in unknown points. Water level and ground level as primary and secondary variables are used by them. Deutsch and Journel (1992) and Goovaerts (1997) presented a method in which the ground elevation is used as the secondary variable for interpolation of groundwater level by cokriging.

This Study targets include:

- Estimate the accuracy of kriging and cokriging methods in estimating average groundwater level on the watershed in different month of the year.
- 2- The comparison between kriging, cokriging and arithmetic averaging method results.

2. Material and Methods

A. Theoretical Foundation

Basic theory of geostatistics is described by several authors (Webster and Oliver (2001), etc.). Semivarigram is the main tool in geostatistics which shows the dependence between neighboring observations. Semivariogram can be defined by half the variance of the difference between attribute values at all points with (h) intervals as follows:

$$\gamma(h) = \frac{1}{2N(h)} \sum_{i=1}^{N(h)} [Z(x_i) - Z(x_i + h)]^2$$

Which $Z(x_i)$ is the total amount of variable and N (h) is the number of attribute pairs from points that are separated by distance (h). Before geostatistical estimation one model is needed to calculate variogram values for each sampling interval which may be used. The most important models are Spherical, Exponential, Gaussian, Circular and Nugget net effect (Isaaks and Sirvastava(1989)) . Adequacy and appropriateness and accuracy of variogram developed model must be tested by cross validation technique satisfactorily. Cross

validation idea includes the removal of a data and estimate the amount of it by different variogram models at the same time. Actual and estimated values are compared and the most accurate model that can have the best prediction remains (Goovaerts (1997)). Estimated values in the graph cross the actual values show the correlation coefficient. The most appropriate variogram is obtained based on the correlation coefficient and on the tried and error. Leuangthong et al. (2004) reported that the variograms obtained through cross-validation satisfy the minimum acceptance criteria for geostatistical analysis. Kriging is an accurate interpolation method and also the best unbiased linear estimator. The best unbiased linear estimator must have the minimum variance estimation error. Kriging general equation is as follows:

$$Z^*(x_p) = \sum_{i=1}^n \lambda_i Z(x_i)$$

In order to achieve the unbiased kriging estimates total following equations must be solved

simultaneously.
$$\begin{cases} \sum_{i=1}^{n} \lambda_{i} \gamma(x_{i}, x_{j}) - \mu = \gamma(x_{i}, x) \\ \sum_{i=1}^{n} \lambda_{i} = 1 \end{cases}$$

Where $Z^*(x_p)$ is the calculated amount in the place (x_p) , $Z(x_i)$ the known amount in the location (x_i) , λ_i the weight related to i-th data, μ the Lagrange coefficient and $\gamma(x_i, x_j)$ the variogram value corresponding to a vector starting at x_i and x_j the ultimate limit of the vector.

General form of cokriging equations is as follows:

$$\begin{cases} \sum_{l=1}^{v} \sum_{i=1}^{n_{l}} \lambda_{il} \gamma_{lv}(x_{i}, x_{j}) - \mu_{v} = \gamma_{uv}(x_{j}, x) \\ \sum_{i=1}^{n_{l}} \lambda_{il} = \begin{cases} 1, & 1 = u \\ 0, & 1 \neq u \end{cases} \end{cases}$$

Where u and v are primary and secondary variables. In cokriging method the variation of u and v has cross correlation so that secondary variable participates in determination of primary variable variation. For cokriging analysis cross semivariogram must be determined first. At any point u and v should be measured and cross semivariogram is estimated with the following equation:

$$\gamma_{uv} = \frac{1}{2N(h)} \sum_{i=1}^{N(h)} [Z_u(x_i) - Z_u(x_i + h)][Z_v(x_i) - Z_v(x_i + h)]$$

B. Study area Location

"Mian-ab" basin is located between two cities: "Shushtar" and "Bandghir" and is on the 40 kilometer north of "Ahwaz" approximately, between longitude 29° 66" to 29° 92" east and latitude 35° 20" to 35° 41" north. Study area is an island between the river "Gargar" and "Shatit" and that is enclosed by "Gargar "river in the east and "Shatit" river in the west. In figure 1 position of study area in the "Khuzestan" province taken by Landsat satellite is marked.

3. Results

According to recorded data for observation wells in the twelve months, data belong to the minimum and maximum months and also from annual average was used for finding the best variogram model. Chosen model is used for calculation in all month of the year. Data used in the kriging should be normalized which according to calculated skewness and kurtosis criteria logarithmic conversion for normalizing the data was used. Also, trend testing is done to find out any possible existence trend in the process which the result shows no trend in variables. For cokriging analysis at least two variables is required. In this way, these two variables are covariates in which the primary variable is

estimated by the second variable assistance. In this study the cokriging method was used to affect ground level (topography) in groundwater level estimating. To do this, the correlation between these two variables must be evaluated. Amounts of groundwater level in the months of maximum and minimum (May and October) and annual mean in addition of corresponding ground level values for observation wells is used to check this correlation. High obtained values for R² (The correlation coefficient between primary and secondary variables in cokriging method) confirms correlation between mentioned variables. Figure 2 shows correlation between ground level and groundwater level in case of different modes. The results are shown in table 1. . Ultimately in both methods and for maximum and minimum months and also for annual mean according to (RMSE) criterion best model was selected. The selected model and its profile are expressed in table 1. Mean estimation error (MEE) is defined as:

$$MBE = \frac{1}{n} \sum_{i=1}^{n} (Z^*(x_i) - Z(x_i)), \text{ and also root mean}$$
square error (RMSE) is defined as:
$$RMSE = \frac{(Z^*(x_i) - Z(x_i))^2}{n}.$$

Monthly groundwater levels for basin's wells (46 wells in water year 2006-2007) are considered for this study. The wells in the basin have been scattered to control groundwater level fluctuation. Also ground level for cokriging calculations is used as secondary variable. According to Goovaerts (1997) in environmental applications large values may indicate potentially critical points so they should be removed only if they are clearly wrong.

Table 1. Selected model profiles in kriging and cokriging methods

METHODS	VARIABLE	MODEL	RANGE	Nugget	Sill	Nugget	R ²
						SILL	
	OCTOBER	EXPONENTIAL	32000	0.00002	0.02461	0.00082	
KRIGING	MAY	EXPONENTIAL	32000	0	0.02010	0	
	ANNUAL MEAN	EXPONENTIAL	32000	0.00019	0.02228	0.00852	
	OCTOBER	EXPONENTIAL	32000	0.00002	0.02461	0.00082	0.76
COKRIGING	MAY	EXPONENTIAL	32000	0	0.02010	0	0.75
	ANNUAL MEAN	EXPONENTIAL	32000	0.00019	0.02228	0.00852	0.76

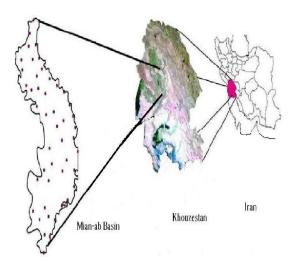
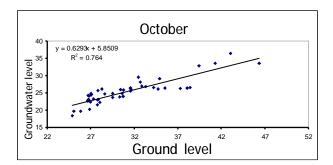


Figure 1. Study area position



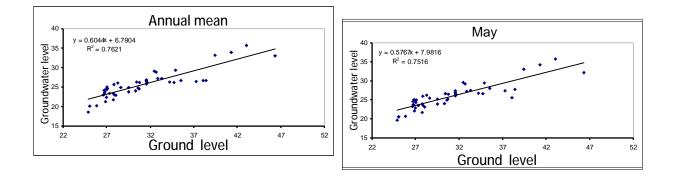


Figure 2. Correlation between ground level depth and groundwater

Values for MEE and RMSE criteria according to chosen model for each month in kriging and cokriging methods are shown in table2. Also values of skewness and kurtosis parameters for data before and after logarithmic conversion are expressed.

Table 2. Evaluation results from kriging and cokriging methods and parameters of statistical data									
MONTH	KRIGING		COKRIGING		DATA		DATA PARAMETERS AFTER		
					PARA	METERS		LOGARITMIC	
							TRANSFORMATIO		
	RMSE	MEE	RMSE	MEE	S	K	S	K	
October	2.49	0.075	1.65	0.030	1.05	4.87	0.46	3.09	
November	2.43	0.076	1.63	0.032	0.95	4.45	0.41	2.80	
December	2.45	0.073	1.61	0.031	0.92	4.52	0.38	2.8	
January	2.38	0.081	1.61	0.032	0.79	4.35	0.24	2.68	
February	2.25	0.083	1.46	0.033	0.82	4.40	0.27	2.70	
March	2.15	0.068	1.39	0.034	0.84	4.37	0.28	2.72	
April	2.18	0.071	1.37	0.034	0.81	4.22	0.26	2.85	
May	2.14	0.077	1.35	0.035	0.89	4.62	0.41	2.63	
June	2.28	0.083	1.46	0.034	1.00	4.62	0.46	2.87	
July	2.31	0.078	1.53	0.033	0.88	4.78	0.42	2.91	
August	2.33	0.078	1.58	0.032	0.97	4.55	0.32	3.11	
September	2.40	0.075	1.56	0.033	0.92	4.24	0.30	3.03	
Annual	2.34	0.078	1.51	0.033	0.93	4.36	0.38	2.86	
Mean									

Table 2. Evaluation results from kriging and cokriging methods and parameters of statistical data

Ratio $\frac{Nugget}{Sill}$ is used for classification of spatial correlation. If the ratio for a variable be less than 0.25, then this

variable would have high spatial correlation and if the ratio is between 0.25-0.75 it has a restricted correlation and if it is upper than 0.75, it has weak correlation(Liu et al.(2006)). Figure 3 shows average groundwater level on different months in "Mian-ab" basin. In this diagram arithmetic average method is compared with kriging and cokriging results (which are considered as interpolation methods).

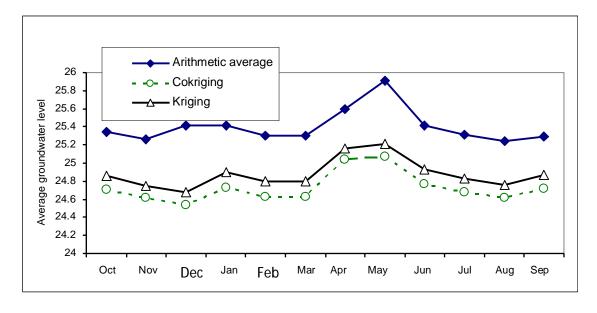


Figure 3: Average groundwater level in different month using kriging, cokriging and arithmetic average method

4. Conclusion

Complete and sustainable water resources management requires adequate knowledge from amount and changes

(spatial and temporal) of groundwater. Adequate and accurate information plays a key role in management decisions. In order to check the anisotropy, the

conventional approach is to compare variograms in several directions. In this study major angles of 0°, 45°, 90°, and 135° with an angle tolerance of ± 22.5 were used for detecting anisotropy possibility. However, there were no distinct differences among the structures of the calculated variograms in the four main directions. Results indicate that monthly average data obtained from the arithmetic average method has higher estimates of groundwater potential on the mentioned plain. Both kriging and cokriging have low values of error criteria (MEE and RMSE) which these results confirm unbiased assumption (estimation error close to zero) in these methods. Among the kriging and cokriging methods (interpolation methods) kriging estimation has a higher groundwater level. But according to RMSE criteria, cokriging method has higher accuracy although this increased accuracy is not so significant. The results also reflect the fact that groundwater level changes in the plain during December and January does not follow by data of the arithmetic average values.

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Financial Transmission Rights and Auction Revenue Rights

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Abstract: This paper surveys on two important issues in restructured power systems. One of them is Financial Transmission (FTR). Financial transmission right is a financial instrument which can improve the liquidity of operation in power system from point of view of all decision makers in competitive power systems. Another approach is Auction Revenue Rights (ARR) which ARR allocation consistent with congestion as determined by the FTR Auction. Analysis of these two mechanism and their impacts on long-term operation of power system are considered in this paper. Suppliers and large consumer, therefore, desire to contract in FTR to hedge their long-term risks. The FTR mechanism is based on the after settling market and determination Locational Marginal Price (LMP). In this area, delivery of energy (quantity and price) from the amount of FTRs which supplier is bidding for distinct path, and the price that the supplier is willing to pay for each FTR, are determined. This paper surveys on the long-term conditions of the FTR and mature one.

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Keywords: Restructured Power System, Financial Transmission Rights, Auction Revenue Rights, Loacational Marginal Price.

1. Introduction

Financial transmission rights (FTRs) are the most popular tools to hedge the risk of suppliers and large consumers in delivery of energy in the power markets. In restructured power system operation, the suppliers are competing with together in satisfying the consumer demand. In this area, operation of power market is based on two mechanisms. Uniform Pricing (UP) and Pay-as-Bid (PAB) are these mechanisms. In UP mechanism the supplier paid based on Market Clearing Price (MCP), which determined by more expensive generation units which accepted in the market and considered in Daygeneration scheduling (Javadi Javadinasab, 2011). This mechanism also called Marginal Pricing (MP) (Kahn et al., (2001). Another mechanism is PAB. In Pay-as-Bid mechanism each supplier receives his offers which submit in the market (Javadi and Javadinasab, 2011). In the PAB mechanism after settling the market determination of LMP in all buses in network; the final payment of consumers in the corresponding bus are determined. The LMPs may be different in network. One of the main components in LMP is congestion lagrangian multiplier (Ren and Galiana, 2004). In a power grid congestion is caused by limitations in transmission capacity. When a transmission line is congested, the maximum acceptable energy transferring is reached and the further loading is not allowed.

A transmission congestion charge is incurred when the system is constrained by physical limits. So a reasonable transmission pricing method should provide some economic signal to reflect the

charge due to the physical constraints. One option is to base the change on locational marginal prices. That is, the congestion charge for a specified path is the product of the flow along the path and the price differences between the two terminals of the path.

The transmission congestion charge may skyrocket in some cases, and create a big loss for a market participant. To hedge the risk, the participant can purchase a right to transfer power over a constrained transmission path for a fixed price, which is called a firm transmission right. The holder of such a right receives a credit that counteracts the congestion charge (Ren and Galiana, 2004).

Financial instruments awarded to bidders in the FTR auctions that entitle the holder to a stream of revenues (or charges) based on the hourly Day-Ahead congestion price differences across the path.

Main challenges in this area are exposes LMP in some ordinary power market, such as Pennsylvania, New-Jersey and Maryland, PJM, participants to price uncertainty for congestion cost charges. During constrained conditions, PJM Market collects more from loads than it pays generators (PJM, 2011).

2. Financial Transmission Rights

Firm transmission rights (FTRs) are proposed as purchased rights that can hedge congestion charges on constrained transmission paths. By holding FTR, a transmission customer has a mechanism to offset congestion charges when transmission lines are congested. Besides providing financial certainty, FTR could maximize the efficient

use of the system and make users pay for the actual use of congested paths (Shahidehpour, et al. 2002).

As LMPs and FTRs have been widely utilized in many power restructuring models to resolve problems associated with transmission congestion and pricing, it should be detailed these key subjects in a comprehensive manner. Then, a transmission congestion management scheme that incorporates LMPs and FTRs should be discussed.

The ISO would adjust preferred schedules on a nondiscriminatory basis to keep the system within its limits and applies curtailment priority according to the participants' willingness to avoid curtailing transactions. In this paper a general restructuring model where pool, bilateral, and multilateral contracts exist concurrently assumed. In this scheme, transmission congestion and losses are calculated based on LMPs. A flow-based tracing method is utilized to allocate transmission charges. FTR holders' credits are calculated based on line flow calculations and LMPs.

LMP is the marginal cost of supplying the next increment of electric energy at a specific bus considering the generation marginal cost and the physical aspects of the transmission system. LMP is given as:

LMP = generation marginal cost + congestion cost + Cost of marginal losses

Mathematically, LMP at any node in the system is the dual variable (sometimes called a shadow price) for the equality constraint at that node (sum of injections and withdrawals is equal to zero). Or, LMP is the additional cost for providing one additional MW at a certain node.

A firm transmission right4 (FTR) is a purchased right that can hedge congestion charges on constrained transmission paths. In other words, it provides FTR owners with the right to transfer an amount of power over a constrained transmission path for a fixed price.

Market participants pay congestion charges under a constrained situation based on LMP differences. These charges arise when the energy demand across a transmission path is more than the capability of transmission lines on that path. Under constrained situations, each participant is charged for congestion based on the MWh value of generation ordered to serve its load. The charge will be based on MWh and the difference in LMPs of injection and extraction points. If it happens that FTR is also called fixed transmission right or financial transmission right.

Each FTR holder receives a congestion credit in each constrained hour that is proportional to

the FTR value. This credit allocation is based on preferred schedules, while congestion charges are based on actual deliveries. From the preferred schedule FTRs, the total congestion credits are calculated and compared with the total congestion charges, which are based on the cost of re-dispatched schedules at each hour. If the total congestion credits are less than or equal to the total congestion charges, the congestion credit for each FTR holder is equal to the one calculated. If there are any extra congestion charges, the extra charges are distributed among market participants at the end of the month. Otherwise, the congestion credit for each FTR will be equal to a share of total congestion charges in proportion to its credit allocation. The insufficiency in hourly congestion charges may be offset by excessive charges in other hours at the end of the accounting month.

If a market participant does not hold a FTR and its contract is not curtailable, this participant will incur a congestion charge and have no mechanism to offset the congestion charge. In comparison, FTR holders will receive a credit that counteracts the congestion charge for the specified path. The credit is computed as follows, where LMP1 and LMP2 represent LMPs at starting and ending points of the FTR respectively:

FTR credit = amount of FTR \times (LMP1 - LMP2)

Instead of being defined from point to point, FTRs can be attached to a branch or flow-gate in the network. They are then called flow-gate rights (FGRs). FGRs operate like FTRs except that the value of these rights is not tied to the difference in nodal prices, but to the value of the Lagrange multiplier or shadow cost associated with the maximum capacity of the flow-gate. When a flow-gate is not operating at its maximum capacity, the corresponding inequality constraint is not binding, and the corresponding Lagrange multiplier μ has a value of zero.

The only FGRs that produce revenues are thus those that are associated with congested branches.

2.1. The FTR versus FGR

There are some debates on the advantages and disadvantages of FTRs and FGRs. Here is a summary of the main points of this debate:

• The market for FGRs should be more liquid than the market for FTRs because there are many more possible combinations of point-to-point rights than there are branches likely to be operated at maximum capacity.

- However, it may be difficult to predict which branches will be congested. Trading on a fixed set of critical flow-gates may cause other branches to become congested.
- The value of FTRs is difficult to determine because the point-to-point transmission capacity changes with the configuration of the network. On the other hand, the maximum capacity of a given branch is much more constant, particularly if the flow on this branch is only limited by its thermal capacity.
- FGRs are simpler because there are typically only a few congested branches in a network. On the other hand, as soon as one branch is congested, all the nodal prices are different.
- Participants must take into consideration and understand the operation of the network when purchasing flow-gate rights. In practice, this means that they must know the matrix of Power Transfer Distribution Factors (PTDFs). Participants who buy FTRs do not need to concern themselves with the operation of the network. They can base their decisions on their perception of the fluctuations in nodal prices.

In a perfectly competitive market, FTRs, FGRs and even physical transmission rights are equivalent. If competition is less than perfect FGRs, it may provide more opportunities for gaming, particularly if trading focuses on a fixed set of flowgates (Kirschen and Strbac, 2004).

3. Auction Revenue Rights

ARR are the mechanism by which the proceeds from the Annual FTR Auction are allocated. Auction Revenue Rights are entitlements allocated annually to Firm Transmission Service Customers that entitle the holder to receive an allocation of the revenues from the Annual FTR Auction. Auction Revenue Rights will be allocated to Network Transmission Service Customers and Firm Point-to-Point Transmission Customers. Market Participants will request ARRs, and PJM will approve all, part or none of the request based on the results of the Simultaneous Feasibility Test. At the beginning of each Annual Planning Period, ARRs are allocated to Network Transmission customers and to Firm Point to Point Transmission customers for the duration of the Annual Planning Period.

 Network Integration Service-Network Integration Service ARRs are designated along paths from specific generation resource(s) to the customer's aggregated load. The Network Service Customer has the option to request ARRs for all or any portion of an historic

- generation resource. A Network Service Customer's total ARR designation to a zone cannot exceed the customer's total network load in that zone. Network Service Customers make ARR requests through PJM eTools.
- Firm Point-to-Point Service-PJM allocates ARRs to Firm Point-to-Point Service customers for approved service requests, subject to passing the Simultaneous Feasibility Test. The point of receipt is either a generation resource within the PJM RTO or the interconnection point with the sending Control Area. The point of delivery is the set of load buses designated in OASIS or the point of interconnection with the receiving Control Area. The duration of the ARR is the same as for the associated Transmission Service Request (TSR). The Point-to-Point Customer has the option to request ARRs consistent with the transmission reservation.

Auction Revenue Rights are defined from a source Price Node to a sink Price Node for a specific MW amount. The economic value of each ARR is based on the MW amount and on the Locational Price differences between the sources and sinks node for FTR Obligations resulting from the Annual FTR Auction. The economic value of an Auction Revenue Right can either be positive (a benefit) or negative (a liability). Annual FTR Auction revenue is distributed to Auction Revenue Rights holders in proportion to, but not to exceed, the economic value of the ARRs when compared to the clearing prices for FTR Obligations in each round of the Annual FTR Auction proportionally. The settlements for Auction Revenue Rights will be based on the clearing prices from each round of the Annual FTR Auction. The amount of the credit that the ARR holder should receive for each round is equal to the MW amount of the ARR (divided by the number of rounds) times the price difference from the ARR sink point (delivery point) to the ARR source point as shown in the following formula:

ARR Target Allocation = (ARR/# Allocation Target)
* (LMP_{Sink} - LMP_{Source})

Note that the LMP values in the above equation are results for FTR Obligations from the appropriate round of the Annual FTR auction.

Holders of Auction Revenue Rights may retain allocated ARRs, and receive associated allocations of revenues from the Annual FTR Auction. ARR holders may also convert ARRs into FTRs by "self-scheduling" an FTR into the first round of the Annual FTR Auction. When "self-scheduled", an FTR must have the same path as the associated ARR. Additionally; holders of ARRs may

also reconfigure ARRs by bidding into the Annual FTR Auction to acquire an FTR on an alternative path or for an alternative product.

The following is a list of business rules and guidelines to follow when requesting Network Integration Service ARRs:

- All Network Integration Service ARR requests must pass a Simultaneous Feasibility Test before being given PJM approval.
- PJM can approve all, part, or none of the ARR request based on the results of the Simultaneous Feasibility Test.
- The path for each Network Integration Service ARR is defined from specific historical generation resources to aggregate Network Customer Load in the Transmission Zone or other designated Load Aggregation Zone.
- The total ARRs for a historical generation resource to the (Load Supply Entity) LSE load cannot be greater than the MW amount of the resource that was assigned to the LSEs on a prorata basis.
- A participant's total ARR amount to a transmission zone or load aggregation zone cannot exceed the participant's total network load in that zone or load aggregation zone.
- ARRs are specified to the nearest 0.1 MW. (PJM,

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Electrochemical degradation of some pesticides in agricultural wastewater by using modified electrode

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Abstract: This work deals with the possibility of using Ti/Rh-modified electrode for the electrocatalytic oxidation process of some pesticides (malathion, imidacloprid and chlorpyrifos). The Ti/Rh-modified electrode was prepared by brushing of rhodium nitrate solution on preanodized titanium substrate and annealing. The results of the electrolytic oxidation were expressed in term of chemical oxygen demand (COD) removal, which was determined instrumentally. For the Ti/Rh-modified electrode (anode), the highest electrocatalytic activity was obtained in the presence of NaCl as conductive electrolyte. The different operating conditions of electrocatalytic oxidation process were studied which include: current density, pH, electrolysis time, initial pesticide concentration and conductive electrolyte concentration. The optimum operating conditions for the above mentioned electrode was determined.. Journal of American Science 2011;7(7):44-50]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Ti/Rh-modified electrode combined electrochemical oxidation, pesticides, chemical oxygen demand (COD).

1. Introduction

The ambitious plan of the Government of Egypt (GOE) to reclaim 3-4 million feddans as an additional cultivated area up to the year 2017 put further pressure on the existing limited fresh water resources. On the other hand, the vast increase in industrial horizontal and vertical expansions need more water conservation. Furthermore, the increasing population presents another red flag for the available renewable water resources. According to the limited water availability, there is a real need to search for another water sources. These sources can be found within the non-conventional water sources in Egypt. The agricultural wastewater represents one of the major non-conventional water sources in Egypt due to its volume that reaches about 16 bilion cubic meters per year (BCM/yr). Most of this volume, about 12 BCM/yr, is disposed in the Mediterranean Sea. Water quality of this major source is threatened due to several pollution causes. So, chemical treatment of this major source before using is very important [1].

Out of the world production of pesticides (3 million tonnes in 2009), 20% (equivalent to 600000 tonnes) were exported annually to developing countries, and at least 90% were used in agriculture for pest, weed and plant disease control. The remaining 10% were used for public health programmes, particularly for the control of vectors of human diseases (malaria, filariasis schistosomiasis, leishmaniasis and trypanosomiasis) [2]. The amount of pesticides applied actually affecting target pests is often less than 1%, while over 99% moves into the environment to contaminate the land, water and air [2]. These toxic compounds have been implicated in various disorders and diseases including cancer,

adverse reproductive outcomes, peripheral neuropathies, neurobehavioral disorders, impaired immune functions and allergic sensitization reactions, particularly of the skin, cumulative inhibition of cholinesterase activity because of long-term low doses of exposure [2].

Millions of tons of pesticides applied annually are used in modern agriculture to increase production through controlling harmful effects caused by the targets organisms including insects, fungi, bacteria, viruses as well as grasses grown in between the economical crops [3].

Polluted drainage water from a dump of toxic chemical waste containing organophosphoric pesticides and their natural degradation products was treated with electrochemical oxidation in order to investigate the applicability of the technique in remediation of natural complex polluted water [4]. This work aims to study the possibility of using Ti/Rh-modified electrode for the electrocatalytic degradation of some pesticides.

2- Experimental

2.1 Preparation of the Titanium/ Titanium oxide/ Rhodium oxide ($Ti/TiO_2/Rh_2O_3$) electrode

The Ti substrate (IMI 115) of dimension 1.5 x 6 cm² were pretreated by mechanical polishing, using sand papers down to 4/0 grade, and degreasing with acetone. After this, the substrates were degreased in an alkali soaking cleaner of the following composition: NaOH 50 g/L, Na₂CO₃ 20 g/L, Na₃PO₄ 20 g/L, and sulphonic acid 2 g/L [6]. The degreasing process was carried out at 50°C for 5 min, and then the Ti substrates were washed in running distilled water. The degreasing process was followed by pickling, where the substrates were

immersed in a solution containing nitric acid (400 g/L) and hydrofluoric acid (50 g/L). This was found to be a good pickling solution, because it removed the oxides and scales from the Ti surfaces without difficulty and rendered the metal active. Finally, chemical polishing was carried out on the Ti substrates by their immersion and boiling in oxalic acid solution (100 g/L) for 5 min. The anodizing process was carried out on the pretreated Ti substrates in oxalic acid solution (80-100 g/L) at current density ranging from 15-25 mA/cm², at ambient temperature. These high current densities were chosen with the aim of obtaining porous and conductive Ti oxides on the surface of the substrates. Stainless steel electrodes (austenitic) were used as cathodes. The distance between the cathode and anode was 2 cm [7]. The rhodium oxide is deposited on the treated Ti substrate by brushing of the nitrate solution [195 g/L Rh(NO₃) 3.2H₂O, Aldrich], followed by heat treatment for 4 min at 673 K. This procedure was repeated until the desired oxide loading (7 \pm 1 mg cm⁻²) was achieved. Then the electrode is annealed at the same temperature for 1 h [8].

2.3 Electrocatalytic degradation procedures:

The electrolysis of aqueous solutions (250 mL) containing the pesticides and the electrolyte solution to be treated electrochemically was carried out in a one-compartment Pyrex glass cell of 250 ml volume with three plates electrodes of 12 cm² which consists of the prepared Ti/ TiO₂/Rh₂O₃ electrode as anode and two graphite electrodes as cathodes. DC power supply GW (model: GPR-181 OHD, Taiwan) was used. The current and potential measurements were carried out using two digital mutimeters (BK Mini-Pro Multimeter, model: 2405A, Taiwan). All experiments were carried out with magnetic stirring.

2.4. Chemicals

Chemicals used for degradation are different types of pesticides; malathion, chlorpyrifos and imidacloprid.

Common name: Malathion

IUPAC name: Diethyl (dimethoxy thio phosphryl

thio)succinate

Common name: Chlorpyrifos

IUPAC name: O,O-diethyl O-(3,5,6-trichloro-2-

pyridyl)-phosphorothioate

mon name: Imidacloprid

IUPAC name: 1-(6-chloro-3-pyridyemethyl) -N-

nitroimidazolidine-2-yliedeneamine

2.5. Analytical measurements

Analytical parameters were measured to evaluate the electro-catalytic oxidation efficiency of abovementioned organic (pesticides) compounds, these parameters were:

A. Chemical Oxygen Demand COD (mg O₂ /l), which is a measure of the oxygen equivalent to organic matter content of a sample that is susceptible to the oxidation by strong chemical oxidant. COD can be related empirically to organic matter. COD during the electrolysis was determined by an open reflux (COD reactor, ECO 6, VELP SCIENTIFICA, Italy), dichromate titrimetric method as described in standard methods [9]. This method for determination of COD may be used were sample chloride concentration is known to be less than 2000 mg/l. This means that, in the present investigations the interferences of Cl⁻ ions present in the solution and the electro-generated species may occur. To eliminate the effect of these interferences, two different methods were taken into considerations [10]. The first was carried out by adding sodium bisulphate (Na₂S₂O₅) to the organic compound (pesticides) solutions and heating before measurements of COD. The added of sodium bisulphate destroys the hypochlorite with evolution of chlorine gas. The second includes the measurements of COD for blank solutions, which are free from the under test organic compound. These blank solutions were treated under the same operating conditions used in the electro-catalytic oxidation of organic (pesticides) compound solutions. From the measurements of COD values of blank and organic (pesticides) compound solutions after treatment, the value of COD is corresponding to the organic compound present in solution that could be evaluated. The COD values obtained from the two methods were matched with each other. The equation used to calculate the COD removal efficiency in the experiments is:

 \overrightarrow{COD} Removal % = $[\overrightarrow{COD_{\circ}} - \overrightarrow{COD_{final}} / \overrightarrow{COD_{\circ}}] \times 100$

Where, COD_{\circ} (initial) and COD_{final} of the pesticide solutions are calculated in mg/l

B. The average current efficiency (ACE) is calculated by the following equation [11];

$ACE\% = (COD_{\circ} - COD_{t}) FV/8 It$

Where COD° and CODt are the chemical oxygen demand at initial time and given time t (g O_2 /L), respectively, I the current (A), F the Faraday constant (96487 C/ mol), t the treatment time (s), V is the volume of solution (L) and 8 is the oxygen equivalent mass (g/eq).

C. The energy consumption (EC) is calculated by the following:

$EC = UIt / 3.6 (COD_{\circ} - COD_{t}) V$

Where U is the voltage applied (V) and other parameters are as defined as before [11].

D. The optimum operating conditions for the electrocataltic degradation processes:

Several parameters were studied for investigation the optimum conditions for the degradation synthetic agricultural wastewater (which prepared from pesticides). The studied operating conditions were: current density, conductive electrolyte concentration, pH and initial pesticide dose. HCl and NaOH were used for pH adjustment in case of using NaCl as conductive electrolyte.

3- Results

A series of experiments was carried out in NaCl solution to investigate the effect of different operating factors on the rate of the electrochemical degradation of the investigated pesticides on the Ti/Rh modified electrode.

3.1. Effect of applied current density

Different current densities of values 50,100, and 250 mA/ cm² were applied to investigate the electro-catalytic degradation of the investigated pesticides in 2 g/L NaCl solution and pH of 3. Figures (1-3) show that the variation of COD removal % of pesticides as a function of electrolysis time at different current densities for the investigated pesticides.

The plots of figure (1) indicated that:

- i) For each pesticide and at a given current density, the COD removal % increased with the increase of electrolysis time reaching a limiting value (especially at 250 mA/ cm²).
- ii) At a given time of electrolysis, the COD removal % increased with the increase of applied current density. The maximum COD removal% was obtained at a current density of 250 mA/ cm² and they were: 78, 81 and 69 for the pesticides imidacloprid, malathion and chlorpyrifos respectively. The values of t_{1/2} deduced from the plots of figure (1) at a current density of 100 mA/ cm² were: 53.2, 48.7 and

69.7 minutes for the pesticides imidacloprid, malathion and chlorpyrifos respectively. It is indicated from this investigation that, the Ti/Rh modified electrode exhibited its highest activity towards the degradation of the investigated pesticides in NaCl solution at 100 mA/ cm² of applied current density. Therefore, this value is considered the optimum current density for the electro-catalytic degradation of the investigated pesticides.

3.2. Effect of pH of solution

Figure (2) shows the variation of COD removal % of the pesticide as a function of time at different pH values (3, 7.2 and 10). These experiments were carried out in NaCl solution (2g/l) on Ti/Rh modified electrode. As shown from the plots of figure (2) that, at a given pH value, the COD removal % increased with the increase of electrolysis time reaching to a limiting value. At a given electrolysis time, the COD removal % decreased with increase of value of solution, where the maximum values of COD removal% were obtained at pH of 3 for the pesticides. For this reason, the pH value of 3 was taken as optimum.

3.3. Effect of conductive electrolyte concentration

In this investigation, the experiment was carried out in different NaCl concentration of 1, 2 and 5 g/L containing 1% as initial concentration of each pesticide under the following operating conditions: pH of 3 and current density of 100 mA/cm². Figure (3), shows the variation of COD removal % of pesticides as a function of electrolysis time for the investigated pesticides (imidacloprid, malathion and chlorpyrifos), respectively on Ti/Rh modified electrode. Inspection of the plots of figure (3), revealed that:

- i) At a given NaCl concentration, the COD removal% increased with increase of electrolysis time reaching limiting values.
- ii) Also, at a given electrolysis time the COD removal% noticeable increase with increase of NaCl concentration from 2 to 5 g/L. The values of COD removal% obtained in presence of 2 g/L NaCl were: 78, 81 and 69 for the pesticides imidacloprid, malathion and chlorpyrifos respectively.

3.4. Effect of initial pesticide dosage

The results so far have indicated that the maximum electrochemical degradation of the investigated pesticides was obtained at 250 mA/cm² in 2g/L NaCl solution of pH 3. Figure (4) shows the effect of different initial pesticides concentrations (0.5%, 1% and 5%) on the variation of COD removal % as a function of electrolysis time under the optimum operating conditions mentioned above. Inspection of the plots of figure (4), revealed that:

- i) At a given time of electrolysis, the COD removal% are decreased with increasing initial concentration from 0.5 -5% respectively.
- ii) COD removal % in the presence of 0.5% and 1% of initial concentrations is near to each other.
- iii) At a given initial loaded concentrations, the COD removal % increased with increase of the electrolysis time with a rate depending on both of nature of each pesticide and its initial concentration.

4-Discussion

The mechanism of electrochemical oxidation of wastewater is a complex phenomenon involving coupling of electron transfer reaction with a dissociate chemisorptions step. Basically two different processes occur at the anode; on anode having high electro-catalytic activity, oxidation occurs at the electrode surface (direct electrolysis); on metal oxide electrode, oxidation occurs via surface mediator on the anodic surface, where they are generated continuously (indirect electrolysis). In direct electrolysis, the rate of oxidation is depending on electrode activity, pollutants diffusion rate and current density. On the other hand, temperature, pH and diffusion rate of generated oxidants determine the rate of oxidation in indirect electrolysis. In indirect electro oxidation, chloride salts of sodium or potassium are added to the wastewater for better conductivity and generation of hypochlorite ions [5]. The reaction of anodic oxidation of chloride ions to form chlorine is given as:

2Cl
$$Cl_2 + 2e$$
` (1.1)
The liberated chlorine form hypochlorous acid $Cl_2 + H_2O$ $H^+ + Cl^- + HOCl$ (1.2)
And further dissociated to give hypochlorite ion $HOCl$ $H^+ + OCl^-$ (1.3)

The generated hypochlorite ions act as main oxidizing agent in the pollutant degradation. The direct electro-oxidation rate of organic pollutants depends on the catalytic activity of the anode, on the diffusion rate of the organic compounds in the active points of anode and applied current density. A generalized scheme of the electro-chemical conversion/combustion of organics of pollutant on noble oxide coated catalytic anode (MO $_{x}$) is given below. In the first step, H $_{2}$ O is discharged at the anode to produce adsorbed hydroxyl radicals according to the reaction:

$$MO_x + H_2O MO_x(OH) + H^+ + e^-$$
 (1.4)

In the second step, generally the adsorbed hydroxyl radicals may interact with the oxygen already present in the oxide anode with possible transition of oxygen from the adsorbed hydroxyl radicals to the oxide forming the higher oxide MO_{x+1} . $MO_x(OH) MO_{x+1} + H^+ + e^-$ (1.5)

At the anode surface, the "active oxygen" can be present in two states. Either as physisorbed (adsorbed hydroxyl radicals OH or/and as chemisorbed (oxygen in the lattice, MO_{x+1}). In the absence of any oxidizable organics, the "active oxygen" produces dioxygen according to the following reactions:

$$MO_x(OH) MO_x + 1/2 O_2 + H^+ + e^-$$
 (1.6)

$$MO_{x+1}$$
 $MO_x + 1/2$ O_2 (1.7)
When NaCl is used as supporting electrolyte Cl⁻ ion may react with $MO_x(OH)$ to form adsorbed OCl radicals according to the following reaction:

$$MO_x(OH) + Cl$$
 $MO_x(OCl) + H^+ + 2e$ (1.8)

Further, in presence of Cl ion, the adsorbed hypochlorite radicals may interact with the oxygen already present in the oxide anode with possible transition of oxygen from the adsorbed hypochlorite radical to the oxide forming the higher oxide MO_{x+1} according to the following reaction and also MO_x(OCl) simultaneously react with chloride ion to generate active oxygen (dioxygen) and chlorine according to the following reactions:

$$MO_x(\ OCl) + Cl^ MO_{x+1} + Cl_2 + e^-$$
 (1.9)
 $MO_x(\ OCl) + Cl^ MO_x + 1/2 O_2 + 1/2 Cl_2 + e^-$ (1.10)

In the presence of oxidizable organics the physisorbed "active oxygen" (OH) should cause predominantly the complete combustion of organics and chemisorbed will participate in the formation of selective oxidation products according to the following reactions:

$$1/2 R + MO_x(^{\circ}OH)$$
 $1/2 ROO + H^+ + e^{\circ} + MO_x$ (1.11)

$$R + MO_{x+1} \qquad RO + MO_x \tag{1.12}$$

The physisorbed route of oxidation is the preferable way for waste treatment. It is probable that dioxygen participates also in the combustion of organics according to the reactions, such as formation of organic radicals by a hydrogen abstraction mechanism: RH + OH R + H₂O; reaction of organic radical with dioxygen formed at the anode: R ROO and further abstraction of a hydrogen atom with formation of an organic hydrogen peroxide (ROOH) and another radical; ROO' + R'H ROOH + R`. Since the organic hydrogen peroxides formed are relatively unstable, decomposition of such intermediates leads to molecular breakdown and formation of subsequent intermediates with lower carbon numbers. These sequential reactions continue until the formation of carbon dioxide and water. In this case the diffusion rate of organics on the anode area controls the combustion rate. In the same way indirect electrochemical oxidation mechanism has been proposed for metal oxide with chloride as

supporting electrolyte for wastewater treatment. The role of hypochlorite in electrochemical treatment of pesticide via chlorine generation is:

Pesticide + $OCl^ CO_2$ + H_2O + Cl^- (1.13)

3.5. Calculation of electrical yield (Current Efficiency)

The current efficiency is defined as the ratio between the electrical charge that actually used to oxidize the organic compounds and the total consumed electrical charge [12]. Table (1) represents the current efficiency values and the energy consumption values of the under test electrode used for the electrolysis degradation of the pesticides at their optimum operating conditions.

3.6. Conclusion

The electrochemical treatment of simulated wastewater containing the investigated pesticides (malathion, imidacloprid and chlorpyrifos) has been investigated under several operating conditions using modified electrode. The electrocatalytic activity at applied current density of 250 mA/cm², pH of 3 and supporting electrolyte of 2 g/L of NaCl. In the present investigation, it could be concluded that, the use of the under test modified Ti/Rh electrode in the electro-catalytic degradation of some organic compounds (pesticides) lead to low energy consumption and low cost of the process, so these electrode could be applied for treatment of wastewaters agricultural containing organic compounds such as pesticides.

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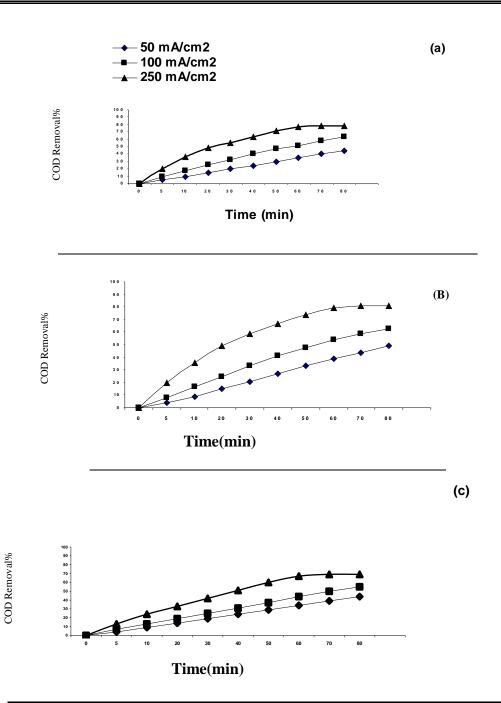


Fig. (1): Removal of COD with electrolysis time for 1% concentration of (a): imidacloprid, (b): malathion and (c): chlorpyrifos pesticides, supporting electrolyte 2 g/L NaCl, pH 3, and Ti/Rh modified electrode.

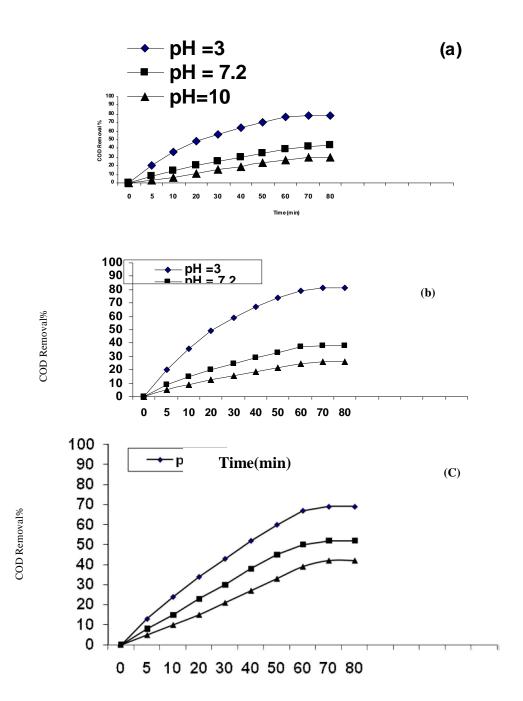


Fig. (2): Removal of COD with electronic discrete for 10% contraction of (a): imidacloprid, (b): malathion and (c): chlorpyrifos pesticides, supporting Time(min) of (3, 7.2, 10) and Ti/Rh modified electrode.

Influences gender on adjustment and self-esteem among adolescents

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Abstract: In the present study an attempt is made to see whether male and female adolescents studying in standard 9 differ in their level adjustment and self esteem. A total of 100 adolescent students studying in Yasouj city were randomly selected. They were administered Bell's Adjustment Inventory (1968) (which measured adjustment of an individual in 4 areas-Home, health, social and emotional) and Self esteem inventory developed by Cooper and Smith (1987), which measured self esteem of an individual in 5 areas-general self, social self, home parents, lie scale and school academic. Independent samples 't' test was applied to see the differences between male and female students. Results revealed that male students found to have higher levels of self esteem compared to female students. Further, Gender had no differential influence over adjustment scores in home, health, emotional, and social areas.

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Key words: Adjustment, Self-Esteem, Adolescence, Gender, Inventory

Introduction

the Physical adaptation which varies from person to the other (Alan, 2000). Adolescence will start with puberty and end with growth and general development termination. Both periods adolescence and puberty start at the same periods; however, adolescence lasts 8 years and includes pubescence changes in the body along with mental, drive, tendency, interaction, emotional development, job satisfactory and moral and religious purification. The adolescence period lasts about 7 to 8 years and ranges from 12 to 20 years old (Weissman, 1975). Adjustment refers to adoption of the organism to demands of the environment. Human being not only adapts to their environment but through the use of intelligence changes the environment to meet the needs more effectively. He learns to develop his self by exchanging the demands and influence of his environment. In the process of meeting the demands of life on may be encountered with problems of health. Duncan (1949). Many studies have been conducted on problems of adolescents and various factors influencing adolescents' behavior. Conflict between parents, mother's low level of education, lack of support from parents, negligence by parents, adverse affect of television viewing giving rise to unfulfilled unrealistic demands, exposure to peers who smoke, drink or use drugs, their social status in modern society etc. were some of the important factors found to be responsible for development of problem behavior in adolescents. Problem behavior in adolescent gives rise to symptoms such as frustration, obstinacy, aggressiveness, impulsiveness, violent behavior, antisocial behavior, etc. Faulty

Adolescence is the Physiological learning period and

lifestyle is responsible for some behavioral problems in adolescents and it increases prevalence of psychosomatic disorders during this stage of development indicating the importance of a healthy environment. On the whole, satisfying the needs leads to every single individual adjustment. Man lives in a world full of challenges resulted in depression and conflict as hindrances in achieving the goals. In other words, when a man's needs are not satisfied, he she suffer mental breakdown and tension. Thus, removing disappointment, shortcomings and life challenges ends in adjustment.

Self-esteem is assumed constantly as one of aspects in personality in close interaction with the others. Since the family environment plays a significant role in malign personality' it can pave the way for selfevaluation. This' self-esteem is considered constantly as one of the aspects in personality close interaction Possessing the feeling of self with others. esteem is as a vital asset which can engender talent and flourish initiative. (Douglas, 1968) low self esteem is as an Index in diagnosing the children's abnormalities. Despite the fact that it is not clear whether low self -esteem is the chief cause of every abnormality, the study conducted by Shamlou(2005) revealed that it is obvious that low self esteem children face unsurmounted and numerous challenges . In other words, cognitive process, affection impetus, imitative and decision making are affected by self- valuation. It is as the kernel of characteristics in interaction with the rest.

In recent years there has been increasing interest in gender-related influences on adolescence adjustment and academic achievement. There is growing appreciation that a better understanding of concerns

in these areas will be necessary not only for promoting optimal individual development, but also for meeting the nation's social and economic needs (Browen & Finkelhor, 1986). Contemporary theory and research reflects a shift from studying gender as static, relatively isolated indicator to examining their mutual implications for adolescence adjustment within more process-oriented, integrative frameworks. (Chandy & Blum, 1996). Using this approach. Contextual and psychological experience of group members can be considered in relation to normative processes of adaptation within specific periods or stage of development. Several factors point to early adolescence as a period of particular importance for issue pertaining to gender (Cohen & etc, 1996). These include increased exposure to others of differing backgrounds at this age stage-specific concerns such as puberty and dating and the emerging salience of group identity in processes of self-understanding (cohen & Willis, 1985).

Therefore, the adolescence with the same age group who are present at school can feel the tangibility of Pedagogical changes. Since school is a social environment, it is fundamental that every single individual keeps in touch with his/ her peer groups Besides, the adjustment conflict can be posited in terms of the manner of adjustment to the school atmosphere, principals, teachers and subject matters is incorrect behaviors and will be pessimist to the future (Douglas, 1968).

Objectives

The purpose of the present study is to investigate

- 1) To find whether there is a significant differences between the adjustment of Standard (IX) boys and girls.
- 2) To find whether there is a significant differences between the Self-Esteem of Standard (IX) boys and girls.

Methodology

Population and Sample

Population: The population of the study consisted of all the Standard (IX) student in Yasouj city. The present study was conducted on the random sample of 100 Standard (IX) students (N = 100), male (N₁ = 50) and female (N₂ = 50) of secondary schools of Yasouj city. The age of the subjects of class (IX) ranged between 14 and 15 years.

TOOLS

1. Adjustment Inventory for adolescent Students (BAI) developed by Bell's Adjustment (1968). The inventory comprises of 140 items in relation to five areas of adjustment (Home 35, Health 35, Social 35, and Emotional 35 items). The test is helpful in

screening the poorly adjusted students who may need further psycho-diagnostic study and counseling for their adjustment problems. The reliability coefficients were determined by spilt half and test retest methods, where the reliability coefficients varied from .81 to .89 for various areas of adjustment through split half and reliability coefficients varied from .89 to .92 through test retest method for different areas of adjustment. Cross validation of the scale with K.Kumar's adjustment inventory resulted in Pearson's r of .72, .79, .82 and .81 for home, health, social and emotional areas respectively.

2. Self – Esteem Inventory for adolescent Students developed by Cooper smith(1987). The Inventory comprises of 58 items in relation to five areas of Selfesteem.(General self 25, Social self 8, Home parents 8, Lie scale 8, School Academic 8). The alpha coefficient for the total self esteem scale was .88 and .79 for the Anglo-Indian and Vietnamese-Australian samples respectively. The validity of the was ascertained by Convergent and scale validity using EPQ (Eyesenck discriminate Personality Questionnaire), where negative and significant correlations were obtained for neuroticism scale and positive and significant correlations were obtained for extroversion dimension.

Procedure

The Tools were administered on the sample of 100 selected adolescent subjects. The items in the answer sheet were scored according to of scoring keys for four different areas. (Home, Health, Social, and Emotional). The data thus obtained was analyzed & interpreted using various statistical techniques.

The obtained scores were recorded on master sheet and later fed to the computer using SPSS for Windows software (version 16.0). Depending on the scores the subjects were classified into two levels of self-esteem-low and High. Using Independent samples 't' test, influence of self esteem was verified on 4 areas of adjustment and total adjustment scores, taking self esteem as independent variable (varied at 2 levels-low and high) and adjustment scores as dependent variables.

Analysis and interpretation of data

In all the components of self-esteem significant differences were observed between male and female students except in school academic self esteem. In the case of general self esteem ('t'=5.581; P=.000), social self ('t'=6.962; P=.000), Home, parents ('t'=6.574; P=.000) and in total self esteem scores ('t'=8.10; P=.000), where male students had higher self esteem scores than female students. In the case of school academic self esteem male and female

students (means 3.54 and 3.54 respectively) had similar self esteem scores and t test revealed a non-significant difference between them ('t'=.841; P=.912). The male students seem to have higher self esteem (with respect to total self esteem, general, social self, home-parents) than female students may

be because of our patriarchal culture wherein boys are always being made to feel they are superior compared to girls. Since girls are hardworking as seen on annual results and they are more studious, may lead to scoring more than boys.

Table 1: Mean self esteem scores (on various areas) of male and female students with the results of Independent samples 't' test.

Gender	Self esteem	Mean	S.D	't' value	P value
Male	General	16.70	2.70	5.581	.000
Female		13.68	2.71	3.381	
Male	Social self	6.90	1.43	6.962	.000
Female		4.92	1.41	0.902	
Male	Home parents	7.18	1.52	6.574	.000
Female		5.18	1.52	0.574	
Male	School				.912
	academic	3.54	1.45	0.841	
Female		3.54	1.45		
Male	Total	35.92	4.322	8.100	.000
Female		28.90	4.343	0.100	

Table 2 : Mean adjustment scores (on various areas) of male and female students with the results of Independent samples 't' test

Areas of					P value
adjustment	Gender	Mean	S.D	't' value	
Home	Male	12.72	4.71	.563	.575
	Female	12.24	3.77	.505	
Health	Male	8.80	5.25	.218	.828
	Female	8.58	4.84	.210	
Social	Male	16.98	5.40	.975	.332
	Female	16.00	4.63	.913	
Emotional	Male	13.70	6.11	.764	.447
	Female	12.90	4.20	.704	
Total	Male	52.24	15.31	1.059	.292
	Female	49.48	10.28	1.039	

In all the areas of adjustment, gender did not have significant influence as all the obtained 't' values found to be non-significant. In other words male and female students did not differ significantly in their adjustment scores. In areas like home, health, social, emotional and in total adjustment scores, male and female students had statistically similar scores.

Main findings

- 1. Male students found to have higher levels of self esteem compared to female students.
- 2. Male students had higher self esteem than female students in the cases of general self esteem, social self & home self.

3. Only in academic self esteem male and female students had similar scores.4. Gender had no differential influence over adjustment scores in home, health, emotional, and social areas.

The relationship among gender identity, sex typing, and adjustment has attracted the attention of social and developmental psychologists for many years. However, they have explored this issue with different assumptions and different approaches. Generally the approaches differ regarding whether sex typing is considered adaptive versus maladaptive, measured as an individual or normative difference, and whether gender identity is regarded as a uni-dimensional or multidimensional construct. In this context, Lurye, Zosuls, & Ruble (2008) consider both perspectives and suggest that the developmental timing and degree of sex typing, as well as the multidimensionality of gender identity, be considered when examining their relationship to adjustment.

Our self-concept reflects a variety of beliefs that begin to develop in early childhood. The experiences that we have, the basic ideas we formed about ourselves, and the messages we heard growing up. help form our self-concept and influence our selfesteem. Gender Socialization creates expectations for the way women and men behave, think and feel about themselves. Girls entering adolescence struggle with many issues such as body image, which can lead to eating disorders, fears of rejection and mixed messages from society. These cultural messages have tremendous impact on the self-esteem of women. Boys and men also live by social pressures to behave in the prescribed roles that define manhood. Boys and men are also subject to inauthentic feelings of self if they do not fulfill the definition of being "male."In research and policy design, gender issues need to be addressed more explicitly, rather than as a subcategory of the poor. Modelling and planning tools, such as Social Accounting Matrices should incorporate gender disaggregated data where available.

- The use of rapid, qualitative, participatory and action oriented research techniques may be of more value than top down quantitative exercises in identifying the implications of adjustment for women. Resources might be usefully geared to community level monitoring and evaluation, for example of chiatr.

service provision, with the involvement of women who are the users of services. This should be tied to some form of accountability of service providers.

To conclude, adolescent age is being considered as stress and storm full age, where there will be rapid transition both psychologically and physically among adolescents. This may lower the self esteem of the adolescents which is more pronounced in female adolescents. This in turn affect the adjustment process of the adolescent in different settings too.

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The Effect Of Freezing And Heating On The Infectivity Of Sarcocystis fusiformis To Cats and Evaluation Of ELISA For Its Diagnosis In Water Buffaloes (Bubalus bubalis)

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Abstract: One hundred and thirty oesophageal muscles of slaughtered water buffaloes (*Bubalus bubalis*) were examined macroscopically for detection of *Sarcocystis fusiformis* cysts. The prevalence of *S. fusiformis* cysts in the examined buffaloes (3-6 years old) was 65 (50%), their dimensions ranged from 10.0–45.0 mm length & 1.5-7.0 mm width. Cats fed on fresh *S. fusiformis* cysts or those exposed to temperature at 50°C for 15 minutes were infected and shed *Sarcocystis* oocysts and sporocysts. Boiling of *S. fusiformis* cysts for 15 minutes, refrigeration for 3 days at 4°C and freezing for 2-3 months at -18 °C were effective in inactivating the cysts in buffalo meat. The antibodies against *S. fusiformis* were detected in 77 (59.23%) sera of the examined buffaloes by ELISA using bradyzoites of the same species. [Journal of American Science 2011; 7(7):55-57]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: Adjustment, Self-Esteem, Adolescence, Gender, Inventory

Key words: Sarcocystis fusiformis, heating, freezing, ELISA.

1. Introduction

Sarcocystis spp. are common cyst-forming coccidian parasites with a heteroxenous life cycle and wide range of hosts. Sarcocystis spp. are oval, whitish cysts that vary in size from microscopic to visible. Each intermediate and definitive host may harbor more than one Sarcocystis species (Dubey et al., 1989).

Water buffaloes (Bubalus bubalis) in Egypt harbour four Sarcocystis spp. (El-Sayed, 2010). Two macroscopic (S. fusiformis and S. buffalonis) with cats as definitive hosts and two microscopic (S. levinei with dogs as definitive hosts and S. dubeyi with unknown definitive host but thought to be zoonotic). The infection of water buffaloes with macroscopic Sarcocystis cyst renders the meat leading downgrading unmarketable to condemnation of the carcass. In addition, the propagation of these S. fusiformis cysts in their final host (cats) will induce contamination of the environment due to excretion of the infective sporocysts (Dubey et al., 1989).

Sarcocystis fusiformis infecting water buffaloes in Egypt were studied by a number of authors (reviewed by El-Sayed, 2010). Its prevalence varied from 17.2 % (age 2-3 years old) and 68.1 % (over 5 years old). However, research studies on the effect of heating and freezing on its infectivity to the final host (cats) were not studied in Egypt and few data are available from other countries on other Sarcocystis spp. from water buffaloes and sheep (Srivastava et al., 1986 and Collins and Charleston, 1980). Furthermore, importation of water buffalo meat from India with possible introduction of S. fusiformis cysts has promoted our interest in studying this topic. In

addition, this study aimed at evaluation of serodiagnostic test (ELISA) for detection of *S. fusiformis* antibodies before slaughtering using crude antigen prepared from bradyzoites of the same species of cysts.

2. Materials and Methods

I-Collection of samples:

One hundred and thirty oesophageal muscles of slaughtered buffaloes ranged from 3 to 6 years old at El-Bassatin abattoir were macroscopically examined and those found infected with *S. fusiformis* cysts were collected and placed in properly labeled plastic bags, then immediately transported to the Parasitology laboratory. Upon arrival to the laboratory, *S. fusiformis* cysts were collected from water buffaloes and *S. fusiformis* cysts were also dissected out from imported meat (from India). Both cysts were used for experimental infection of cats.

II- Collection of sera for serological examination:

Serum samples were obtained from the same examined animals (hundred and thirty buffaloes). Sera were separated by centrifugation at 1500 rpm and stored at $-20~^{\circ}\text{C}$ until used.

- Experimental infection of the final host:

Eighteen young cats (4-6 weeks old) were used for experimental infection. All cats were coccidian free at the time of the experiment since neither oocysts nor sporocysts were detected in their feces after daily examination for five consecutive days. Then, cats were assigned into six groups 3 cats each. Each group was caged individually and fed only commercial dry cat food. Each cat in each experimental group was inoculated with 20 cysts whether fresh or treated. The cats of 1st group were

fed on freshly collected *S. fusiformis* cyst. The 2nd group was infected with *S. fusiformis* cyst exposed to temperature of 50°C for 15 min. The 3rd group was inoculated with the cysts after boiling for 15 min. The cats of the 4th group were inoculated with *S. fusiformis* cysts kept in refrigerator (4 °C) for three days. The 5th group was inoculated with *S. fusiformis* cysts obtained from imported buffalo's meat preserved for about 2-3 months at -18°C. The last group of cats was kept as non-infected negative control. Starting from 1st day post inoculation, faeces was regularly collected daily and thoroughly examined for the presence of sporulated oocysts by direct smear and the flotation concentration technique for 50 days post infection (Soulsby, 1982).

IV Serological diagnosis:

IV.a-Preparation of *S. fusiformis* antigen:

Freshly collected *S. fusiformis* cysts (40 cysts/ml PBS pH 7.2) were frozen and thawed for six times followed by sonication 2 times, each for 20 seconds and centrifugation at 14,000 rpm for 45 minutes. The supernatant was collected and aliquoted. The protein concentration of the antigen was determined (Lowry et al., 1951).

IV.b- Enzyme- linked immunosorbent assay (ELISA) (Iacona et al., 1980):

Specific antibody against *S. fusiformis* antigens was detected in the buffalo's sera by ELISA. Sera of water buffaloes infected with macroscopic *S. fusiformis* cysts (65 in number) and those negative for these cysts (65 in number) were subjected to serological analysis. Wells in ELISA plates were coated with 100 ul of *S. fusiformis* antigen at the rate of 40 ug /ml and sera were tested at dilution 1:100 in PBS. The optical density (O.D) was measured at 405 nm against blank control well. The tested sera were considered positive when the absorbency values were as more than the cut off values (0.36).

3. Results

1- Results of Macroscopical examination

The result of macroscopical examination of oesophageal muscles revealed that 65 (50%) of 130 buffaloes (3-6 years old) were infected with *S. fusiformis* cysts. Macroscopic cysts appear grossly as spindle shaped white or creamy in color. *Sarcocystis fusiformis* cysts measured 10.0–45.0 mm length & 1.5-7.0 mm width. Stained smears of *S. fusiformis* contents revealed banana shaped bradyzoites (9-14um ×4.5-5.5um).

2-Results of experimental infection:

Feeding cats with *S. fusiformis* cysts in the six groups revealed that only cats fed on fresh *S. fusiformis* cyst (group1) and cysts subjected to temperature of 50° C (group2) were infective since the cats excreted *Sarcocystis* oocysts and sporocysts. Cats in the other groups (3-5) were negative for *S. fusiformis* infection during experiment (50 days post infection). The prepatent period was 10-14 days and cats were still excreting sporocysts until the end of the experiment (50 days). The sporoysts were shed intermittently; they were ellipsoidal measuring 9.5-14.5 μ m×8.5-12.4 μ m (12.0×10.45 μ m), containing four sporozoites and a granular residium.

3-Result of serological diagnosis (ELISA):

Examination of sera of 130 water buffaloes by ELISA using *S. fusiformis* antigen revealed that 77 (59.23%) had antibodies against *S. fusiformis* (O.D. **Error! Not a valid link.**). Fifty three (40.07 %) serum samples were negative (O.D. ranging between 0.125- 0.355) (Table 1). All the 65 water buffaloes infected with macroscopic *S. fusiformis* were ELISA positive (100%) while only 12 (18.46 %) out of 65 macroscopically negative had *S. fusiformis* antibodies.

Table1: Results of serological examination of 130examined buffaloes using ELISA.

Total No. of examined animals by ELISA	NO. of seropositive animals	%	Average O.D.	NO. of seronegative animals	%	Average O.D.
130	77	59.23%	1.26 (0.37- 2.150)	53	40.07%	0.24 (0.125- 0.355)

4. Discussion

Sarcocystis spp. is one of the most common parasites affecting of water buffaloes meat. The present study revealed that 65 (50%) of 130 buffaloes were infected with macroscopic *S. fusiformis* The high incidence of *S. fusiformis* cyst infection in

buffaloes is associated with the fact that the buffaloes are in close contact with the final host (cats). In Egypt, Nassar, 1982 reported the incidence of *S. fusiformis* in buffaloes of 2-5 years was 94.0%. El-Sayed (2010) also, mention that the prevalence of *S. fusiformis* was 17.2 % in buffaloes 2-3 years old and

68.1 % in buffaloes over 5 years old. Low incidences (28%) was recorded in Sohag governorate, Egypt by Khalifa et al. (2008) and in Iran 20% of the examined buffaloes were infected with *S. fusiformis* by macroscopic examination (Ghorbanpoor et al., 2007). The difference in the incidence of *Sarcocystis* infections may be attributed to the difference in the ecological conditions and hygiene in the different localities were water buffaloes are raised. The difference in the age groups of the sampled animals contributes also to different incidence.

Concerning the effect of heating on the infectivity of S. fusiformis cysts, it was found that cats fed on fresh cysts and those subjected to 50°C for 15 minutes excreted viable oocysts and sporocysts of Sarcocystis. The obtained results revealed also that boiling for 15 minutes, refrigeration (for 3 days at 4°C) and freezing (for 2-3 months at -18 °C) were effective in inactivating S. fusiformis in buffalo meat. In sheep, Sarcocystis gigantea macrocysts were viable after 10 minutes at 52.5°C but not at 60°C. Macrocysts survived 60 days at -14°C and infected cats (Collins and Charleston, 1980). Sarcocystis levinei cysts infecting water buffaloes lost its infectivity to dogs when heated at 65-75°C while those cysts heated between 40-60°C were still infective to dogs (Srivastava et al., 1986). Also, cysts stored at -4°C for 2 days when fed to dogs didn't shed sporocysts but those kept at -2°C for 1 day shed sporocysts.

Conventional methods of diagnosing Sarcocystis spp. infections, involve time consuming and labourintensive examinations of host muscle tissue for the presence of cysts or cystozoites are neither suitable for use in large-scale screening programmes, nor for use in diagnosing infections in livestock. In addition, diagnosis of S. fusiformis in living animals is needed specially for importing water buffaloes. Therefore, serological tests detecting specific antibodies to S. fusiformis have been assumed to be important in the diagnosis of sarcocystosis. A Few attempts have been made to evaluate the accuracy of these tests in diagnosis of sarcocystosis in buffaloes. In this study, antigen derived from S. fusiformis in buffaloes was utilized in ELISA procedure. Seventy seven (59.23%) out of 130 serum samples of examined buffaloes were positive for Sarcocystosis. Twelve samples (18.46%) out of 65 negative samples macroscopical examination for S. fusiformis were considered positive by ELISA which was most likely due to early stage of infection in these animals. This may be due to that these serologically positive water buffaloes harbour S. fusiformis cysts which were not detected macroscopically. Sarcocystis fusiformis antibodies were detected by the ELISA in 54.6% of the examined buffaloes in Iran (Ghorbanpoor et al., 2007). Antibodies against *Sarcocystis* spp. were also detected in 88.6% of buffaloes from Iraq by IFAT (Latif et al., 1999). The obtained result revealed that sero-epidemiological surveys on livestock using ELISA can be carried out without the need to examine the animals after slaughtering.

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Effects of 90min Exposure to 8mT Electromagnetic Fields on Memory in Mice

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Abstract: The aim of this experimental study was to investigate the effect of extremely low frequency electromagnetic fields (ELF EMF) on memory function in mice. Memory function was evaluated with passive avoidance learning in a standard wooden box that despite his natural tendency, mice learns to stay on a small platform to avoidant electric shock. 24h after learning session, laboratory animals were placed in a sinusoidal electromagnetic field created using a round coil, for 90 minutes to exposure to an 8mT, 50Hz. Then animals were placed on small platform again and step-down latency measured as memory index. The results showed that exposure to a 50 Hz, 8mT electromagnetic field for 90 minutes has devastating effects on memory function in male mice. [Parviz Askari. Effects of 90min Exposure to 8mT Electromagnetic Fields on Memory in Mice. Journal of American Science 2011; 7(7):58-61]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: electromagnetic field; memory;cognition;mice

1. Introduction

Nowadays achieving new technologies, the human has created different intensities electromagnetic fields, communication services and various electrical devices. there are worries about influences electromagnetic fields on the metabolism and biological processes and molecular mechanisms and cellular organisms. The first report in 1979 about possible damaging effects of exposure to electric and magnetic fields by Whertteimer and Leeper was related to electrical fields and cancer in children [1]. In 1980 researchers investigated an increased risk of leukemia and brain tumors in people who were faced to exteremly low frequency electromagnetic fields (ELF EMF). Such evidence was led to increased attention to the risk of EMF [2]. Further research was focused on the risk of central nervous system disorders including Alzheimer and Parkinson diseases in people who were exposure to occupational electromagnetic fields and electric shock

It was also found that occupational exposure to the same fields increases the risk of heart disorders, Cardial Arrhythmia-Related Conditions and Acute Myocardial Infarction [4].

The harmful effects of EMF on cognition, learning and memory in animals have been investigated using an assortment of cognitive and behavioral tasks, tests and exposure conditions [5]. Animal models and human designs

have shown that ELF EMF can change peripheral and central nervous system activity. These changes include the increased activity of hypothalamic nuclei and intracerebral nuclei [6], neurotransmitter synthesis in synapses and Ganglya [7], changes in the activity of neuronal receptors including dopamine receptor and 5-HT (1B) [8] and such changes ultimately affect the learning and memory functions [9].

Behavioral and psychological studies have shown that exposure to ELF can affect human cognitive functions and behaviors of animals [10, 11, 12, 13]. For example exposed rats to 25 or 50 Hz fields in the short term (7 days) or long term (25 days) were examined in the Y form maze. The results indicated that neither short-term, nor long term exposure did not make a change in motor activity, but 50 Hz field exposure will decrease recognition of new arm of the maze [13].

In another experimental study Jadidi and his colleagues (2007) confirmed that 20 min exposure to 8 mT, 50 Hz field can impair spatial memory consolidation but such impaires can not created by a 2 mTesla field [14]. The researchers believe that ELF EMF can make changes in calcium ion homeostasis in neuronal tissues. Hippocampal regions of mouse brain which has exposed to 50 Hz field for 90 days (50 and 100 mT) were isolated and compared with the control group. it was found that exposure to ELF EMF increased Ca ions levels in cells [1].

In the other hand some researchers have reported that ELF fields have positive effects on cognitive functions. Liu et al (2008) examined spatial learning and memory changes using Morris water maze after 4 weeks exposure to ELF EMF (4hours daily with a 50 Hz, 2mT ELF). They reported that such exposure leads to reduced long-term delay in finding the hidden platform, and improved long-term memory, without effect on short term memory or motor activity [15]. Kavaliers et. All have observed behavioral improvement in mice water maze responses that is associated with biological opioid system [16].

Considering the above findings, it is not absolutely correct confirmed that the ELF fields can improve memory or impair it as a cognitive functions. This study investigated the effect of ELF EMF (50 Hz) on memory in adult male mice.

2. MATERIAL AND METHOD

A. Sbjects and Experimental Groups

Adult male mice (25 - 30 g) were separately housed five per cage in a room with natural light cycle and constant temperature (24 \pm 2 C). Food and water were available ad libitum. All procedures were conducted in agreement with the National Institutes of Health Guide for care and use of laboratory animals. Three groups were used: exposed to 8 mT(N=10), shamexposed(N=10), control group(N=10).

B. Behavioral Training

This experimental study was aimed to examine one of the most stable kinds of learning's that named as avoidance learning. In this type of learning, animal not only does not receive reinforcement, but also receives a kind of stimuli or situations that may threat the survival of it. Since such irritating situations are a serious threat, generally only once experimental effort makes a long remain stable learning. In this study, to measure memory, laboratory animals (mice) were evaluated with inhibitory (passive) avoidance task.

Passive avoidance learning box is a wooden box with dimensions 30 * 30 * 40 cm and the floor of the 29 steel bars, the diameter of 0.3 cm. Bars are away from each other 1 cm. A wooden platform (4 x 4 x 4cm) is placed in the middle floor of the box. By an electric shock (1 Hz, 0.5 seconds, and 50 V, DC) can be controlled irritating situation (Grass S44-Quincy, Massachusetts.USA). In the learning stage, the animal was gently placed on the small wooden platform in the middle of box. Animal's natural tendency to coming down from the platform, make it to move in space of larger wooden box immediately.

A 15 seconds electric shock was given as soon as animal came down from the platform and placed on the

floor of the box. Step-down latencies of the animals were used to assess

Memory retention. The training and testing sessions were carried out between 8:00 a.m. and 2:00 p.m. in a room with light and sound attenuated..

So despite his natural tendency, mice learn to stay on platform. After 24 hours and in test session, memory function, with step-down latency (second) was calculated [17].

C. The Electromagnetic Field Exposure System

Electromagnetic field was applied in a room adjacent to that used for behavioral experiments. A sinusoidal magnetic field was created using a round coil electromagnet made from a 1000 turned copper wire (0.50 mm). The electromagnet was supplied with a sinusoidal waveform signal generator (GFG-8019G, Good Will instrument Co.). Then amplifier output droved to coil, producing an ELF of 8 mT at the center of the coil. The desired intensity ELF (8 mT) calibrated using a Gauss meters (K72106-9-WALKER, USA) at the center of the coil. The heat generated by coil dissipated due to good ventilation in exposure area. The electrical apparatuses and exposure system adjusted on the laboratory non-metallic table.

90 min before test session in the inhibitory avoidance learning apparatus, experimental mice were exposed to electromagnetic field (in the center of round coil). Sham-control mice were placed in the same situation but there was not electrical current and electromagnetic field, and Control group did not experience it.

3. RESULTS

Because of significant differences in behavioral learning of animals, non-parametric statistical methods were used for data analysis.

In the first step, differences in learning session between three groups were compared. Using SPSS software and non-parametric test (Kruskal Wallis test), results showed that there has not any significant difference between three groups in the learning session (Kruskal Wallis test, Chi-Square =0.923, dF=2, p <.630).

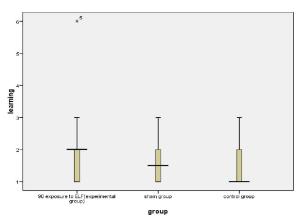
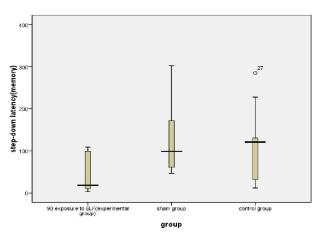


Fig1. Step-down latency in learning session

Compared the control group and experimental group (10 mice in each group) in the learning session was not significant (U Mann-Whitney = 38.50, p <.341). Similar result in sham-control group and experimental group was obtained (U Mann-Whitney = 45.00, p <.684). See fig 1.

The analysis of test session (memory function) data showed that the step-down latency in groups which mice exposed to electromagnetic Tesla 8 mT (50 Hz) were significantly lower than control groups. Comparison of experimental and control mice indicated significant differences between two control ane experimental groups (U Mann-Whitney = 16.00, p <.010) and also significant differences between shamcontrol and experimental too (U Mann-Whitney = 11.



00, p <.003). See fig 2.

4. DISCUSSION

Based on the results, it can be concluded that exposure to 8 mT, 50 Hz electromagnetic field impairs the memory function. So cognition and animal's memory will not be used and animal's step-down

latency and avoiding the shock reduces. It is well-known that the differences between step-down latency on the platform in learning and test sessions are an index of the rate of memory function in inhibitory (passive) avoidance task. Staying on the platform in test session in control and sham-control group mice indicated that memory was remain, while experimental group performed significantly less than the other groups. Therefore it can be stated that exposure to electromagnetic field even in a single 90 minutes exposure, can impair memory in mice. These findings are in agreement with the results showing the impairing effects of ELF on cognitive functions [14, 9, 10, and 11].

Fig2. Step-down latency in test session (memory)

Previous studies mainly focused on cognitive functions specially the memory and learning in different tasks and duration of expusure, so inconsistent results are predictable. Jadidi et al. (2007) provide evidence that exposure to a 50 Hz, 8 mT magnetic field for 20 min impaired consolidation spatial memory using a water maze but, not retrieval of learned information. Further, no effect was found in 2 mT magnetic field [14]. McKay and Persinger (2000) also found 60 min exposure to 200-500 nT ELF before training phase impaired spatial memory in the radial maze whereas exposure before testing phase decreased responding time of rats in this task [18]. Lai et al. (1998) showed that 60 min exposure to a 60 Hz, 1 mT ELF before training impaired spatial memory in a water maze [12]. Decreased perception, memory and cognition functions were found in 60 min exposure to 50 Hz, 1 mT magnetic field in a human study [9]. However, there are evidence which show no significant effects or a positive effect of ELF on learning and memory [19]. For instance, Kurokawa, Nitta, Imai, and Kabuto found no significant effects of a 50 Hz, 50 IT magnetic fields on human brain [20]. Also there were not any harmfull effects of 45 min exposure to a magnetic field at 0.75 mT on memory in mice [21]. This inconsistency may be due to differences in protocols (such as type of task, intensity of the applied ELF and exposure duration, etc.) among different studies.

The mechanisms underlying the harmful effects of magnetic field on learning and memory are not known. The brain cholinergic system plays a crucial role in learning and memory [22, 23]. It has shown that exposure to ELF decreased activities of cholinergic system in the frontal cortex and hippocampus; both regions are involved in memory processing [11]. Thus, one possibility is that the impairment of cognition processing can result from decrement in transmission of

cholinergic system. Also exposure to ELF can change calcium ion [1], and EEG, GABA, and calcium ions in the brain and these changes may effect on cognition [24].

In summary, findings indicate that 90 min exposure to a 50 Hz 8 mT, electromagnetic fields can impair memory function in passive avoidance learning. In agreement with others our data indicates that exposure to ELF has impairment effect on learning and memory functions. Therefore, further studies are required to find out the underlying mechanisms.

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The effect of light, tone and movement interferences on selective association behavior in laboratory white rats during day and night

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Abstract

This study investigated the effect of light, tone and movement interference on selective association behavior in laboratory white rats during day and night circle. Subjects included four white laboratory rats (i.e., 2males and 2 females). They were randomly selected and divided into two experimental and control pairs. These pairs were exposed to day and night stimuli such as shock avoidance, and compound antecedent stimuli (i.e., light, tone and movement). Both pairs were exposed to shock avoidance either at nights or during the day to arrive at the level of asymptote. At the next stage, two pairs were exposed to antecedent stimuli by deleting shock reinforcement either at nights or during the daytime to be conditioned during training and reinforcement. The research method was behavior experimental analysis. Test results and observations were analyzed and the findings revealed that there was significant difference between the frequencies of the associations at night or during the daytime (p<.05). However, there was not a significant difference between light, tone, and movement association frequencies at night and daytime in both pairs (p<.050). [Parviz Askari. The effect of light, tone and movement interferences on selective association behavior in laboratory white rats during day and night. Journal of American Science 2011; 7(7):62-67]. (ISSN: 1545-1003). http://www.americanscience.org.

Key words: light, tone, movement, interferences, stimuli, rats, avoidance training

learning very difficult and impossible. The most evident principle of biological limitation is that limitation supports behaviors that have value of survival and avoids behaviors that are destructive for survival (Lefransowa, 2000, translated by Seyyed Mohammadi, 2006). The biological limitations explain that learning is not an integrated and general process but it is a collection of comfortable responses (Zeiler, 2002). It is believed that n each learning experiment, organism's heredity deposit should be considered. The innate capacity limits the associations that animal can learn and responses that will show in a special situation (Moore, 2004).

According to Timberlake (1999; 2005), the animal's behavior can be understood better when it is based on evolutional and ecological environment; we should also be aware of evolutional pre- readiness that is effective in an organism. From the viewpoint of Seligman (1971, quoted in McDonald & Chiappe, 2003), some kinds of animals learn some associations better than other kinds of animals because they have more readiness concerned with their biological characteristics. Accordingly, for some kinds of animals, making a kind of association is difficult because they are not ready to learn it biologically; therefore, animals should capable of having evolutional readiness to acquire such behaviors previously. For example, rats learn pressing the lever to receive food more easily than pecking to a button

Introduction

Selective association refers to a kind of association that happens among a compound of conditioned stimulus and unconditioned stimulus more easily in comparison with other compounds (Domjan, 2008). When the test animals learn some compounds among conditioned stimulus unconditioned stimulus more easily than other compounds, selective association has been happened (Tomarken, Mineka & Cook, 1989; Cook & Mineka, 1990: Wises & Panilio, 1993: Lolardo & Foree, 1976). The visual signs (light), audio (tone) and tasting (taste or smell) are effective signs as conditioned stimuli; however, they can be effective only when accompanying with special unconditioned stimuli or make association. These results indicate the phenomenon of selective association (Lolardo & Droungas, 1989, quoted by Domjan, 2002). According to Balkenus (2000) organism equipped with innate and biological mechanisms for learning; and learning principles related to animal biological willingness significantly. Also, biological limitations have been considered as an important matter concerning learning in animals (Kari, 1998; Domjan & Galef, 1983). Biological limitations can be defined in the simplest form as follows:

The innate capability makes some signs of learning very easy and possible and other kinds of

tone with negative reinforcement (electric shock) was more than association between tone and food. Doves also made association between light and food easily. Brennan and Riccio (1994) conditioned the rats and observed that they learn association between tone and shock more easily than association than the association between light and shock. On the other hand, rats showed avoidance response by hearing the tone while they did not show the avoidance response by seeing light.

In a collection of responses, Zahoric, Houpt andSwartzman (190) indicated that selective association in conditioning hatred of taste. The results showed that ruminant animals like sheep and goat can avoid food related to disease but disease should happen during a short time after eating food so that animal shows hatred of taste. Boakes and Poli (1975) compared rats and doves in an experiment concerning their responses to food program and found that rats pressed lever in order to get food while doves pecked the button to receive food. Haofman and Timberlake (1998) indicated that rats use audio and smelling stimuli more than visual stimuli for searching in T form maze during day.

Damian (2005)indicated motivational behaviors (e.g., hunger, fear, etc.) concerned with doves' attention to the certain kinds of signs. He found that the animals' motivational behaviors like hunger and fear activate a stimulus filter that makes bias animals' attention to certain kinds of signs. When the doves were hungry ad motivated to find food, the showed responses and reactions to the visual signs; however, under the condition of fear that were exited to avoid hunger, they reacted against audio signs. Foree and Lolodo (1973) trained the doves to press the lever with the existence of the compound stimulus consisting tone and red light. For some doves, the reinforcement was avoiding electrical shock and for other group, it was representing food. In the appetitive test, the compound stimulus and light could control the way of pressing the lever strongly; however, control of tone on the response was very slight. On the other hand, in the avoidance test, the compound stimulus and tone controlled most responses than light (Lolordo & Foree, 1973).

Wilcoxon, Dragoin and Kral (1971) in comparison between quails and rats found that quails make association between taste more than visual characteristics. Timberlake (2002) wit comparison of rats' searches during day and night in the maze has shown that he rats without deprivation and reinforcement continue searching in the maze successfully if they are tested during the night. Seligman (1971) indicated that rats learn pressing the lever to get food more easily than pecking to a button;

to get food. Doves also learn pecking to a button to receive food more easily than pressing the lever because doves have readiness evolutionally and biologically with pecking to the button and rats by using their class (Ohman & Mineka, 2001). Timberlake (2001) explains that birds like doves use visual stimuli in order to each and peck the grain and they do pecking during day and cannot do it during the night while animals like rats search in environment during night. The rats react to the visual stimuli, tone and movements in their environments during the night. These different activities are due to evolutional and biological pre-readiness (Timberlake, 2001).

The traditional learning theories lead us to this hypothesis that learning laws are general among different kinds of stimuli and responses in all situations for all the animals. These hypotheses are seen in Skinner Operant conditioning and Pavlov Classical conditioning. According to the Skinner's (1938) theory, all animals can be conditioned based on the method of Operant conditioning. According to Pavlov's (1928) Classical conditioning, each stimulus like tone and light can be conditioned in all animals due to the concordance with unconditioned stimuli (mower & klin, 2001). According to Breland & Breland's (1961) viewpoint, no animal can be understood, predicted and controlled well unless there is enough information concerning their instinctive behavior patterns, evolutional history and ecological situation.

Garcia & Loelling (1966, quoted in Malon, 1990) in an experiment on four groups of rats indicated that rates learn association between taste and vomiting while they cannot make association between tone and taste. Rats also make association between light and shock easily. The theory of selective association with recognition behavior idea and emphasis of this idea animal's evolutional concordance environment is completely relevant. The rats rely on taste in order to select food in their natural habitats; therefore, there is a kind of genetic or innate relation between taste and intestine reactions that that only facilitates the relation between taste and vomiting (Kari, 2003). Some small birds make association between disease and color sensory pattern better than its taste (Sinervo, 2007).

Brushfield, Luu, Callahan, and Gilbert (2008) compared the learning of acquiring smelling audio and visual activities in laboratory rats. The findings showed that test animals learn acquiring smelling and audio activities during day but they have problem in acquiring visual activities. The results of Panililio and Wises' (2005) research on doves revealed that when light or tone were represented to show avoidance responses separately, association between

equipment to produce shock in the lower part of the cage in the right and left parts and there was an equipment to make vibration in these two parts.

The schedule

Night: The test time during the night was changeable from 10 p.m. to 3 a.m.

Day: The test time during the night was changeable from 9 a.m. to 5 p.m.

First stage of the test

The subjects of the experimental pair (one in the night and the other in the day) were exposed to concurrent conditioning method. In this type of conditioning, the conditioned stimulus is represented in the similar time and also ends with each other simultaneously. Thus the experimental group was exposed to antecedent stimuli of tone, light and vibration with electrical shock reinforcement during 17 days and nights till the subjects learnt avoidance the response completely. When conditioned and unconditioned stimuli were represented to the experimental pair, they went from cage floor where there was no shock and their learning achieved at the approximate level.

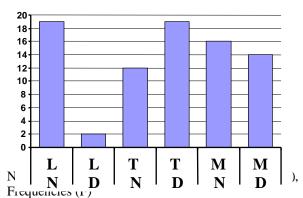
The second stage

The subjects were exposed to antecedent stimuli by deleting shock reinforcement.

Data collection and registration

Data were manually recorded through observation. On the other hand, the researchers recorded data by representing conditioned stimuli and observing animal responses in the form of escape or lack of escape of the rats.

Linear and column representation of the frequency related to avoidance response with existence of antecedent stimuli during day and night is shown in Graphs 1 and 2 concerned with the hypotheses 2 to 6.



Graph 1. Frequency of responses **Results**

Hypothesis 1: There is meaningful difference between association frequencies during day and night.

moreover, doves learn pecking to a button to receive food more quickly than pressing the lever (Sligman, 1971, quoted in McDonald & Cheap, 2003). Shappir, Jacobs and Lolordo (1980, quoted in Domjan, 2002) found that doves which are conditioned with food as reinforcement may make association between visual stimuli with food more than audio stimuli and food. When doves are conditioned to avoid shock, they may be conditioned with audio signs more than visual signs. Gemberling and Domjan (1982) indicated that the selective association in the laboratory rats. In this research, taste and a lithium chloride and a sensory stimulus (tone) with electrical shock reinforcement was used The results showed that rats cannot make association between taste and shock while rats made association between the sensory stimulus (tone) with electrical shock and test animals could make association between taste and lithium chloride (vomiting).

Shattelworth (1973, quoted in Blue, 1979) in a research on the chickens found that when chickens are thirsty they peck on a button to receive water while they use more visual signs than audio signs. Therefore, the aim of this research was to indicate the effect of light, tone and movement interferences as environmental factors on selective association behavior during day and night cycle among the laboratory white rats. The main concern was that whether in the avoidance conditioning situation with compound conditioned stimulus and unconditioned stimulus or electrical shock reinforcement with changing time situation between conditioned stimuli and unconditioned stimuli throughout day and night. In doing so, the conditioned stimuli which are selected to control avoidance response are similar or not.

Subjects

The subjects under the test included four laboratory white rats (i.e., two male and two females with the age range of four months). The subjects divided into two experimental and control pairs randomly. The experimental pair included two white rats. One of them was tested during night and another was tested during the daytime. The control pair were also two white rats. One of them was tested during night and the other was tested during the daytime. The research method was behavior experimental analysis.

Research procedure

In this research, two similar cages with similar conditions and facilities were used to test the subjects during day and night. One cage was special for experiment and conditioning the rats and another one was considered for the rest of the rats. There was a bell ringing on the top of the cage and a lamp was used to light beside the bell and an electrical

Discussion and conclusion

The aim of performing this research is indicating the effect of light, tone and movement interferences as environmental factors on selective association behavior during day and night in laboratory white rats. In general, the results showed that there is meaningful difference between frequencies of associations' interferences like light, tone and movement during day and night.

According to Tables 1 and 2 as well as Graphs 1 to 3, the results indicated that there is meaningful difference between associations frequency during day and night in the level (p<0.0.5) and shows that associations during day and night are different, because rats are night-rover and searcher and active during night naturally; therefore, they response visual stimuli (light) and (audio), (tone) and (movement) almost similarly. Moreover, in the natural factor like cold whether and wound is always rooted in the external stimuli as a result, there is a kind of innate relation between external stimuli and innate relation between external stimuli and external ache during night that facilitates the association between tone and movement and light during night for rats. Rats learn fear of audio stimuli (tone and movement) and visual (light) more easily during night for activity and searching food, because these stimuli prepare better safety and security signs for rats. But rats react less during day to the visual signs and learn fear of audio stimuli more easily during fear of audio stimuli more easily during day according to the previous findings.

This findings are concordant with the research of Timberlake (2002) indicated that rats are more active during night and use all signs in the maze and also concordant with the research of Timberlake and Haofman (1998) indicated that rats use less visual signs during day. Also it is concordant with the research of Brushfield, Luu and co-workers (2008) and research of wises and panlilio (2005).

Also it was seen that the difference between associations frequencies during day in the level (p<0.05) is meaningful. Rat's response to tone and movement is more during day, while rat does not show avoidance response to the light during day. Because audio stimuli at tone and movement are responded by rats better during day, for fear is a better signs than tone and movement concerning safety or audio signs during day cause more fear for rats than light. Moreover, it is distinguished that rats use less visual signs for less activity during day and use more smelling and audio signs to search food during day.

These research are concordant with findings of Timberlake (2002), Timberlake and Haofman (1998),

According to table 1 and figure 1, it can be seen that the required value in the level (p<0.05) is meaningful; therefore, there is difference between frequency during day and night and hypothesis 1 is approved.

Hypothesis 2: There is meaningful difference between association frequencies during day.

According to Table 2 and figure 1, it is seen that the required value in the level (p<0.05) is meaningful; therefore, there is difference between frequency in day and hypothesis 2 is approved.

Hypothesis 3: There is meaningful difference between interferences frequency during night.

According to Table 2 and figure 1, it is seen that the required value in the level (p<0.05) is not meaningful; therefore, there is not difference between frequency during night and hypothesis 3 is not approved.

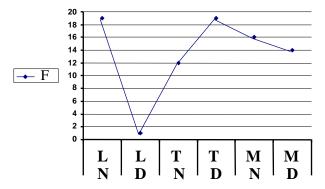
Hypothesis 4: There is meaningful difference between frequencies of light selection during night and day as condition stimulus to make avoidance response. According to Table 2 and figure1, it is seen that the required value in the level (p<0.05) is meaningful, therefore, there is difference between frequency of light selection during day and night and hypothesis 4 is approved.

Hypothesis 5: There is meaningful difference between frequencies of tone selection during day and night as condition stimulus in order to make avoidance response.

According to table 2 and figure 1, it is seen that the required value in the level (p<0.05) is not meaningful; therefore, there is not difference between frequency of tone selection during day and night and hypothesis 5 is not approved.

Hypothesis 6: There is meaningful difference between frequencies of movement selection during day and night as condition stimulus in order to make avoidance response.

According to table 2 and figure 1, it is seen that the required value in the level of the (p<0.05) is not meaningful. Therefore, movement selection during day and night and hypothesis 6 is not approved.



Graph 2. Frequency of responses

more facility in comparison with other associations and the environment and situation within which concordance of stimuli is performed and it can be effective as the differences between various kinds of animal and stimulus situation in finding the kind of selective association. This belief challenges the traditional learning theories that free responses of organism cause conditioning automatically if they are accompanied with reinforcement or if a conditioned stimulus is accompanied with unconditioned stimulus.

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Brushfield and co-workers (2008), Brennan and Riccio (1994). It was distinguished that the associations during night happen almost similarly and rats response to all conditions stimuli during night like tone, light and movement almost equally because rats are more active during nights; therefore, they may use each stimulus to predict danger and since there is more danger during night, rats may response to tone, light and movement. In the natural environment of rats, fear of external factors is always rooted in external stimuli. Therefore, a kind of innate relation is between external stimulus and external ache which are the result of visual and audio signs the same as audio signs and they may suddenly stand by seeing light during night and it maybe rat's innate response to see a cat at night.

The results of this research were concordant with the findings of Timberlake (2002), Timberlake and Haofman (1998), Brushfield and co-workers (2008), Brennan and Riccio (1994). The results indicated that the difference between light association frequencies is meaningful during day and night in the level of (p<0.05). The reason at this difference is that the rats are more active during night and have more capability concerning sight than day and since these animals have less activity during day and rest in their habitat they may be less exposed to light during day. Also, it is distinguished that rats have problem in acquiring visual activities during day (e.g., Brushfield 2008). and co-workers, Another difference concerning light associations during day and night was that the rats responded audio signs more than visual signs in the stimulus situation of fear in order to avoid danger during day. These results are concordant with the findings of Timberlake (2002); Timberlake and Haofman (1998); Brushfield and coworkers (2008); Brennan and Riccio (1994); and Domjan (2005). The results showed that rats' responses during day and night to the tone stimulus was almost similar, because rats may response to the environment tones either when they are in their rest place or outside. These result are concordant with the findings of Timberlake (2002); Timberlake and Haofman (1998); Brushfield and co-workers (2008), Brennan and Riccio (1994) and Domjan (2005). Also, results indicated that rat's response to movement stimulus during day and night is almost similar, because rats may response to the environment either when they are in their rest place or outside. These results are concordant with the findings of Timberlake (2002); Timberlake and Haofman (1998); Brushfield and co-workers (2008), Brennan and Riccio (1994) and Domjan (2005).

According to the results of this research it can be said that natural associations or associations that are directly related to organism survival are formed with

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The study of simple and multiple relationships between the variables of perfectionism and imposture feeling with the mental health of MA students

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Abstract: The present research investigated the simple and multiple relationships between the variables of perfectionism and imposture feeling with the mental health of MA students of Science and Research University, Ahvaz Branch. In this research, perfectionism and imposture feeling are predictable variables and general mental health is the criterion variable. The examined sample consists of 131 male and 130 female students of Ahvaz Science and Research University who were selected through multi- stage random sampling method. In order to collect data, four questionnaires of Ahvaz reality distortion Scale, Clance's Imposture Feeling Scale, Ahvaz Perfectionism Scale and SCL 25 Scale were used. The present study is a fundamental research of correlation method and in order to analyze data, Pearson Correlation Coefficient and Multi-variable Correlation Coefficient were utilized. The results indicated that there was a significant relationship between perfectionism and imposture feeling with mental health. Moreover, the correlation between perfectionism and imposture feeling was significantly positive.

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Key words: perfectionism, imposture feeling, mental health

1. Introduction

Man's mental health depends on the constructive components of his personality. The composition of these components may be different in various people and make different personal patterns. Many researchers believe that individual differences and various personal characteristics distinguish individual reactions in different situation and stressful factors. Perfectionism is one of the man's personal characteristics. It has been considered by many researchers in recent decades and each researcher has different definition about perfectionism according to his own viewpoint. The culture and the ground of perfectionism is a belief that indicates reforming moral perfectionism is the major goal of moral effort and perfectionism in divine wisdom means that being innocent is possible during life. In order to describe the concept of perfectionism, Freud believes that the main motive in these groups' life is not to achieve prosperity but reaching perfection and superiority. They should achieve perfectionism in each field and make their best; otherwise, they will not be pleases. Lack of reaching the accomplishments makes them stressful, depressed and gives them the feeling of sinful concerned with catching the goals (7).

Horney explains the concept in wider aspects as needs and perfectionism behaviors. Horney calls ten needs which can be almost seen in all these people. One of these needs is perfection while to be criticized. The people always afraid of to do wrong and being

deceived. They make their best to indicate no defect and try to remove their faults and conceal them; therefore, their personality runs into a mask.

Personality relates to different negative consequences like failure feeling, sin feeling, lack of decision making, shame feeling, slow working and low self-respect and some mental disorders like alcoholism, mental anorexia depression and personal disorders (2).

Hewitt and Genest (1990) believe that severe need to be successful and avoiding others' criticism and keeping away from indicating faults and defects make perfectionist people to perform continuous and hard activities in order to achieve success. But most of them are deeply sensitive against others' criticism and excessively evaluation. This conscience severity and superior entity make a kind of power to progress, on the hand it can be a reason to make these people a little happy about their accomplishments and cause sensitivity against criticism and failure.

The researchers (e.g., Najarian, Makvandi and Nikfar, 1995) believe that there is a relationship between high level of perfectionism and psychosis (6). Perfectionism can be normal or abnormal. In normal perfectionism, people enjoy hard and tiresome works and when they feel freedom to do works, try to do their best.

Being successful to do works bring a kind of pleasure and happiness (1). Burns (1980) believes

that average perfectionism is normal even if it has all perfectionism factors.

Five aspects have been suggested for perfectionism including excessively anxiety of wrong doing, personal criteria of high level performance, personal understanding about parents, expectations, excessive criticism about oneself and tendency to be doubtful (8).

Frost and Gross (1995) have divided perfectionism to three different kinds from other perspective: self- oriented perfectionism includes a person's attempts to achieve perfect entity. In this respect, perfectionist people show strong motivation to achieve perfectionism. They have unreal criteria or they have the idea of black and white criterion and just focus on their own defects (12).

Perfectionism for the sake of others, include biased beliefs and expectations about others' capabilities and tendency to have perfectionist criteria for people who are very important for this person. The third kind is social induced perfectionism which refers to people who apply exaggerating and unreal expectations although meeting these standards to be approved and accepted by other people (11 & 12). According to studies conducted by Shirzad, Mehrabi Zadeh, and Haghighi (1992), there is a positive relationship between perfectionism and migraine headache. Therefore, perfectionism can prepare the situation to cause psychosomatic disorders (3).

The other variable in this research is the phenomenon of imposture feeling. In dictionaries, imposture is defined as a person who is thinking to do a work based on lying or wants to deceive others with unreal and false information (Webster's1-1. Dictionary). This phenomenon is a kind of imposture feeling. This feeling is a kind of indecency experience and the feeling of deceiving other people.1-2. These people are working in high level fields or positions and others know them as successful persons, but they do not have such beliefs; they work harder than others and have control and wisely effects on other people (10).

According to the researchers (i.e., Clence et al.,), the signs of this abnormal phenomenon are as follows:

- 1. People affected by imposture feeling believe that others may discover their weaknesses and disabilities as soon as possible. They do not have enough recognition about themselves while others know them better and all facts and realities will be uncovered in shot term period.
- 2. People affected by this phenomenon get high scores in internalization tests.
- 3. These people are afraid of shame and humiliation.
- 4. They feel sin when reaching success.

- 5. They captured by continuity manner and vicious circle. In fact, when these people focus on test or duty, experiences severe hesitation, fear, and stress. They face nightmares and psychosomatic problems but work hard although they are unhappy about their success.
- 6. People affected by internalizing positive feedback face difficulty. Because they have never any experience of happiness and delight after reaching success and avoid indicating their excitement.
- 7. They have excessive stress. They neglect themselves but consider others as powerful, able and effective people.

According to Webster (2004), this phenomenon relates to some personality constructive components, for example there is a meaningful positive correlation between flexibility in interpersonal relations and imposture feeling phenomenon (14).

Cheek (2003) indicated that the level of imposture feeling in women with high level of changeability and severe need to change has high correlation. Therefore, it seems that imposture feeling may be seen differently among male and female students with different levels. But researchers scarcely dealt with this area (9).

The purpose of the present study was to discover the simple and multiple relationships between male and female MA students of Ahvaz Science and Research University. According to this aim and the relate literature, the following hypotheses were suggested:

1. There is a negative relationship between perfectionism and mental health among the MA students.

There is negative relationship between perfectionism and mental health among male MA students.

There is negative relationship between perfectionism and mental health among female MA students.

- 2. There is negative relationship between imposture feeling and mental health among MA students.
- 2-1. There is negative relationship between imposture feeling and mental health among MA male students.
- 2-2. There is negative relationship between imposture feeling and mental health among MA female students.
- 3. There is negative relationship between imposture feeling and perfectionism among MA students.
- 3-1. There is negative relationship between imposture feeling and perfectionism among MA male students.
- 3-2. There is negative relationship between imposture feeling and perfectionism among MA female students.
- 4. There are multiple relationships between perfectionism and imposture feeling wit mental health among MA students.

- 4-1. There are multiple relationship between perfectionism and imposture feeling wit mental health among MA male students.
- 4-2. There are multiple relationship between perfectionism and imposture feeling wit mental health among MA female students.

2. Research sample

Statistical population of this research included the MA students of Ahvaz Science and Research University. The research sample comprised of 261 male and female students selected through multistage random sampling method.

3. Research instrument

In this research, Ahvaz Perfectionism Scale (APS) was used to measure perfectionism. questionnaire is a self-report scale consists of 27 items prepared by Najarian, Atari, and Zargar (1989). The items of this scale have 4 alternatives ranging from Never, Seldom, Sometimes, and Often. Except for items 11, 16, 17, and 23 which get scores in reverse method, the rest of items are scored according to 1,2,3,4 amounts. Cronbach's Alpha Coefficient for this scale is 0.90. Najarian et al. (1989) used the mentioned scale with the scales of behavioral patterns (TA1) type A and (TA2), SCL-90-R physical objection micro scale and Copper-Smith's self respect scale simultaneously in order to evaluate the validity of perfectionism scale. The validation analysis showed the degree of validity except for APS correlation coefficient with Type A behavioral pattern while other final coefficients were significant at the level of (p<.05).

The reliability coefficient of perfectionism scale in the present research was (r=0.83).

In order to evaluate the imposture feeling of the participants, Clance's 20 items Scale was used. Clance's Imposture Feeling Scale (CIS) was developed by Clance in 1980; and this research was translated into Persian by researchers. The reliability coefficient of this scale was calculated through Kudar Richardson Formula based on test-retesting method. The items in this scale include five alternatives of Completely False, Seldom, Sometimes, Often and Completely True. These alternatives are scored based on 0,1,2,3, and 4 amounts. In order to define the rate of validity, SCL 25 was used and the obtained correlation coefficient was 0.46 that was significant. In order to rate the mental health, the SCL25 was used. This scale is a short list with 90 signs and 25 items. It has been validated in Ahvaz Shahid Chamran University and gained high validity and reliability scores. This scale was used to measure general mental damage. The items of this scale have five choices including Severely, High, Partly, Low, and Nothing. These items were scored2, 3, 4, 1, and 0 respectively. The high score in this scale shows low mental health. Its correlation coefficient was 0.87 between enmity factor and SCL25. The overall correlation of this test with Depression Scale was 0.49 for all samples. The correlation among females was 0.56 and among males was 0.47.

4. Findings

1. Descriptive findings

The mean and standard deviation (SD) of all variables have been indicated in Table 1 which shows that the mean score of mental health scores among female students was higher than male students. Since higher mean score in SCL 25 scale indicated lower mental health; therefore, it seems that female students have lower mental health in comparison with male students. Moreover, female students got higher scores in perfectionism which indicated that the rate of perfectionism was higher among females rather than males. But the difference of imposture feeling scores was not significant between male and female students.

The mean and SD of participants' scores in the questionnaires of mental health, perfectionism and imposture feeling are presented in Table 1.

2. The findings relate to hypotheses

Statistical analysis of data concerned with the hypotheses indicated the following results in Tables 2 to 6. The correlation coefficients of participants' scores in the questionnaires of perfectionism and imposture feeling with mental health are presented in Table 2.

As Table 2 shows, there is a significant relationship between perfectionism and mental health in all the male/female participants (p<0.0001). Since getting higher scores in mental health questionnaire means lower mental health, there was a negative correlation between perfectionism and mental health. On the other hand, with the increase of perfectionism scores. mental health decreases. Thus the hypotheses 1, 1-1, and 1-2 of the research approved. The results also indicated that there was a significant relationship between imposture feeling and male/female participants (p<0.0001). Since getting higher scores in mental health scal4e showed the lower mental health; therefore, there was a negative correlation between imposture feeling and mental health. On the other hand, with increase of imposture feeling scores, mental health was decreased. Therefore, hypotheses 2, 2-1, and 2-2 were approved (p<0.0001).

The correlation coefficients between the participants' scores in the questionnaires of perfectionism and imposture feeling are presented in Table 3

As Table 3 shows, there is significant positive correlation between perfectionism and imposture

feeling among male/female participants (p<0.0001). This correlation was relatively higher than male students (0.60 vs. 0.39). It means that the more correlation rate among female students can be due to different genders and getting higher scores in perfectionism. Since the rate of SD among males and females was not significant concerned with the two variables of perfectionism and imposture feelings. In other words, the error level in correlation analysis was very low (4).

Multi-stage correlation coefficient of perfectionism and imposture feeling with mental health among university students is presented in Table 4.

Table 4 indicates that the multi-stage correlation coefficient for linear composition of perfectionism and imposture feeling variables with students' mental health equals 0.64, the defining coefficient equals 0.41, and F ratio equals 89.52 (p<0.001). In other words, hypothesis 4 was approved. Since regression coefficient (β) analysis of perfectionism was more than imposture feeling regression coefficient; therefore, perfectionism variable showed more predictable power.

Multi-stage correlation coefficient perfectionism and imposture feeling with mental health among male students is shown in Table 5. Findings indicated that multi-stage correlation coefficient for linear composition of perfectionism variables and imposture feeling with mental health of male students equals 0.62, the defining coefficient equals 0.38, and F ratio equals 39.57 (p<0.001). correlation Therefore, the coefficients significantly correlated. In other words, hypothesis 4-1 was approved. Moreover, the rate of regression coefficient in perfectionism variable was higher than the coefficient of imposture variable. Thus perfectionism variable in male group can predict mental health better than the imposture feeling variable.

Multi-stage correlation coefficient perfectionism and imposture feeling with mental health among female students is presented in Table 6. In Table 6, multi-stage correlation coefficient for linear composition of perfectionism and imposture feeling variables with mental health of female students equals 0.65, the defining coefficient equals 0.42, and F ratio equals 45.36 (p<0.001). Therefore, the hypothesis 4-2 was approved. On the other hand, regression coefficient (B) indicated that between the two predictable variables, the perfectionism variable showed more predictable power for mental health. Comparing the results of Table 5, it ca be concluded that the rate of multi-stage relation of perfectionism and imposture feeling with mental health among females was more than males.

5. Discussion and conclusion

Findings of the present study revealed that the correlation between perfectionism and mental health was negative since high score in SCL 25 test showed low mental health. Therefore, higher perfectionism scores indicate lower mental health. The result of this research is consistent with the study of Najarian, Verdi and Mehrabizadeh. It may be concluded that when perfectionism is high in a person, the negative aspects of perfectionism component cause that person's mental health will be decreased and he is ready to be affected by mental diseases. But if the rate of this component is high, mental pressures around him can help the person to be mentally ill. The researchers (e.g., Hewitt & Flett) showed that the people with high level of perfectionism have weak mental system and it makes them very sensitive against the problems and pressures around them. Depression is one of the hazards that threaten perfectionists; therefore, most depressed students are in high level of perfectionism. Moreover, the studies conducted by Najarian and his co workers indicated that there is significant relationship between perfectionism and migraine headache that is a psychosomatic disease, so it seems that perfectionism can predict some mental or psychosomatic diseases.

The perfectionists have excessive motivations and if they do not achieve their desirable progress, they will be affected by contempt feeling which could be the sign of mental diseases. Table 3 shows that the correlation coefficient of perfectionism and mental health variables in female students is equal to 0.63 and in male ones is equal to 0.57. This difference reveals that female students seem to be more sensitive than male ones against mental diseases.

This finding matches with other researchers who worked on the large number of female students in depression and stress. Since high scores in both variables are accompanied by decrease of mental health including depression, positive and significant relationship between them seems to be acceptable. A matter that may probably common between them is dissatisfaction about one's deeds. The perfectionists are less pleased about themselves and evaluate themselves with difficult tests; therefore, people with imposture feeling have partly these characteristics. For example, people with imposture feeling know themselves as unable people and others as wise and capable persons. Thus it is not surprising that in female students who get higher scores concerned with imposture feeling the rate of correlation is 0.60.

According to Table 2, there is negative ans significant relationship between the phenomenon of imposture feeling and general mental health. On the other hand, the imposture feeling is accompanied

with mental health decrease. The phenomenon of imposture feeling is an unpleasant phenomenon and a kind of disease that can make a person depressed. Since the sample of the research is students of the university, their feeling was more sensitive than the overall population of the society. Clance has indicated a significant relationship between mental health and depression. Thus this study agrees with Clance's findings. The obtained correlation coefficients indicate that there is greater relationship between the above variables among female students. Perhaps it is due to the female sensitivity against the mental diseases. Finally, it was apparent that imposture feeling and mental health have meaningful relationship.

Tables 4, 5, and 6 indicate multi-stage relationship between perfectionism and imposture feeling variables with mental health since multi-stage correlation coefficients for male and female students were 0.62 and 0.65 respectively. These coefficients are almost higher than the other two variables. Moreover, regression coefficients are different in the two variables of perfectionism and imposture feeling concerned with the mental health variable. This indicates that (β) in perfectionism variable is relatively higher than (β) in imposture feeling variable; therefore, perfectionism variable has more effect on mental health.

Table 1. Mean and SD of mental health, perfectionism and imposture feeling

rabier.	Table1. Mean and SD of mental hearth, perfectionism and imposture feeling										
N	SD	Mean	Participants								
				Variables							
261	17/27	27/20	Total								
131	15/07	23/91	Male	Mental Health							
130	18/68	30/63	Female								
261	12/51	38/44	Total								
131	11/81	36/68	Male	Perfectionism							
130	13/08	40/39	Female								
261	13/26	48/62	Total	Imposture Feeling							
131	13/49	48/15	Male								
130	13/22	49/31	Female								

Table 2. Participants' scores of perfectionism and imposture feeling with mental health

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	N	p	r^2	r	Participants	
						Variables
	261	P<0001	%37	%61	Total	
	131	P<0001	%32	%57	Male	Perfectionism
	130	P<0001	%40	%63	Female	
ŀ	261	P<0001	%21	%46	Total	
	131	P<0001	%19	%44	Male	Imposture Feeling
	130	P<0001	%24	%49	Female	
L						

Table 3. Correlation coefficients between perfectionism and imposture feeling

W	p	r²	r	Participants	Variables
261	P<0001	%24	%49	Total	
131	P<0001	%15	%3 9	Male	Perfectionism
130	P<0001	%3 6	%60	Female	

Table4. Correlation coefficient of perfectionism and imposture feeling with mental health

Regression	Regression Coefficient		Defining Coefficient	Multi-stage Correlation	Predictable Variable	Criterion Variable
Imposture Feeling	Perfectionism		(RS)	Coefficient (MR)		
	B= 0.70 t = 9.27 p= 0.001	89.52 P<0001	0.41	0.64	Perfectionism	Mental Health
B = 0.24 t = 3.83 P= 0.001					Imposture Feeling	

Table 5. Correlation of perfectionism and imposture feeling with mental health (Males)

I abl	Tables. Correlation of perfectionism and imposture feeling with mental health (Males)										
Regression	Regression Coefficient		Defining	Multi-stage	Predictable	Criterion					
		P	Coefficient	Correlation	Variable	Variable					
Imposture	Perfectionism		(RS)	Coefficient							
Feeling				(MR)							
	B =0.61 t = 2. 96 p= 0.001	39.57 P<0.001	0.38	0.62	Perfectionism	Mental Health					
B =0/28 t = 3/33 P= 0/001					Imposture Feeling						

Table6. Multi-stage correlation of perfectionism and imposture feeling with mental health (Females)

	Regression Coefficient		Defining Coefficient	Multi-stage Correlation	Predictable Variable	Criterion Variable
Imposture Feeling	Perfectionism		(RS)	Coefficient (MR)		
	B =0.74 t =6.13 p= 0.001	45.36 P<0.001	0.42	0.65	Perfectionism	Mental Health
B =0.26 t = 2.16 P= 0.03					Imposture Feeling	

5/30/2011

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Evaluation Biochemical of color changes in bean root glands

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Abstract: Research project as a split plot experiment in randomized block design with four replications in the research farm, Islamic Azad University of Ahvaz were executed. The main treatments include bean plant varieties and different levels of secondary treatments were N fertilizer. about 21-25 knots formed days after sowing on plant roots began in the nodes, which consists of very small (the highest average diameter of 0.21 Cm), mostly green and white had a few that Colors mark the node recently and is also lack of nitrogen fixation. After 35 days of planting the color pink, reddish nodules were marked and there was lag, hemoglobin, and nitrogen fixation was started in the red bean nodules average 10 days after flowering continued. The different levels of nitrogen in terms of value increase be white within the gland more time your showed such treatment 80 kg N fertilizer per hectare, white inside glands 60 days after planting in 64 percent of the nodes was observed But in the 40 kg ha treatment 40 days after planting, only 12 percent of white lumps were observed. Green, white and non-efficient Nitrogenase enzyme that normally expresses the growth was achieved during the primary colors red, pink and biological nitrogen fixation efficiency and the approximately 35 days after planting continued until after flowering, and brown or black aging glands shows that 10 days after flowering, the color nodes showed. [Tayeb Saki Nejad, Alireza Shokoohfar. Evaluation Biochemical of color changes in bean root. Journal of American Science 2011; 7(7):75-78]. (ISSN: http://www.americanscience.org1545-1003).

Keywords: Evaluation; Biochemical; color; bean root glands

1. Introduction

Leg hemoglobin (in legumes glands)

Hemoglobin log significant only in tumor tissues and legumes are treated in other systems, N fixation is not observed. Valentine et al (2008) for their extensive studies of the pigments in fungi and yeast have identified, but in other higher plants (except legumes) have had there. Initially that Leg hemoglobin glands were placed within tissues. Host cells containing Bacteria from other infected cells are not bigger. Nitrogenase activity and nitrogen fixation in legumes contain large quantities Leg hemoglobin with them (in the case of red or pink) is connected. Yellow or browning that denote *Bacteroied* aging or failure is usually caused by poor condition occurs. Green, a white or non-effectiveness node reveals Nitrogenase activity. Physiological importance pigment Leg hemoglobin is not completely understood, but probably do breathe oxygen transfer in the glands and the production of ATP is required and can say that observation number, size and color glands signs of status in legumes is nitrogen fixation(2).

Before 1960 little information about the biochemistry and enzyme studies had stabilized. Enzymes which were able to establish for the first time in early 1960 were extracted from the cells, the first success in this field of research anaerobic

bacterium Clostridium enzyme was. Enzyme, which then were able to stabilize free from other microorganisms stabilizer (including aerobic bacteria from you) are also extracted. Then the stabilizers of bacteria in the ball of Bacteroiedy legumes were extracted. The enzyme stabilizers of the root were also extracted (4).

That the enzymatic catalytic reduction wills "Nitrogenase" is called. The final product ammonia interaction is. By the interaction, catalytic Nitrogenase is as follows:

When ammonia is produced, none of the compounds (stable and unstable) intermediates of this reaction have not yet discovered secreted out of and then construction *Bacteroied* amides and amino acids can be stabilized.

Very large and complex enzyme that ammonium nitrogen reduction surgery will do that in fact the Nitrogenase is composed of two proteins, one protein that contains iron and molybdenum catalyst and other reaction is a protein that contains iron as a reducing substance for protein, iron - molybdenum acts.

How to transfer electrons to nitrogen is not known precisely but is likely to include several stages (2, 3 and5).

Nitrogenase enzyme contains several important properties are:

1 - Basically this enzyme requires anaerobic conditions. Hence the free oxygen concentration in cells

Contaminated, the bacteria must be kept very low level. Legume nodules is essential in the presence of hemoglobin log is possible. The red hemi protein the building of the animal hemoglobin recalled, with a strong affinity for oxygen is thus low oxygen concentration is maintained at around Bacteroied while doing breathing oxygen is still available.

2 - Restore the enzyme catalyst in many reactions such as intermittent Substrata is Cyanamid and acetylene. These Svbstrat intermittent physiological importances are not. However, acetylene reduction and accurate method suitable for evaluating enzyme activity has created.

Products because this practice is that polyethylene by Bacteroied or nodes are free and can be analyzed by gas chromatography.

3 - This enzyme can also restore the catalyst is the proton reduction to hydrogen gas by the enzyme Nitrogenase Bacteroied depends on the preparation and continuous supply of ATP and resuscitation been able to give the hydrogen atoms (i.e. protons and electrons) to The reason is that is mentioned in paragraph after ATP is required(2, 6).

ATP and inorganic phosphate of ATP in their respiratory chain Bacteroied system is produced. Article revived by accommodating change of host plant photosynthesis products is obtained major photosynthetic products in the transport of these materials leaves of higher plants to other parts of the plant, but probably through sucrose Bacteroiedy ball of legumes is not used. But instead, may be the first by the enzyme "Anvrtaz" be hydrolyzed to glucose and fructose. Although currently in carbohydrate metabolism Bacteroied not start well, but know that Bacteroied glycol sis enzymes are contained (2, 6).

Thus it is believed that glucose-6 phosphate as a material for accommodating variable interplay Nitrogenase enzyme acts all details of electron transfer to Nitrogenase enzyme is not yet clear. But despite this, can a hypothetical system of electron transfer to Nitrogenase offered (8).

It is believed that the interplay of structural variability in this sector to create iron protein Will. And reducing to a matter will become strong. Then this could be strong reducing electrons to the iron and molybdenum significant part Nitrogenase (which in turn makes the resuscitation) to transfer (12, 15).

Studies (in the laboratory and outside the living cell environment) have shown that at least four ATP molecules per pair of electrons are transferred to hydrolysis, so the revivals of a molecule into two molecules, at least 12 ATP molecules are required because six electrons per molecule was required resuscitation.

In addition to several other accommodating change materials may be revived by the Nitrogenase complex. Acetylene gas is one of the materials that a non-physiological material is ethylene and is revived. Because ethylene can be high sensitivity by gas chromatography (small and portable device) was discovered and determined than determining acetylene - ethylene sometimes for Nitrogenase activity in the field to measure and identify the effects of various environmental factors and agricultural operations on the fixation is used (16).

Proton also for accommodating a material change is Nitrogenase. In fact, part of the electron flow through Nitrogenase (in some cases third or more) may not be used in reclamation should be thus, may also stabilized by Bacteroied gas production out of them. Get out of this release and reducing power dissipation and shows some of the rhizobial bacteria that produce some ball in the Nitrogenase enzyme action and little or no value basically do not lose. In these bacteria are more efficient and effective fixation. Because having a mechanism through which are produced and released by Nitrogenase is placed back in the cycle. The first step of getting into this cycle, which is absorbed by the enzyme, is catalytic Bacteroied in:

$$H_2 \rightarrow 2H^+ + 2\overline{e}$$

The next steps include re-utilization of protons and electrons produced in the interplay of materials by electron carriers. Many of the current research is devoted to the consolidation in the identification of some varieties of cultivars and rhizobial bacteria, some varieties of legume plants that produce some ball in which is not produced(16,13).

2. Material and Method

Research project as a split plot experiment in randomized block design with four replications in the research farm, Islamic Azad University of Ahvaz were executed. The main treatments include bean plant varieties and different levels of secondary treatments were N fertilizer.

Sampling

Root study was conducted by the method of the cease-cylinder convention of bringing out the full parameters of root nodule number and diameter (with a caliper) were measured and cut the tubers into the color detection was performed.

A plot, lines 9 and 3 and 2 during plant growth and for sampling of roots and nodules were used, the sampling interval was 12 days of each other, and 0.6 m (cm 100 cm length and 60 between two rows) and number of plants to 10 plants per plot reached.

Statistical calculations

On all results, analysis of variance was followed by Duncan's test, comparison was done and the results are presented as tables with charts, Excel 2000 Plant growth analysis was performed with SAS computer program for agriculture and mini tab and estimates were calculated.

3. Result

In the color of the node that is a qualitative trait following results were obtained:

- A about 25-21 knots formed days after sowing on plant roots began in the nodes, which consists of very small (the highest average diameter of 0.21 Cm), mostly green and white had a few that Colors mark the node recently and is also lack of nitrogen fixation.
- **B** After 35 days of planting the color pink, reddish nodules were marked and there was lag, hemoglobin, and nitrogen fixation was started in the red bean nodules average 10 days after flowering continued.
- ${\it C}$ the color of the flowering period of jaundice turned into nodes and in maturity period, the nodes, Brown was inclined to black, Hague and juts (2005) as picks during the flowering plants because of high energy needs, the transitional process of hydrate carbon to roots and nodules are actually off the bacteria causing the inactivity of plant symbiotic bacteria is biological nitrogen fixation and stops the node to color and blackened leaves.
- **D** The different levels of nitrogen in terms of value increase be white within the gland more time your showed such treatment 80 kg N fertilizer per hectare, white inside glands 60 days after planting in 64 percent of the nodes was observed But in the 40 kg ha treatment 40 days after planting, only 12 percent of white lumps were observed.
- *E* green, white and non-efficient Nitrogenase enzyme that normally expresses the growth was achieved during the primary colors red, pink and biological nitrogen fixation efficiency and the approximately 35 days after planting continued until after flowering, and brown or black aging glands shows that 10 days after flowering, the color nodes showed.

Gland enlargement of the bacteria entering into the root level of the three fertilizer treatments were started with different speeds in all treatments, but what how much low-gland enlargement process was seen. the fields and pastures with any amount of nitrogen fertilizer in the soil is usually knots woman will start, but a large dependence on nitrogen initial nodes have high levels of soil nitrogen in the soil reduces the size of the nodes due to Biological fixation of nitrogen in the accumulation of this element that only element nodes are accumulated in very small nodes remains reduced (12). in some legumes that are like planting clover in pastures and hay High levels of soil nitrogen in the presence of large nodules on the roots is synthesized but not nitrogen fixation activity nodes and color within the glands were mostly white and green indicating a very low Nitrogenase enzyme activity (14).

4. Discussion

Rhizobial behavior inside host cells, the active node has several stages: the first stage of infection and invasion are rhizobial invasive modes and secondly between the ball and the rhizobial symbiosis mode occurred and nitrogen fixation begins. In the third stage ball due to rot and fall are coming back to the root zone.

Ball formation on the legume family plants roots first with bacterial invasion began around cords is fatal. Plant roots of their active ingredients (for tryptophan) that are secreted growth and proliferation of bacteria in space node roots are intensifying (16)

Bacteria causing the nodes to turn this material into Akin (alpha-indole acetic acid) and possibly make into the hairy roots of auxin cause corrosion swing are the host. If the node-causing bacteria belonging to the group be able to work on the root enter hairy roots are spun. In some cases the bacteria produce are narrow and the field through their skin of root parenchyma cells (cortex) deliver and cause the swell woven find more amplified (14).

- A Cords develop fatal
- B The community surrounding cords rhizobial bacteria killer
 - C Attract polar deadly bacteria on cords
 - D Bending the tip hairs fatal
 - E Squirm cords fatal
- F Development disciplines within cords fatal infection
- G New rhizobial fatal to the hairs inside the skin cells to root tissue inner skin

H - The release of bacteria from infected fields

Thus the formation of bumps with will say that the root node. Glands root emergence requires that one hand bacteria to infect their specific host and infect the other hand, host plant acceptance and provide factors necessary to contamination. The fitness area affected by plant genetic structure of bacteria is possible.

Cell division of bacteria within host cells quickly continues, the host cells are divided rapidly in comparison with non-infected cells will be smaller. With growth rates of host cells, bacteria cells and also changes the sheets come in the name Bacteroied. Deformation associated bacteria Bacteroied hemoglobin; Nitrogenase and other enzymes are required for nitrogen fixation. In this time of rhizobial growth forms reached out to the development and tissue formation in the host *Leg hemoglobin* nitrogen fixation starts (11).

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The Importance and the Necessity of "Studying" and the effective factors on its reduction from the viewpoint of the people in East Azarbayjan province, Iran

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Abstract: The number of the scientific articles and the rate of reading books and magazines are the most important indicators of scientific, cultural, social and economical growth and development in any country. This study was done in order to examine the importance & necessity of "studying" from the viewpoint of the people in East Azarbaijan. The design of the research was measurative and descriptive. The statistical community was "all the people in East Azarbaijan" (1,846,244 persons); the sample included "660 persons" and the sampling method was multi-phas clustral sampling. The tools for this study, was researcher-made questionair with 0/94 reliability. For the analysis of the datas T-test, Anova, Pierson correlation coefficient, Multi-variable regression and hierarchial evaluation, were used. The results indicated that "studyng" is important in the familial, economic, cultural, social, political and business awareness growth and the most important factors on the reduction of the "studying" respectively were: not having enough opportunity and motivation for studying, the attractive television progrom. It is suggested that the cheap and poket-sized books should be published and the mass media should devote columns or programs for introducing and criticizing of this printed books; in order to make the people familiar with the books and make them pick out suitable books for studying in their short opportunities.

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1.Introduction

The human brain, like his body, needs food and exercise. Studying is the food, and meditation about what has been studied is the exercise of the brain. Robinz (1999) believes that: "Studying important and voluable issues, those that strengthen us, and reading the subjects that teach us new things, are more obligatory than eating food". Dekart considers a "book" as the best nurse for us and says: "A book is a nurse that I prefer it to a king's crown", and Amerson thinks of it as the most important factor for being alive and expresses that: The one who lives with books, is alive forever" (Ghorbanalizadeh, 2001). On the whole it can be said that: the societies which are aware of the role of "studying and reading" enjoy more scientific and cultural development.

The number of the scientific articles and the rate of reading books and magazines are the most important indicators of scientific, cultural, social and economical growth and development in any country. Unesco has announced the expansion of books and long-term planning for education as the basis of economical development, and the economical and social council of the United Nations has also declared "books" as one of the required tools for development and flourishing of nations (Ebrami, 1996). Hosseinzadeh (1999), Abdolhosseini (2007) and Moeenpour (2000) believe that: in any country that

books are read more, brightness and sagacity are more; and the nation that studying, knowledge and virtue will move towards nonentity and extinction.

As the national gross production with the revenue index in economics, along with other indexes, is a criterion for evaluating economic condition of a country, from the number of the people who study books, the way that they do it, the number of public libraries, the number of the printed books, the rate of purchasing books by people and the amount of time they spend on reading, it is possible to determine the level of the culture in a country and through this way it is possible to see the path and the direction of a nations growth and development, or its decline and extinction (Yousefi, 2000; Stinger, 1999; Ghorbanalizadeh, 2001)

The increase of studying and reading culture in a society causes appearing of positive outlook of people towards emotional useful professions and paves the way to social and emotional growth and also makes a person have more compatibility with himself, his family and with society, and provides them with mental health and also promotes their human personality (Zarsazi, 2004; Karbakhsh Ravari, 1999). By continuously studying about "family", it is possible to take effective steps to create good and close relationships among family members, solve the problems and family disagreements, develop

creativity and train artistic and literary talent of the people. By having the employees and workers of a society studying books, it is possible to take some basic and influensive actions for developing professional knowledge and promoting practical skills, improving work quality, decreasing damage, cooperating and involvement with other members of an organization, and promoting commitment and revenue. On the other hand by reading appropriate books and printed materials about economics, business and trades, it is possible to be aware of the market situation, stock exchange, customers, competitors and their expectations, and also to plan and perform a suitable strategy in a business. Finally it is possible to know the cultural elements of ones society and be familiar with the dimentions of cultural invasion in the community, and also to know proper cultural tools and use them for mental and spiritual development and promotion by studying books and published materials (Shabani, 2008).

Donyavizadeh (2001), Nafisi (1994), Lindgreen (1994) Seif (2001), Vinistin et al (2000), and Haghani and Khadivzadeh (2009), all believe that studying and getting accustomed to it is an acquired performance that can be formed and flourished in home and at school; so it is necessary to pay sufficient attention to teaching study skills for children and adolescents from the early ages, since these study skills can't be taught promptly and it is urgent to pay attention to them during a long-term period with a step-by-step programming. Ramaya (1998) believes that the first point in having a "studying community" is the familiarity of parents, instructors and educational affairs authorities with the role and importance of books in individual and social life and their awareness of various methods of studying and creating the habit of studying and reading among children and adolescents. Since parents and teachers have a great influence on the education and training of the children in a society, they should know various conditions and opportunities well, and based on this, they should select a method that can guarantee their success in this field.

The necessity and importance of propagating the culture of studying necessitates that the subject of "Studying and Reading Books" should be included as a necessary curriculum in different levels of eduction from the first elementary levels, and supervising and evaluating this issue should be planned and acted upon really strictly (Ever, 1998).

Some western scholars mountain that about %95 of children can be made interested in studying by the time of primary school enterance, and for a person who is not developed to this level it will be difficult to be made eager to reading in later periods

of time. As Rogers (2010) showed: grade three high school student do not make so noticeable changes in their study methods compared to grade two ones. Other studies show that the people who are not accustomed to studying in their middle ages, they wont perform it in their old ages, when they have more free time in their lives (Stinger, 1991).

Education and sociological propound different obstacles in peoples studying habits. One of the obstacles in this field is the high price of books. If the price of books is beyond peoples financial power the rate of selling books will diminish, So there should be great effort to keep the price of the books and other printed materials reasonably fixed (Stinger, 1991). The expensiveness of books in the society has changed this cultural article into a luxurious material. Certainly in this uncontrolled book market, the university students suffer more than other groups in the society. Most of the students do not have sufficient financial income because of the shortage of educational support from the government side and lack of support from organizations and administrations scholarships. In most conditions, some university students are unable to purchase the books that have been recommended by their professors and this has a direct effect on their researches and studying activities and because of the mentioned reason most of the resource used by students for their researches are old out of data they lack the scientific value, so this fact will have negative effects on scientific activities of the nation in long period.

Some other factors in reduction of the rate of studying among students are as the following: hyper activity, poor performance in a special lesson and its influence on other lessons, over reading at the night of the exam, not having an increase in the study hours in accordance to the higher levels of studying, studying while a person is exhausted, ignoring the prerequisites, suddenly stopping of reading side books while studying the main courses, passive studying, not studying on time, slow reading, being forced to study in an inappropriate situation, losing interest in studying, not being awarded material encouragement and just being encouraged verbally, punishment to force to study or during studying, irrelevancy of the subject of studying with real life affairs, just memorizing the subjects instead of learning them, weakness in previous grades, studying the subjects continuously, not having a proper evaluation at school, family problems, and having several sisters and brothers at home, the problems at school, having uninterested friends, not enjoying the material to be studied, excessive emphasis on studying by parants, unemployment of the educated people or their low income, not having concentration

negative emotional background, feeling useless, being uninterested, boredom in studying, not applying the suitable encouragement or punishment mechanisms, indifference in studying, lack of attractiveness of studying compared to neutralizing factors such as TV or computer, physical tiredness or illness, lack of familiarity with suitable and instrumental materials of reading, lack of knowledge about correct study skills, lack of practice and repetition in studying, lack of a proper schedual and programming the time lack of parental reception in studying at home, shortage of income, inavailibility of books and libraries, not applying the previously learned materials in current educational, professional, individual and family fields, not having sufficient previous experience of studying, lacking matching relationship between formal school curricula and free subjects to study, the different methods of teachers and professors in high schools and universities, shortage of cultural centers and libraries, lack of suitable books for the young generation, financial problems, expensiveness and lack of interest and motivations in studying (Fouladchang & Latifian, 2008; Imani, 2002; Moeenpour, 2000; Gharib, 1996; Shariati Roudsari, 1995).

Esmaeeli (2005) has divided the factors of studying into cultural, social, familial, institutional, individual and related to authorities in an organization (http://mgt solution.com). Indeed, the tendency of the young people to studying has a meaningful relationship with gender, age, social class, level of their own and their parents education, tribe, family income, access to books and libraries, membership in a union or in a special organization, having a decisive, friendly, autocracy, critic or concerned family structure, the educational degree, cultural professions. Mazlo's needs hierarchy, selfefficiency and different strategies, habits, and skills for different individuals (Asadi Sarvestani & Karami, 2008; Ghanavizchi & Davarpanah, 2007; Ronning, 2009, Johnkert, 2009; Best & Brozo, 1985).

Each Iranian person studies just 2 minutes in a day which is very far from the minimal universal standards. According to the available statistics, the average amount of studying for an English person is 2.5 hours and for a French one is 2 hours (Aghayari, 1993). Studying non-educational books has the least and lowest position in filling the students leisure time. More than 4.3 hours of the students time is spent to study school books, 1.4 hours for sports and playing, 2.2 hours for watching TV films, 1.4 hours for listening to music and entertainment, and only 1.8 hours is used for non-educational studies (http.mehrnews.com). Yousefi(2000) said that the average study time for any Iranian individual is 1 minute a day, while it is 4 hours for a French and 3

hours and a half for an English person. The findings of a research in England indicates that children read three books, on the average, each month, and this fact rarely changes until about their adulthood even when they are about 50 years old.

The report of the ministry of culture and Islamic Guidance, shows that: The average studying time in Tabriz, among the habitually studying people is 88 minutes. The amount of time spent on studying for those who are endowed with studying is 12.59 minutes and for the literate group is 6.28 minutes for a day. Moeenpour (2000) also has calculated that: averagely each person in the upper than 15-year-old group studies 47.57 minutes in a 24-hour period.

Studies show that the women study 1.5 times more than men (Zarsazi, 2004), disability does not affect people's outlook toward studying (Jelfs, 2010), the increase in adolescents educational level has caused an increase in their study of non-educational books, the high price of books is the most important factor in reducing the rate of studying among adolescents and the young people and the rate of interest in reading, among the young people is high (Monshizadegan, 2000).

There are strong testimonies that show education has a direct relationship with the rate of reaching newspapers and the effects of education will be much more in an individuals studying pattern in his future life, years after graduation and the effect of this factor dose not decrease by increasing age. Other factors are: familial factors (social, economical, and populational features, numbers of children, having a private room or having some quiet hours, purchasing books by the adults, studying regularly by an adult) (Stinger, 1991), being familiar with methods and skills of reading and applying them practically (The habit of studying, time management, testing, note taking, perception of the reading material, new vocabulary, study lessons, fast reading and memory) (Azarila, quoted by Donyavizadeh, 2001)

Considering the above, inspecting people's out-look and status towards studying has always been one of the research necessities; so the main objective of this research is to recognize the importance and necessity of " studying" from the viewpoint of the people in East Azarbayjan Province and the effective factors on its reduction.

2. Material and Methods

The method of the research is descriptivesurveying. The statistical community includes all the people in East Azarbayjan Province between the ages of 15-60, which totally consists of 1,846,244 people. For sampling, the multi-phase clusteral method was used, and for carrying out the research, at first the statistical community was divided into nine agegroups. Then from those groups, three other groups, 20-24, 30-34 and 40-44 age-groups were selected randomly. After arranging the age-groups, the towns were chosen randomly and 600 people as the statistical sample were chosen and for preventing the subsidence of the sample, another 10 percent (60 people) was added to the sample volume and the final sample volume included 660 people.

The measurement means, in this research, was a researcher-made questionnaire which had been made according to likert spectrum scale. To determine the validity of the test, the apparent method (using the experts ideas) was used, and finally the agreement index of the referees was obtained upper than 0.83. The reliability of the questionnaires was also calculated about 0.94, according to kronbakh- Alpha index.

For analysis of the questions, the "X2" test, the one-way Variance analysis, and the hierarchy evaluation method for setting priority were used.

3.Results

According to the " X^2 " Test it can be said that the rate of the importance of studying is significant in the familial information growth, (X^2 =122, p=000), in the political information growth (X^2 =243, p=0.000), in the social information growth (X^2 =340, p=0.000), in the cultural information growth (X^2 =260, p=0.000), in the economical information growth (X^2 =296, p=0.000) and in the professional information growth of the people (X^2 =439, p=0.000).

Table1: Preference of the effective factors in the studying reduction

	, e
index	factor
221.01	Not having enough opportunity for studying
167.95	Not having necessary motivation for studying
158.35	The attractive programs of the television
145.78	The expensiveness of the favorite books in book stores
132.45	ilability of a suitable library at work or in noreki@gmail.com educational place
126.25	Being unfamiliar and aware of the recent books
118.45	Not having a suitable place for studying at home
117.11	Not having a suitable library at work or school
84.75	The internet and computer programs
84.6	Unavailability of the favorite books in the libraries

According to the information of the table 1, and after allocating ranked indexes to each of the ten factors, it was determined that: the most important effective factors in the reduction of the rate of

studying among those people who had participated in our research are as the following: not having enough opportunity for studying: 221.01, not having necessary motivation for studying: 167.95, The attractive programs of the television: 158.35, the expensiveness of the favorite books in book stores: 145.86, unavailability of a suitable library at work or in the educational place: 132.45, being unfamiliar and aware of the recent books: 126.25, not having a suitable place for studying at home: 118.45, not having a suitable library at work or school: 117.11, the internet and computer programs: 84:75, and unavailability of the favorite books in the libraries: 84.6.

Finally it can be seen that not having the sufficient time is the most important, and unavailability of the favorite books in the libraries is the weakest factor in reduction of the studying rate.

Table 2: One-way Variance analysis for the rate of studying among different age-groups

		SS	df	MS	F	sig		
	B.g	6686.19	2	3343.09				
	W.g	390847.9	633	617.45	5.14	0.005		
	T	397534.16	635		-			

According to the information of the table 2, it can be concluded that the rate of studying among different age-group has a significant difference, and according to the LSD follow-up test this difference between the age-groups of 20-24 and 40-44 is significant. The average studying rate in the 20-24 age-group is 26.69 hours in a month (53.38 minutes in a day), in the 30-34 age-group it is 25.2 hours in a month (50.4 minutes in a day), and in the 40-44 age-group it is 19.8 hours in a month (39-6 minutes in a day). Generally, the people in our statistical sample group study, on the average, 46.26 minutes everyday.

Table 3: One-way Variance analysis for the rate of studying among different educational degrees

	SS	df	MS	F	sig
B.g	13570.53	2	2261.75		
W.g	382024.16	633	609.28	3.71	0.001
Т	395594.7	635		-	

According to the information of the table 3, there is a meaningful difference between the rate of the studying and the peoples educational degrees, and the amount of studying is higher in upper-than-bachelor degree holders. The average rate of studying in people with the primary school certification is 6.66,

guidance school 20.73, high school 28.66, high school graduates 25.17, college graduates 24.36, bachelors 23.43 and upper than the bachelors degree is 25.

4.Discussion

The results of the research show that studying is effective in the growth of peoples family information. In other words the more the rate of studying is, the more is their family information growth. These results, is in accordance with the results of the researches carried out by Robinz (1999), Nafisi (1994), Lind Green (1994), Zarsazi (2004), Karbakhsh Ravari (1999) and Fouladchang and Latifian (2008).

Studying is effective in the growth of peoples political information In other words the more peoples studying rate is, the more is their political information growth. The results of this research is in accordance with the results of the researches carried out by Emerson (quoted by Ghorbanalizadeh, 2001), Hosseinzadeh (1999), Abdolhosseini (2007), Yousefi (2000), Ramaya (1998) and Ghorbanalizadeh (2001).

Studying is effective in the growth of peoples social information. In other words the more is peoples studying rate, the more is their social information growth. The results of this research is in accordance with the results of the researches performed by Yousefi (2000), Ramaya (1998) Ghorbanalizadeh (2001), zarsazi (2004) karbakhsh Ravari (1999) and Asadi Sarvestani and karami (2008).

Studying is effective in peoples cultural information growth. In other words the more peoples studying rate is, the more is their cultural information growth. The results of this research is in accordance with the results of the researches performed earlier by Ramaya (1998), Yousefi (2000), Ghorbanalizadeh (2001), Shabani (2008), Karbadhsh Ravari (1999), Fardavar (1998) and Abdolhosseini (2007).

Studying is effective in peoples economical information growth. In other words the more people studying rate is, the more is their economical information growth. The results of this research is in accordance with the results of the researches carried out by UNESCO Research Organization (quoted by Ebrami, 1996), Zarsazi (2004), Karbakhsh Ravari (1999), Shabani (2008), Asadi Sarvestani and Karami (2008).

Considering the fact that studying is one of the most reliable ways of getting information in different fields, it seems that through this method(studying) people's family, political, social, cultural, economical and professional increases remarkably.

The main effective factors in decreasing of the rate of studying among the persons participating in our statistical sample are listed as: not having enough opportunity to study, not having enough and necessary motivation for studying, the attractive television programs, expensiveness of the books, and lack of suitable library at school and working places. The findings of this research is in agreement with the results of the researches done by Stinger (1991), Imani (2002). Shariati Roudsari (1995), Gharib (1996), Asadi Sarvestani and Karami (2008), Moeenpour (2000) and Monshizadegan (2000). Promoting of the expectations of the people in the society and their economical and social competitions. have made of the people involved in work and beneficial administrative and economical activities, and the people are hecticly busy maintaining their physiogical and primary needs, such as food, clothes, and housing, so they can't find sufficient opportunity to study. Also lack of paying attention to scientific thought in various professional and educational atmospheres, inapplicability of the school subjects and the weak content of other motivation towards studying. On the other hand, nowadays, people mostly choose watching television programs to fill their free time.

The daily growing of television and satellite networks, and also the great variety of the films and programs of these medias cause people to spend most of their spare time with these programs, and as a result, they fall in far distance from studying, which is an exact, and deep work that needs contemplation, in comparison to watching TV, thus in a long-term period, they lose the motivation and mood of studying.

The rate of studying is different in various age-groups and the age-groups of 20-24 and 40-44 study more than other ones. The results of this research is in accordance with the findings obtained from a research carried out by Ghanavizchi and Davarpanah (2007). The results of their research show that there is a significant difference in peoples out-look towards studying among the people in age-bracket of 31-35, and the ones in age-groups of 10-15, 16-20, and 21-25.

The rate of studying is different among people, considering the educational certification, and the amount of reading written materials is higher in upper than bachelors degree holders. The results of this research is in accordance with the findings of the researches performed by Ghanavizchi and Danvarpanah (2007), Asadi Sarvestani & Karami (2008) and Monshizadegan (2000).

Considering the fact that people with higher educations, specially those studying to get their masters degrees, have more familiarity and

fellowship with studying and probably, because of professional necessities, need more studying, so the rate of studying is higher among the people having a masters or ph.d degrees.

To increase the rate of reading noneducational books in the society, it is suggested that there should be some studying competitions held by schools, universities, mosques, and organizations, continuously and through this way the individuals of the society should be encouraged to study useful and character-making books. Also it is possible to plan some suitable spaces in apartment complexes, parks, terminals, doctors offices, hospitals, factories and hotels for the people to study books, newspapers, and magazines, and through these steps, than the books and the culture of studying into the real lives of the people.

It is suggested that the scholars, authors, prefessors and researchers of the society write and publish cheap, thin, pocket-sized, small books, considering the needs of different age-groups, instead of writing expensive, big and thick books, so that the people of the society firstly can get the books easily, and secondly can be familiar with a basic subject in a short period of time, and carry it everywhere that they want comfortably.

The mass media, such as the press, radio and television, should allocate some columns, or some special hours in a day to introduce the books, and the brief summary or abstracts and the printed reviews of the recently published books, in order to make people familiar with them.

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Effect of irrigation on the yield of mungbean cultivars

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Abstract: In order to study the effect of irrigation on yield quality and quantity and morphological characteristics of mungbean, pilot in the summer 2010 on a farm located in the city *HAMIDIH* using factorial design in randomized complete block with four replications. In this experiment four levels of irrigation 7, 10, 13, and 16-day and three local varieties, and the essence of radiation were studied and evaluated .During different stages of plant growth with eight times the level of field sampling of shoot dry weight, leaf dry weight, and pod dry weight, seed dry weight and leaf area was measured at physiological maturity was produced yield. Studies showed the best yield cultivar associated with the essence of seven-day irrigation (3328 kg ha) was. And most of the biological function associated with a 7 day gem varieties and irrigation amount was 9273 kg ha maximum harvest index to local varieties and 10 days irrigation amount was 49 percent .The results showed that the most appropriate gem varieties and cultivars 7 days irrigation is the most appropriate irrigation. Because the highest grain yield, biological yield the most won. Journal of American Science 2011; 7(7): 86-90].(ISSN: 1545-1003). http://www.americanscience.org.

Key words: mungbean, irrigation, yield

1. Introduction

Increase crop yield of essential community needs to coordinate with today's world population is increasing. World population rate 1.6 to 1.7 percentages is growing each year and thus 90 million people are added to agricultural consumers. Over these 90 percent of the population growth in developing countries where food supply shortages already have been suffering is concerned. This means that food production must be increased constantly to social disharmony and human food shortages in many parts of the world to prevent (20)

1.1. Humidity

Mungbean plants often limited rainfall and the use of residual soil moisture to grow. This plant needs as the plant or as a main area with a short rainy season to be planted. Vetch is relatively resistant to drought and the growing season should coincide with periods of heavy precipitation is. Vetch water was requirement of about 410 mm or 3.2 mm a day with an average growing season for plants 60 to 70 days. The most sensitive growth period is the flowering stage of water shortage (20).

1.2. Treatment effects of drought stress on yield of mungbean

The best time to irrigate during flowering in mungbean has announced.

Searchers in his review in 2008 on the interaction of organic blue and potassium

application on yield of mungbean did announced that water stress reduced growth and thus reduce the yield is (3) while the period of flowering and maturity in terms of moisture stress in compared with full irrigation is short term (6)

Sngakara (2001) stated that the research of water stress on the major environmental stresses limiting growth and yield are Hakan lbs (1994) also found that the experimental water stress, reduced yield in mungbean (21)

Ahmadi 2005 reported that the experiment was carried out, plants and plant sanctuary located in rainfed areas compared to irrigated plants earlier stage of proceedings entered in the shorter growing period and thus lower yield were produced (1). mungbean yield under the influence of drought stress is reduced.

Research found that the amount of carbohydrate affect yield and reduced drought stress.

1.3. Cultivar effects on economic yield

Aphiphan, pookpakdi et al. 1983, reported that during its review differences between genotypes of mungbean due to increased material flow photosynthetic organs is generating economic yield (4).

They also expressed the difference in yield characteristics and genotypes are related to their genetic differences .

Research on the row spacing and irrigation cut announced on mungbean genotypes with increased drought decreased yield. Experiment on its moisture stress on growth yield and wax bean genotypes had taken place between t Ahmadi, A. and A. Siosemardeh. 2005he cultivar announced in terms of levels there was a significant difference in yield, so that the cultivar COS16 and Tylor had the highest yield.

The effect of irrigation levels on yield and yield of soybeans had been received between the yields of soybean cultivars, significant differences exist.

A study entitled Comparison of different varieties of mungbean varieties to yield a significant amount in terms announced.

2. Material and Method

2.1. Profile geographic and climatic conditions

This test on a farm located in the city HAMIDIH summer 1389 with the following geographic profile was:



Latitude: 31 degrees 33 minutes elevation are higher sea: 13 m, Geographic: 48 degrees and 10 minutes Average Annual Rainfall: 248.5 mm

Fig1. Exit seedling

2.2. Pilot project specification and plan

The study used a factorial experiment in randomized complete block design with four replications that were tested factors including irrigation 4 levels include:

I1 = 7 days

I2 = 10 days

I3 = 13 days

I4 = 16 days

The second factor includes the three varieties cultivated varieties were implanted:

V1 = LOCAL V2 = PARTOVV3 = GOHAR

2.3. Estimate final yield the final harvest area

In the final harvest of mungbean plant value of a square unit area, plants were collected and measured the dry weight of pods in plant counting, number; number of seeds per pod and yield were calculated according to the formula.

$$u = \underbrace{K.L.Z.A}_{10^5}$$

 $U = grain \ yield$

K = number of plants in meter square

L = average number of pods plant

Z = average number of seeds per pod

A = grain weight in grams



Fig2. Trifoliate stage of a mungbean

3. Result

3.1. Check component manufacturing plant 3.1.1. Yield

Compared with cereals, grains have a lower yield. Pulses in all three processes to reduce operating yield: breathing light, nitrogen fixation and photosynthesis relationships. Light respiration in the light occurs and 30 percent of all cereal production to photosynthetic consumption brings. Symbiotic relationship between nitrogen fixing plants produce about 10 percent of the potential to reduce grain.

Fig3: pod Phase vetch

Consequently, to produce a certain amount of protein compared with starch and more energy is consumed in the process only if grains lower grain yield occurs. Also high in protein, cereal grains



may cause early protein remobilization from leaves to seeds and leaves in these conditions the capacity for photosynthesis decreases.

Fig4: View of the farm harvest

3.2. Effect of irrigation on yield

The analysis of variance of data indicates a significant difference in the level of one percent on yield. Among the irrigation treatments II treated with 2953 kg ha I4 treated with the highest and lowest 1296 kg ha grain yield were produced.

Stress, especially in the growing stage, reduces the capacity of the source plants for the source and sink is forced to balance the number of flowers and pod production to reduce the stress that can handle grain filling period and also reduced and the final yield is reduced. The results also



corroborated from other reviews to reduce grain yield is affected by drought.



Fig5: mungbean harvest

Fig6: Vegetative phase

3.3. Cultivar effect on grain yield

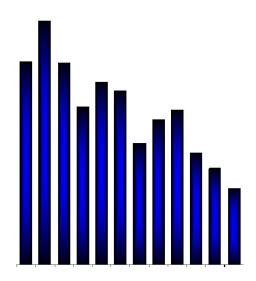
Variance table showed a significant cultivar effect on grain yield has not. Among the varieties evaluated in this test, the digit rays with 2279 kg/ha produced the highest grain yield between genotypes of mungbean has increased the flow from the photosynthetic organs are functioning and productive as possible LAI is more and more dry matter accumulation result will yield more.

3.4. Irrigation interaction variety on grain yield

Yield in percent probability level affected irrigation and cultivar interactions were. Comparisons with related average showed that treatment with 3328 kg ha I1v2 and I4v3 treated with 1043 kg ha respectively the highest and lowest



grain yield were produced. Since the yield of yield in the full irrigation treatments to the highest amount they were consequently yield the maximum amount in your conditions are. Because while reducing the rate of growth period and impaired



photosynthesis and carbon dioxide fixation is reduced yield.

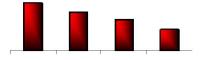
Fig7: Effect irrigation on Yield

Fig7: Effect interaction irrigation \times cultivar on Yield

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Serum Retinol Level in Patients with Chronic Liver Disease

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Abstract: Chronic hepatitis C virus (HCV) infection is a major risk factor for hepatocellular carcinoma (HCC). The rate of HCC development among HCV-infected persons ranges between 1% and 3% after 30 years. Retinoids are known to possess an anti-tumor role by suppressing tumor promotion and progression. Retinoid depletion is often observed during pre-malignant status and cancer development. Loss of retinoid activity or responsiveness is closely linked to carcinogenesis in several organs. This work aimed to investigate serum retinol levels in patients with chronic hepatitis C, liver cirrhosis and HCC and to assess its importance as a risk factor for the development of HCC. A total of 90 subjects were included in the study and were assigned to the following 4 groups. Group I included 15 healthy subjects as a control group. Group I included 15 patients presented with chronic hepatitis C infection. Group I included 45 patients with liver cirrhosis, it was further categorized according to Child Pugh classification into three groups; Group I a: It included 15 Child grade A patients. Group I b: It included 15 Child grade B patients. Group I c: It included 15 Child grade C patients. Finally Group IV included 15 patients with hepatocellular carcinoma. Controls had significantly higher serum retinol level than HCV and HCC patients. Higher level of serum retinol was found in Group I, while the lower levels were found in Group IV and Group III c. Serum retinol mean value was significantly higher in patients with HCC on top of apparent normal liver than those on top of cirrhotic liver. Serum retinol was inversely correlated to age. No significant correlation was found between duration of interferon therapy, gender and serum retinol level. A positive correlation was found between serum retinol level and Hb, platelets count and albumin level, while negative correlation was found between serum retinol level and other liver function test parameters & serum creatinine. High significant difference was found between different histopathological grades in liver biopsy and serum retinol level. The highest serum retinol level was associated with normal liver and the lowest was associated with shrunken cirrhotic liver with multifocal lesion. Patients receive interferon therapy had a higher serum retinol level than patients do not receive interferon therapy. We concluded that serum retinol levels are lower in patients with chronic liver disease and is directly related to the severity of liver disease. Serum retinol levels are significantly lower in patients with HCC superimposed on liver cirrhosis compared with patients who have cirrhosis alone. Further studies are needed to elucidate role of retinol levels in the development of HCC and if retinol supplementation will be of help.

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Keywords: Serum Retinol; Patient; Chronic Liver Disease

1. Introduction:

Chronic hepatitis C is defined as an infection with the hepatitis C virus persisting for more than six months. Hepatitis C has infected nearly 200 million people worldwide, and infects 3-4 million more people per year (**Shepard et al., 2005**).

Egypt has the highest seroprevalence for HCV, up to 20% in some areas. There is a hypothesis that the high prevalence is linked to a now-discontinued mass-treatment campaign for Schistosomiasis (**Frank et al., 2000**).

Cirrhosis is a gradually developing chronic disease of the liver which always involves the organ as a whole. It is irreversible consequence and final stage of various chronic liver diseases of different etiology, or the result of long term exposure to various noxae (Kuntz and Kuntz 2008).

Hepatocellular carcinoma (HCC) is one of the most common malignant primary liver tumors

worldwide, it ranks fifth in frequency in men and eighth in women. Between 500000 and one million new cases are reported each year. The annual mortality rate is virtually the same as its annual incidence. Its geographical distribution varies greatly and correlates almost 100% with regional incidence of HCV and HBV infection. In Africa we have high incidence with 20-150 per 100000 inhabitants per year (Bosch et al., 2004).

Retinol is the animal form of vitamin A and it is a fat-soluble vitamin, which is important in vision and bone growth. Retinol affects the differentiation and growth of many tissues and has antitumor properties. Retinol is among the most usable forms of vitamin A (Eray et al., 2007).

Retinol has antioxidant activity and promotes cell differentiation, so it may protect against the development of hepatocellular carcinoma (HCC) by controlling hepatocellular differentiation and reducing inflammatory responses (Donato et al., 1998).

Only few small randomized controlled trials have demonstrated a possible role of retinol in chemoprevention as well as amelioration of symptoms in HCC; however the results of these trials need to be confirmed (Newsome et al., 2000).

This study **aimed** to investigate serum retinol levels in patients with chronic liver disease (CLD) and to assess its importance as a possible risk factor for the HCC development in cirrhotic patients.

2. Subjects and methods

The present study was carried out in the departments of internal medicine and biochemistry, faculty of medicine, Zagazig University and El-Ahrar Hospitals, during the period from October 2009 to April 2010.

A - Subjects

This study included 75 patients with chronic liver diseases. Patients of Group I and Group III a were taken from department of internal medicine of El AHRAR Hospital and the other groups of patients were taken from department of internal medicine Faculty of Medicine, Zagazig University. Their ages ranged from 22 to 67years with a mean age \pm SD of 45.56 \pm 10.39. They were 49 males and 26 females.

The studied subjects were divided into the following groups:

Group : it included 15 healthy volunteers as a control group. Their ages ranged from 19 to 61 years with a mean age \pm SD of 37.13 \pm 12.2. They were 9 males and 6 females.

- **Group II:** it included 15 patients with chronic hepatitis C. Their ages ranged from 32 to 48 years with a mean age \pm SD of 39.2 \pm 5.65 .They were 11 males and 4 females.
- » 14 patients were on interferon therapy for a duration ranging from 1 month to 12 months with a mean duration \pm SD of 7.2 \pm 0.9. They were 10 males and 4 females. Their ages ranged from 33 to 48 years with a mean age \pm SD of 39.7 \pm 5.61.
- » Male patient was not on interferon therapy. He was 32 years old.

Group III: it included 45 patients with liver cirrhosis. They were further categorized according to Child Pugh classification into three groups:

- **1. Group IIIa:** it included 15 Child grade A patients. Their ages ranged from 26 to 64 years with a mean age \pm SD of 47.8 \pm 10.96. They were 8 males and 7 females.
- » 3 patients were on interferon therapy for a duration ranging from 2 months to 5 months, with a mean duration \pm SD of 3.6 \pm 0.88. They were 2 females and

- one male. Their ages ranged from 26 to 33 years with a mean age \pm SD of 29 \pm 1.26.
- » 12 patients were not on interferon therapy. They were 7 males and 5 females. Their ages ranged from 44 to 64 years with a mean age \pm SD of 52.5 \pm 7.37.
- **2. Group IIIb:** it included 15 Child grade B patients. Their ages ranged from 22 to 50 years; with a mean age \pm SD of 37.53 \pm 8.65. They were 10 males and 5 females.
- » 3 patients were presented with encephalopathy. They were 2 males and one female. Their ages ranged from 35 to 50 years with a mean age \pm SD of 41.3 \pm 7.76; with a disease duration ranged from 3.5 m to 10 m; with a mean duration \pm SD of 5.83 \pm 2.08.
- » 3 male patients were presented with jaundice. Their ages ranged from 22 to 44 years with a mean age \pm SD of 36.33 \pm 12.42; with a disease duration ranged from 8 m to 18 m, with a mean duration \pm SD of 12.66 \pm 2.9.
- » 2 female patients were presented with hematemesis & melena (H&M). Their ages were 28 and 45 years with a mean age \pm SD of 36.5 \pm 12.02; with a disease duration ranged from 5 m to 6 m, with a mean duration \pm SD of 5.5 \pm 0.5.
- » Male patient presented with bleeding tendency, he was 33 years old with a disease duration about 7 m.
- » 3 male patients were presented with combined encephalopathy and bleeding tendency. Their ages were between 31 and 46 years with a mean age \pm SD of 37.66 \pm 7.63; with a disease duration ranged from 9 m to 24 m, with a mean duration \pm SD of 15 \pm 4.58.
- » female patient presented with spontaneous bacterial peritonitis (SBP). She was 37 years old, with disease duration about 3 m.
- » 2 patients presented with combined encephalopathy and H&M. They were one male and one female. Their ages were 25 and 49 years with a mean age \pm SD of 37 \pm 16.37, with a disease duration ranged from 4 m to 11 m with a mean duration \pm SD of 7.5 \pm 3.5.
- 3. Group IIIc: it included 15 Child grade C patients. Their ages ranged from 34 to 67 years with a mean age \pm SD of 51.66 \pm 8.5. They were 9 males and 6 females.
- » 4 patients were presented with combined H&M and encephalopathy. They were 2 males and 2 females. Their ages ranged from 41 to 57 years with a mean age \pm SD of 48.75 \pm 7.5; with a disease duration ranged from 3.5m to 13 m with a mean duration \pm SD of 8.5 \pm 1.65.
- » Male patient presented with combined bleeding tendency and encephalopathy. He was 54 years old with disease duration about 11m.

- » Male patient presented with combined H&M, bleeding tendency and encephalopathy, he was 49 years old with a disease duration about 5m.
- » 4 patients were presented with combined H&M, jaundice and encephalopathy. They were 3 males and one female. Their ages ranged from 49 to 67 years with a mean age \pm SD of 58.75 ± 7.67 ; with a disease duration ranged from 9 m to 17 m with a mean duration \pm SD of 12.5 ± 1.84 .
- » 2 patients were presented with combined SBP and encephalopathy. They were one male and one female. Their ages were 34 and 47 years with a mean age \pm SD of 40.5 \pm 9.19; with a disease duration ranged from 2 m to 4 m, with a mean duration \pm SD of 3 \pm 1.
- » female patient presented with encephalopathy. She was 47 years old, with disease duration about 3 m.
- » female patient presented with combined jaundice and encephalopathy. She was 55 years old with disease duration about 6 m.
- » male patient presented with combined encephalopathy, jaundice and SBP. He was 59 years old, with disease duration about 11 m.
- **Group IV:** it included 15 patients with hepatocellular carcinoma. Ten patients have cirrhotic liver and 5 patients with normally apparent liver. Their ages ranged from 34 to 66 years, with a mean age \pm SD of 52.46 \pm 8.5. They were 9 males and 6 females.
- $\gg 1$ male patient was presented with combined encephalopathy and bleeding tendency. He was 66 years old with disease duration about 6 m.
- » 2 male patients were presented with SBP. Their ages were 51 and 57 years with a mean age \pm SD of 54 \pm 2.24; with a disease duration ranged from 2 m to 12 m with a mean duration \pm SD of 7 \pm 5.
- » 3 patients were presented with encephalopathy. They were 1 male and 2 females. Their ages were 49 and 61 years with a mean age \pm SD of 53 \pm 6.92 with a disease duration ranged from 2 m to 4 m with a mean duration \pm SD of 3 \pm 0.54.
- » 2 patients presented with jaundice, they were 1 male and one female, their ages were 34 and 54 years with a mean age \pm SD of 44 \pm 14.14 with a disease duration ranged from 1 m to 7 m with a mean duration \pm SD of 4 \pm 3.
- » female patient was discovered accidentally. She was 53 years old.
- » 6 patients presented with H&M. They were 4 males and 2 females. Their ages ranged from 37 to 60 years with a mean age \pm SD of 52.16 ± 8.56 , with a disease duration ranged from 3 m to 24 m with a mean duration \pm SD of 12.5 ± 3.43 .

Exclusion criteria:

All conditions that affect retinol homeostasis are excluded from the study:

- 1. Advanced renal diseases.
- 2. Malignancies other than HCC.
- 3. Severe malnutrition.
- 4. Heavy parasitic infestation.
- 5. Drugs which interfere with retinol.

No one of the selected patients was excluded.

B-Methods:

All Subjects were subjected to the following:

- I- Full medical history and detailed physical examination.
- II- Ultrasonography and Computed tomography scanning of the abdomen:

Abdominal ultrasonographic examination and Computed Tomography scanning was done in fasting state evaluating:

- * The liver for size, echo pattern and presence or absence of focal lesions (detected masses were evaluated as regards site, size, echo pattern).
- * The spleen for size.
- * **Portal vein diameter** (normally regarded as 9-12 mm) and presence or absence of thrombosis.
- * Presence or absence of hepatic periportal fibrosis.
- * Abdominal lymph node enlargement (para-aortic & porta-hepatic).
 - * Presence of ascites.

III- Laboratory investigations:

- 1. Complete blood picture (CBC).
- 2. Prothrombin time (PT).
- 3. Liver function test.
- 4. Kidney function tests.
- 5. Alpha fetoprotein (AFP) determination (Using AFPmab ELISA Kit by EOUIPAK).
- 6. Hepatitis virus markers: HBsAg, HBcAb (IgM) and HCV-Ab.
- 7. Liver biopsy

IV- Determination of Serum retinol level using thin layer chromatography in accordance to MacCrehan and Schonberger (1987).

Preparation and Processing of Measured Standard Samples

Weighed quantity of the standard was dissolved in chloroform. Carefully measured aliquots was then spotted separately on specially prepared silica gel plates and developed as outlined in the third section below. After development, the spots were visualized by UV light, scraped off the plate separately; and measured spectrophotometrically as described below.

An internal standard was prepared by adding 20 μg quantities of retinal dissolved in 50 μ l of ethanol to 3 ml of human serum. This prepared

standard and a control sample of serum was then carried through the extraction, fractionation, and quantification procedures described below.

Extraction of Retinol from Human Serum

First 20 ml of venous blood were drawn from each of the control and patient subjects in the fasting state. The blood was allowed to clot at room temperature for 20 min and the serum separated by centrifuging for 20 min at 2700 rpm. In order to obtain a nonsaponified sample, the retinol was extracted by a modification of the procedure of Blankenhorn (1957). Then 3 ml of 95% ethanol were pipetted into each of two 15-ml stoppered centrifuge tubes, and 1.5 ml of serum was added dropwise through the ethanol into each tube. Finally, 3.0 ml of petroleum ether was added to each of the tubes, which were then stoppered tightly. The tubes were shaken vigorously by hand for 10 mm in order to liberate retinol from the carrier proteins and then centrifuged for 10 mm at 1500 rpm. The petroleum ether (upper phase) of the tubes, containing the retinol compounds, was carefully pipetted off and pooled into a single stoppered tube. The aqueous ethanol (lower phase), containing phospholipids and neutral lipids and the precipitated protein, was discarded. The pooled extract was taken to dryness under a stream of nitrogen and dissolved in 0.5 ml of n-hexane just prior to chromatography.

Development

Development is usually performed in rectangular glass tanks lined with filter paper. A convenient volume of solvent for 21*21*6 Cm tank is 100 mL. After equilibration period of 20 min, the plate is placed on the tank and allowed to stand until the desired developing distance is obtained.

Fractionation by Thin-Layer Chromatography

First, 20 X 20 X 0.5 cm glass chromatography plates were washed with \underline{H} aemosol detergent, rinsed thoroughly with distilled water, and dried with acetone. The plates were coated to a thickness of 0.5 mm with a mixture of silica gel G and distilled water, 1:2 (w/v).

The coated Silica plates can be activated by heating at 120oC for 1 h in an attempt to enhance resolution, while spraying the plates with a solution of an antioxidant has been reported to prevent degradation of the compounds on the plates.

The chromatographic procedures were performed in a dark room illuminated only with a red light. A line was drawn on the plate 13 cm from the origin, and all silica gel above this line was scraped off with a razor blade. Then 40μ 1 of standard was spotted with a Hamilton microsyringe on the left

quarter of the plate. The entire 0.5 ml of the n-hexane extract of serum was spotted horizontally across the remaining three-fourths of the plate. The plates were placed immediately into developing tanks containing a solvent system of benzene and ethyl ether, 90:10 (v/v), and developed to 13 cm in a nitrogen atmosphere for periods of 25-30 mm.

Quantitative Measurement of Fractions

Immediately after the plates were removed from the developing tank, the standard spots were visualized by UV light. The concentration of retinol was detected by using GAMAG TLC Scanner 3 apparatus.

Statistical analysis:

Data were entered, checked and analyzed using SPSS for windows version 10.

3. Results

Table 1 shows demographic data of patients and controls.

Table 2 shows demographic, clinical and laboratory data of different groups of patients. There were high significant differences between the studied groups of patients as regards, age, Hb level, platelet count, total bilirubin, albumin level, FP, GGT, PT and serum creatinine (p<0.001), and significant differences between the studied groups of patients as regards, SGPT and SGOT (p<0.01). While no significant differences between the studied groups of patients were found as regards other studied parameters (p >0.05).

Table (3) shows the comparison of mean value \pm SD of serum retinol level (µg/dl) of cases and controls. A high significant difference of serum Retinol level (P < 0.001) was found between cases and controls. Controls had a higher serum retinol level than cases.

Table (4) shows serum retinol level ($\mu g/dl$) among studied groups. A progressive decrease in serum retinol level was observed in the three groups of patients as compared to the control group & the lower most level was observed in group IV (P<0.001).

Table (5) shows LSD for serum retinol level (µg/dl) among studied groups of patients. A highly significant difference was obtained in comparing any of the studied groups of patients (P < 0.001) except for IV Group and III b, III c groups, also Group III c and Group III b.

Table (6) shows serum retinol level ($\mu g/dl$) in the two groups of HCC patients. Among patients with HCC (group IV) serum retinol level was significantly lower in HCC patients with liver cirrhosis than those with apparently normal liver (P < 0.001).

Table (7) shows correlation between serum retinol level (μ g/dl) and different laboratory parameters. There was a positive highly significant correlation between serum retinol level and the following parameters: HB, platelets count and albumin level (P < 0.001). While an inverse high correlation was found between serum retinol level and other liver function test parameters, serum creatinine (P < 0.001). No significant correlation was found between ALP, rrandom blood sugar and serum retinol level (P >0.05).

Table (8) shows correlation between serum retinol level (µg/dl) and age, blood pressure, gender and duration of interferon therapy. There was an inverse correlation between serum retinol level and age $\,$ (P < 0.001), while a high positive correlation was found between serum retinol level and BL.P (P < 0.001). No significant correlation was found between duration of interferon therapy, gender and serum retinol level (P >0.05).

Table (9) shows mean serum retinol level $(\mu g/dl) \pm SD$ and liver biopsy findings in Child A and

HCV groups. A high significant difference was found between the different grades of histopathological changes in liver biopsy findings as regard serum retinol level (P < 0.001).

Table (10) shows different abdominal ultrasound findings as regard serum retinol level ($\mu g/dl$). A significant relation was found between different findings of abdominal US and serum retinol level (P < 0.001). The highest serum retinol level was associated with normal liver and the lowest was associated with shrunken cirrhotic liver with multifocal lesion.

Table (11) shows relation between serum retinol level ($\mu g/dl$) and interferon therapy in HCV and Child A groups of patients. A significant difference of serum retinol level (p < 0.05) was found between patients receive interferon therapy and patients do not receive interferon therapy. Patients receive interferon therapy had a higher serum retinol level than patients do not receive interferon therapy.

Table (1) Demographic data of patients and controls

17	Table (1) Demographic data of patients and controls										
	Control		Cases		T	p					
Age (years)						*					
Mean \pm (SD)	37.1 ± 1	2.2	45.73 ±	10.48	2.55	<0.01					
Range	19 - 61		22 - 67		S	lig					
Sex											
	No		No								
Male	9	60	49	65.3	X2	p					
Female	6	40	26	34.7	0.16	0.6					

Table (2) Demographic, clinical and laboratory data of different groups of patients

	HCV	7	Chile	l A	Chile	1 B	Chile	l C	HCC		F	P	
Age (years) Mean ± (SD) Range	39.2 - 32 - 4		47.8 26 - 0	± 10.96 64	37.53 22 - 3	3 ± 8.65 50	51.60 34 -	5 ± 8.5 67	52.40 34 -	6 ± 8.5 66	9.	** 9.8 <0.001 Sig	
Sex	No		No		No		No		No		X^2	P	
Male	11	73.3	8	53.3	10	66.7	9	60	9	60			
Female	4	26.7	7	46.7	5	33.7	6	40	6	40	1.48	0.82	
Symptoms	No		No		No		No		No		X^2	P	
Encephalopathy	0	0	0	0	0	0	15	100	4	26	5.91	0.11	
H&M	0	0	0	0	0	0	9	60	6	40	6.05	0.09	
SBP	0	0	0	0	0	0	3	20	2	13	4.32	0.1	
Jaundice	0	0	0	0	0	0	6	40	2	13	6.11	0.08	
Bleeding tendency	0	0	0	0	0	0	2	13.5	1	8	4.59	0.19	
НВ	11.4	±1.4	12.1	±1	11.4	±1.4	10.7	±2.6	9.4 ±	1.5 *		**	
											6	.8 < 0.001	
Platelets count	242.	7 ±70.7	248.9	9 ±55.7	242.	7 ±70	170.	1 ±110	144 :	±58 *	**		
											1	1.1 < 0.001	
SGPT	25.7	±16	21 ±8	8.8	41.3	±20	23 ±	20	31 ±	16	4.38 0.01*		
SGOT	24.7	±16	15.9	±5.4	24.7	±16	22 ±	18.9	32.8	±16.9	3.37 0.01*		
Bilirubin	0.77	±0.2	1.3 ±	0.35	$2.5 \pm$	0.6	3 ±1.	3	2.9 ±	1.1	28	28.08 0.001**	

Albumin	4 ±0.15	3.1 ±0.3	3 ±0.54	2.4 ±0.6	4 ±0.4	46.9 0.001**
FP	46 ±16	48.6 ±15.8	46.5 ±16	117 ±27	930 ±394*	71.3 0.001**
GGT	19.2 ±6	20.8 ±8.5	19.3 ±6	41 ±16.1	29.6 ±13	10.68 0.001
ALP	48.9 ±16	59.9 ±18.8	48.8 ±16	66.5 ±34	61.7 ±21.1	1.49 0.11 NS
PT	11.7 ±1.1	15.3 ±0.8	15.2 ±1	18 ±2.4	16.7 ±2.7	37.08 0.001**
S. creatinine	0.58 ± 0.2	0.6 ± 0.2	0.58 ± 0.2	1.38 ±0.5	1.26 ±0.6	17.8 0.001**
RBS	113 ± 55	106.7 ±14.6	113 ± 55	104.9 ±13.7	102.1 ±13.1	0.5 0.76 NS

Table (3) comparison of mean value \pm SD of serum retinol level (µg/dl) of cases and controls

		Serum retinol level ± SD (Range)	T	Р	Sig
cases	75	$14.67 \pm 3.48 \ (9 - 22)$	15.78	< 0.001	HS
control	15	$29.4 \pm 2 (27 - 33)$			

Table (4) serum Retinol level (µg/dl) among studied groups

Tuble (1) bettim Reumon tever (µg/un) umong budated groups					
	± SD (Range)	Median			
Group I	$29.4 \pm 2 (27 - 33)$	29.2			
Group II	$20.1 \pm 1.2 (18.2 - 22)$	20.2			
Group III a	$15.98 \pm 0.3 (15.5 - 16.5)$	16			
Group III b	$13.97 \pm 0.3 (13.57 - 14.7)$	13.99			
Group III c	$11.86 \pm 0.6 (11 - 13)$	11.79			
Group IV	$11.4 \pm 2.65 (9 - 15.7)$	10.18			

K = 79.77 P < 0.001

Table (5) LSD for serum retinol level ($\mu g/dl$) among studied groups of patients

	Group I	Group II	Group III a	Group III b	Group III c
Group IV	< 0.001	< 0.001	< 0.001	NS	NS
Group III c	< 0.001	< 0.001	< 0.001	NS	
Group III b	< 0.001	< 0.001	< 0.001		
Group III a	< 0.001	< 0.001			
Group II	< 0.001				

Figure (1) Mean serum retinol level among studied groups

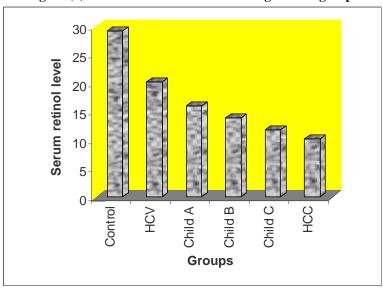


Table (6) Serum retinol level ($\mu g/dl$) in the two groups of HCC patients

	No	Retinol - ±SD (range)	T	p
Cirrhotic liver	10	9.6 ±0.81 (9 – 11)		**
Apparently normal liver	5	$14.85 \pm 0.64 \ (14.07 - 15.79)$	12.4	< 0.001

Table (7) Correlation between serum retinol level ($\mu g/dl$) and different laboratory parameters

	r	р	Sig
Haemogloubin	0.42	< 0.001	HS
platelets	0.52	< 0.001	HS
SGPT	-0.28	< 0.001	HS
SGOT	-0.31	< 0.001	HS
Bilirubin	-0.71	< 0.001	HS
Albumin	0.5	< 0.001	HS
FB	-0.4	< 0.001	HS
GGT	-0.38	< 0.001	HS
ALP	-0.08	> 0.05	NS
PT	-0.72	< 0.001	HS
RBS	-0.09	> 0.05	NS
S.Creatinine	-0.45	< 0.001	HS
PCR (quantitative)	-0.66	< 0.001	HS

Table (8) Correlation between serum retinol level ($\mu g/dl$) and age, blood pressure, gender and duration of interferon therapy

	r	p	Sig
Age	-0.43	< 0.001 *	HS
Blood pressure	0.48	< 0.001 *	HS
Gender	0.31	. > 0.05	NS
Duration of interferon	0.21	> 0.05	NS
therapy			

Table (9) Mean serum retinol level (µg/dl) ± SD and liver biopsy findings in Child A and HCV groups

	Retinol - ±SD (range)
1/6	$20.1 \pm 1.35 \ (18.4 - 21.7)$
2/6	$19.9 \pm 1.1 \ (18.2 - 21.5)$
3/6	$20.57 \pm 1.6 \ (18.7 - 22)$
4/6	$15.9 \pm 0.3 \ (15.5 - 16.4)$
5/6	$16 \pm 0.38 \ (15.5 - 16.5)$

Table (10) Different abdominal ultrasound findings as regard serum retinol level ($\mu g/dl$)

P < 0.001

	Retinol - ±SD
Normal liver	20.98 ± 7.8
Fatty liver	18.76 ± 2.3
Periportal fibrosis	17.6 ± 2.6
Bright liver	15.75 ± 0.83
Early cirrhotic liver	13.9 ± 0.74
Shrunken cirrhotic liver	12.2 ± 1.1
Shrunken cirrhotic liver + focal	10.2 ± 0.7
lesion	
Shrunken cirrhotic liver +	9 ± 0.01
multifocal lesion	

F = 36.69

Focal lesion + normally	14.8 ± 0.6
apparent liver	

F = 14.01 P < 0.001

Table (11) Relation between serum retinol level ($\mu g/dl$) and interferon therapy in HCV and Child A groups of patients

	No	Mean ± SD	Range
Patients on interferon therapy	17	19.39±2.02	15.53 - 22
Patients not on interferon therapy	13	16.35±1.21	15.5 – 20.24

T = 2.34

4. Discussion

There has been a debate as to whether the measurement of serum retinol levels provides an accurate representation of tissue (hepatic) levels. Whilst the relationship is not linear in its entirety, it is accepted that there is a direct correlation between serum and hepatic levels during vitamin A deficiency. After a certain point, increasing hepatic retinol levels do not produce a proportional increase in serum retinol levels. More importantly, patients with cirrhosis fall towards the lower part of this curve, where a direct relationship exists, thus validate the usage of serum levels as a guide to hepatic levels (Olson 1984).

In our study, a statistically significantly (p<0.001) lower serum level of retinol was observed among patients with chronic liver disease when compared with control group. The decrease in serum level of retinol found in our patients with chronic liver disease can be explained by the reduced hepatic vitamin storage (Janczewska et al., 1995), reduced enzymatic conversion of β-carotene into retinol (Moreno et al., 2002), and/or diminished release of binding proteins by the liver (Janczewska et al., 1995).

Chronic inflammation and infection, which are part of clinical manifestations of chronic liver disease, are also responsible for the reduction of the serum level of retinol. This can be attributed to the reduction in the synthesis and release of retinol binding protein, during acute phase response (Stephensen and Gildengorin 2000).

The inadequate consumption of vitamin A leads to the depletion of its organic reserves. In patients with cirrhosis, the inadequate intake of this vitamin, mainly the vitamin A from animal sources, which is highly available, can exacerbate an expected reduction in the serum levels of vitamin A. In addition, the reduction in protein ingestion, by unfounded belief patient's or inadequate recommendations in clinical practice, as prophylaxis for the hepatic encephalopathy contributes for the reduction of vitamin A from animal sources daily ingestion and the decreasing of bioconversion of provitamin A carotenoids (Sklan et al., 1989). Moreover, the liver disease can course with intestinal alterations that can compromise the bioavailability

p < 0.05

and the bioconversion of carotenoids in vitamin A (Albillos and Hera 2002).

Our findings were consistent with **Newsome et al.** (2000) and Yuan et al. (2006). They had demonstrated that patients with chronic liver diseases have reduced levels of retinol in the blood and in the liver.

Our study not only confirmed that serum retinol levels were lower in patients with chronic liver disease; but also shown that this decrease was related to the severity of liver disease. Severity of liver disease can be assessed either clinically according to child and Pugh classification (**Pugh et al., 1973**), according to histopathological grading (**Sun et al., 2009**), or by default according to abdominal ultrasound findings (**Newaz Khan et al. 2000**).

Patients with advanced liver cirrhosis (Child C group) had lower retinol levels when compared with other patients with less severe liver disease as chronic hepatitis C infection or Child A and B groups of cirrhosis.

High significant difference (p<0.001) was observed between serum retinol level and the different histopathological changes in liver biopsy. Significant relation (p<0.001) was found between different findings of abdominal ultrasound and serum retinol level. The highest serum retinol level was associated with normal liver and the lowest was associated with shrunken cirrhotic liver associated with focal lesion.

Hepatic stellate cells which are rich in retinol are activated to become myofibroblast while the liver undergoes a fibrotic transformation during cirrhosis. Myofibroblast lose retinol content (Blomhoff and Wake 1991). The increase rate of conversion of hepatic stellate cells into myofibroblast is associated with loss of hepatic ability for retinol storage (Knittel et al., 1999). Newsome et al. (2000) and Yuan et al. (2006) demonstrated that the synthesis of retinol binding protein by the liver is impaired with the progression of the liver disease.

Hepatocellular carcinoma is a common cause of morbidity and mortality in patients with liver cirrhosis, leading to more than a million deaths per year worldwide. Treatment options in such patients are limited (**Fried1998**). A complementary approach to the management of HCC is to decrease its

incidence in at-risk populations. Retinoids have long been the focus of investigators searching for putative anticancer agents (Goodman 1984). Many of the synthetic retinoids, which act as tumor differentiating agents, have demonstrated a potential for cancer prevention in animal models (Parker 1996). The relationship between retinols and neoplasia has become the focus of much attention over the past 20 years. Recognition that its antioxidant properties, as determined in vitro, would be of benefit in the treatment of malignant conditions has led to its usage in clinical trials (Issing et al., 1997).

In our study, the lower levels of serum retinol were found in HCC group, reduced serum levels of retinol could be the cause or consequence of HCC (Yu et al., 1994). The reduction of hepatic stellate cells is a major cause of such retinoid depletion in the tumors. In addition, a rapid metabolism of retinoid into an inactive metabolite may participate in such depletion (Okuno et al., 2001).

Several antioxidants, including -carotene, vitamin E, and selenium, have been shown to inhibit chemically induced liver cancer in rodents (**Moreno et al., 2002**).

Retinol has been shown to inhibit the formation of aflatoxin B1 (AFB 1) – DNA adducts in hepatocytes (Yu et al., 1994). A crucial step in aflatoxin-induced hepatocarcinogenesis, and to inhibit the development of pre-neoplastic lesions in the liver of rats treated with chemical carcinogens (Berberian et al. 1995). Retinoids also have been shown to inhibit the transformation (activation) of hepatic stellate cells (Chi 2003) and to suppress the proliferation of human hepatoma cells (Piao et al., 2003).

Persistent inflammation caused by chronic infection with HBV and/or HCV is believed to be one mechanism of hepatocarcinogenesis and is probably mediated by inflammatory cytokines (**Nieters et al., 2005**).

Retinoids inhibit the production proinflamatory cytokines in cultured macrophages and reduce inflammatory reactions (Brinckerhoff et al., 1983). Reactive oxygen species induced by chronic inflammation can cause damage to DNA, proteins, and lipids (Rama and Balraj 2004). Reactive oxygen species - induced DNA damage is believed to be directly involved in hepatocarcinogenesis (Loguercio and Federico Malfunction of retinoid nuclear receptor in hepatoma cells may contribute to hepatocarcinogenesis (Okuno et al., 2001). Antioxidants, such as retinol and carotenoids, can neutralize reactive oxygen species and can possibly prevent the development of HCC (Moreno et al., 2002).

Newsome et al. (2000) found that high serum retinol mean value in patients presented with HCC on top of apparent normal liver when compared with those on top of cirrhotic liver. We found same results with high significant difference between both (P < 0.001), this can be explained due to reduced number of hepatic stellate cells, prevalence of myofibroblast and deterioration of liver functions in cirrhotic patients (Burt and Oakley Lecture 1993).

Plasma concentration of albumin is a marker of synthetic ability of the liver (**Keith et al.**, 1999). While liver enzymes (ALT&AST) are markers of hepatocellular damage (**Kale et al.**, 2001), also plasma bilirubin concentration is a marker of hepatic excretory function of the liver (**Mayne 1994**). With liver impairment the plasma level of albumin is decreased, while liver enzymes and bilirubin levels are increased (**Kuntz and Kuntz 2008**). **Eray et al.** (2007) and **Zheng1 et al.** (2008) share us the high positive correlation (P < 0.001) between serum retinol level and albumin level, and also the inverse correlation (P < 0.001) between serum retinol level and liver enzymes and bilirubin.

Given that prothrombin is one of the hepatic dependant clotting factors. With impairment of hepatic functions, the plasma concentration of prothrombin is decreased, so subsequent increase in prothrombin time **Pinnas and Meinke** (1992). A high significant inverse correlation (P < 0.001) between serum retinol level and prothrombin time was found. **Eray et al.** (2007) and **Zheng1 et al.** (2008) had found that Serum retinol level inversely correlated with the prothrombin time.

A highly significant inverse correlation (p<0.001) between serum retinol level and AFP was found, this can be explained as following high levels of AFP is considered as a biomarker for diagnosis of HCC **Bruix and Sherman (2005)**.

An inverse correlation (P < 0.001) between serum retinol level and age was found. Ballew et al. (2009) had found that Serum retinol level positively correlate with the patient's age, while Eray et al. (2007) and Newsome et al. (2000) found that serum retinol level not associated with the patient's age. Our finding can be explained as Egypt is considered one of the developing countries with low socioeconomic standards, absence of programs of geriatric care, bad nutritional habits of elderly. Sommer (2008) had announced that vitamin A deficiency is common in developing countries and the major cause of deficiency is diet which contains few animal sources.

A positive correlation (P < 0.001) was found between serum retinol level and blood pressure. This was in agreement to **Takebayashi et al.** (2006) who reported that serum retinol level correlated positively

with systolic blood pressure. Connolly et al. (2007) had reported that a negative correlation was found between serum retinol level and blood pressure. The possible mechanism of blood pressure lowering effect of retinoids has not yet been clarified. It may reflect alleviation of renal damage by retinoids, allowing the kidney to normalize blood pressure. Additionally, however, retinoids lower the expression of the angiotensin receptor in vitro and in vivo, so block the effects of angiotensin II (Sabine et al. (2004).

In our study No statistically significant difference (p>0.05) between gender and serum retinol level was found. This was in agreement to **Eray et al.** (2007).

No significant correlation (p>0.05) between ALP and serum retinol was found. This was in agreement to **Newsome et al. (2000).** No significant correlation (p>0.05) between rrandom blood sugar and serum retinol was found. This was in agreement to **Eray et al. (2007)**. While **Iwasa et al. (2009)** had found that Serum retinol level positively correlated with the rrandom blood sugar.

A positive high correlation (P < 0.001) between serum retinol level and hemoglobin was observed. In countries where vitamin A and iron deficiency are endemic in children; serum retinol concentration is positively correlated with hemoglobin concentration and biochemical iron tests (Mejia and Chew 1988). The mechanisms explaining the relationship between vitamin A and iron status are not known, although it has been speculated that vitamin A is necessary for the release of iron from stores to maintain adequate levels of plasma iron to bone marrow and that vitamin A may enhance absorption of iron, perhaps by preventing the inhibitory effects of phytates and polyphenols on iron absorption (Garcia-Casal et al., 1998).

A positive correlation (P < 0.001) between retinol and platelet count was observed. This was in agreement to **Zheng1 et al.** (2008) and **Iwasa et al.** (2009). Although the mechanism is unclear, But there are some evidence that vitamin A benefits hematopoiesis and hence platelets production (Noreen and Gray-Donaldb 2002):. Also platelet count in CLD is taken as an indicator of portal hypertension, which indicates the degree of cirrhosis. Platelet count progressively decreases with progressive decrease in liver functions cirrhotic patients (**Kuntz and Kuntz 2008**).

A highly significant inverse correlation (P < 0.001) between quantitative PCR and serum retinol level was found. This was in agreement to **Kohge et al. (2009).** Retinol increases the antiviral effect of interferon -2b plus ribavirin when retinol is taken

during course of interferon therapy (Kohge et al 2009).

No significant correlation (P >0.05) was found between duration of interferon therapy and serum retinol level. A significant difference (p < 0.05) of serum retinol level was found between patients receive interferon therapy and patients do not receive interferon therapy, but these results may be misleading because in our work we had taken only one blood sample from the patients who were on interferon therapy, we should take multiple blood sample in multiple setting (before, during and after treatment) from every patient on interferon therapy to compare effect of interferon on serum retinol level. Multiple further studies are needed for further evaluation of interferon therapy and serum retinol level

This study demonstrated that serum retinol levels are lower in patients with chronic liver disease and have also shown that this decrease is directly related to the severity of liver disease. Low serum retinol levels may have a role in the development of HCC suggesting that supplementation may be of benefit. Serum retinol levels are significantly lower in patients with HCC superimposed on liver cirrhosis compared with patients who have cirrhosis alone.

Further studies are encouraged to determine serum retinol role in primary and secondary prophylaxis of HCC in cirrhotic patients, and to identify a serum retinol level below which the risk of HCC would substantially increase and hence provide a threshold level for retinol supplementation.

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Dietary supplementation with polyunsaturated fatty acids source and its effects on the native turkey's liver important beneficial fatty acids

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Abstract:This experiment was conducted to evaluated canola oil on the some of beneficial fatty acids of Iranian native turkey liver. Nine male turkey chicks randomly divided into three experimental treatments (Three levels of canola oil; 0, 2.5 and 5 percent) with three replicates were arranged in a completely randomized design. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. adrenic acid, docosapentaenoic acid and -linolenic acid significantly affect canola oil and this status show that canola oil could improved liver fatty acids profile.

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Keywords: Canola oil, Iranian native turkey, n-3 fatty acids, liver

1. Introduction

Essential fatty acids such as omega-3 fatty acids are molecules that cannot be synthesized by the human body but are vital for normal metabolism. Deposition of EPA and DHA in animal products such as meat and eggs provides a valuable source in the human diet. Feeding the long chain n-3 fatty acids EPA and DHA leads to their deposition in intramuscular fat and in eggs, particularly as phospholipids. There is some production by the animal of EPA and DHA from 18 carbon n-3 fatty acids (linolenic synthesis) which occurs in some vegetable oils such as canola seed or oil and linseed(flax). We know chicken meat due to relatively low prices could play an important role in human diets. The poultry has a peculiar capability of incorporating omega -3 fatty acids in the internal fat of meat and other tissues (Saricicek et al., 1997, Crespo and Esteve-Garcia, 2001, Zollitsch et al., 1997 and Osek et al., 2001). Due to increased knowledge of people, consumers have become health conscious and want to consume only healthy foods. Therefore in many countries manufacturers have started producing health-promoting foods. However, animal tissues enriched with n-3 fatty acids could effectively help to human health (Kinsella et al., 1990). Canola oil is marketed as oil very low in saturated fatty acids and high in monounsaturated fatty acids, and one of good source of omega 3 fatty acids (Mehta, 2000^{a,b}), and could directly usage in human foods or indirectly meets from enriched animal tissue such as meat or giblet. Poultry liver prices is low and poor people application that for food cooking. Iranian native turkey keeping in the

north of Azerbaijan village as range breeding, in this experiment deference level of canola oil usage in native turkey's diets and their effects on the liver fatty acids profile were studied.

2. Materials and methods

Nine male native turkey chickens were distributed in a completely randomized design (three level of canola oil 0, 2.5, 5 percent) with three experimental units each (ten chicks/pen). The experimental diets formulated isonitrogenouse and with the isoenergetic, accordance recommendations of the National Research Council (table 1). The birds were given access to water and diets ad-libitum. The composition and calculated nutrient composition of the treatment diet is shown in Table 1. At the end of the growing period the number of two pieces from each pen randomly selected and slaughtered with cutting the neck vessels and experimental samples from each liver tissue samples prepared and sent to the laboratory at temperature -20°C below zero were stored and the composition of fatty acids present in the samples (Table 2) was determined by gas liquid chromatography, according to Folch et al (1957).

Statistical Analysis

The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 8.2.The Duncan mean separation test was used to determine significant differences between mean values.

3. Results

Least square means for EPA and DHA fatty of turkey liver shown in table 2. acids Eicosapentaenoic acid (EPA) or (5, 8, 11, 14, 17eicosapentaenoic acid) not significant experimental treatment numerically decreased compared control group. Docosahexaenoic acid (DHA) or (4, 7, 10, 13, 16, 19-docosahexaenoic acid) contents have a same rate and between different treatment have not significant deferent. C22: 4n-6, adrenic acid or (7,10,13,16-docosatetraenoic acid) Control group with 7.7425 percent and treatment with 2.5 percent canola oil with 8.0057 percent not significant, but experiment with percent canola oil with 9.9028 percent compared other group significantly is higher. C22:5 n-3, docosapentaenoic acid (DPA) or (7,10,13,16,19-docosapentaenoic acid) significantly affected levels of canola oil and from 3.3204 percent in control group respectively reached to 7.2176 and 8.0682 percent for 2,5 and percent of canola oil. C18:3 n-3, -linolenic acid or (9,12,15-

octadecatrienoic acid) in control group is 4.2234 percent ad usage canola oil in experimental treatment significantly increased content this fatty acid and respectively reached to 7.5523 and 7.9896 percent. DPA and DHA are chemically derived from linolenic acid; the conversion of linolenic acid into these products is not very efficient in mammals. The direct addition of these longer chain omega-3 fatty acids to the diet can significantly increase the amounts of EPA, DPA, and DHA in the tissues (Leskanich et al., 1997, Wood and Enser, 1997). Dietary fatty acids to modify tissue fatty acids profile (Azain, 2004). The fatty acid concentrations in meat, adipose and tissues reflect the animal's own metabolic processes as well as the diet it has consumed. Previous work has shown how the type of oil or fat consumed by animals can change the fatty acid concentrations in body tissues proportionately to the concentrations found in the diet (Skelley et al., 1975, Busboom et al., 1991, Romans et al., 1995, and Bee et al., 2002). This result suggests that the animals were able to process and incorporate the PUFAs into body tissues.

Table 2: Least s	square means for EP.	A and DHA fatty	acids of turkey li	ver	
		Canola oil levels			
	control	2.5	5	P value	SEM
C20:5n-3 ¹	2.842 a	2.321 ^a	2.500 a	0.8729	0.7111
C22:6 n-3 ²	3.030 ^a	2.637 ^a	3.425 ^a	0.4450	0.4089
C22: 4n-6 ³	7.7425 ^b	8.0057 ^b	9.0928 ^a	0.0290	0.2756
C22:5 n-3 ⁴	3.3204 ^b	7.2176 ^a	8.0682 a	0.0004	0.4136
C18·3 n-3 ⁵	4.2234 ^b	7.5523 ^a	7.9896 ^a	0.0008	0.3843

1- eicosapentaenoic acid (EPA) or (5,8,11,14,17-eicosapentaenoic acid) 2- docosahexaenoic acid (DHA) or (4,7,10,13,16,19-docosahexaenoic acid) 3- adrenic acid or (7,10,13,16-docosatetraenoic acid) 4- docosapentaenoic acid (DPA) or (7,10,13,16,19-docosapentaenoic acid) 5- -linolenic acid or (9,12,15-octadecatrienoic acid)

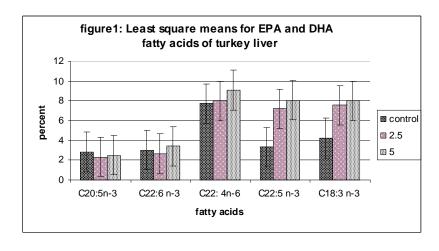


TABLE 1. Percentage composition of experimental diets in four period

	<u> </u>	4 -8 week		3	3 - 12 wee	k	1.	2 - 16 wee	k	1	6 - 20 wee	ek
Ingredients'	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 nutr	ient content	t										
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.

Conclusion

In conclusion, this study has demonstrated that the use of canola oil could significantly increased adrenic acid, docosapentaenoic acid and -linolenic acid content in the liver of native Iranian turkey and improved that quality.

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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

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Physico-chemical properties of tempeh produced from chickpea seeds

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Abstract: Chickpea seeds are rich source of protein (24.63 %), fat (5.62 %), carbohydrates (64.60 %), ash (3.30 %) and fiber (1.85 %). The ant-nutritional factors of raw chickpeas were 7.98, 4.64, 10.96 and 269.38 mg /g dry matter, phytic acid, tannins, trypsin and total phenols, respectively. These seeds are a good source of K (771.77), Ca (156.13), Na (107.34), Mg (152.58), Cu (0.98), Fe (6.85) and Zn (3.83 mg /100 mg). Tempeh was produced from chickpea flour after soaking, blanching (whole seeds), blanching (dehulled) and inoculated with a suspension of *Rizophus oligospours*. The product was evaluated for nutritional quality. Protein in tempeh (28.85 %) was higher than that recorded in raw seeds. However, fat (2.84), ash (2.10) and fiber (1.68 %) were affected due to soaking, blanching and fermentation. Carbohydrates content (64.53 %) was not affected due to the previous treatments. Antinutritional factors of tempeh were reduced by 71.18, 73.22, 89.78 and 67.84 % with phytic acid, tannins, trypsin and phenols, respectively compared with this content in raw chickpeas. Protein solubility, water solubility index and water absorption index. In-vitro protein digestibility, in tempeh was higher compared with raw chickpeas. Determination of color showed that ΔE (color difference) of tempeh was high (18.79). Also, essential amino acids reached to their high values in tempeh..

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Key words: Tempeh – blanching – anti-nutritional factors - chickpeas.

1. Introduction:

A pulse, including chickpea (Cicer arietinum L) is one of the most important crops of the world due to their nutritional quality. They are rich sources of carbohydrates, protein, vitamins and minerals (Costa, et al., 2006 and Gowen, et al., (2007). Chickpea seeds are usually consumed at the raw green tender stage (unripe stage), called Malana, or in the form of mature dry seeds after parching as a popular snack food. (Alajaji and El-Adawy 2006). Chickpeas contain also certained anti-nutritional constituents such as trypsin inhibitors, phytic acid and tannins (Wang et al., 2010).

Some components of pulses or legumes can be fully or partially removed by different processing as soaking and cooking Mubarak, 2005; Ramakrishna et al. 2006 and El- Maki et al. 2007).

Fermentation is the one of the processes that decrease the levels of anti-nutrients in food grains and increase minerals extractability (Badau et al., 2005). Tempeh is a solid-substrate fermentation patty consisting of cooked acidified beans and /or grains. This product has been a protein staple in Indonesia for centuries (Bates, and Schmidt 2002). Tempeh in Indonesia is usually produced by fermenting soybeans (i.e., one of the most important grains of legume family) with Rhizopus oligosporus, but other pulses or solid substrates such as barley kernels (Feng et al. 2005; Feng et al. 2007) and chickpeas (Reyes-Moreno et al. 2000) can be used as well.

Studies on organic characteristics of tempeh (such as protein, lipids, vitamin, phytate, isoflavone, and carbohydrates) have been published elsewhere *Eklund-Jonsson et al. 2006; Azeke et al. 2007; Angulo-Bejarano et al. 2008*). It's easy to make tempeh at home at a very low cost. Dehulled soybeans are soaked overnight, cooked for about 30 min and mixed with tempeh starter. After 36 to 48 hours incubation you have delicious fresh tempeh. Tempeh starter contains spores of *Rhizopus oligosporus or Rgizopus oryzae.*(*Bates* and *Schmidt 2002*).

Furthermore, chickpea has several undesirable attributes, such as long cooking time, protease inhibitors, phytates and phenolic compounds, which must be decreased or eliminated for the effective utilization of this legume (Mila'n-Carrillo, et al., 2000). Solid state fermentation (SSF) represents a technological alternative for processing a great variety of legumes and/or cereals to improve their nutritional quality and to obtain edible products with palatable sensory characteristics. Several other substrates have been used to prepare tempeh, e.g. common beans, chickpeas, rapeseed, lupine, home bean, ground nut, wheat, corn/soybean (Cuevas-Rodri'guez, et al., 2004). The potential of using SSF to improve the nutritional value of cereals and/or legumes has been evaluated (Egounlety, et al., 2002). This procedure requires a relatively simple infrastructure and can produce chemical changes, e.g.

in soluble proteins and soluble carbohydrates; furthermore, it is possible to significantly decrease antinutritional factors, e.g. protease inhibitors, phytic acid, tannin content, and flatulence producing factors (Hachmeister and Fung 1993). The tempeh was obtained from fresh and hardened chickpea. The SSF process caused a significant increase (p < 0.05) in crude protein, true protein (19.6-19.9 to 23.2-23.4%), protein solubility, in vitro digestibility (68.6-73.1% to 79.9-80.5%), available lysine (2.19-3.04 to 3.19-4.07 g lysine/16 N) a significant decrease (p < 0.05) in lipids, minerals, and phytic acid (8.82-10.73 to 2.11 g phytic acid/g dry matter), and tannins (16.1-22.4 to 3 mg catechin / g dry matter (Reyes-Moreno. et al., 2000).

The objective of this investigation was to evaluate physico-chemical and nutritional properties of different processed chickpea seeds (soaking and blanching) and tempeh obtained from subsequent processed chickpea flours fermented by the solid state fermentation (SSF).

2. Materials and Methods:

Materials:

Samples:

Chickpea (*Cicer aritinum*, L.) variety Giza was obtained from the Field Crops Research Institute, Agricultural Research Centre (A.R.C.) Ministry of Agriculture, Giza, Egypt. Chickpea cleaned and stored at 4°C in tightly sealed containers until used.

Chemicals:

The chemicals used in this study (trichloroacetic acid, ammonioum molybdate and sodium phytate, gallic acid, tris (hydroxymethyl) aminomethane, benzoyl-DL-arginine-*p*-nitroaniline (BAPA) dimethyl sulfoxide were purchased from Sigma Chemical Company St. Louis, MO., USA.). Trypsin enzyme which used for in-vitro protein digestibility (IVPD) from bovine pancreas type IIII, 16.500 BAEF Umg ⁻¹, pepsin (P-7000) and Vanillin reagent were purchased from Sigma Chemical Company (St. Louis, MO, USA). Potato dextrose agar (PDA) media was obtained from Oxoid.

Mineral standards:

Standard solution (1000 ppm) of macro elements; potassium (K), calcium (Ca), sodium (Na), and magnesium (Mg) as well as micro elements; copper (Cu), manganese (Mn), iron (Fe) and zinc (Zn) were provided by Merck (Darmstadt, Germany). The standards were prepared from the individual 1000 mg/L. Working standards were prepared from the previous stock solutions.

Mould strain:

The strain *Rizophus oligospours* (NRRL 2710) used for production of tempeh was provided from Microbiological Resource Center (Cairo, MIRCEN), Faculty of Agriculture, Ain Shams University, Egypt.

Methods:

Activation of Rizophus oligospours:

Rizophus oligospours was activated and maintained on PDA medium (APHA, 1992) broth at 25°C for 24 h, then was propagated in PDA at 25°C. The culture was conserved at 4°C. Using separate sterile pipettes, a series of decimal dilutions were prepared (10⁵ to 10¹⁰) from an overnight culture grown in PDA broth. All dilutions were shacked in a vortex and the volum of suspension contained about 10⁹ spores was collected.

Processing methods:

The effect of some physical treatments (i.e. soaking, blanching with whole seed, blanching with dehuled seed and fermentation strains of *R. oligosporous*), individually and in combination for reducing anti-nutritional factors (ANFs) of the tested seeds were studied.

After each step for every particular processing method, the samples were dried at $50\,^{\circ}\text{C}$ for $20\,\text{h}$. in a hot air oven and ground in an electric mill to pass a $60\,$ mesh sieve screen .The powdered samples were stored in plastic containers under cooling until analysis for their anti-nutritional factors.

Physical methods:

Soaking:

Chickpea seeds were soaked in distilled water (1:10, w/v) for 12 hrs, at room temperature (~ 25 °C). The soaked seeds were drained and rinsed three times with 600 ml distilled water.

Dehulling:

Hulls were removed by hand after soaking (*El-Beltagy*, 1996).

Blanching treatments:

Seeds were blanching in distilled water (100°C) in the ratio of 1:10 (w/v) on a hot plate for 30 min.

Production of chickpea tempeh flour:

Tempeh flour was prepared using the procedure described by *Reyes-Moreno et al.* (2004). As observed in Fig. (1) Chickpea seeds were soaked at 25 °C for 16 h in four volumes of a 0.9 M acetic acid solution (pH 3.1). Seeds were then drained and their seed coats removed hand. The cotyledons were then cooked at 90 °C for 30 min, cooled at 25 °C, inoculated with a suspension of R. oligosporus (1 X 10⁹ spores/ l), and packed in perforated polyethylene

bags (15 X 15 cm). Solid state fermentation (SSF) was carried at 30-37 °C for 43-77 h. The resulting chickpea tempeh was dried at 52 °C for 12 h, cooled at room temperature (25°C) and mille. Chickpea tempeh flour was kept at 4°C in tightly sealed containers until used.

Analytical Methods:

Proximate composition:

Protein, fat, crude fiber and ash were determined according to the methods described in the A.O.A.C. (2000). A total carbohydrate was calculated by

difference. All the measurement of analyzed samples were made in triplicate.

Determination of phytic acid:

The phytic acid content in both raw and treated seeds samples was determined according to the method of *Mohamed et al.*, (1986) using chromogenic (solution methanol, concentrated H₂SO₄, concentrated HCL, elemental mercury and ammonium molybdate). The amount of phytic acid content was expressed as mg/g sample (dry weight basis).

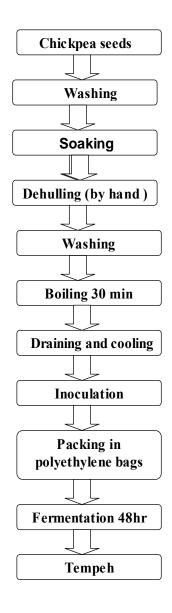


Fig. 1. Flow-sheet of Tempeh production.

Determination of tannins:

Tannins were assayed in accordance with the modified vanillin-HCL method of *Price et al.*, (1978) and catechin was used as the reference standard.

Determination of trypsin inhibitor:

Trypsin inhibitor activity (TIA) was measured by the method described by *Hamerstrand et al.* (1981).

Determination of total phenolics:

Total phenolics compounds were estimated according to the method described by *Meda et al.* (2005).

In vitro protein digestibility procedure (IVPD):

In vitro digestibility of protein was determined by successive pepsin trypsin enzyme system according to method of *Chavan et al.*, (2001) with minor modification.

pH values:

The pH of flour samples was recorded using a pH meter. Each flour sample (10 g) was suspended in 100 ml of boiling distilled water. After cooling, the slurry was shaken (1500 rpm, 25 °C, 20 min) using an orbital shake (HANNA instruments Hi 9021 Microprocessor pH Meter according to AACC (1995).

Bulk density:

Bulk density determined according to the method of *Berrios*, (2007). The flour samples were gently filled into 10 ml graduated cylinders, previously tarred. The bottom of the cylinder was gently tapped on a laboratory bench several times until there was no further diminution of the sample level after filling to the 10 ml mark. Bulk density was calculated as weight of sample per unit volume of sample (g/ml). Measurements were made in triplicate.

Bulk density $(g/ml) = \frac{\text{Weight of sample } (g)}{\text{Volume of sample } (ml)}$

Color:

Color was measured by using a spectro-colorimeter (tristimulus color machine with CIE lab color scale) (Hunter, Lab Scan X E, 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*= - 0.86, b*= - 0.16). Color difference (Δ E) was calculated from a, b, and L parameters, using Hunter-Scot field's equation (*Hunter. 1975*).

$$\Delta E = (\Delta a^2 + \Delta b^2 + \Delta L^2)^{\frac{1}{2}}$$

Where: $a=a-a_{\circ}$, $b=b-b_{\circ}$ and $L=L-L_{\circ}$. Subscript *o* indicates color of control Hue angle

(t $_{g}$ ⁻¹ b/a) and saturation index ($_{a^2+b^2}$) were also calculated.

Minerals determination:

Mineral contents, ie. Copper (Cu), magnesium (Mg), manganese (Mn), iron (Fe) and zinc (Zn) were determined according to the method of *A.O.A.C.* (2000) using Atomic Absorption Spectrophotometer, Perkin-Elmer 2380. The flame photometer was applied for calcium (Ca), potassium (K) and sodium (Na) determination according to the method described by *Pearson* (1976).

Amino acids determination:

After hydrolysis of chickpea flour with 6 N HCL at 110 °C for 24 hrs, the HPLC apparatus (Waters Assoc, USA) was used for identifying the amino acid of the tested samples according to *Millipore Cooperative* (1987) modified PICO-TAG method. Amino acid score was calculated according to *FAO /WHO* (1985) as follows:

Amino acid score (%) = mg of *EAA in 1 g of test protein X 100 mg of EAA in 1 g of **reference protein * Essential amino acids ** EAA (1985) FAO/WHO

Water absorption index (WAI) and water solubility index (WSI):

Water absorption index (WAI) and water solubility Index (WSI) of chickpea flours were determined by slightly modifying the method of *Anderson*, *et al.*, (1969). WAI and WSI were calculated by the equations:

WAI = Weight of sediment
Weight of dry solids

WSI % = Weight of dissolved solids in supernatant X 100 Weight of dry solids

Statistical analysis:

The results were statistically analyzed by analysis of variance and least significant difference (L.S.D.) at 0.05 levels according to the method described by *Snedecor and Cochran (1980)*.

3. Results and Discussion

Chemical composition of chickpea seeds and their tempeh:

Chemical composition of raw chickpeas indicate that these seeds are a good source of protein, fat, ash, fiber and total carbohydrates (Table1). These results coincide with those reported by *costa et al.*, (2006). On the other hand, chemical composition of

raw chickpea seeds were slightly or highly affected by different processing, i.e. soaking in water and blanching as well as the final tempeh product producing from the seeds.

Table (1): Chemical composition of chickpea seeds (dry weight basis) and tempeh as affected by different processing methods.

	, memous.		Trea	tment		
Components %	Raw seeds	Soaking seeds	Blanching (whole seeds)	Blanching (dehulled) seeds	Tempeh products	LSD at (5%)
Protein	24.63 ^b	24.86 ^b	24.12 ^b	24.37 b	28.85 ^a	3.04
	± 2.0	±1.0	±1.0	±2.0	±2.0	
Fat	5.62 ^a	5.71 ^a	4.93 ^a	5.17 ^a	2.84 ^b	1.15
	±0.02	±0.02	±0.02	±0.02	± 0.02	
Ash	3.30^{a}	2.98 ^d	3.22 b	3.11 ^c	2.10 ^e	0.02
	±0.02	±0.02	±0.02	±0.02	± 0.02	
Fiber	1.85 ^d	1.94 ^c	2.67 a	2.59 ^b	1.68 ^e	0.02
	±0.02	±0.03	±0.02	±0.02	± 0.03	
*Total	64.60 ^b	64.51 ^b	65.06 ^a	64.76 ^b	64.53 ^b	4.62
Carbohydrates	±2.0	±3.0	±3.0	±3.0	±2.0	

^{*}Calculated by difference.

- -All values are means of triplicate determinations \pm standard deviation (SD)
- Means within row with different letters are significantly difference (P < 0.05)

Protein content in raw chickpea seeds was slightly affected during soaking or blanching, but the reduction observed was not significant (P < 0.05). In contrast, protein value increased significantly (P < 0.05) in tempeh product by 17.13 % compared with the raw chickpea seeds. The reduction of protein content during the processing may be due to solid substrate fermentation (SSF) and due to both dehulling and leaching of solid material which may reflect an increase in mould biomass (*Paredes-Lopez et al.*, 1991; Sparringa and Owens, 1999). Our results are agreement with those reported by Alajaji and El-Adawy (2006) and Daur et al., (2008).

Regarding to fat content, similar pattern as protein was observed with the soaking and blanching. However, significant decreases (P < 0.05) was detected in tempeh product; the reduction of fat was 49.47 % compared with the fat content in raw chickpeas seeds. The great reduction in fat content due to solid substrate fermentation (SSF) and the oxidation as well as utilization of fatty acids by the fungus as a source of energy (*Ruiz-Teran* and *Owens* 1996).

Ash content in raw chickpea seeds was reduced significantly (P < 0.05) with the different treatments (soaking and blanching) and tempeh product (Table 1). These reductions were 9.70, 2.42, 5.76 and 36.36 % with soaking, whole seed blanching, dehulled blanching and tempeh, respectively. Data proved that, the highest reduction of ash was recorded with tempeh product. While the lowest reduction was detected with whole seed blanching. Data also proved that fiber content in soaking and blanching chickpea seeds increased significantly (P < 0.05) by 4.86,

44.32, and 40.00 % with soaking, whole seeds blanching and dehulled blanching, respectively. However, this value decreased significantly (P < 0.05) by 10.81 %. These results indicate the highest fiber content with the blanching. Increases of fiber content could be due to protein-fiber complexes formed after possible chemical modification induced by the soaking and cooking of dry seed (*Bressani*, 1993). Similar results were noticed by *El-Adawy* (2002) and *Alajaji* and *El-Adawy* (2006).

Soaking and dehulled blanching led to slightly decrease and increase, respectively on the content of total carbohydrates. However, this affect was not significant. Regarding to whole seed blanching, total carbohydrates were slightly increased significantly (P < 0.05) by 0.71 %. On the other hand, total carbohydrates in tempeh product not affected significantly (P < 0.05). These results are agreement with those reported by *Reyes-Moreno et al.*, (2000) and *Egounlety* and *Aworh* (2003).

These results proved that during tempeh production, soaking and blanching slightly decreased the chemical composition of raw seeds except carbohydrates. However, this reduction was the highest due to the fermentation process.

Effect of different processing on anti-nutritional factors of chickpea and tempeh:

Data in Table (2) indicate the content of antinutritional factors (phytic acid, tannins, trypsin inhibitor and total phenols) and their affected by different processing (soaking, blanching and tempeh production). Results proved that these factors decreased significantly (P < 0.05) due to the different

processing. The lowest reduction of the factors were 3.63 % (phytic acid), 16.85 % (tannins), 21.07 % (trypsin) and 19.21 % (total phenols) due to the soaking in water. These reduction increased by blanching, which recorded 32.10, 41.68, 74.45 & 27.71 %, (whole seeds) respectively and 41.10, 50.11,

78.92 & 36.34 % (dehulled), respectively. However, the highest reduction of these factors was detected in tempeh product, which recorded 71.18, 73.22, 89.78 and 67.84 % with phytic acid, tannins, trypsin and total phenols, respectively.

Table (2): Effect of different processing on anti-nutritional factors of raw chickpea seeds to produced tempeh.

Treatment	Phytic acid (mg/g dry matter)	*R%	Tannins (mg catechin/g dry matter)	*R%	Trypsin inhibitor (TI/mg/g sample)	*R%	Total phenols (mg/100g sample	*R%
Raw seeds	7.98 ^a		4.63 ^a		10.96 ^a		269.38 ^a	
	±1.0		±0.03		±1.0		±3.0	
Soaking seeds	7.69 ^a ±1.0	3.63	3.85 b ±0.03	16.85	8.65 b ±0.02	21.07	217.64 b ±4.0	19.21
Blanching	5.42 ^b	32.10	2.70 °	41.68	2.80 °	74.45	194.73 ^c	27.71
(whole seeds)	±0.02	32.10	±0.03	41.08	±0.02	74.43	±3.0	27.71
Blanching (dehulled seeds)	$4.70^{b} \pm 0.02$	41.10	2.31 ^d ±0.03	50.11	2.31 ° ±0.02	78.92	171.50 ^d ±3.0	36.34
Tempeh	2.30 ° ±0.02	71.18	1.24 e ±0.03	73.22	1.12 ^d ±0.03	89.78	86.64 e ±3.0	67.84
LSD at (5%)	1.41		1.31		0.81		8.98	

- *Reduction
- -All values are means of triplicate determinations \pm standard deviation (SD)
- Means within column with different letters are significantly difference (P < 0.05)

The reduction of anti-nutritional factors may be due to leaching out of these compounds into soaking water (Abd El-Hady and Habiba 2003 and Ramakrishna et al., 2006). Also, phytase activity may be partially responsible for reducing the phytic acid level in fermented product (Sharma and Khetarpaul, 1997). The relationship between decreases in phytic acid content and increases in fermentation time could be explained by phytase enzyme synthesis by Rhizopus, which hydrolysis phytic acid (Reyes-Moreno et al., 2004). The decrease of poly phenols indicates the ability of micro flora to ferment phenolics (Elyas et al., 2002). Similar findings were noticed by Khandelwal et al., (2010).

Nitrogen protein solubility and in-vitro protein digestibility (IVPD) values in raw, processed chickpea seeds and tempeh:

Data presented in Table (3) demonstrate that raw chickpea seeds were rich in total nitrogen (3.94 %) and non-protein nitrogen (0.49 %). Beside, nitrogen protein solubility in both water and (0.5 N) NaCl was high which recorded 79.20 and 50.46 %, respectively. Also, results proved that in-vitro protein digestibility of raw chickpea seeds was high (66.19 %). The effect of different processing (soaking, blanching and tempeh production) on these values were slight or insignificant.

Regarding to protein and total nitrogen, data proved that their contents not affected significantly (P < 0.05) due to soaking or blanching. On the other hand, non-protein nitrogen content not affected significantly (P < 0.05) by soaking, but data showed that significantly decreased (P < 0.05) was observed in both whole seed and dehulled blanching, and the reduction was 20.41 and 24.49 %, respectively compared with raw chickpeas. In addition protein solubility in both water or (0.5 N) NaCl solution was affected significantly (P < 0.05) due to soaking and blanching. Protein solubility in water decreased by 5.11, 10.93 and 6.84 % with soaking, whole seed blanching and dehulled blanching, respectively. This reduction increased to 9.14, 20.02 and 15.48 %, in this order with (0.5 N) NaCl. These results indicate that protein solubility in (0.5 N) NaCl was lower than in water. Data also reveled that in-vitro protein digestibility increased significantly (P < 0.05) due to the different processing. The relative increase were 17.10, 11.77 and 13.57 % with the treatments of soaking, whole seed blanching and dehulled blanching, respectively. In tempeh flour, data showed that different processing caused significantly increased (P < 0.05) in protein (17.13 %), total nitrogen (17.26 %), non-protein nitrogen (14.29 %) and in-vitro protein digestibility (24.70 %). In contrast significantly decreased recorded in protein solubility in both water (29.68 %) and (0.5 N) NaCl (21.28 %).

Table (3): Nitrogen protein solubility and In-vitro protein digestibility (IVPD) values in raw, processed

chickpea seeds and tempeh.

_	Protein	Total	Non-protein	Protein solubil	ity %	In-vitro protein
Treatment	%	nitrogen	nitrogen	In water	In (0.5N)	digestibility
	70	%	%		Nacl	(IVPD) %
	24.63 ^b	3.94 ^b	0.49 ^b	79.20 a	50.46 a	66.19°
Raw seeds	±1.53	±0.02	±0.02	±3.0	±3.0	±3.0
Soaking	24.86 b	3.98 b	0.43 ^b	75.61 ^{a b}	45.85 ^b	77.51 ^b
Seeds	±1.0	±0.02	±0.02	±2.0	±2.0	±2.0
Blanching	24.12 b	3.86 b	0.39 °	70.54 ^c	40.36 °	73.98 ^{c d}
(whole seeds)	±1.0	±0.02	±0.02	±2.0	±2.0	±2.0
Blanching	24.37 b	3.90 b	0.37 °	73.78 ^b	42.65 ^{b c}	75.17 °
(dehulled seeds)	±2.0	±0.02	±0.02	±3.0	±2.0	±2.0
Townsh	28.85 a	4.62 a	0.56 a	55.69 ^d	39.72 °	82.54 a
Tempeh	±2.0	±0.02	±0.02	±2.0	±3.0	±3.0
LSD at (5%)	3.04	0.6	0.06	3.80	4.46	4.23

⁻All values are means of triplicate determinations \pm standard deviation (SD)

From the results obtained, some traditional cooking methods decreased the values of protein and non-protein nitrogen. This decrease might be attributed to their diffusion into cooking water (Alajaji and El-Adawy, 2006). In protein solubility, all processing methods decreased the rat of solubility in both water and NaCl solution. Similar results obtained by Helmy (2003) who reported that the rate of decreasing ranged from 8.40 to 57.72 % in water and from 16.50 to 50 23 % in NaCl solution. Regarding to in-vitro protein digestibility, data showed increases with all the treatments. These increases could be explained by the elimination of anti-nutritional factors (e. g. hydrolysis of phytic acid during fermentation) and protein denaturation during the cooking step, which results in protein that are more vulnerable to enzyme action (Angulo-Bejarano et al., 2008). Reyes-Moremo et al., (2000) reported that solid state fermentation represents a technological alternative for a great variety of cereals and legumes or combination of them to improve the IVPD of tempeh from chickpea.

Physico-chemical properties of different processed chickpea seeds and tempeh:

Some physico-chemical properties of raw, processed chickpea seeds and tempeh were studied and data presented in Table (4). pH values, bulk density, water absorption and water solubility index in raw chickpea seeds were 6.0, 0.74, 1.90 and 27.94, respectively. Similar results was reported by Kaur and Singh (2005). pH, bulk density and water solubility index values were decreased significantly (P < 0.05) due to soaking, whole seed blanching and dehulled blanching. However, water absorption index increased significantly (P < 0.05) with these treatments. The relative increase of water absorption index were 9.47, 19.47 and 30.53 % and the reduction (%) of water solubility index were 11.92, 30.74 and 40.16 as affected by soaking, whole seeds blanching and dehulled blanching, respectively compared by raw chickpea seeds. Similar pattern was recorded with the tempeh, which pH, bulk density and water solubility index decreased significantly (P < 0.05), while water absorption index increased significantly (P < 0.05).

Table (4): Physico-chemical properties of different processed chickpea seeds and tempeh.

		•	Treatment	•		
Parameters	Raw seeds	Soaking seeds	Blanching (whole seed)	Blanching (dehulled seeds)	Tempeh	LSD at (5%)
pН	6.00 ^a	5.92 b	5.81°	5.75 ^d	5.60 e	0.06
_	±0.02	±0.02	±0.02	±0.02	±0.02	
Dully donaity	0.74 ^a	0.71 ^b	0.69 ^b	0.66 ^c	0.59 ^d	0.03
Bulk density	±0.02	±0.03	±0.02	±0.02	±0.02	
Water absorption	1.90 ^d	2.08 ^{cd}	2.27 °	2.48 b	3.96 ^a	0.21
index (WAI)	±0.02	±0.02	±0.02	±0.02	±0.02	
Water solubility	27.94 ^a	24.61 ^a	19.35 b	16.72 ^b	10.87 ^c	3.88
index (WSI)	±3.0	±2.10	±2.08	±2.0	±1.0	

⁻All values are means of triplicate determinations \pm standard deviation (SD)

⁻ Means within column with different letters are significantly difference (P \leq 0.05

⁻ Means within raw with different letters are significantly difference (P < 0.05)

The relative increase of water absorption index was 108.42 % and the reduction of water solubility index was 61.10 % as compared with raw chickpea seeds. The last results for tempeh seeds were due to partial protein denaturation and starch gelatinization occurring during the cooking step (Angulo-Bejarano et al., 2008). Our results are agreement with those reported by Milan-Corrillo et al., (2000) and Reyes-Moreno et al., (2004).

Color values of raw, processed chickpea seeds and tempeh:

Hunter color values of raw and different processed chickpea flour as well as tempeh from its were

determined and data are presented in Table (5). Data proved that lightness values "L" of raw chickpea slightly increased due to the different treatments. The relative increase was 1.85, 4.45 and 5.25 % due to soaking, blanching (whole seeds) and blanched (dehulled), respectively. These results are agreement with those reported by *Reyes-Moreno et al.*, (2004) and *Kaur* and *Singh* (2005). Increasing of "L" value meaning a lighter color, but fermentation results in a slightly darker color due to the influence of mycelia color and the drying stamp (*Angulo-Bejarano et al.*, 2008)

Table (5): Hunter color values of different processed chickpea seeds and tempeh.

Treatment	L	a	b	a / b	Saturation	Hue	ΔE*
Raw seeds	82.22	2.75	19.69	0.14	19.88	82.05	
Soaking seeds	83.74	2.68	18.63	0.14	18.82	81.81	1.85
Blanching (whole seeds)	85.88	3.16	27.72	0.11	27.90	83.50	8.83
Blanching (dehulled seeds)	86.54	2.76	28.09	0.10	28.23	84.39	9.45
Tempeh	68.91	7.12	30.47	0.23	31.29	76.85	18.79

^{*}Color difference

Data in the same table indicate that redness "a" value was slightly decreased with soaking and slightly increased due to blanching. On the other hand, values of yellowness "b" were increased due to whole seed blanching and dehulled blanching by 40.78 and 42.66 %, respectively compared with the yellowness "b" value of raw chickpea. However, soaking caused slightly decrease (5.38 %). The same trend was observed in results of saturation and hue values. The color difference (ΔE) of chickpea was very little with soaking (1.85). However, these values were increased to 8.83 and 9.45 due to whole seeds and dehulled blanching, respectively.

Regarding to tempeh, results proved that this product had high values of redness "a" and yellowness "b", but had little lightness "L" compared with raw chickpea. In addition saturation and color difference (ΔE) were high values.

Minerals content of raw, processed chickpea seeds and tempeh:

Data presented in Table (6) shows macro and micro-elements content in raw chickpea seeds and their affected by different processing. Raw chickpeas are a good source of major elements (K, Ca, Na, & Mg) and lower or moderate source of micro-elements (Cu, Fe & Zn). These elements were reduced due to the different processing.

Table (6): Minerals content of raw, processed chickpea seeds and tempeh.

Elements (mg / 100g)	Treatment								
Elements (mg/ 100g)	Raw seeds	Soaking seeds	Blanching (whole seeds)	Blanching (dehulled seeds)	Tempeh				
Macro-elements: Potassium (K)	771.77	541.74	337.29	298.27	199.40				
Calcium (Ca)	156.13	137.29	121.96	109.20	76.52				
Sodium (Na)	107.34	104.83	102.35	100.40	69.85				
Magnesium (Mg)	152.58	149.70	147.47	145.31	102.10				
Micro-elements: Copper (Cu)	0.98	0.82	0.71	0.64	0.47				
Iron (Fe)	6.85	6.73	6.34	5.96	4.13				
Zinc (Zn)	3.83	3.51	3.39	2.97	2.09				

The lowest reduction of minerals was detected due to soaking. These reduction were 29.81, 12.07, 2.34, 1.89, 16.33, 1.75 and 8.36 % with K, Ca, Na, Mg, Cu, Fe and Zn, respectively. On the other hand, the reduction of minerals increased with whole seed blanching by 56.30, 21.89, 4.65, 3.39, 27.55, 7.45 & 11.49 % and dehulled blanching by 61.35, 30.06, 6.47, 4.77, 34.69, 12.99 & 22.45 %, with K, Ca, Na, Mg, Cu, Fe & Zn, respectively. These reduction in minerals content might be attributed to the leaching of such minerals into soaking and blanching water (*Helmy*, 2003). Similar results for beans and chickpeas were reported by *Wang et al.*, (2008 and 2010).

Minerals content was also reduced due to tempeh producing. The reduction (%) of K, Ca, Na, Mg, Cu, Fe and Zn were 74.16, 51.0, 34.93, 33.08, 52.04, 39.71 and 45,43, in this order. These reduction was higher than the reduction due to processing or soaking. Although, these reduction of minerals was high, the product of tempeh consider a suitable source of the minerals

Essential amino acids (EAA) profile of raw, processed chickpea seeds and tempeh:

Essential amino acids (EAA) content of raw, processed chickpea flours (soaking and blanching) and tempeh are shown in Table (7). Data indicate that raw chickpea contained different types EAA, i.e. leucine, isolucine, lysine, methioine, phenyl alanine, therionine, valine, cystine and tyrosine at values ranged between 1.36 to 7.50 g/ 100g protein. The total of EAA was 39.89 g/ 100 g protein. These values proved that raw chickpea are a good source of these EAA.

Regarding to EAA in chickpea, data show that slightly decrease or increase and sometimes not affected due to the different processing (soaking and blanching) and tempeh production. Total EAA slightly increased in chickpea seeds (1.05 %) due to soaking and tempeh (5.54 %) production. However, whole

seeds and dehulled blanching decreased EAA by 2.16 and 1.63 %, respectively. Similar results reported by *Alajaji* and *El-Adawy*, (2006) and *Bejarano et al.*, (2008).

Amino acid scores of raw, processed chickpea seeds and tempeh:

Leucine was increased in tempeh and it is clear from these results that tempeh content covered the daily recommended requirements of FAO/WHO for all essential-amino acids compared to raw, soaking, blanching (whole seed) and blanching (dehulled) where the later covered daily requirements of some essential-amino acids and not covered other some essential-amino acids especially Methionine + Cystine and threionine.

The EAA scores of proteins from raw, different processed chickpea seeds and tempeh were evaluated and data collected in Table (8). Comparing these scores with the suggested Ref. pattern of FAO / WHO (1985). From the results data proved that leucine, isolucine, lysine, (phenyl alanine + tyrosine) and valine were slightly or not affected due to the different treatment, so their limits covered the recommended requirements of FAO/WHO (1985). However, (methionine + cystine) and therionine were affected due to the different processing, but their limits were near to the requirements of FAO /WHO. (Methionine + cystine), therionine and leucine were found to be the first, second and third limiting amino acids in the raw and different processed chickpea seeds respectively. Tempeh flour had (methionine + cystine), lysine and therionine as the first, second and third limiting amino acids respectively. These results are agreement with those reported by Alajaji and El-Adawy, (2006) and Angulo- Bejarano et al., (2008). They reported that, (methionine + cystine) was the first limiting amino acid in raw and different processed chickpea flours (boiling, autoclaving and microwave cooking).

Table (7): Essential-amino acids (EAA) profile of raw, processed chickpea Seeds and tempeh

Essential-amino acids	Treatment						
(EAA) (g / 100g protein)	Raw seeds	Soaking seeds	Blanching (whole seeds)	Blanching (dehulled seeds)	Tempeh		
Leucine	7.59	7.66	7.43	7.48	7.74		
Isolucine	4.76	4.80	4.66	4.69	5.18		
Lysine	6.00	6.07	5.87	5.94	5.63		
Methionine	1.54	1.58	1.50	1.49	1.62		
Phenyl alanine	5.57	5.62	5.45	5.51	6.20		
Therionine	3.89	3.92	3.80	3.82	4.24		
Valine	5.60	5.65	5.48	5.54	5.79		
Cystine	1.36	1.39	1.33	1.30	1.55		
Tyrosine	3.58	3.62	3.51	3.47	4.15		
Total essential-amino acids	39.89	40.31	39.03	39.24	42.10		

Amino acids			Treatmen	nt			Amino acids scores				
Essential- amino acids (EAA) (g / 100g protein)	Raw seeds	Soaking seeds	Blanching (whole seeds)	Blanching (dehulled seeds)	Tempeh	Ref. pattern (FAO/WHO 1985)	Raw seeds	Soaking seeds	Blanching (whole seeds)	Blanching (dehulled seeds)	Tempeh
Leucine	7.59	7.66	7.43	7.48	7.74	7.00	108.43	109.43	106.14	106.86	110.57
Isolucine	4.76	4.80	4.66	4.69	5.18	4.00	119.00	120.00	116.50	117.25	129.50
Lysine	6.00	6.07	5.87	5.94	5.63	5.50	109.09	110.36	106.73	108.00	102.36
Methionine +Cystine	2.90	2.97	2.83	2.79	3.17	3.50	82.86	84.86	80.86	79.71	90.57
Phenyl alanine +Tyrosine	9.15	9.24	8.96	8.98	10.35	6.80	134.56	135.88	131.76	132.06	152.21
Therionine	3.89	3.92	3.80	3.82	4.24	4.00	97.25	98.00	95.00	95.50	106.00
Valine	5.60	5.65	5.48	5.54	5.79	5.00	112.00	113.00	109.60	110.80	115.80

Table (8): Amino acids scores of raw, processed chickpea seeds and tempeh.

CONCLUSION:

It could be concluded that chickpeas are rich source of protein, fat, carbohydrates and minerals. Besides, they are contained anti-nutritional factors, i. e. phytic acid, tannins, trypsin inhibitor and phenols. These components partially affected by soaking, blanching and fermentation to produce tempeh product. However, the final products still a good source of the chemical composition, minerals and essential amino acids (EAA). In most cases, EAA limits covered the recommended requirements of FAO / WHO.

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Effect of Zataria Multiflora Extract on Degradability Kinetics, of Sunflower Meal

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Abstract: The aim of the present study was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora water extract* (ZMWE) on sunflower meal (SM) degradability were studied by *in vitro* gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for dry matter, crude protein, and Non-Fibrous Carbohydrate 95.88, 30, and 12.73 percent, respectively. The results showed that gas volume at 24 h incubation (for 200 mg dry samples), were 42.40, 41.41 and 40.52 ml/200 mg DM for SM, levels 0.15 ZMWE and 0.3 ZMWE, respectively. the gas production from soluble fraction (a), the gas production from insoluble fraction (b), rate constant of gas production during incubation (c) and the potential gas production (a + b) contents of SM were 3.607 (ml/200 mg DM), 49.32 (ml/200 mg DM), 0.135 (ml/h) and 52.92 (ml/200 mg DM), while for level 0.3 ZMWE were 4.655 (ml/200mg DM), 48.66 (ml/200 mg DM), 0.134 (ml/h) and 53.321 (ml/200mg DM).

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Keywords: Non-Fibrous Carbohydrate; *zataria multiflora*; sunflower meal; gas production technique; crude protein; Taleshi native male cattle

Abbreviations: ZMWE, Zataria multiflora water extract; SM, sunflower meal; CP, crude protein; NFC, non-fibrous carbohydrate; ZM, Zataria multiflora; (a), the gas production from soluble fraction (ml/200 mg DM); b, the gas production from insoluble fraction (ml/200 mg DM); c, rate constant of gas production during incubation (ml/h); a + b, the potential gas production (ml/200 mg DM).

1. Introduction

Global warming due to increases in the atmospheric concentrations of greenhouse gases such as carbon dioxide and methane is an important issue. Generation of methane from livestock, particularly from ruminants, represents 2 to 12% of gross energy intake (Johnson and Johnson, 1995).

A growing concern about global climate change has increased attention on ways to abate ruminal methanogenesis. Therefore, current interest is focused on use of safe natural products, vs. chemical compounds, to beneficially manipulate ruminal fermentation. Antimicrobial compounds are routinely incorporated into ruminant diets to improve feed efficiency, suppress methanogenesis and reduce excretion of N in urine and feces. In recent years, there has been increased concern regarding use of in feed antibiotics in ruminants due to the progressive increase of antibiotic resistance among pathogenic microorganisms (Carro et al., 2003).

Ruminants establish a symbiotic relationship with rumen microorganisms by which the animal provides nutrients and optimal environmental conditions for the fermentation of feeds, and microorganisms degrade fiber and synthesize microbial protein as an energy and protein supply for the animal, respectively. However, this symbiotic relationship has energy losses of methane and protein (losses of ammonia N) inefficiencies (Van Nevel and Demeyer, 1988).

These losses not only reduce production performance, but also contribute to the release of pollutants to the environment (Tamminga, 1996).

in vivo, in situ and in vitro methods have been used to evaluate the nutritive value of feedstuffs. The in vitro gas production technique has proven to be (a) potentially useful technique to evaluate the nutritive value of feedstuffs, since it gives an estimate of the potential rate and extent of nutrient fermentation in the rumen. However, this technique is measuring gas produced by the fermentation of energy containing components in feeds, and not only that of protein (Mirzaei-Aghsaghali et al., 2008a, 2008b); (Maheri-Sis et al., 2007, 2008); (kiyani et al., 2010).

The objective of this study was to evaluate the potential of natural plant extracts as fermentation pattern in vitro gas production characteristics, by in vitro gas production technique.

2. Material and Methods

2.1. zataria multiflora Samples:

During summer season ZM samples were collected from different parts of Esfahan province. Next, there were drying for one week, and homogeneous mixture were papered for nutritive chemical analyzes. For determination of (zataria multiflora) effects, we added zataria multiflora extract with two level (0.15 and 0.3 mL: 200 mg sample) into gas test syringes. All samples were then ground in a laboratory mill through a 1 mm screen.

2.2. Chemical Analysis

Dry matter (DM) was determined by drying the samples at 105 °C overnight and ash by igniting the samples in muffle furnace at 525 °C for 8h and Nitrogen (N) content was measured by the Kjeldahl method (AOAC, 1990). Crude protein (CP) was calculated as N \times 6.25 (Van Soest et al. 1991). Non-Fibrous Carbohydrate (NFC) is calculated using the equation of (NRC, 2001), NFC = 100 - (NDF + CP + EE + Ash).

All chemical analyses were carried out in triplicate.

2.3. Procedure of plant extracts preparation

The plant extracts were prepared according to (Patra et al., 2006) with some modifications. The plant materials were dried at 50°C and ground in mills to pass a 1 mm sieve and 100 g placed in 1000 ml of distilled water solvent. The flasks of all the solvents were stoppered and agitated with a magnetic stirrer for 24 h at room temperature. Then the solutions were centrifuged at 3000 g for 10 min. The residue was re-extracted with 500 ml of distilled water for 24 h stirring at room temperature and centrifuged again at 3000 g for 10 min. The plant extracts were combined. distilled water was evaporated from the solution at approximately 85°C by using a rotary-evaporator.

2.4 Treatments and experimental design

The different levels of ZMWE were added to the diet sample. Three levels (0, 0.15 and 0.3 ml/30 ml buffered rumen fluid) of ZMWE were investigated as follow: (i) no additive; (ii) ZMWE0.15 and (iii) ZMWE0.3.

2.5. In vitro gas production

Fermentation of sunflower meal samples were carried out with rumen fluid was obtained from three fistulated Taleshi native male 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, 1988, 1979) as follows. 200 mg dry weight of the sample was weighed in triplicate into calibrated glass syringes of 100 ml in the absence and presence of level 0.15 and 0.3ml (ZMWE).

The 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. The 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 was recorded before incubation 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours after incubation. All samples were incubated in triplicate with three syringes containing only rumen fluid-buffer mixture (blank). The net gas productions for sunflower meal samples were determined by subtracting the volume of gas produced in the blanks. Cumulative gas production data were fitted to the model of (Ørskov and McDonald 1979).

 $P = a + b \left(1 - e^{-ct} \right)$

Where P is the gas production at time t, a gas production from soluble fraction (ml/200 mg DM), b the gas production from insoluble fraction (ml/200 mg DM), c the gas production rate constant (ml/h), a+b the potential gas production (ml/200 mg DM) and t is the incubation time (h).

2.6. Statistical Analysis

Data on apparent gas production parameters were subjected to one-way analysis of variance using the analysis of variation model ANOVA of SAS (2000). Multiple comparison tests used Duncan's multiple-range test (1980).

Significance between individual means was identified using the Duncan's multiple range tests. Mean differences were considered significant at (P<0.05). Standard errors of means were calculated from the residual mean square in the analysis of variance. All data obtained from three replicates n=3.

3. Results

3.1. Chemical composition

The chemical composition of sunflower meal shown in Table 1.

The chemical composition of sunflower meal shown in Table 1. Chemical composition including dry matter) DM, crude protein (CP), and Non-Fibrous Carbohydrate (NFC) were estimated; 95.88, 30, and 12.73 percent, respectively.

Gas production parameters (a, b, c) and calculated amounts of SM, levels 0.15 and 0.3 ZMWE are presented in Table 2.

Table 1 Chemical composition of sunflower meal (%).

enemiear composition of samiower	111cui (70).
dry matter (DM)	95.88
crude protein (CP)	30
non-fiber carbohydrate (NFC)	12.73

3.2. In vitro gas production

Gas production volumes (ml/200mg DM) (at differents incubation times shown in Figure 1.

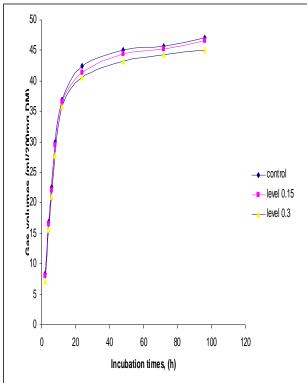


Fig. 1. In vitro gas production volume of sunflower meal at different incubation time.

Gas volume at 24 h incubation (for 200 mg dry samples), soluble fraction (a), insoluble but fermentable fraction (b), potential gas production (a + b) and rate constant of gas production (c) of SM were 42.40, 3.607, 49.32, 52.92 ml/200 mg DM and 0.135 ml/h, for ZMWE_{0.3} 41.41, 3.921, 49.08, 53.004 and 0.135 while for ZMWE_{0.3} were 40.52, 4.655, 48.66, 53.321 ml/200mg DM and 0.134 ml/h, respectively.

Gas volume at 48 h incubation (for 200 mg dry samples), of SM, ZMWE $_{0.15}$ and ZMWE $_{0.3}$ were 44.99, 44.49 and 43.27 (ml/200 mg DM), respectively. Gas volume at 72 h incubation (for 200 mg dry samples), of SM, ZMWE $_{0.15}$ and ZMWE $_{0.3}$ were 45.75, 45.23 and 44.25 respectively.

Table 2. *In vitro* gas production volume (ml/200mg DM) and estimated parameters of sunflower meal at different incubation times.

		tretm	ent
Time (h)			
	i	ii	iii
2	8.34	97.95	7.17
4	16.86	16.57	15.51
6	22.54	22.04	21.01
8	29.88	29.49	27.84
12	36.89	36.62	35.85
24	42.40	41.41	40.52
48	44.99	44.49	43.27
72	45.75	45.23	44.25
96	47	46.65	45.10
Estimated param	neters		
a (ml)	3.607	3.921	4.655
b (ml)	49.32	49.08	48.66
(a+b) (ml)	52.92	53.004	53.321
c (ml/h)	0.135	0.135	0.134

(i): no additive, (ii): $ZMWE_{0.15}$, (iii): $ZMWE_{0.3}$, a: the gas production from soluble fraction (ml/200 mg DM), b: the gas production from insoluble fraction (ml/200 mg DM), c: rate constant of gas production during incubation (ml/h), (a + b): the potential gas production (ml/200 mg DM).

4. Discussions

This study suggested that the ZMWE0.3 have the potential to affect ruminal fermentation efficiency, and be a promising methane mitigating agent.

Newbold et al. (2006) and Calsamiglia et al. (2007) described essential oils (EO) as follows: volatile aromatic compounds with an oily appearance extracted from plant materials typically by steam distillation; alcohol, ester or aldehyde derivatives of phenylproponoids and terpenoids; some of the more common EO compounds available include thymol (thyme and oregano), eugenol (clove), pinene (Juniper), limonene (dill), cinnamaldehyde (cinnamon), capsaicin (hot peppers), terpinene (tea tree), allicin (garlic), anethol (anise), etc.; antimicrobial activity; modify rumen microbial fermentation.

(Patra et al., 2006) reported that extracts of plants in methanol and water had more soluble sugars than with ethanol. The cumulative volume of gas production increased with increasing time of incubation. Although there are other models available to describe the kinetics of gas production, the Ørskov and McDonald (1979) was chosen because the relationship of its parameters with intake, digestibility and degradation characteristic of forages and concentrate feedstuffs had been documented.

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The study canola meal degradability with Zataria Multiflora Extract Using in Vitro Gas Production Technique

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora water extract* (ZMWE) on canola meal (CM) degradability were studied by in vitro gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for dry matter, crude protein, were and Non-Fibrous Carbohydrate 93.7, 35, and 21.46 percent, respectively. The results showed that gas volume at 24 h incubation (for 200 mg dry samples), were 47.32, 47.30 and 47.12 ml/200 mg DM for CM, levels 0.15 ZMWE and 0.3 ZMWE, respectively. the gas production from soluble fraction (a), the gas production from insoluble fraction (b), rate constant of gas production during incubation (c) and the potential gas production (a + b) contents of CM were 2.15 (ml/200 mg DM), 54.96 (ml/200 mg DM), 0.113 (ml/h) and 57.12 (ml/200 mg DM), while for level 0.3 ZMWE were 1.73 (ml/200 mg DM), 54.64 (ml/200 mg DM), 0.112 (ml/h) and 56.37 (ml/200 mg DM).

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Keywords: crude protein; *Zataria multiflora*; canola meal; gas production technique; dry matter; water extract; rumen liquid

Abbreviations: ZMWE, *Zataria multiflora water extract*; CM, canola meal; CP, crude protein; NFC, non-fibrous carbohydrate, DM, dry matter; ZM, *Zataria multiflora*; a, the gas production from soluble fraction (ml/200 mg 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/200 mg DM).

1. Introduction

Ruminants establish a symbiotic relationship with rumen microorganisms by which the animal provides nutrients and optimal environmental conditions for the fermentation of feeds, and microorganisms degrade fiber and synthesize microbial protein as an energy and protein supply for the animal, respectively. However, this symbiotic relationship has energy losses of methane and protein losses of ammonia (N) inefficiencies (Van Nevel and Demeyer, 1988).

These losses not only reduce production performance, but also contribute to the release of pollutants to the environment (Tamminga, 1996). Ruminant nutritionists have long been interested in modulating the competition among different microbial populations with the objective of improving the efficiency of energy and protein utilization in the rumen. This has been achieved through the optimization of diet formulations and the utilization of feed additives that modify the environment and enhance or inhibit specific microbial populations (Calsamiglia et al., 2006). Antibiotic ionophores have been very successful in

reducing these energy and protein losses in the rumen (Van Nevel and Demeyer, 1988).

The public concern over the routine use of antibiotics and growth promoters in livestock production has increased recently because of the risk of the antibiotic residues presence in milk and meat and its effect on human health. These led to its prohibition in the European Union in 2006 in animal feeding. Accordingly, there is greater interest in using plants and plant extracts as alternatives to feed antibiotics to manipulate ruminal fermentation, improve feed efficiency and animal productivity. Many plants produce secondary metabolites such as phenolic compounds, essential oils, and sarsaponins (Calsamiglia et al., 2007) that affect microbial activity. Although many plant extracts have been shown to affect microbial activity (Makkar., 2005), gro wth performance of growing lambs (Chaves et al., 2007) and on milk production (Benchaar et al., 2007).

Thymol, a phenolic molecule present as the main component in thyme oil, is highly active against S. typhimurium in vitro, presumably damaging the cytoplasmic membrane integrity of the pathogen (Si et al., 2006).

in vivo, in situ and in vitro methods have been used to evaluate the nutritive value of feedstuffs. The in vitro gas production technique has proven to be a potentially useful technique to evaluate the nutritive value of feedstuffs, since it gives an estimate of the potential rate and extent of nutrient fermentation in the rumen. However, this technique is measuring gas produced by the fermentation of energy containing components in feeds, and not only that of protein Mirzaei-(Aghsaghali et al., 2008a, 2008b); Maheri-Sis et al., 2007, 2008) kiyani et al., 2010).

The objective of this study was to evaluate the potential of natural plant extracts as fermentation pattern in vitro gas production characteristics, by in vitro gas production technique.

2. Material and Methods

2.1. zataria multiflora Samples:

During summer season ZM samples were collected from different parts of Esfahan province. Next, there were drying for one week, and homogeneous mixture were papered for nutritive chemical analyzes. For determination of (zataria multiflora) effects, we added zataria multiflora extracts with two level (0.15 and 0.3 mL: 200 mg sample) into gas test syringes. All samples were then ground in a laboratory mill through a 1 mm screen.

2.2. Chemical Analysis

Dry matter (DM) was determined by drying the samples at 105 °C overnight and ash by igniting the samples in muffle furnace at 525 °C for 8h and Nitrogen (N) content was measured by the Kjeldahl method (AOAC, 1990). Crude protein (CP) was calculated as N × 6.25 (Van Soest et al. 1991). Non-Fibrous Carbohydrate (NFC) is calculated using the equation of (NRC, 2001), NFC = 100 - (NDF + CP + EE + Ash).

All chemical analyses were carried out in triplicate.

2.3. Procedure of plant extracts preparation

The plant extracts were prepared according to (Patra et al., 2006) with some modifications. The plant materials were dried at 50°C and ground in mills to pass a 1 mm sieve and 100 g placed in 1000 ml of distilled water solvent. The flasks of all the solvents were stoppered and agitated with a magnetic stirrer for 24 h at room temperature. Then the solutions were centrifuged at 3000 g for 10 min. The residue was re-extracted with 500 ml of distilled water for 24 h stirring at room temperature and centrifuged again at 3000 g for 10 min. The plant extracts were combined, distilled water was

evaporated from the solution at approximately 85°C by using a rotary-evaporator.

2.4 Treatments and experimental design

The different levels of ZMWE were added to the diet sample. Three levels (0, 0.15 and 0.3 ml/30 ml buffered rumen fluid) of ZMWE wer investigated as follow: (i) no additive; (ii) ZMWE0.15 and (iii) ZMWE0.3.

2.5. In vitro gas production

Fermentation of canola meal samples were carried out with rumen fluid was obtained from three fistulated Taleshi native male 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, 1988, 1979) as follows. 200 mg dry weight of the sample was weighed in triplicate into calibrated glass syringes of 100 ml in the absence and presence of level 0.15 and 0.3ml (ZMWE). The 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. The 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 was recorded before incubation 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours after incubation. All samples were incubated in triplicate with three syringes containing only rumen fluid-buffer mixture (blank). The net gas productions for canola meal samples were determined by subtracting the volume of gas produced in the blanks. Cumulative gas production data were fitted to the model of (Ørskov and McDonald 1979).

$$P = a + b (1-e^{-ct})$$

Where P is the gas production at time t, a the gas production from soluble fraction (ml/200 mg DM), b the gas production from insoluble fraction (ml/200 mg DM), c the gas production rate constant (ml/h), a + b the potential gas production (ml/200 mg DM) and t is the incubation time (h).

2.6. Statistical Analysis

Data on apparent gas production parameters were subjected to one-way analysis of variance using the analysis of variation model ANOVA of SAS (2000). Multiple comparison tests used Duncan's multiple-range test (1980).

Significance between individual means was identified using the Duncan's multiple range tests. Mean differences were considered significant at (P<0.05). Standard errors of means were calculated

from the residual mean square in the analysis of variance. All data obtained from three replicates n=3.

3.

Results

3.1. Chemical composition

The chemical composition of canola meal shown in Table 1.

Chemical composition including dry matter (DM), crude protein (CP), and Non-Fibrous Carbohydrate (NFC) were estimated; 93.77, 35, and 21.46 percent, respectively.

Table 1
Chemical composition of canola meal (%)

Chemical composition of canola mear (70).						
dry matter (DM)	93.77					
crude protein (CP)	35					
non-fiber carbohydrate (NFC)	21.46					

3.2. In vitro gas production

 $Gas \quad production \quad volumes \quad (ml/200mg \quad DM) \quad (at \quad differents incubation times shown in Figure 1.$

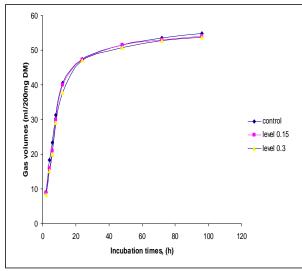


Fig. 1. In vitro gas production volume of canola meal at different incubation time.

Gas production parameters (a, b, c) and calculated amounts of CM, levels 0.15 and 0.3 ZMWE are presented in Table 2.

Gas volume at 24 h incubation (for 200 mg dry samples), soluble fraction (a), insoluble but fermentable fraction (b), potential gas production (a + b) and rate constant of gas production (c) of CM were 47.32, 2.15, 54.96, 57.12 ml/200mg DM and 0.113 ml/h, while for 0.3 ZMWE were 47.12, 1.73, 54.64, 56.37 ml/200mg DM and 0.112 ml/h, respectively. Gas volume at 48 and 72 h incubation (for 200 mg dry samples), of CM were 51.41 and 53.79 ml/200mg

DM, while for ZMWE $_{0.3}$ were 50.77 and 52.82 ml/200mg DM, respectively.

Table 2. *In vitro* gas production volume (ml/200mg DM) and estimated parameters of canola meal at different incubation times.

	tretment				
Time (h)					
	i	ii	iii		
2	9.05	9	8.36		
4	18.42	18	17.24		
6	23.33	23	22.42		
8	31.32	31.02	21.96		
12	40.49	39.99	37.83		
24	47.32	47.30	47.12		
48	51.41	51.41	50.77		
72	53.79	52.90	52.82		
96	54.78	54.07	53.74		
Estimated parameters					
a (ml)	2.15	2.43	1.73		
b (ml)	54.96	55.46	54.64		
(a+b) (ml)	57.12	57.89	56.37		
c (ml/h)	0.113	0.103	0.112		

(i): no additive, (ii): $ZMWE_{0.15}$, (iii): $ZMWE_{0.3}$, a: the gas production from soluble fraction (ml/200 mg DM), b: the gas production from insoluble fraction (ml/200 mg DM), c: rate constant of gas production during incubation (ml/h), (a + b): the potential gas production (ml/200 mg DM).

4. Discussions

This study suggested that the $ZMWE_{0.3}$ have the potential to affect ruminal fermentation efficiency, and be a promising methane mitigating agent.

(Patra et al., 2006) reported that extracts of plants in methanol and water had more soluble sugars than with ethanol. The seed pulp of Terminalia chebula extracted by methanol reduced methane emission by 95% with the lower dose (0.25 ml/30 ml incubation medium) and the inhibition was almost complete at the double level of extract.

Sommart et al. (2000) reported that gas volume is a good parameter from which to predict digestibility, fermentation end product and microbial protein synthesis of the substrate by rumen microbes in the in vitro system. Gas volumes also have shown a close relationship with feed intake (Blummel and Becker, 1997) and growth rate in cattle (Blummel and Ørskov, 1993). The soluble fraction (a) makes it easily attachable by ruminal microorganisms and leads to much gas production (Blummel and Becker, 1997).

Nagy and Tengerdy (1968) found that addition of essential oils extracted from Sagebush (Artemisa tridentata) altered the composition of the

bacterial population during a 24 h incubation of rumen fluid in vitro.

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The study Zataria Multiflora Water Extract effects On the Short Chain Fatty Acid, Net Energy, Metobolizable Energy and Organic Matter Digestibility Of Sunflower Meal Using In Vitro Gas Production Technique

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml) buffered rumen fluid) of *Zataria multiflora water extract* (ZMWE) on sunflower meal (SM) degradability were studied by in vitro gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for ether extract , ash, neutral detergent fiber and acid detergent fiber were 5.97, 5.5, 45.8 and 30.6 percent, respectively. The results showed The organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NE₁) contents of SM were 8.36 MJ/kg DM, 0.937 mmol and 4.533 MJ/kg DM, while for level 0.3 ZMWE were 64.76 g/kg DM, 8.04 MJ/kg DM, 0.895 mmol and 4.664 MJ/kg DM.

[Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. The study Zataria Multiflora Water Extract effects On the Short Chain Fatty Acid, Net Energy, Metobolizable Energy and Organic Matter Digestibility Of Sunflower Meal Using In Vitro Gas Production Technique. Journal of American Science 2011;7(7):127-130]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: metabolizable energy; *zataria multiflora*; sunflower meal; gas production technique; neutral detergent fiber; organic matter digestibility

Abbreviations: ZMWE, *Zataria multiflora water extract*; SM, sunflower meal; EE, ether extract; ZM, Zataria multiflora; OMD, organic matter digestibility; ME, metabolizable energy, SCFA, short chain fatty acid; CP, crude protein; NE_I, net energy for lactation.

1. Introduction

Ruminal microbial activity is essential for the use of structural carbohydrates and synthesis of high quality protein in ruminants. However, microbial fermentation in the rumen may result in considerable energy and protein losses as methane and ammonia (NRC, 2001).

Methane emission and excretion of N from ruminant livestock substantially implicate global warming and N pollution. Recently, there has been an increased interest in saponins or saponin-containing plants for modifying ruminal fermentation. Saponins are phytochemical compounds composed of a steroid or triterpernoid sapogenin linked to one or more sugar chains (Cheeke, 1999).

in vivo, in situ and in vitro methods have been used to evaluate the nutritive value of feedstuffs. The in vitro gas production technique has proven to be a potentially useful technique to evaluate the nutritive value of feedstuffs, since it gives an estimate of the potential rate and extent of nutrient fermentation in the rumen. However, this technique is measuring gas produced by the fermentation of energy containing components in feeds, and not only that of protein (Mirzaei-

Aghsaghali et al., 2008a, 2008b); (Maheri-Sis et al., 2007, 2008); (kiyani et al., 2010).

The objective of this study was to evaluate the potential of natural plant extracts as fermentation pattern in vitro gas production characteristics, organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acids (SCFA) and net energy for lactation (NE $_{\rm l}$) by in vitro gas production technique.

2. Material and Methods

2.1. zataria multiflora Samples:

During summer season ZM samples were collected from different parts of Esfahan province. Next, there were drying for one week, and homogeneous mixture were papered for nutritive chemical analyzes. For determination of (zataria multiflora) effects, we added zataria multiflora extracts with two level (0.15 and 0.3 mL: 200 mg sample) into gas test syringes. All samples were then ground in a laboratory mill through a 1 mm screen.

2.2. Chemical Analysis

Neutral detergent fiber (NDF) and Acid detergent fiber (ADF) were determined by

procedures outlined by Van Soest et al. 1991) with modifications described by (Van Soest et al. 1991). All chemical analyses were carried out in triplicate.

2.3. Procedure of plant extracts preparation

The plant extracts were prepared according to (Patra et al., 2006) with some modifications. The plant materials were dried at 50°C and ground in mills to pass a 1 mm sieve and 100 g placed in 1000 ml of distilled water solvent. The flasks of all the solvents were stoppered and agitated with a magnetic stirrer for 24 h at room temperature. Then the solutions were centrifuged at 3000 g for 10 min. The residue was re-extracted with 500 ml of distilled water for 24 h stirring at room temperature and centrifuged again at 3000 g for 10 min. The plant extracts were combined. distilled water was evaporated from the solution at approximately 85°C by using a rotary-evaporator.

2.4 Treatments and experimental design

The different levels of ZMWE were added to the diet sample. Three levels (0, 0.15 and 0.3 ml/30 ml buffered rumen fluid) of ZMWE wer investigated as follow: (i) no additive; (ii) ZMWE0.15 and (iii) ZMWE0.3.

2.5. In vitro gas production

Fermentation of sunflower meal samples were carried out with rumen fluid was obtained from three fistulated Taleshi native male 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, 1988) as follows. 200 mg dry weight of the sample was weighed in triplicate into calibrated glass syringes of 100 ml in the absence and presence of level 0.15 and 0.3ml (ZMWE). The 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.

The 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 was recorded before incubation 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours after incubation. All samples were incubated in triplicate with three syringes containing only rumen fluid-buffer mixture (blank). The net gas productions for sunflower meal samples were determined by subtracting the volume of gas produced in the blanks. Cumulative gas production data were fitted to the model of (Ørskov and McDonald 1979).

$$P = a + b (1 - e^{-ct})$$

Where P is the gas production at time t, a the gas production from soluble fraction (ml/200 mg DM), b the gas production from insoluble fraction (ml/200 mg DM), c the gas production rate constant (ml/h), a + b the potential gas production (ml/200 mg DM) and t is the incubation time (h).

The metabolizable energy (MJ/kg DM) content of sunflower meal was calculated using equations of (McDonald et al., 1995), (Menke and Steingass1988) and (Menke et al. 1979) as follows:

for all feeds,

ME (MJ/kg DM) = 0.016 DOMD

for forage feeds,

ME (MJ/kg DM) = 2.20 + 0.136 GP + 0.057 CP + 0.0029 CF²

for concentrate feeds,

ME (MJ/kg DM) = 1.06 + 0.157 GP + 0.084 CP + 0.22 CF - 0.081 CA

Where:

GP = The 24 h net gas production (ml/200 mg⁻¹), CP = Crude protein

Short chain fatty acids (SCFA) is calculated using the equation of (Makkar 2005) and (Maheri-Sis 2007, 2008).

Where, Gas is 24 h net gas production (ml/200mg DM).

SCFA (mmol) = $0.0222 \times GP - 0.00425$

The organic matter digestibility was calculated using equations of (Menke et al. 1979) as follows:

OMD (g/kg DM) = (%)14.88 + 0.889 GP + 0.45 CP +XA

Where:

GP = About 24 h net gas production (ml /200 mg⁻¹)

CP = Crude protein (%)

XA = Ash content (%)

NEL (MJ/kg DM) = $0.115 \times GP + 0.0054 \times CP + 0.014 \times EE - 0.0054 \times CA - 0.36$ (Abas et al., 2005).

2.6. Statistical Analysis

Data on apparent gas production parameters were subjected to one-way analysis of variance using the analysis of variation model ANOVA of SAS (2000). Multiple comparison tests used Duncan's multiple-range test (1980).

Significance between individual means was identified using the Duncan's multiple range tests. Mean differences were considered significant at (P<0.05). Standard errors of means were calculated from the residual mean square in the analysis of variance. All data obtained from three replicates n=3.

3. Results

3.1. Chemical composition

The chemical composition of sunflower meal shown in Table 1.

The chemical composition of sunflower meal shown in Table 1. Chemical composition including ether extract (EE), crude ash (CA), neutral detergent fiber (NDF), acid detergent fiber (ADF) were estimated; 5.97, 5.5, 45.8 and 30, 6 percent, respectively.

Table 1. Chemical composition of sunflower meal (%).

(/*/:	
neutral detergent fiber (NDF)	45.8
acid detergent fiber (ADF)	30.6
Ash	5.5
ether extract (EE)	5.97

3.2. In vitro gas production

calculated amounts of organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NEI) of sunflower meal (SM) are presented in Table 2.

Calculated amounts of organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NEI) of SM (66.43 g/kg DM, 8.36 MJ/kg DM, 0.937 mmol and 4.53 MJ/kg DM, respectively) were high as compared to 0.3 Zataria multiflora water extract (ZMWE) (64.76 g/kg DM, 8.04 MJ/kg DM, 0.895 mmol and 4.664 MJ/kg DM, respectively).

Table 2. *In vitro* gas production volume (ml/200mg DM) and estimated parameters of sunflower meal at different incubation times.

	Esti	Estimated parameters			
	OMD	ME	SCFA	NE ₁	
i	66.43	8.36	0.937	4.533	
ii	65.56	8.20	0.915	4.669	
iii	64.76	8.04	0.895	4.664	

(i): no additive, (ii): ZMWE_{0.15}, (iii): ZMWE_{0.3},

OMD: organic matter digestibility (g/kg DM), ME: metabolisable energy (MJ/kg DM),

ME: metabolisable energy (MJ/kg DM) SCFA: short chain fatty acid (mmol),

NE₁: net energy lactation (MJ/kg DM)

4. Discussions

Effects of essential oil on rumen microbial fermentation in vitro or in situ are well established (Calsamiglia et al., 2007).

The potential of plant secondary metabolites to reduce enteric CH4 production has been recognized and very extensive screening of a large range of plants and their secondary compounds (patra et al., 2006).

There was a positive correlation between NFC content of feeds and gas production, but feed CP, NH₃-N and NDF levels were negatively correlated with gas production (Getachew et al.,

2004; Maheri-Sis et al., 2007). Different chemical composition leads to different nutritive value, because chemical composition is one of the most important indices of nutritive value of feeds. Variation in chemical components of feeds such as starch, NFC, OM, CP, NDF and soluble sugars contents can be result in variation of *in vitro* gas production volume (Maheri-Sis et al., 2008).

This study suggested that the ZMWE $_{0.3}$ have the potential to affect ruminal fermentation efficiency, and be a promising methane mitigating agent.

(Patra et al., 2006) reported that extracts of plants in methanol and water had more soluble sugars than with ethanol.

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Zataria Multiflora Extract could affect Metobolizable Energy and Organic Matter Digestibility of Canola Meal?

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Abstract: This experiment was conducted to survey effect of adding different levels (0, 0.15, 0.3 ml/30ml buffered rumen fluid) of *Zataria multiflora water extract* (ZMWE) on canola meal (CM) degradability were studied by *in vitro* gas producing techniques. Gas production test with mixtures of filtered rumen liquid of three Taleshi native male cattle rumen in times of 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours were performed. Chemical composition for ether extract , ash, neutral detergent fiber and acid detergent fiber were 3.4, 7.14, 33 and 22 percent, respectively. The results showed The organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acid (SCFA) and net energy for lactation (NE₁) contents of CM were 79.46 g/kg DM, 10.27 MJ/kg DM, 1.046 mmol and 5.28 MJ/kg DM, while for level 0.3 ZMWE were 41.85 g/kg DM, 3.63 MJ/kg DM, 1.047 mmol and 1.22 MJ/kg DM. [Mohammad Salamat Azar, Ramin Salamat Doust-Nobar, Yahya Asadi, Morteza Kiani Nahand, Saeid Najafyar, Bakhshali Khodaparast, Hamed Aminipur. Zataria Multiflora Extract could affect Metobolizable Energy and Organic Matter Digestibility of Canola Meal? Journal of American Science 2011;7(7):131-134]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Zataria multiflora; Canola Meal; gas production technique; neutral detergent fiber; organic matter digestibility

Abbreviations: ZMWE, *Zataria multiflora water extract*; CM, canola meal; EE, ether extract; ZM, *Zataria multiflora*; OMD, organic matter digestibility; ME, metabolizable energy, SCFA, short chain fatty acid; NE_l, net energy for lactation; NDF, neutral detergent fiber; ADF, acid detergent fiber

1. Introduction

in vivo, in situ and in vitro methods have been used to evaluate the nutritive value of feedstuffs. The in vitro gas production technique has proven to be a potentially useful technique to evaluate the nutritive value of feedstuffs, since it gives an estimate of the potential rate and extent of nutrient fermentation in the rumen. However, this technique is measuring gas produced by the fermentation of energy containing components in feeds, and not only that of protein (Mirzaei-Aghsaghali et al., 2008a, 2008b); (Maheri-Sis et al., 2007, 2008); (kiyani et al., 2010).

Many plants produce secondary metabolites, a group of chemicals that are not involved in the primary biochemical processes of plant growth and reproduction but are important to protect the plants from insect predation or grazing by herbivores. Several thousand plant secondary metabolites have been reported (Kamra et al., 2006).

Accordingly, it has been suggested that secondary metabolites could be used as alternatives to antibiotics in ruminant feeds (Greathead, 2003), as they may modify ruminal fermentation thereby enhancing the efficiency of utilization of feed energy while decreasing methane emissions (Garcia-Gonzalez et al., 2006).

Ruminal microbial activity is essential for the use of structural carbohydrates and synthesis of high quality protein in ruminants. However, microbial fermentation in the rumen may result in considerable energy and protein losses as methane and ammonia (NRC, 2001).

Methane emission and excretion of N from ruminant livestock substantially implicate global warming and N pollution. Recently, there has been an increased interest in saponins or saponin-containing plants for modifying ruminal fermentation. Saponins are phytochemical compounds composed of a steroid or triterpernoid sapogenin linked to one or more sugar chains (Cheeke, 1999).

The public concern over the routine use of antibiotics and growth promoters in livestock production has increased recently because of the risk of the antibiotic residues presence in milk and meat and its effect on human health. These led to its prohibition in the European Union in 2006 in animal feeding. Accordingly, there is greater interest in using plants and plant extracts as alternatives to feed antibiotics to manipulate ruminal fermentation, improve feed efficiency and animal productivity. Many plants produce secondary metabolites such as phenolic compounds, essential oils, and sarsaponins (Calsamiglia et al., 2006), that affect microbial

activity. Although many plant extracts have been shown to affect microbial activity (Patra et al., 2006), gro wth performance of growing lambs (Chaves et al., 2007), and on milk production (Benchaar et al., 2007).

The objective of this study was to evaluate the potential of natural plant extracts as fermentation pattern in vitro gas production characteristics, organic matter digestibility (OMD), metabolizable energy (ME), short chain fatty acids (SCFA) and net energy for lactation (NE $_{\rm l}$) by in vitro gas production technique.

2. Material and Methods

2.1. zataria multiflora Samples:

During summer season ZM samples were collected from different parts of Esfahan province. Next, there were drying for one week, and homogeneous mixture were papered for nutritive chemical analyzes. For determination of (zataria multiflora) effects, we added zataria multiflora extracts with two level (0.15 and 0.3 mL: 200 mg sample) into gas test syringes. All samples were then ground in a laboratory mill through a 1 mm screen.

2.2. Chemical Analysis

Neutral detergent fiber (NDF) and Acid detergent fiber (ADF) were determined by procedures outlined by (Van Soest et al. 1991). with modifications described by (Van Soest et al. 1991). All chemical analyses were carried out in triplicate.

2.3. Procedure of plant extracts preparation

The plant extracts were prepared according to (Patra et al., 2006) with some modifications. The plant materials were dried at 50°C and ground in mills to pass a 1 mm sieve and 100 g placed in 1000 ml of distilled water solvent. The flasks of all the solvents were stoppered and agitated with a magnetic stirrer for 24 h at room temperature. Then the solutions were centrifuged at 3000 g for 10 min. The residue was re-extracted with 500 ml of distilled water for 24 h stirring at room temperature and centrifuged again at 3000 g for 10 min. The plant extracts were combined. distilled water was evaporated from the solution at approximately 85°C by using a rotary-evaporator.

2.4 Treatments and experimental design

The different levels of ZMWE were added to the diet sample. Three levels (0, 0.15 and 0.3 ml/30 ml buffered rumen fluid) of ZMWE wer investigated as follow: (i) no additive; (ii) ZMWE0.15 and (iii) ZMWE0.3.

2.5. In vitro gas production

Fermentation of canola meal samples were carried out with rumen fluid was obtained from three fistulated Taleshi native male 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, 1988) as follows. 200 mg dry weight of the sample was weighed in triplicate into calibrated glass syringes of 100 ml in the absence and presence of level 0.15 and 0.3ml (ZMWE).

The 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. The 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 was recorded before incubation 2, 4, 6, 8, 12, 24, 48, 72 and 96 hours after incubation. All samples were incubated in triplicate with three syringes containing only rumen fluid-buffer mixture (blank). The net gas productions for canola meal samples were determined by subtracting the volume of gas produced in the blanks. Cumulative gas production data were fitted to the model of (Ørskov and McDonald 1979).

$$P = a + b (1-e^{-ct})$$

Where P is the gas production at time t, a the gas production from soluble fraction (ml/200mg DM), b the gas production from insoluble fraction (ml/200mg DM), c the gas production rate constant (ml/h), a + b the potential gas production (ml/200mg DM) and t is the incubation time (h).

The metabolizable energy (MJ/kg DM) content of canola meal was calculated using equations of (McDonald et al. 1995), (Menke and Steingass 1988) and (Menke et al. 1979) as follows:

for all feeds,

ME (MJ/kg DM) = 0.016 DOMD

for forage feeds,

ME (MJ/kg DM) = 2.20 + 0.136 GP + 0.057 CP + 0.0029 CF²

for concentrate feeds,

ME (MJ/kg DM) = 1.06 + 0.157 GP + 0.084 CP + 0.22 CF - 0.081 CA

Where:

GP = The 24 h net gas production (ml/200 mg⁻¹), CP = Crude protein

Short chain fatty acids (SCFA) is calculated using the equation of (Makkar 2005) and (Maheri-Sis 2007, 2008).

Where, Gas is 24 h net gas production (ml/200mg DM).

SCFA (mmol) = $0.0222 \times GP - 0.00425$

The organic matter digestibility was calculated using equations of (Menke et al.1979) as follows:

OMD (g/kg DM) = (%)14.88 + 0.889 GP + 0.45 CP + XA

Where:

GP = About 24 h net gas production (ml/200 mg⁻¹)

CP = Crude protein (%)

XA = Ash content (%)

NEL (MJ/kg DM) = $0.115 \times GP + 0.0054 \times CP + 0.014 \times EE - 0.0054 \times CA - 0.36$ (Abas et al., 2005).

2.6. Statistical Analysis

Data on apparent gas production parameters were subjected to one-way analysis of variance using the analysis of variation model ANOVA of SAS (2000). Multiple comparison tests used Duncan's multiple-range test (1980).

Significance between individual means was identified using the Duncan's multiple range tests. Mean differences were considered significant at (P<0.05). Standard errors of means were calculated from the residual mean square in the analysis of variance. All data obtained from three replicates n=3.

3. Results

3.1. Chemical composition

The chemical composition of canola meal shown in Table 1.

The chemical composition of canola meal shown in Table 1. Chemical composition including ether extract (EE), crude ash (CA), neutral detergent fiber (NDF), acid detergent fiber (ADF) were estimated; 3.4, 7.14, 33 and 22 percent, respectively.

Table 1. Chemical composition of canola meal (%).

Table 1. Chemical composition of canola	mear (70).
neutral detergent fiber (NDF)	33
acid detergent fiber (ADF)	22
Ash	7.14
ether extract (EE)	3.4

3.2. In vitro gas production

calculated amounts of organic matter digestibility, metabolizable energy, short chain fatty acid, net energy for lactation of canola meal are presented in Table 2.

Calculated amounts of organic matter digestibility, metabolizable energy, short chain fatty acid, net energy for lactation of canola meal (79.46 g/kg DM, 10.27 MJ/kg DM, 1.046 mmol and 5.28 MJ/kg DM, respectively) were high as compared to 0.3 ZMWE (41.85 g/kg DM, 3.63 MJ/kg DM, 1.047 mmol and 1.22 MJ/kg DM, respectively).

Table 2. *In vitro* gas production volume (ml/200mg DM) and estimated parameters of sunflower meal at different incubation times.

	OMD	ME	SCFA	NE _l			
i	79.46	10.27	1.046	5.28			
ii	73.16	9.16	1.05	6.09			
iii	41.85	3.63	1.047	1.22			

(i): no additive, (ii): ZMWE_{0.15}, (iii): ZMWE_{0.3},

OMD: organic matter digestibility (g/kg DM),

ME: metabolisable energy (MJ/kg DM),

SCFA: short chain fatty acid (mmol),

NE₁: net energy lactation (MJ/kg DM)

4. Discussions

This study suggested that the $ZMWE_{0.3}$ have the potential to affect ruminal fermentation efficiency, and be a promising methane mitigating agent.

In general, rumen microbial activity was affected by the use of plant extracts and secondary plant metabolites. It is interesting to point out that when supplied at high levels (3,000 mg/L) most essential oils and their secondary constituents reduced the total VFA concentration compared with control, which is consistent with their antimicrobial activity (Davidson and Naidu, 2000).

Menke and Steingass (1988) suggested that gas volume at 24 h after incubation has been relationship with metabolisable energy in feedstuffs.

In vitro dry matter and organic matter digestibility were shown to have high correlation with gas volume (Sommart et al., 2000).

Bravo and Doane (2008) recently presented results from a meta-analysis of lactating dairy cow trials involving essential oils comprised of cinnamaldehyde and eugenol (Pancosma, Geneva, Switzerland); 16 trials and 33 treatment comparisons. essential oils increased DMI and milk yield by 1.5 kg/d (P < 0.001) and 1.1 kg/d (P <0.001), respectively. It was reported that diet nutrient composition, greater NEL, NFC or NDFD, improved the milk yield response to essential oils (Bravo and Doane, 2008).

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Integrating Evidence Based Nursing into the Critical Care Nursing Course: Challenges from Students' Perspectives

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Abstract: In critical care settings, there is a considerable need for highly experienced and knowledgeable nurses making efficient clinical decisions. Utilization of evidence based nursing (EBN) guides clinical decisions and practices. Therefore, it is important for critical care nurses to receive the necessary education to practice EBN. This begins with the ability to ask a clinical question and search for evidence answering it properly, which were the focus of teaching in this study. Therefore, this study aims to identify challenges to integrating EBN into the critical care nursing (CCN) course from students' perspectives. Undergraduate students who were enrolled into the CCN course on January 2010, Faculty of Nursing, University of Alexandria, were included in the study. Different teaching/learning strategies fostering adult learning were utilized to teach EBN related activities. A questionnaire was developed to identify challenges to integrating EBN into the course. Study findings indicated that about two thirds of total students have a moderate level of negative attitude to integrating EBN in the critical care practice. Most of students have moderate challenges to integrating activities of EBN into the CCN course. Two thirds of the students indicated that challenges related to course coordination are moderate. In relation to practicing EBN related activities, formulating a focused clinical question was moderately or highly challenging to the students. Searching for research evidence was moderately challenging to more than half of students. Time constraint while searching the internet was the highest top reported challenge. In conclusion, integrating EBN into the CCN course was challenging to students in different levels. Most of challenges were related to a lack in background research knowledge and skills and time constraints. So, the current study recommended that students have to receive their research course as one of the fundamental courses. In addition, more time management is required, in which an arrangement between different courses schedules and adequate time to practice free learning activities should be provided.

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Key words: evidence based nursing (EBN)-critical care nursing (CCN)-teaching/learning approaches.

1. Introduction:

One of the characteristics of the CCN practice is the application of the relevant theories, research, and latest evidence-based guidelines (1). When nurses are unaware of evidence based practices (EBPs), they tend to use their current knowledge, which is limited and outdated ⁽²⁾. Nurses who work in critical care often encounter life-sustaining treatment decisions. These decisions may be related to offering or withholding a specific care, performing a practice in a particular way, and/or dealing with patients' clinical and ethical dilemmas. Making these decisions creates anxiety, uncertainty, and requires risk taking on the part of the critical care nurses^(3,4). Basing nursing decisions and practice strategies on the best available evidence improves patients' outcomes and ensures that provided nursing care is both costefficient and effective (5).

EBN is described as using the best available evidence from research, along with patient preferences and clinical experience, when making

nursing decisions ⁽⁶⁾. It encompasses significant skills that are not traditionally part of nursing undergraduate training, including; precisely creating a searchable question arising from clinical knowledge gaps; conducting an efficient search and evaluation of available literature answering this question, extracting the clinical message, and applying it to fill the clinical gap^(6,7). In Egypt, studies show that there are a number of barriers to the application of $EBN^{(8,9)}$. One of the major barriers is nurses' lack of EBN related knowledge and skills. Therefore, EBN requires sound, operational and professional educational preparation. Teaching **EBN** undergraduate students effectively fosters the attitude, knowledge, skills, and behaviours necessary for EBN

Furthermore, teaching EBN is a challenge for the teacher as it requires innovative teaching/learning approaches ⁽¹⁰⁾. The first recommended approach is providing mixed sessions including both didactic and interactive elements.

Didactic sessions comprise lectures, and may include question and answer periods. While, the interactive sessions involve some form of interaction amongst the participants, which may take the format of small-group work, or the opportunity to practice skills (11-13). The second approach includes basing educational activities on the internet. This is beneficial as it provides important forum for teaching EBN and allows more effective interactive learning. In addition, it overcomes the challenge of being limited by time or location. The third approach includes relating learning activities to the clinical practice, allowing identification of real gaps between current and desired levels of competencies, and identifies clinically effective solutions fulfilling these gaps (13-16)

Finally, the fourth approach focuses on taking the learners' needs into consideration as they are adult learners contributing into their learning experience. On the other hand, teachers are only facilitators to the process of learning. They are committed to the development of the learners' skills of inquiry, helping students learn to make reasoned decisions, and providing them with adequate feedback. After all, cooperative learning is the most recommended approach for teaching EBN by actively involving students in learning process. This approach enables students to learn from peers, creates positive relationships among students and promotes students' healthy psychological adjustment to the learning activities. Cooperative learning offers a way to structure learning situations so that students work together to achieve shared goals. Students cooperate to foster learning, rather than approaching learning in isolation (13,17,18)

In this research, the focus is upon teaching activities related to the first two primary skills of EBN. First is when nursing students convert their needs for information into answerable clinical questions, which is widely believed to be the key to efficiently finding high-quality evidence (19). Next is when the students access electronic databases to find evidence answering these clinical questions, which is essential to lifelong learning, taking the student from novice to expert (18). Previous studies indicated that learning these primary key skills of EBN has a number of challenges as perceived by students^(10,20). Moreover, it has been found that many students may encounter clinical questions but are rarely answering them due to these challenges. A large number of studies investigated challenges to integrating EBN into practice^(8,9,21). Yet, fewer studies investigated challenges to teaching EBN. They indicated that challenges to teaching EBN may include; lack of time, motivation and interest, and difficulty in accessing literature (10,20,22)

Identifying challenges for integrating EBN into critical care nursing courses can assist in developing strategies to overcome challenges facing students. Therefore, this study was conducted to identify challenges to integrating EBN into the CCN course from students' perspectives.

2. Materials and Method:

Research design: descriptive study.

Aim:

To identify challenges to integrating EBN into the CCN course from students' perspectives.

Research question:

What are challenges of integrating EBN into the CCN course from students' perspectives?

Materials:

Setting: Emergency and Critical Care Nursing Department, Faculty of Nursing, University of Alexandria.

Subjects:

All undergraduate students who were enrolled into the CCN (1) course on January 2010 were subjected to the same educational intervention in order to learn EBN (89 students), however, 46 students of them accepted to participate in the research and answer the questionnaire.

Tool: Challenges to integrating EBN into the CCN **course questionnaire**: was developed after reviewing the related literature (8-10, 21, 23) to identify challenges to integrating EBN into the CCN course. It includes 3 parts. Part "1" involves challenges related to students' attitude towards integrating EBN into the critical care practice, in which negative students' attitude is considered a challenge (7 statements). Part "2" involves challenges to teaching EBN. It is classified into two sections; challenges related to students' attitude towards integrating EBN activities into the CCN course (12 statements) and challenges related to coordination of the CCN course (9 statements). Part "3" includes challenges to practicing EBN activities. It is divided into 2 sections; challenges to formulating a clinical question, and challenges to searching for research evidence (5, and 8 statements: respectively).

Each statement was rated on a five Likert scale from strongly agree to strongly disagree. A number of statements are phrased positively (16 statements) to prevent students' tendency to respond similarly to all items by choosing "agree" or "strongly agree" for all statements. The characteristics of the studied sample; such as

residence, working or not and having available computers are included in this tool.

Methods:

An approval to conduct the study was obtained from the responsible authorities at the Faculty of Nursing, Alexandria University. Study questionnaire was developed after reviewing the related literatures. The reliability of the questionnaire was tested; the Cronbach reliability coefficient was 0.698. A pilot study was conducted on 5 students who received the same course, one semester before, to test the feasibility and applicability of the study questionnaire.

Educational intervention:

EBN related activities were integrated into the CCN (1) course in order to assist students in learning skills enabling them to link theory and clinical practice. The course consisted of 15 lectures; each one was for 2 hours. These lectures covers the main concepts of caring critically ill patient which are derived from the scope of critical care nursing; critically ill patient, critical care nurse, and critical care environment. Examples of topics under these main concepts are Nutrition of critically ill, pain and sleep in intensive care unit...etc. Ten sessions were specified to teaching/learning EBN, one session at the end of each of ten consecutive lectures. Each one extended for thirty minutes. The first session started at lecture three. The following are activities conducted in each of the ten sessions.

Session (1) was an introduction to EBN. It involved an orientation on the importance of EBN and its process. After this session, an evidence based health care practice (EBHP) group was created on facebook to provide materials and websites for EBHP and for the purpose of discussing issues related to EBHP in general. This group was not restricted to the students; it attracted other health care members to participate in it. Session (2) involved the topic of formulating a focused answerable clinical question. In this session, a presentation about formulating a clinical question, using the PICO format, was displayed to the students. PICO represents an acronym for Patient/Problem, Intervention, Comparison and Outcome (24). At the end of this session, students were asked to be assigned into small groups including three students with a voluntary selection. Each group was asked to make a critique to the existing critical care practices to choose a topic of personal interest and deliver a question frequently encountered in clinical practice. This can stimulate self-directed learning (25). Then, each group was asked to email the selected question to the teacher. Each group worked independently.

Session (3) was a discussion on clinical questions formulated by students. Each question was discussed on the light of a number of queries such as; how common is it relevant to the critical care practice? What are its benefits or harms of care? This discussion provided students with a feedback from their teacher and colleagues. Then, students were asked to restate their questions again based on this discussion and to resent it by email to the teacher. Consequently any feedback could be sent from the teacher to each group, if needed, would be invisible to the other groups.

Sessions (4, 5, and 6) were on searching electronic database skills to find research evidence. Students were learned to use PICO format in the searching process, as, it contains the essential elements and keywords of the research question (24). Combining Boolean operators which are the connector terms; such as AND, OR, and NOT with the PICO format to structure an effective search keywords were also explained (24). The main electronic database used to search was the PubMed which is linked to the world's largest medical library. PubMed (www.pubmed.com) was used because it allows easy and free search. It allows assistance in finding search terms using the MeSH (Medical Subject Heading Database). In addition, it includes a PubMed's Clinical Oueries section, makes it easier to find articles that report applied clinical research and systematic reviews (26). Students were given handouts (print screen pictures) simulating the process of searching the PubMed database to find research evidence.

Sessions (7 and 8) gave the students an idea about research process, and types of evidence resources. A discussion was done about how to ensure that the retrieved evidence is related to the question which stimulates critical thinking as one of the course ILOs. Sessions (9 and 10) were discussion on students' searches, results found, and challenges faced; answering students' queries. Finally, students were asked to send their search results and researches found answering their clinical questions through the email to the teacher to be evaluated. Students were evaluated based on the following criteria; the relevance of the formulated clinical question to the critical care practice, how it is important and frequently faced, the ability to reach evidence answering the question, and submitting assignment on time.

The process of critical appraisal to the obtained research evidence was not focused in this course because students did not receive any research courses before this course; research course is delivered in advanced semesters. In addition, students

are not in a position to integrate critical appraisal of the literature with patient care.

Data collection:

At the end of the course, researchers briefed the students on the study aim, and its anonymized and voluntary nature. Then, the questionnaire was distributed to students. Completion of the questionnaire was taken as consent. Students were asked to provide their rating of each statement included in the study questionnaire on a five Likert scale from strongly Agree to Strongly Disagree. The number of students who returned the questionnaire after completion was 46 students.

Data analysis:

The collected data were coded, analysed using Statistical Package for Social Sciences (SPSS) version 15 software, and tabulated. Data were expressed as percentages, frequencies, means, and standard deviations. Changing the scales was done as follows for each of the 5 challenge types; the score for the challenge was calculated as the sum of the scores of all the items within the challenge using the

strongly disagree=1 up to the strongly agree=5. The obtained score obtained was converted to a percentage based on the maximum possible score for the challenge. The obtained percentage was then categorized as follows; Low= <33.3%, Moderate=from 33.3% to 66.6%, and High= 66.7% or more. Fisher's exact test was used to test the significance of the relationship between challenges to integrating EBN into the CCN course and students' characteristics. The level of significance was set at 0.05.

3. Results

Table (1) shows the characteristics of the studied sample. It was found that half of the studied sample (50%) are males. More than half of the study sample (60.9%) are living in Alexandria. Slightly less than half of them (43.5%) are working besides studying, 76.5 of them (who are working) are working 21 hours or more per week. Most of the studied sample (97.9%) have moderate and /or excellent English proficiency. In addition, about two thirds of them (73.9%) have computers available.

Table (1): Characteristics of the studied sample

Characteristics		Count (46)	%
Sex	Male	23	50.0
	Female	23	50.0
Residence	Alexandria	28	60.9
Residence	Outside Alexandria	18	39.1
Working	Working	20	43.5
Working	Not Working	26	56.5
	<14	2	11.8
Working Hours per week (Hours/week)	14-20	2	11.8
	21+	13	76.5
	Do not know	0	0.0
English Proficiency	Weak	1	2.2
	Moderate	28	60.9
	Excellent	17	37
Having available computer	Yes	34	73.9
Having available computer	No	12	26.1

Table (2) presents distribution of challenges to integrating EBN into the CCN course according to their levels. About two thirds of total students (65.2%) have a moderate level of negative attitude to integrating EBN in the critical care practice. Regarding challenges to teaching EBN, most of students (87%) reports that there are moderate challenges to integrating activities of EBN into the CCN course. Also, about one third of the students (30.4%) report that challenges related to course coordination are high. In relation to practicing EBN related activities, equal percentages (50%) of high and moderate level to formulate a focused clinical While, 41.3% of students are highly auestion. challenging to search for research evidence.

Table (3) shows the highest top ten challenges to integrating EBN activities into the CCN course. It is found that, the time constraint while searching the internet is the highest reported challenge faced by students (mean=3.850±0.988). Four challenges related to applicability of EBN principles in nursing are reported among the highest top ten challenges (mean = 3.740 ± 1.021 , 3.590 ± 1.127 , 3.590 ± 1.185 , and 3.460 ± 1.312 , respectively). In addition, four challenges are related to formulating a focused clinical question and course co-ordination, statements for each challenge $(\text{mean}=3.650\pm1.127, 3.370\pm1.142, 3.540\pm1.168, and)$ 3.430±1.142, correspondingly).

Table (2). Distribution of chancinges to integrating EDN into the CCN course according to their levels							/CI2
	Challenge Level						
Type of Challenge	Low		Moderate		High		Total
	Frequency	%	Frequency	%	Frequency	%	1
Students' attitude towards EBN	1	2.2	30	65.2	15	32.6	46
Teaching EBN							
The attitude towards integrating activities of EBN	6	13.0	40	87.0	0	0	100
into the course	U	13.0	40	07.0	U	0	100
Course coordination	0	0	32	69.6	14	30.4	46
Practicing EBN activities							
Formulating Clinical Question	0	0	23	50	23	50	100
Searching Evidence	0	0	27	58.7	19	41.3	46

Table (2): Distribution of challenges to integrating EBN into the CCN course according to their levels

EBN: Evidence Based Nursing, CCN: Critical Care Nursing

4. Discussion

Implementing EBN into critical care practice promotes quality care and provides a framework for nurses to take decisions related to every day practices (5,27). Thus, it is necessary to prepare undergraduate student nurses with competencies and key concepts of EBN. However, teaching traditional undergraduate nursing students to appreciate, understand, and apply the basic skills of EBN raises numerous challenges (10). Therefore this study aims to identify challenges of integrating EBN into the CCN course from students' perspectives. Accordingly strategies that account for identified challenges can be set to overcome.

The current study indicates that about two thirds of total students expressed a moderate level of negative attitude towards integrating EBN into the critical care practice. Moreover, the rest of students showed a highly negative attitude. This might be due to their lack of research abilities as they did not attend any previous research courses or training, which in turn might have made them feel anxious about the unknown. Estabrooks et al. (2003) (28) indicated that attitude towards research evidence is a key factor influencing research evidence utilization as it plays a crucial role in governing one's motivation to learn, practise and maintain a skill. Therefore, in the current study, the negative attitude towards integrating EBN into the critical care practice reflects a major challenge facing students.

In accordance with the current study, *El-Badawy and Kassem* (2008) ⁽⁹⁾ reported that the first suggested strategy to facilitate research utilization was improving research knowledge through training and education, in which, educational levels and participation in their research was found to be related to positive attitude toward research. Furthermore, *Lai, Teng, and Lee* (2001) ⁽²¹⁾ reported in their study that the majority of nurses agreed or strongly agreed to all the negatively phrased statements on the value of EBP and related that to their level of education and experience in which nurse managers showed more positive attitude than registered nurses. Moreover,

Koessl (2009) (29) added that nurses with a master's degree education that would have included in research courses are more likely to view research as positive. On the other hand, Knops et al. study (2009) (30) showed that nurses had a moderately positive attitude toward the application of principles of EBN into practice. This finding may be attributed to the difference in the educational backgrounds of the studied sample, in which the current study sample were undergraduate students while the later study sample were graduates who have completed research courses and have more practical experience.

In addition, the findings of the current study attributed the students' negative attitude to EBN to the limited resources in the critical care settings where they received their clinical training and had the time to perceive that the availability of the necessary resources is limited. This may be evidenced by the finding that one of the highly ranked top 10 challenges identified by students; ranked as second was "Resources are not sufficient for the application of research". This is supported by the results of Ezz, Zahran, and El-Soussi' (2010) (8) study indicating that there is a lack in resources in critical care settings, as perceived by nurses.

Regarding challenges to teaching EBN, most of students perceived that there are moderate levels of challenges related to the attitude towards integrating EBN activities into the CCN course. This may be attributed to their negative attitude towards integrating EBN into the critical care practice which is related to their lack of research knowledge and skills. This may be proved by the fact that the highest ranked challenge to integrating EBN activities into the CCN course was "Activities required are at a level higher than undergraduate students' level". So they do not feel comfortable with these activities. These results are in line with *Tamim et al.* (2009) findings (31). They indicated that integrating EBP into the curriculum was faced by a number of challenges some of them are related to the insufficient previous educational preparation.

Another factor, which might make students perceive integrating activities of EBN into the CCN course as challenging, is their resistance to change. Several reasons may cause resistance; fear of the unknown, and disjunction between learning and teaching styles. Fear of the unknown may be from the unfamiliar tasks related to EBN. Disjunction between learning and teaching styles may arise when some students' preferred a specific approach of learning. For example, some students do not like interaction during lecturing because this makes it difficult to take notes (32). In the current study, this appears obviously when one of the students stood up suddenly during the lecture and said "I do not like to learn EBN related skills in this manner, I do not like these discussions because when I return home I cannot find a content to study to pass the exam".

Regarding course coordination, there are three main issues evaluated under this topic involving; time schedule, communication, and cooperation. Results showed that the CCN course coordination was either moderately or highly challenging to students. These challenges may be attributed to lack of synchronization between the time schedules of different lectures, in which some lectures might coincide with the time of CCN lectures, resulting in inability of a number of students to attend the CCN lecture. This also led to a difficulty delivering EBN related knowledge and skills to students, a lack of communication among students and between students and their teacher. To overcome similar challenges, online teaching is recommended which expand the educational process beyond the traditional on-campus experience (33). Although the current study involved a number of electronic communication tools; including the E-mail and the EBHC forum, these appeared to be insufficient to replace attending EBN sessions.

Other time related constraints are that group work and self directed learning activities which required plenty of time for colleagues meetings and EBN activities. This is evidenced by the presence of a number of time related challenges among the highest top ten challenges to integrating EBN activities into the CCN course; "Searching through the internet needs a lot of time, ranked as the 1st highest challenge" and "Time was not enough to meet my colleagues to carry out the required activities, ranked as the 9th highest challenge", "I did not attend most of the lectures related to time scheduling, ranked as the 6th highest challenge". Even cooperation related challenges were mainly due to time constraints. This might be evidenced by the 9th highest challenge in ranking "Time was insufficient to meet my colleagues to carry out the required activities". These findings concerning time constraints are in line with Potomkova et al. (2010) (34) who reported that the

most frequently stated obstacle against integrating EBP into a medical curricula were extra time requirements. Another factor that may act as a time constraint is that some students were working besides studying.

One of the obvious challenges related to students' cooperation is "Cooperation with my colleagues was insufficient to carry out what is required". Although students were divided into small groups to facilitate more cooperation, this reported statement conveys the message that cooperation was inadequate in relation to the tasks required to be achieved. This might be because of time constraint and absence of well equipped study rooms for students' meetings. This justification is supported by what a literature reports that one of the drawbacks to cooperative learning occurs when the group need to meet outside of class to achieve its tasks, where timing and other commitments may be an issue (18). The teacher might also play a role in the occurrence of this cooperation related challenge. Johnson and colleagues (1991) (35) indicated that one of the teacher's roles for implementing cooperative learning is monitoring and evaluating students' achievements and helping discuss how well they cooperated with each other. In the current study, supervision and monitoring were not adequate due to the time constraint, and the load of the CCN course content and the integrated EBN sessions.

In relation to practicing EBN related activities, formulating a focused clinical question was challenging to the students in a moderate or high level. Students, as beginners in the critical care practice, frequently ask background questions or questions referring to general aspects of a phenomenon (36), for example; what are the criteria for weaning from a mechanical ventilator?. On the other hand, during the CCN course, students were asked to formulate a foreground focused clinical question and specify its four PICO components; consequently this might constitute a challenge to the students. Furthermore, reformulation of the clinical question after receiving the feedback from the teacher or after trying it while searching through the internet for an answer might create a challenge.

Another reason that might make formulating a clinical question challenging is the nature of the critical care practice, in which students may be encountered by many clinical queries and need to take a lot of critical decisions ⁽³⁾. This might be evidenced as the challenge "I found many of the clinical questions that need to be answered" was ranked as the 3rd highest challenge. In accordance with these results, Huang, Lin, and *Demner-Fushman* (2006) ⁽¹⁹⁾ indicated that there are a number of challenges in structuring clinical questions using the

PICO format such as; inability to reconstruct the original question, and inability to encode fine-grained relationship between frame elements.

As regards searching for research evidence, students found the process moderately or highly challenging. This might be due to the fact that searching databases is difficult and sophisticated. This is supported by the literature emphasizing that searching for research evidence is difficult for the students and recommended the presence of a facilitator who has the required search skills to overcome barriers related to searching evidence is recommend (18).

The time constraint factor also might be another cause for searching related challenges, in which, the highly ranked challenge within those related to searching evidence was "Searching through the internet needs a lot of time". This is in accordance with who indicated that searching for research evidence answering the clinical question is time consuming. In addition, slowness while trying to reach the research evidence due to internet, computer, or software related problems can also prolong time required, which was reported by other researches.

Furthermore, challenges related to the searching for evidence may be as a result of students' inability to find different research evidence resources, such as: systematic reviews, meta-analysis, clinical guidelines, and individual articles. This explanation may be evidenced by the reported challenge "I was unable to identify internet research evidence resources" as one of the top 10 challenges. This might be because students learned to search evidence through PubMed database only. Although PubMed database contains a large number of full text articles, many of them are not available free, additionally to inadequate indexing of the database. For example, a MeSH term for the topic of interest might not exist or a relevant article might not be indexed under the intuitive MeSH term (39).

Searching evidence related challenges might be also attributed to the search question itself, if it is not formulated well. This is in accordance to *Ely and colleagues* (2002) ⁽³⁹⁾ who reported that the success of the search may be much more dependent on asking a good focused clinical question than on the searching process itself. Contrary to the current study, one of the major challenges reported by another research is the lack of the computer skills ⁽⁴⁰⁾. In the current study, this was not reported as high or even moderate challenge because most students have an acceptable level of computer skills as they are required to obtain the ICDL certificate as a basic requirement for the bachelor degree. Another difference between the current research and other researches is that others reported lack of computers

(39,40). This was not an obvious challenge in the current study because most of the students have available computers; even those who do not have computers, they can utilize computers available at the faculty computer lab. Moreover, cooperation between the group members might overcome the challenge of unavailable computer devices for some students.

In relation to the top ten highest ranked challenges to integrating EBN into the CCN course, among these challenges two were not discussed in this section. First challenge is "I found many of the clinical questions that need to be answered" which might be because of the fact that students are beginners in their clinical experience in the critical care consequently having a lot of clinical queries, in addition to the nature of the critical care practice (3,39). Second challenge is "The results of practical research cannot be applied in reality" which might be because of the lack of resources in critical care settings, students observed during their training. This is in line with what was reported in a study (2011) (8) conducted at the same critical care settings, where students received their training in.

Limitations: For this study, lack of students' research related knowledge and skills did not allow integrating the step of research appraisal into the course. Another difficulty facing the teacher of this course was inability to evaluate students' interactions within the small group because of the time constraint.

5. Conclusion and recommendations:

In conclusion, integrating EBN into the CCN course had a number of challenges. Most of these challenges were related to the lack of research related knowledge and skills, time constraints, and resistance and difficulty of introducing relatively new EBN related skills to novice students. So, the current study suggested several recommendations. First is giving students their research course as one of the fundamental courses. Second is tailoring the EBN competences over the four years, in a sequence to help students build up their expertise in EBN. Third is efficient time management among different courses schedules, and providing adequate time to practice self-directed learning activities. For the library, it is important to provide adequate training to the librarians on the skills of searching for research evidence, preparing them to play the role of facilitators to this task, not only for the undergraduate students but also for the post graduates students and the faculty members. Moreover, it will be helpful if the library is supplied with well equipped study rooms. In relation to further suggested studies, it is recommended to conduct a similar study on interns and post graduate students. Investigating the effect of

integrating EBN on students' achievement is also recommended.

6. Implications of the research:

Identifying challenges facing integrating EBN into the CCN course will help identifying strategies overcoming these challenges and improving students' learning to EBN practices. When they graduated they will be able to find answers to their clinical queries. Consequently, quality of care and critically ill patient' outcomes will be improved

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Appendix:

Challenges related to students' attitude towards integrating evidence based nursing into the critical care practice:

Ite	m	Mean	Std. Deviation
1.	There is no need to change the practice in critical care units	1.960	0.942
2.	Change is very difficult in critical care units	3.590	1.127
3.	The results of practical research cannot be applied in reality	3.460	1.312
4.	Administration will not allow research application into practice	2.980	0.977
5.	Resources are not sufficient for the application of research in practice	3.740	1.021
6.	Physicians do not cooperate in research application	3.040	1.010
7.	Nurses are not motivated to carry out scientific research	3.590	1.185

Challenges to teaching evidence based nursing

Challenges related to the attitude towards integrating evidence based nursing	Moon	Ctd Daviation
activities into the critical care nursing course	Mean	Std. Deviation
1. Integrating activities of evidence based practice into the course is not of great value	2.110	0.737
2. Integrating those activities into the course makes it not interesting	2.220	0.892
3. Studying evidence based practice does not put us in line with modern principles of nursing practice	1.870	0.619
4. Practicing the activities of evidence based practice does not improve students' scientific level	2.220	0.814
5. Activities required are at a level higher than undergraduate students' level	3.040	1.173
6. Activities required are not considered as a type of self-directed learning	2.240	0.822
7. Participating in these activities is not interesting	2.130	0.833
8. Participating in these activities does not improve nursing decision making skills	2.040	0.893
9. Application of what we learn is difficult when facing a clinical question in the future	1.980	0.683
10. There is a lack of confidence regarding what we learn, and consequently unable to apply it again	1.930	0.879
11. Integration of evidence based practice activities into the course is not important	2.430	1.068
12. It is not recommended to adopt similar courses integrating these activities into them	2.170	0.973
Challenges related to coordination of the critical care nursing course:	Mean	Std. Deviation
1. Time of holding the lecture is not suitable	2.800	1.293
2. I did not attend most of the lectures	3.540	1.168
3. Schedule time of the lecture is inconsistent with the other lectures	2.960	1.282
4. Time was not enough to meet my colleagues to carry out the required activities	3.430	1.241
5. Cooperation with my colleagues was insufficient to carry out what is required	3.220	1.228
6. The activities required did not encourage me to work with my colleagues as a team to achieve them	2.780	1.209
7. Each individual at the team did not carry out activities assigned to him/her	2.870	1.185
8. The results of scientific research were not discussed with my colleagues	2.540	1.130
9. I can not open the e-mail frequently	3.090	1.380

Challenges to practicing evidence based nursing activities in the critical care nursing course:

Challenges related to the formulating a clinical question:	Mean	Std. Deviation
10. I did not know where to start, when formulating the clinical question	3.300	1.171
11. I found it difficult to find a clinical question	3.220	1.134
12. I found it difficult to formulate a clinical question	3.370	1.142
13. I found many of the clinical questions that need to be answered	3.650	1.016
14. Although I found many of the clinical questions, I was confused, whichever is chosen	3.240	1.139
Challenges related to searching for research evidence	Mean	Std. Deviation
1. I was unable to identify internet research evidence resources	3.480	1.169
2. I found many research articles, answering my clinical question	2.780	1.009
3. I do not have necessary skills required for searching researches across the internet	3.280	1.205
4. Searching through the internet needs a lot of time	3.850	0.988
5. Dealing with websites specific to research articles are difficult to deal with	3.300	1.314
6. I have basic skills needed for computer use	2.480	1.295
7. Slow internet connection makes it difficult to obtain the required research	3.300	1.171
8. The cost of Internet and computer use is one of the obstacles to perform the required activities	2.700	1.364

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Barriers and facilitators to research utilization in critical care settings

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Abstract: Basing critical care nursing practice on best research evidence is a key issue for the high standard quality care in critical care settings. However, it has been identified that there is a research -practice gap. Thus, the current study aims to identify barriers and facilitators to research utilization (RU) in critical care settings as perceived by the critical care nurses. This study was conducted at eight intensive care units (ICUs), Main University Hospital, University of Alexandria. Two hundred nurses who were working in these ICUs over the period from 6/12/2009 to 10/1/2010 were included in the study. Barriers and facilitators to research utilization questionnaire was used to identify barriers and facilitators to RU in critical care settings. Study findings shows that RU is challenged in critical care setting by several barriers. A number of facilitators to RU are suggested by the research findings to overcome these barriers. RU is affected by several factors, such as; nurses' age, experience, residence, and level of English language. Therefore, improving nurses' research related knowledge and skills, and adequate organizational support from the critical care setting to RU are the main to strategies recommended to overcome barriers to RU in ICUs. [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(7):145-154].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Barriers and facilitators to research utilization, critical care practice, critical care nursing

1. Introduction:

In critical care practice, where patient's conditions are sophisticated, and are at risk of serious complications and mortality, demonstrating advanced, safe, and effective care is especially important. Thus, interventions based on best research evidence are key issues for critical care nurses (1). RU is the most important piece of the research process. Without such utilization, the research process is simply an exercise in academics. RU is defined as the actual systematic implementation of a scientifically sound, researchbased innovation in a setting with an accompanying process to assess the outcomes of change (2). Currently, the number of critical care nursing related researches grows obviously, however, translating research findings into clinical practice still in its infantile stage and ensuring that they are implemented and sustained remains a challenge (3). Research-practice gap phenomenon is not limited to Egypt; it is known as a worldwide phenomenon ^(4,5). Research-practice gap is attributed to a number of barriers. Funk et al., (6) used Rogers' Diffusion of Innovations model for the development of the structure of tool to assess barriers to RU, called BARRIERS to RU Scale. They correlated the elements of the diffusion model into the structure of the BARRIERS scale, resulting in four major Factors; the adopter, nurse; the organization, setting; the innovation, qualities of the communication, the presentation research; and and/or accessibility of the research (6)

The four interactive factors influencing RU constitute the theoretical framework of the current study, in which barriers and facilitators to RU were categorized according to it. In the current study, the nurse concept in this framework represents the critical care nurse. Setting represents the critical care settings in which nursing activities occur, a specific social system. Setting embodies the processes, relationships, and structures that are contained within an organization. Research signifies innovation. The concept of research in this study encompasses characteristics such as the context in which research is used, the user of the research, the quality of the research itself, and the presentation of the research. These qualities about research may impede nurses from understanding and using research or not. Finally, communication of the research is the process by which participants create and share information with one another in order to reach a mutual understanding (7). It refers to diffusion of the new research related findings from the researcher to the practitioner who then decides to adopt or reject the new idea (8).

Identifying barriers and facilitators to RU in critical care practice is commonly recommended to bridge the gap between research and practice. In Egypt, little is known about nurses' perceptions regarding barriers and facilitators to RU in critical care settings. This research was conducted to study nurses' perception towards barriers and facilitators to RU in clinical settings. This study included only nurses who have a bachelor degree. In addition, it did

not specify what barriers and facilitators to RU were found in critical care settings ⁽⁹⁾. Therefore, this study aims to identify barriers and facilitators to RU as perceived by critical care nurses.

2. Materials and Methods:

Research design: descriptive study design.

Study aim: to identify barriers and facilitators to RU in critical care settings as perceived by the critical care nurses.

Research questions:

What are barriers to RU in critical care settings, as perceived by critical care nurses?

What are facilitators to RU in critical care settings, as perceived by critical care nurses?

Materials

Setting: This study was conducted in the intensive care units (ICUs) at the Alexandria Main University Hospital, in Alexandria University which includes; Casualty care unit (unit I), General (unit III), Triage, Post-operative Cardiothoracic, Chest, Post neurosurgery, Coronary, and Anesthesia intensive care units (ICUs).

Subjects: Two hundred nurses representing all nurses who were working in the previously mentioned ICUs, over the period from 6/12/2009 to 10/1/2010, were included in the current study.

Barriers and facilitators included in each section are classified into the main four categories; nurse, setting, research, and communication related barriers and facilitators. Nurses related barriers/facilitators involve items regarding capability of evaluating the research, appreciating needs to research for change practice, willing to change new ideas, awareness of the value of research for practice etc. Setting related items covers topics

such as, availability of researches, facilities, and time and motivation offered by the organization..... etc. The quality of the research includes items reflecting the strength or weaknesses and applicability of available researches. Communication items focus on the understandability of statistical analyses, clarity of implications for practice, clarity and readiness of the research, availability of research reports/articles readiness, and language of researchetc.

Method:

An official letter was directed from the Faculty of Nursing, Alexandria University to the hospital administrative authorities in order to obtain their acceptance to collect necessary data from the selected settings. Then, the permission was obtained from the hospital administrative authority The study tool was developed based on Funk *et al.* (1991) tool after reviewing the related literature (12,13) and translated into Arabic by the researcher. A pilot study was carried out on 10 nurses who were selected to evaluate the clarity and applicability of the research tool. They were excluded from the total sample, and necessary modifications were done based on their responses. Validation of the tool was assessed by presenting it to five experts from the critical nursing field. Internal consistency reliability (coefficient alpha) was applied (= 0.82).

Informed consent was obtained from each nurse included in the study. The anonymity and confidentiality of responses, voluntary participation and right to refuse to participate in the study were emphasized. The researcher explained to the nurses the objectives of the study orally, in addition, to the written explanations on the covering letter of the questionnaire. The questionnaire was distributed. Nurses were informed to answer it and to bring it back to the administrative office of their respective department. Data were collected by the researcher during the period from: 6 /12 /2009 to 10 /1 /2010. Barriers and facilitators to RU as perceived by critical care nurses were identified using the study tool.

Statistical analysis:

Data were analyzed using Statistical Package for Social Sciences (SPSS) Software Package Version 18.0 (SPSS, Chicago, IL, USA). Quantitative data were expressed using range, mean and standard deviation, while qualitative data was expressed in frequency and percent. Quantitative data was analyzed using student t-test to compare between two categories while F-test (ANOVA) was used to compare three categories or more. P value was assumed to be significant at 0.05

3. Results

Table (I) shows the distribution of the studied nurses according to their characteristics. In relation to studied nurse's age, more than half of studied nurses (62.5%) are between 21 to 30 years old. Ninety-one percent of the studied nurses are living in the city. As

regards the educational level, more than half of the studied nurses (57.5%) are graduated from the faculty of nursing, and 63.5% of the studied nurses are average in English language level. It is found that more than two thirds of the studied nurses (67.5%) have an experience of less than 10 years in ICU.

Table (I): Distribution of the studied nurses according to their characteristics.

Demograph	Demographic characteristics				
Demograph	No. (200)	%			
	> 18- < 20	18	9.0		
Age / years	21 – 30	125	62.5		
rige / years	31 – 40	33	16.5		
	> 41	24	12.0		
Place of residence	City	182	91.0		
	Countryside	18	9.0		
	Secondary nursing school	68	34.0		
Education level	Technical nursing institute	13	6.5		
Education level	Faculty of nursing	114	57.5		
	Post graduate	5	2.5		
	Don't speak	14	7.0		
English language lavel	Weak	20	10.0		
English language level	Average	127	63.5		
	Excellent	39	19.5		
	No experience	5	2.5		
Duration of experience in ICU	10	135	67.5		
/years	11-20	43	21.5		
	>20	17	8.5		

Table (II) demonstrates distribution of studied nurses according to barriers and facilitators to RU. It reveals that the highest barriers scores is related to the setting barriers with mean percent = 79.56% (Mean 35.80 ± 6.89), while the highest facilitators score are in communication and accessibility of the research with mean percent = 81.66% (Mean 28.58 ± 4.97). Studied nurses have a total mean percentage for the barriers equal 76.69% (Mean 130.38 ± 21.36), while for the facilitators are 61.37% (Mean 104.33 ± 16.15).

Table (III) shows the relationship between age and barriers/facilitators to RU. It illustrates that there is no statistical significant difference between age and barriers/facilitators to RU, except for setting and communication and accessibility related facilitators.

The studied nurses who are less than 20 years have facilitators more than other age groups (Mean 17.89±1.81years). Communication and accessibility of research regarding the studied nurses who are less than 20 years have facilitators more than other age groups (Mean 31.50±2.98 years).

Table (IV) shows the relationship between place of residence and barriers / facilitators to RU. It is found that nurses who live in countryside have statistically significant barriers more than whom live in the city. Barriers related to nurses and setting are statistically significant higher in nurses who live in countryside (Mean 33.50 ± 3.97), (Mean 38.44 ± 3.31) than who live in city (Mean 29.51 ± 6.85), (Mean 35.54 ± 7.10) respectively.

Table (II): Distribution of the studied nurses according to barriers and facilitators to RU.

Factor characteristics	Barriers			Facilitators		
	Mean ± SD	Mean (%)	Maxi Score	Mean ± SD	Mean (%)	Maxi Score
Nurses	29.87 ± 6.73	74.68	40	23.78 ± 4.56	79.27	30
Setting	35.80 ± 6.89	79.56	45	16.09 ± 3.25	80.45	20
Quality of research	34.11 ± 5.92	75.80	45	35.89 ± 5.77	79.76	45
Communication & accessibility of research	30.60 ± 5.39	76.50	40	28.58 ± 4.97	81.66	35
Total	130.38±21.36	76.69	170	104.33±16.15	80.25	130

Table (III): Relationship between nurses' age and barriers / facilitators to RU.

			Test of				
Factor charac	Factor characteristics		20 – 30 years	31 – 40 years	41 – 50 years	More than 50	significant
		years				years	F (p)
Nurses	Barriers	27.83 ± 6.03	30.16 ± 6.81	31.85 ± 4.21	27.06 ± 9.16	27.43 ± 7.48	2.208 (0.070)
	Facilitators	25.67 ± 1.68	23.39 ± 4.84	24.48 ± 1.99	22.94 ± 7.58	24.43 ± 1.72	1.384 (0.241)
Setting	Barriers	33.83 ± 8.33	35.78 ± 6.34	37.36 ± 6.87	35.65 ± 7.53	34.14 ± 10.76	0.893 (0.469)
	Facilitators	17.89 ± 1.81	15.83 ± 3.33	16.61 ± 3.07	14.71 ± 3.90	16.86 ± 1.46	2.751* (0.029)
Quality of	Barriers	33.33 ± 7.10	34.34 ± 5.86	34.61 ± 6.22	31.94 ± 5.27	35.00 ± 3.51	0.787 (0.535)
research	Facilitators	38.44 ± 2.20	35.28 ± 6.15	36.45 ± 4.67	35.65 ± 7.56	38.00 ± 1.91	1.571 (0.184)
Communication	Barriers	30.06 ± 8.23	30.68 ± 4.89	31.06 ± 4.35	29.65 ± 7.76	30.71 ± 3.40	0.243 (0.914)
& accessibility of	Facilitators	31.50 ± 2.98	27.96 ± 5.02	28.52 ± 5.17	29.41 ± 5.71	30.43 ± 2.64	2.468* (0.046)
research							
Total	Barriers	125.06±27.97	130.96 ± 20.19	134.88 ± 17.75	124.29 ± 27.86	127.29 ± 20.61	1.051 (0.382)
1 otal	Facilitators	113.50 ± 5.75	102.46 ± 17.00	106.06 ± 13.21	102.71 ± 21.85	109.71 ± 457	2.257 (0.064)

F: F test (ANOVA), *: Statistically significant at p 0.05

Table (IV): Relationship between place of nurses' residence and barriers/facilitators to RU.

	Factor characteristics			Test of significance	
Factor characteristics				t (p)	
Nurses	Barrier	29.51 ± 6.85	33.50 ± 3.97	3.744* (0.001)	
	Facilitators	23.73 ± 4.60	24.28 ± 4.20	0.490 (0.625)	
Setting	Barrier	35.54 ± 7.10	38.44 ± 3.31	3.087* (0.004)	
	Facilitators	16.03 ± 3.38	16.67 ± 1.28	1.628 (0.110)	
Qualities of research	Barrier	33.97 ± 6.07	35.56 ± 3.97	1.529 (0.139)	
	Facilitators	35.82 ± 5.96	36.56 ± 3.24	0.516 (0.606)	
Communication and accessibility of	Barrier	30.54 ± 5.53	31.17 ± 3.84	0.466 (0.641)	
research	Facilitators	28.43 ± 5.14	30.06 ± 2.36	1.322 (0.188)	
Total	Barrier	129.56 ± 21.90	138.67 ± 12.46	2.713* (0.011)	
	Facilitators	104.00 ± 16.63	107.56 ± 9.81	0.889 (0.375)	

t: Student t-test *: Statistically significant at p 0.05

Table (V) presents the relationship between nurses' educational levels and barriers/ facilitators to RU. It shows that there is no statistical significant difference between educational level and barriers / facilitators to RU, except for nurses & setting related barriers. There are statistical significant difference between

education and barriers to RU, in which nurses graduated from health institute have higher nurses and setting related barriers (Mean 33.62 ± 2.47) and (Mean 37.08 ± 4.37) than others.

Table (V): Relationship between nurses' educational level and barriers/facilitators to RU in ICUs.

			Test of significance			
Factor charac	eteristics	Diploma	Health institute	Bachelors Degree	Post graduate	F (p)
Nurses	Barriers	28.24 ± 7.30	33.62 ± 2.47	30.49 ± 6.51	28.20 ± 6.26	3.210*(0.024)
	Facilitators	23.41 ± 4.99	24.85 ± 3.26	23.89 ± 4.52	23.40 ± 1.14	0.413 (0.744)
Setting	Barriers	34.46 ± 6.97	37.08 ± 4.37	36.75 ± 6.68	29.00 ± 10.56	3.488* (0.017)
	Facilitators	16.38 ± 3.33	15.92 ± 3.73	15.95 ± 3.11	15.60 ± 4.51	0.303 (0.823)
Qualities of research	Barriers	32.97 ± 6.17	33.77 ± 4.95	34.77 ± 5.88	35.40 ± 4.39	1.416 (0.239)
	Facilitators	35.69 ± 5.99	36.69 ± 4.33	35.87 ± 5.90	36.80 ± 3.35	0.151 (0.929)
Communication	Barriers	30.15 ± 6.01	31.15 ± 4.38	30.85 ± 5.21	29.60 ± 3.29	0.342 (0.795)
and accessibility of	Facilitators	28.96 ± 4.46	27.77 ± 6.14	28.34 ± 5.21	31.00 ± 2.00	0.723 (0.539)
research						
Total	Barriers	125.81 ± 23.35	135.62 ± 10.87	132.87 ± 20.60	122.20 ± 23.09	2.092 (0.103)
	Facilitators	104.44 ± 16.49	105.23 ± 15.55	104.04 ± 16.42	106.80 ± 7.85	0.065 (0.979)

F: F test (ANOVA) *: Statistically significant at p 0.05.

Table (VI) shows the relationship between level of English language and barriers /facilitators to RU. There are statistically significant differences between level of English language and barriers,

except for the qualities of research related barriers. In addition, there is no statistical significant difference between English language and facilitators, except the qualities of research related facilitators.

Table (VI): Relationship between nurses' English language level and barriers/facilitators to RU in ICUs

		Level of English language				Test of significance
Factor char	Factor characteristics		Weak	Average	Excellent	F (p)
Nurses	Barriers	29.21 ± 5.85	26.30 ± 9.31	30.72 ± 60.10	29.18 ± 7.00	2.802* (0.041)
	Facilitators	24.57 ± 1.95	22.00 ± 6.40	24.08 ± 4.16	23.41 ± 5.21	1.434 (0.234)
Setting	Barriers	33.71 ± 7.60	32.85 ± 10.05	36.72 ± 5.32	35.08 ± 8.66	2.602* (0.053)
	Facilitators	17.71 ± 1.82	15.40 ± 3.47	16.06 ± 3.28	15.92 ± 3.35	1.518 (0.211)
Qualities of	Barriers	35.29 ± 5.73	32.80 ± 6.83	34.43 ± 5.50	33.31 ± 6.81	0.873 (0.456)
research	Facilitators	37.93 ± 4.43	32.25 ± 6.94	35.99 ± 5.16	36.67 ± 6.77	3.625* (0.014)
Communication	Barriers	30.79 ± 4.81	27.45 ± 8.94	31.39 ± 4.54	29.56 ± 5.26	3.835* (0.011)
and accessibility	Facilitators	30.50 ± 2.82	29.80 ± 4.53	27.91 ± 5.27	29.44 ± 4.48	2.284 (0.080)
of research						
Total	Barriers	129.00 ± 18.30	119.40 ± 33.14	133.26 ± 17.14	127.13 ± 25.50	2.934*(0.035)
	Facilitators	110.71 ± 9.06	99.45 ± 19.71	104.05 ± 15.83	105.44 ± 16.81	1.422 (0.238)

F: F test (ANOVA) *: Statistically significant at p 0.05

Table (VII) the relationship between nurse's experience in ICUs and barriers / facilitators to RU. It shows that there is no statistical significant difference

between nurse's experience in ICUs and barriers to RU, except quality of research related barriers. There are nurses no experience have higher barriers (Mean and SD = 38.00 ± 3.46) than others.

Table (VII): Relationship between nurse's experience and barriers /facilitators to RU in ICUs

Factor chara	Factor characteristics		Nurse's experien	ce in ICUs / years	S	Test of significant
			10	>10 - 20	>20	F (p)
Nurses	Barriers	29.20 ± 1.79	30.38 ± 7.23	28.72 ± 5.69	28.94 ± 5.78	2.320 (0.058)
	Facilitators	25.40 ± 1.82	23.21 ± 5.26	24.70 ± 1.28	25.41 ± 3.62	1.304 (0.270)
Setting	Barriers	37.20 ± 2.95	36.16 ± 6.28	34.42 ± 8.43	36.00 ± 8.06	0.772 (0.511)
	Facilitators	17.00 ± 1.87	15.88 ± 3.58	16.47 ± 2.63	16.47 ± 1.91	0.582 (0.628)
Quality of	Barriers	38.00 ± 3.46	34.53 ± 5.79	31.88 ± 6.85	35.24 ± 2.93	3.288* (0.022)
research	Facilitators	37.60 ± 1.67	35.59 ± 6.43	36.40 ± 4.26	36.47 ± 4.02	0.436 (0.728)
Communication	Barriers	33.60 ± 5.22	30.81 ± 5.68	29.14 ± 4.77	31.71 ± 3.80	1.903 (0.130)
and accessibility of	Facilitators	28.20 ± 4.15	28.33 ± 5.29	28.91 ± 4.31	29.82 ± 4.17	0.533 (0.660)
research						
Total	Barriers	138.00 ± 8.92	131.89 ± 21.54	124.16 ± 22.95	131.88 ± 15.64	1.696 (0.169)
	Facilitators	108.20 ± 4.21	103.01 ± 18.30	106.47 ± 10.20	108.18 ± 10.65	0.966 (0.410)

F: F test (ANOVA) *: Statistically significant at p 0.05

Table (VIII) shows the top ten barriers to RU. It demonstrates that most of barriers are related to the setting. In addition, the highest barrier is "administration will not allow implementation and members of the staff are not supportive of implementation in setting related barriers with mean percent equal 82.70%, 82.20 %. While the lowest barriers were the research is not reported clearly and readably with mean percent equal 79.70%.

F C: Factor characteristics, N:Nurse, S:Setting, Q:Quality of research, C:Communication & accessibility of research.

Table (IX) shows the top ten facilitators to RU. It illustrates that the highest values are presented for strengthening higher education and increasing the base to knowledge research in communication and accessibility of research related facilitators with mean percent equal 82.90%. While the lowest values are strengthening of administrative support and encouragement for the use of scientific research in nurses related factor with mean percent equal 80.90%.

Table (VIII): Top ten barriers to RU in ICUs:

Rank	F C	Top ten Barriers	Mean ± SD	Mean (%)
1	S	Administration will not allow implementation	4.14 ± 0.96	82.70
2	S	Other staff are not supportive of implementation	4.11 ± 1.06	82.20
3	S	Does not have support from immediate superiors in the work	3.90 ± 1.03	82.20
4	S	There is insufficient time to read research and implement new ideas	4.03 ± 1.04	80.50
5	S	Lack of financial incentives for the application of scientific research	4.09 ± 0.94	80.50
6	S	Physicians will not cooperate with implementation	4.02 ± 0.95	80.40
7	Q	The conclusions drawn from the research are not justified	3.82±0.93	80.40
8	Q	The literature reports conflicting results	3.90 ± 0.92	80.30
9	N	The nurse is isolated from knowledgeable colleagues with whom to discuss research	3.99 ± 1.09	79.80
10	C	The research is not reported clearly and readably	3.99 ± 0.92	79.70

FC: Factor characteristics, N:Nurse, S:Setting, Q:Quality of research, C:Communication & accessibility of research.

Table (IX): Top ten facilitators to RU in ICUs.

Rank	F C	Facilitators	Mean ± SD	Mean (%)
1	C	Increase the base to knowledge research	4.15 ± 0.80	82.90
2	С	Translating articles and scientific research of the Arabic language easy to read and benefit from	4.14 ± 0.83	82.70
		the results		
3	C	Sessions to increase awareness of nurses to research methods	4.13 ± 0.84	82.60
4	S	Provide incentives for creativity and new ideas based on scientific research	4.11 ± 0.90	82.10
5	S	Translations of articles and research findings to read and study	4.09 ± 0.87	81.80
6	С	To hold regular meetings where the exposure of nursing research and utilization of the results	4.07 ± 0.98	81.40
7	С	Providing workplace libraries containing the most important research in nursing to develop skills	4.06 ± 1.04	81.20
8	N	Encourage the medical team to apply the results of scientific research	4.06 ± 0.98	81.20
9	Q	Justify the conclusions in the end of the search in an appropriate manner and understandable	4.06 ± 0.83	81.10
10	Q	Strengthening of administrative support and encouragement for the use of scientific research	4.05 ± 0.74	80.90

F C: Factor characteristics, N: Nurse, S: Setting, Q: Quality of research, C: Communication and accessibility of research.

4. Discussion:

In order to keep nursing professional skills and competencies up to date, critical care nurses are required to follow the latest research evidence and apply the knowledge generated to develop their own work. A strategy commonly recommended for bridging the gap between research and practice is to identify barriers to RU and identify strategies that account for barriers (14). Therefore, this study was conducted to assess barriers and facilitators to RU as perceived by the critical care units' nurses.

The study results discussed in the following section are composed of the detected top barriers and facilitators to RU in ICUs and their relationships with nurses' socio-demographic characteristics as perceived by critical care nurses.

Regarding barriers and facilitators to RU, it was found that critical care nurses perceived that they are challenged by a large number of barriers to RU in critical care settings which in turn needs a lot of facilitators to overcome. This may be because the culture of integrating research evidence into the

clinical practice in our hospitals is at the infancy stage, and actually most of nursing practices are based on their experiences and not on research findings. On the other hand, Oh's study (1) in Korea found that nurses perceived that there are few barriers to RU. This might be because nurses in Korea have more positive culture towards RU and their hospitals have facilities that support the integration of nursing research into practice, evaluate them within the real clinical environment, provide nurses with the consultation and support regarding research methods and statistics, and set guidelines to follow in clinical areas. Consequently, the great support to RU in health care settings, where Oh's study was conducted, resulted in few barriers to RU.

Regarding the top ten barriers to RU, it was found that the first six barriers are related to the setting. These results are in line with a study conducted in Egypt which it was found that setting related barriers were ranked as the top barriers to RU ⁽⁹⁾. Furthermore, Yava *et al.*, ⁽¹⁵⁾, Fink *et al.*, ⁽¹⁶⁾, and Glacken and Chaney, ⁽¹⁷⁾ reported the same results in

which nurses perceived setting related barriers as the highest cited barriers to RU. Among setting related barriers that come at the top ranking are; the administration do not allow the implementation of research findings, health team members are not supportive and cooperative to nurses to implement research results, nurses have no support from immediate superiors, time is insufficient to read research and implement new ideas, and financial incentives for the application of the scientific research are lacking. These findings may be because the setting in the current study has limited financial and human resources. First, the limitation of the financial resources leads to a difficulty in applying the study findings which may need extra- equipment and materials, an absence of incentives for the application of researches, and an absence of financial support to fund accessing full-text nursing articles or even a library containing up-to-date textbooks. Second, the shortage of the staff members may limit nursing staff time to read and apply research findings and hinder the administrative authorities and other health team members to support nurses to utilize research evidence. This is in alignment with a number of other studies in which nurses perceived the limitation of nursing time to read and integrate research evidence into practice among the most important barriers to RU $^{(9,\,15,18)}$.

On the other hand, a research finding indicated that the nurses' lack of interest and their inadequate reading habits are seen sometimes more important issues than the lack of time. In other words, lack of time may be an accepted excuse, when there is no lack of interest, lack of need, or lack of knowledge"(11). Another cause that may place setting related barriers among the top barriers to RU may be the absence of a policy for RU in these settings. The current study shows that there are many suggested facilitators to RU. Critical care nurses might suggest a large number of setting related facilitators among the top suggested facilitators to RU because they perceive that setting related barriers are placed at the top ten barriers to RU. Among the suggested facilitators are organizational support through providing translations to the articles and research findings written in English, and offering incentives for creativity and new ideas based on scientific research are cited among the top ten facilitators to RU.

Following setting related barriers to RU is the quality of research related barriers which include; the conclusions drawn from the research are not justified, and the literature reports conflicting results. These perceptions of the nurses regarding research related barriers may be attributed to the lack of research-related nurses' knowledge as practical

nurses do not receive any research related studies while they are studying at their schools. Even, nurses with bachelor degrees do not receive research related courses after their graduation except for, those who register for post-graduate studies. Lack of research related knowledge makes nurses unable to understand research findings or evaluate their quality, even, if those researches are written in a good quality (10, 19-21). To overcome these barriers, nurses in this study suggested a number of research quality related facilitators that come at the top ten facilitators to RU, including; justifying the conclusions in the end of the search in an appropriate and understandable manner.

One of the ten highly ranked barriers to RU, in this study, is a nurse related barrier. This barrier is that the nurse is isolated from knowledgeable colleagues with whom to discuss the research findings, which was marked as a great barrier to RU by the majority of the critical care nurses. This item can be interpreted in various ways. Firstly, it may reflect nurse's need of knowledge and guidance while attempting to interpret research findings. Secondly, it may indicate that nurses do not have a negative attitude regarding RU; they just need the educational support. One of the ten highly ranked barriers to RU. in this study, is related to research communication; the research is not reported clearly. Unfortunately, most of the critical care nursing researches are conducted by the academic staff at the nursing faculties, and the communication between those researchers and the nursing practitioners is lacking. This lack of effective communication may occur because there are dissimilar beliefs, and education ⁽⁷⁾. They do not see each other or speak the same language (22). So, the research may appear difficult to understand by nurses or the study results may not meet the real needs of the clinical practice. The lack of nurses' knowledge regarding scientific research also widen the gap exists between the practical nurses and the scientific researches, additionally to the absence of translated researches from English to Arabic as about half of the nurses in this study stated that the English language in research articles is considered as a great barrier to RU. This is in line with another publication in Turkey (2009) (15) which stated that the nurses' English language skills are relatively low. However, most of the high-quality nursing studies are published in English language.

Therefore, half of the highly ranked facilitators to RU as perceived by nurses were related to research communication, including; increase the knowledge base to research, conducting sessions to increase nurses' awareness to research methods, translating articles and scientific researches to the Arabic language, holding regular meetings to expose nursing research and the utilization of the results,

providing libraries at the workplace containing the most important and updated researches in critical care nursing necessary to develop nurses' skills (23, 19, 21).

Furthermore, the proposals to produce scientific journals especially for nurses expose an unawareness of what is available. The fact that many nursing journals in the field of nursing research have been available for many years is still unknown to some nurses participating in this study. This evidence agrees with their opinion that research is not readily available and it reveals that these nurses are unaware of the resources in their educational institutions where they received their education. Regarding barriers related to research access, about half of the sample doesn't have a well command of English language or computer skills and most of the nurses said they do not have a computer in the unit, where they work. So, it is difficult for them to reach published updated researches.

The following section will discuss the identified nursing characteristics and their relations to barriers and facilitators to RU. Regarding nurses' age, there are statistical significant differences between nurses' age and the facilitators related to settings, communication and accessibility of research. It is found that younger nurses have perceived that there are a lot of facilitators needed to RU rather than older ones. This may be because younger nurses are more overloaded than older. Older nurses usually carry out only the administrative tasks, or even do not carry out several tasks, and may not take evening or night shifts. Work overload and limited time may prevent younger nurses from accessing research or finding time to contact academic researches. In addition, most of setting support such as attending scientific meetings is for older nurses who have managerial position. These results are opposed by Yava et al., (15) study conducted in Turkey. This study showed that the perception of Turkish nurses is not influenced by their age. This may be attributed to the difference between tasks assigned to the nurses in both settings of the two studies, furthermore, in our ICUs, older nurses are usually the nursing managers which may be not the case in other countries where nurses with higher educational and research related activities are usually the mangers (15).

In relation to the place of residence, the present study reveals that the majority of the studied sample includes nurses who are living in the city. Moreover, nurses who live in countryside have a statistically significant perception that they have more barriers to RU than those who live in the city. This may be because nurses who live in the rural areas have higher number of obstacles for the application of research results than others, where it is difficult for them to access the internet and research

articles, and their time and efforts may be consumed each day in transportation to reach their work place in Alexandria where the hospital is present. Therefore, they do not have the time or the effort to apply research findings into practice and perceive a higher number of barriers to RU than others. In relation to the level of English language, the present study reveals that most of the studied nurses either do not speak, speak weak, or average speak English. Moreover, there is a statistical significant difference between the level of English language and barriers to RU. This may be because accepted level of English language is important to the nurses' ability to search the internet and understand the published researches which are always in English. These results are supported by the studies conducted by Yava et al., (15), and Kajermo (11), in which, nurses perceived the English language in research articles as a great barrier to RU.

In relation to the level of education, the present study reveals that more than half of the critical care nurses have bachelor degrees and/or post graduate studies. Moreover, there are statistical significant differences between educational level and nurses and setting related barriers to RU, in which nurses graduated from health institutions have more nurses and setting related barriers and suggest a lot of facilitators to RU than nurses who are receiving postgraduate studies. This may be because nurses graduated from the health institutions have no adequate knowledge and skills about scientific research, how to access research and research critique. In addition, ICU settings in the current study do not provide research related education for those nurses. So they perceive that they have more barriers than other nurses in present study. These results are supported by Kajermo, (11) in which more than half of the nurses had their basic nursing education before the introduction of research related issues into their curriculum.

Regarding the nurse's experience, the present study reveals that there is no statistical significant difference between nurse's experience in ICUs and barriers and facilitators to RU, except for the quality of research related barriers. Nurses who have no experience have higher barriers to RU than others. This is may be because a large portion of the study sample is young aged nurses. Younger nurses are usually more involved in bedside nursing care than older. They may be faced by many clinical queries and questions that need answers from research articles. Consequently, they may be challenged with more research related barriers than older nurses. In addition, they may not receive any research related education after their employment. These results are opposed by Yava et al., (15) study, in which the perception of nurses is not influenced by factors such as years of professional experience, because the majority of studied nurses in their study have high professional experience in nursing care compared with our study sample.

5. Conclusion and recommendations:

In brief, despite the move towards RU, the current study shows that critical care nurses are challenged by several barriers hindering RU and a large number of facilitators to RU are suggested also by the research findings to overcome these barriers. The majority of the highly ranked barriers to RU are categorized as setting related barriers, followed by quality, nurses, and communication and accessibility related barriers, while, the majority of the suggested facilitators to RU are related to communication and accessibility of the research, followed by setting, nurse, and quality of research related facilitators. Moreover, barriers and facilitators to RU are affected by a number of factors, such as; nurses age, experience, residence, and level of English language.

So the current study recommends conducting trainings and workshops raising nurses' awareness on the importance of RU and the research process and methodology. The critical care settings have to give adequate support to RU through providing libraries at the workplace containing the most important and updated researches in critical care nursing. Significant recent research articles have to be translated into Arabic. Moreover, conducting scientific meetings between nurses and researchers will foster communication, motivate nurses to utilize research and assist researchers to define their future questions based on the real clinical queries in critical care settings. Finally, further researches have to be conducted in order to develop and test various strategies fostering RU.

Implication of the research:

Detecting barriers to RU and applying strategies facilitating it will participate in bridging the gap between research and practice. Moving nursing practices in critical care settings from basing them on nurses' experiences, knowledge and skills, which are usually outdated, to basing them on recent research evidence. Consequently, high standards of quality care will be enhanced, patients' safety will be ensured and their outcomes will be improved.

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Diet manipulation could influence liver Polyunsaturated and mono unsaturated fatty acids of Azerbaijan native turkeys?

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Abstract: An experiment was performed to study canola oil on the Polyunsaturated and mono unsaturated fatty acids of Iranian native turkey liver. Nine male turkey chicks randomly divided into three experimental treatments (Three levels of canola oil; 0, 2.5 and 5 percent) with three replicates were arranged in a completely randomized design. Experimental diets consisted of: Basal diet with 0, 2.5 and 5 percent of canola oil. Application of canola oil could decresed mono unsaturated fatty acids and increased Polyunsaturated fatty acids content and usage vegetable oils one of the ways to increased animal tissue quality and this status has direct effects on the human health.

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Keywords: Canola oil, Iranian native turkey, PUFA, MUFA, liver

1. Introduction

The studies show that feeding growing poultry with rich sources of polyunsaturated fatty acids resulted in their subsequent incorporation into carcass lipids. Leskanich and Noble [1997], Wood and Enser [1997], Wenk et al. [2000], and more recently by Gonzales Esquera and Leeson [2001], As could be expected, fatty acid profiles of tissue fat closely reflected those of the dietary fat. As indicated by Leskanich and Noble [1997], marked changes in muscle. The beneficial effects of the n-3 polyunsaturated fatty acids have been demonstrated by numerous reports. Vegetable oils with high levels of n-3 fatty acids could help to enrichment of animal tissues. Some authors (Nuernberg et al, 2005, Wood et al., 2003) revealed the possibility to increase the concentration of beneficial omega 3 fatty acids in animal tissues by using various types of oleaginous sources. The DHA and EPA are synthesized from the n-3 precursor a-linolenic acid (ALA; 18:3), whereas long chain n-6 PUFA such as arachidonic acid (AA) are synthesized from the precursor linoleic acid (LA; 18:2). The ALA and LA are essential to the human diet because neither is synthesized endogenously by humans, and the n-3/n-6 families cannot be inter converted. In theory, the ability to convert ALA to EPA and DHA means that humans have no need for an exogenous supply of these fatty acids (Budowski, 1988).. Gerster, 1998) Sanders & Roshanai, 1983). The objective of this experiment was to evaluated canola oil effect on the liver poly and mono unsaturated fatty acids of Iranian native turkey liver.

2. Materials and methods

Nine male native turkey chickens were distributed in a completely randomized design (three level of canola oil 0.0, 2.5, 5.0 percent) with three experimental units each (ten chicks/pen). The experimental diets formulated isonitrogenouse and isoenergetic, accordance with the 1994 recommendations

of the National Research Council (table 1). The birds were given access to water and diets ad-libitum. The composition and calculated nutrient composition of the treatment diet is shown in Table 1. At the end of the growing period the number of two pieces from each pen randomly selected and slaughtered with cutting the neck vessels and experimental samples from each liver tissue samples prepared and sent to the laboratory at temperature -20°C below zero were stored and the composition of fatty acids present in the samples (Table 2) was determined by gas liquid chromatography, according to Folch et al (1957)[6].

Statistical Analysis

The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 8.2 [7]. The Duncan mean separation test was used to determine significant differences between mean values.

3. Results and discussion

1. Result of Least square means for PUFA and MUFA fatty acids profile of turkey liver are shown in table2. Mono unsaturated fatty acids include C16:1 n7 and C18:1 t11 significantly affected canola oil levels on the diets. C16:1 n7 significantly from 7.7331 percent in control group reached to 5.5392 and 4.8216 percent in experimental treatments and between to levels of oils were not significantly difference. C18:a t11 fatty acid with descending rate significantly decrease in treatment with 2.5 and 5 percent canola oil and from 1.6506 percent in control group reached to 0.1989 and 0.6826 percent in experimental treatment, respectively. Other MUFA fatty acids include C18:1 n-9 and C20:1 n-9 was not statistical difference between experimental treatments.

TABLE 1. Percentage composition of experimental diets in four period

-		4 -8 week		8	3 - 12 wee	k	1:	2 - 16 wee	k	1	6 - 20 wee	ek
Ingredients'	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 nut	rient conte	ent										
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

Table 2: Least square me	eans for PUFA and MU	FA fatty acids profile	of turkey liver		
		Canola oil levels			
	control	2.5	5	P value	SEM
C16:1 n7	7.7331 ^a	5.5392 b	4.8216 ^b	0.0084	0.4426
C18:1 n9	15.8208 a	16.8833 ^a	14.9218 a	0.1328	0.5792
C18:1 t11	1.6506 ^a	0.1989 ^b	0.6826 ^b	0.0174	0.2528
C20:1n-9	1.8905 ^a	1.7975 ^a	2.1554 ^a	0.2368	0.4801
C18:2	2.7771 a	3.1978 ^a	3.0373 ^a	0.5536	0.2629
C18:2 Trans t12	1.0081 ^a	1.4547 ^a	0.5438 ^a	0.4942	0.5116
C18:2n6Cis	4.2921 ^c	8.5931 ^b	9.7358 ^a	0.0001	0.1855
C18:3 n-3	4.2234 ^b	7.5523 ^a	7.9896 ^a	0.0008	0.3843
C20:5n-3	2.8420 a	2.3210 a	2.5000 a	0.8729	0.7111
C22: 4n-6	7.7425 ^a	8.0057 ^b	9.0928 ^a	0.0290	0.2756
C22:5 n-3	3.3204 ^b	7.2176 ^a	8.0682 a	0.0004	0.4136
C22:6 n-3	3.0300 ^a	2.6379 a	3.4254 ^a	0.4450	0.4089
MUFA	26.095 a	24.419 ab	22.581 ^b	0.0446	0.7532
PUFA	29.236 ^b	40.980 ^a	44.393 ^a	0.0016	1.6733

A number of studies have been carried out in the past to 45 modify the fatty acid profile of meat products especially by addition of vegetable oil (Bloukas et al., 1997; Muguerza et al., 2002 Jimenez-Colmenero et al., 2010; Lopez-Lopez et al., 2009). These experiment results agree with other researcher report. About PUFA fatty acids results show that C18:2n6Cis fatty acid from control group with 4.2921 significantly reached to 8.5931 and 9.7358 percent in experimental treatments, and for C18:3 n-3 according to result were shown canola oil could significantly change this fatty acid and from 4.2234 percent increased and reached to 7.5523 and 7.9896 percent in experimental treatment, respectively. C22: 4n-6 fatty acid from 7.7425 in control group significantly reached to 8.0057 and 9.0928 percent, and C22: 5n-6 fatty acid with significant rate from 3.3204 percent reached to 7.2176 and 8.0682 percent. Total of MUFA significantly influence of canola oil and with descending rate significantly decreased and respectively reached to 24.419 and 22.581 percent for experimental treatments. PUFA fatty acids its beneficial fatty acids and increase that's its good for improved animal products quality, application canola oil could significantly increased PUFA and from 29.236 percent reached to 40.980 and 44.393 percent. Some authors (Nuernberg et al, 2005, Wood et al., 2003) revealed the possibility to increase the concentration of beneficial omega 3 fatty acids in animal tissues by using various types of oleaginous sources. The addition of carefully selected oils can reduce the saturated fatty acid content and increase the PUFA content (omega-3) (Jimenez-Colmenero, 2007). A variety of plant derived oils such as olive, flaxseed, canola, etc. and marine derived fish oil and algal oils have been used to modify the fatty acid profile of animal tissues (Jimenez-Colmenero, 2007). Application of canola oil could improve MUFA and PUFA content and usage vegetable oils one of the ways to increased animal tissue quality and this status has direct effects on the human health.

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Accountability in public Administration

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Abstract: Nowadays, one of the basic subjects of plans of development in various countries is the development of the Administrative system structure and behavior for performance improvement and the increasing of accountability in public administration. In the recent citizen – oriented world the creation of accountable and efficient government is one of the modern approaches and strategies in public administration. Considering strategic importance of creation and developing accountable government, the present paper at the framework of fundamentals and theories of accountability in public administration, first it presents the Necessity and the importance of developing accountable government and then Explains the definition, the proposes, the approaches, the types, the equipments and the dimensions of accountability in public administration respectively, then accountability in public sector with private sector and also have been compared to accountability in traditional model with new model of public administration and finally the correlation of government accountability with the process of making administrative system democratized and client's satisfaction has been studied.

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Keywords: Accountability, Citizen Focus, Development of Administrative system, Performance Management, Client's satisfaction, Public Organizations.

1. Introduction

Because of today's existence philosophy and main Prophecy of governments that is, public affairs management, development planning and meeting public interests, then government management should supply Material and Immaterial demands of citizens by producing appropriate and high quality services and commodities and also take accountability in front of their political demands. In this age, which is so-called customer-oriented and citizen-oriented period, governments should acquire public satisfaction and trust bv appropriate accountability to them. Otherwise, public dissatisfaction lead to various Crisis like public trust Crisis, system Legit Imation Crisis, public participation Crisis, most important integrity and convergence Crisis in community. These Crises, while reducing performance and effectiveness of political and administrative system, lead to Disconnect and crisis in development process. In today's competitive world, one of main goals of administrative system change is optimization of performance and accountability increase at government division. Pollitt & Bouckaert (2000) suggested that "administrative and managerial changes lead to government cost reduction and higher quality services for public. Thoughtful persons believe that government performance and accountability optimization among of

strategic factors in successful and sustainable government organizations. They think that establishing total quality management system (TQM) in government division one of approach which lead to continuous optimization of accountability and performance of government organizations (Dixon, 1997). Optimization of accountability and performance of government organizations lead to higher competitive capability, productivity, job satisfaction and client satisfaction (Phelps & et al, 2003). In globalization age, by technology advancement and higher rate of communication and value and culture change and new political demands in public had affects on administrative change process. Because of These events, change converted to exterior matter from interior matter and it is necessitate for government to take accountability to public. In these situations, governments should observe people community at new perspective and as private part clients and try to acquire their maximum satisfactory. From Thoughtful persons view, each government needs an accountability system to act in a manner which acquire public acceptance. Accountability is base of any government which claims for democracy. In other word, democracy Prerequisite having an accountability appropriate system. Owen E.Hughes (2003) compare relationship between

public and government with "Thoroughbred-Attorney" because in fact, public had agreed operation of community by another one in lieu of them. But they should be sure that their interests have been respected. He believe that government organization create by people and by them and must accountable to them. Lack of accountability means converting government and bureaucracy to absolute power and dominates to all affair and move to Decay. Government accountability to different fields certainly lead to increasing performance and Discipline of government system and reducing abuse opportunities from government resources. Of course prerequisite of accountability is that auditor organization or person has enough power in front of respondent one. History shows that at any period's communities encountered with accountability to public interests and requirements. But in this age and in regard of education and information development and increasing social awareness and political vision of nations, it is more pressure on governments to respond to their people (World Bank,).

- **2.** Accountability definition and concept "Accountability" has various definitions including:
 - Accountability means describing why and how works done and what is its results?
 - Accountability means describing activities and behaviors to legal references.
 - Accountibility means some kind of necessity sense in person or social system for describing reasons of accomplishing of certain measure.
 - Accountability simply means examining someone or an organization's performance which have assigned responsibility.
 - Accountability is a multidimensional concept which relate to all fields like political, public service and private divisions (Rose & Lawton, 1999).

For understanding accountability concept, following cases should be noted:

- Accountability isn't responsibility because some peoples may accept any responsibility but meanwhile hasn't any accountability sense.
- Accountability sense isn't work Conscience in work Conscience sense, interior power take effect which originate from ethical, religious or

social attitudes, but in accountability sense we encounter some kind of behavioral attitude which mainly originate from exterior factors like legal alerts and social provisions.

3. Purposes of government accountability

In general, Purposes of government accountability including:

- V Accountability as a means for power controlling: in every system s, process and mechanisms have been predicted for supervision of applying government power application which include government accountability to increasing demands of informed citizens, organizations, stockholder groups, media
- V Accountability as a guarantee for correct using of public resources: Most important aspect of accountability is that people make sure that correspondent do not exceeds of laws and public service value in applying and optimum using of public resources.
- Accountability as means for government service optimization: in despite of last 2 cases, which often indicate to negative and punishment aspects of accountability, accountability as means for advancement and continues optimization of services point out to positive aspect of government services.

4. General accountability procedures

McGarvey (2001) believes that mitigating difficulties and complexities of general accountability is possible just by adopting multi-dimensional analytic framework. From his view, accountability in government division has various procedures and perspectives, including:

1. The Traditional Perspective:

Traditional Perspective of general accountability is simple type of accountability with chain of accountability from official to official, from official to ministry, from ministry to parliament, from parliament to public. This concept supported by Weberian.

2. Democratic Perspective:

Democratic Perspective which closely related to Traditional Perspective, emphasis on affect of democratic political system on government accountability.

3. Professional Perspective:

This procedure, which so-called non political perspective for accountability, state that knowledge and skills and capabilities of people

and organizations increase via learning and education and it in turn enhance accountability.

- 4. management-oriented Perspective: In this perspective, accountability involve explicitly goal setting. This perspective emphasis on directly accountability of managers to users of public services.
 - 5. The Governance Perspective:

The Governance Perspective emphasis on effectiveness, and how government performing duties for increasing accountability.

6. The Regulatory Perspective:

The Regulatory Perspective emphasis on increasing control and supervising and regulation of laws by government. In accordance to Regulatory Perspective, no longer have accountability regulated via managerial relation in hierarchical structures, but it regulate via public auditors, professional WARDENs.

7. The Rational choice Perspective:

This procedure emphasis on individual political strategies, physiological and behavioral factors of public managers in increasing accountability (McGarvey, 2001).

5. Types of governmental accountability From different perspectives, government accountability has various classifications, including:

a. Types of accountability from Owen E.Hughes (2003) view:

From Owen E.Hughes (2003) view, it is to related accountability which is:

1-political accountability: this means elected government to voters.

2-managerial accountability: this means burocreatic accountability to elected government.

b. Types of accountability in Richard Heeks (1998) view:

Richard Heeks (1998) classify accountability to 6 classes:

- 1. Organisation accountability for high level government managers
- 2. Legal accountability for panel staff
- 3. Professional accountability for expert groups
- 4. Public accountability for citizens and customers
- 5. Financial accountability for government budgeter
- 6. Political accountability for policy makers (Heeks, 1998).
 - c. Types of accountability from Romzek (1994) view:

In Romzek (1994) model, classified government accountability to 4 classes (table 1).

Table 1. Accountability systems in terms of value and behavioral expectation from Romzek view

Types of Accountability	Intended value	Behavioral expectation
Organizational	Performance and productivity	Obey from organizational orders
Legal	Law enforcement	Accountability to exterior orders
Professional	Expert science	Respect to judgment and special knowledge of people
Political	Accountability	Accountability to organization owners (people, parliament, etc.)

d. Types of accountability from others view:

In another classification, accountability has 2 lasses:

1. Vertical accountability:

Individual or administrative unit Accountability to higher level person or unit

2. Horizontal accountability:

Accountability of government system to public and people representatives From another perspective, accountability has 2 classes:

First. Direct accountability: in this type of accountability governments inevitably describe and justify their activities for people from media

Second. Indirect accountability: in this type of accountability, government respondents describe their activities to people representatives indirectly

6. Different mechanisms in government division

Generally, Figure 1 indicates various accountability mechanisms for super visioning on government performance (implementing and administrative systems.)

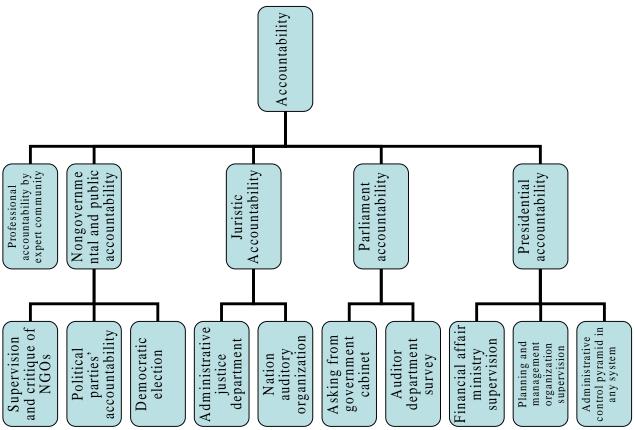


Figure 1. Various mechanisms for accountability and supervision on government performance

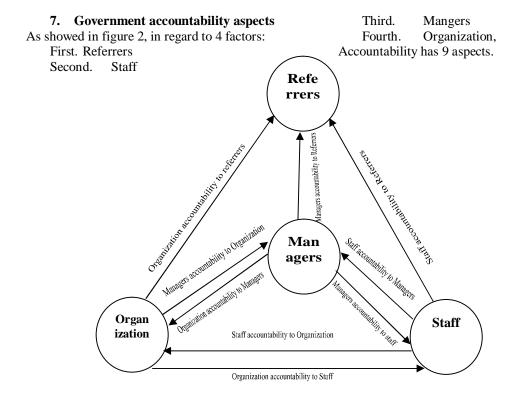


Figure 2. Accountability aspects in government organization

As we see, relation and accountability of the three factors (organization, staff, mangers, referrers) with each other is as mutual relationship but relation and accountability of each of this factors with referrer is Unilateral relationship.

8. Difference between government accountability and private accountability

Accountability is not limited to government division. In accordance to "accountability theory", anyone who does something in lieu of an individual or group should report to this individual or group or take responsibility in front of them with any means (Owen E.Hughes, 2003). But accountability in government part has some difference with accountability in private division. People often think that government part has lower accountability than private division and it is one of reasons for their downsizing. In their opinion, assigning commodities and service supply to private division lead to optimization of services and performance via accepting prevalent accountability mechanism at private division (E.Hughes, 2003). In accordance Thoroughbred- Attorney theory or ownermanager, accountability in government division and particularly at public institutions naturally deficient compared to private division. It means that aside to economic reasons; weak accountability of government division is a Justification for lowering power of bureaucracy and Tendency to privatization (E.Hughes, 2003).lacking political accountability in private division like government division is another difference between accountability in these two.

9. Differences of accountability in traditional pattern and modern government management pattern

In traditional pattern of government management, because of pyramid structure, bureaucracy and product-oriented organization structure. customers and citizens are not in first priory and then this pattern's final goal is increasing productivity. In traditional pattern for public affair management, because of focusing on bureaucracy,, accountability system is weak. In accordance to current theories, pyramid and traditional structures by creating fear and stress decrease innovation and deteriorate organization performance (Johnson, 1995). E.Hughes believes that one of reasons of modern government management pattern acceptance, which developed in early 1990s, is failure of traditional pattern. in this new pattern, accountability is more transparent, dynamic and political than traditional pattern (E.Hughes, 2003).another change in accountability system in modern management pattern is b optimization of relationship with customers and citizens via customer-oriented and organic structures. In modern management pattern, public affairs mangers as part of their current duties try to create direct accountability which in this new system organization is direct responsible of relating with customer and service optimization. In this new pattern, customer role gradually similar to its role in private division (E.Hughes). Table 2 compares modern pattern features (new customer-oriented organizations) with traditional pattern (pyramid product-oriented organization).

Table2. Compare of new customer-oriented and traditional product-oriented organization

Traditional product-oriented organization	New customer-oriented organization
Focuses on cost and production	Focuses on common service and demands
-goal and organization	-common goal and perspective
-control management	-common leadership, vision and participation
-staff and queue	-self management and intergroup networks
-complete procedures and policies	-staff enabling
-pyramid and vertical organization	-flexible and horizontal organization structure
structure	-electronic fast communication
-identify problems by reports	-competition on quality and attention to customer
-competition on production	satisfaction
-defined and limited duties	-flexibility and adaptability to role change
-big and jumped changes	-partial change with optimization
-periodical goal setting	-continues performance optimization
-special job training	-training and optimization of human resources
-emphasis on hi-tech production	-emphasis on process and behavior technology
-make profit from organization goal s	 Work and acquire efficiency from
	total quality and customer goals

10. Conclusion

In humanization process of administrative system it is tried to encourage people to participation and while developing government capacity for more accountability, exploit from current resources whether material or mental one. Generally, administrative system humanization has two interior and exterior aspects:

First. Interior aspect:

In interior aspect, structure and performance of administrative system must change from pyramid situation and each division should have ability to participate in decision making.

Second. Exterior aspect:

In exterior aspect, administrative system must use all of its resources to accountability and meeting public demands. Accountability of government division to public demands and requirements lead to increasing satisfaction and public trust and Loyalty (Organization of European Economic Cooperation, 2002). Client Satisfaction one of new criteria for measuring and evaluation of performance and service quality at public division. Today, various models and theories developed for definition and describing Client Satisfaction which mainly emphasis on Impression and performance quality of him (Everelles & Leavitt, 1992). Piters and waterman suggested understanding client's requirements and demands as feature of successful organization. In other words, survey and evaluate client's opinions is fast and inexpensive approach to service quality optimization (Willams et al., 2000).

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Evaluation of Abrasion Behaviour of Knitted Fabrics under Different Paths of Martindale Tester

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Abstract: The Martindale tester is used for both the abrasion, pilling resistance of fabrics, and straight line test by adjusting three moving parts, each one has three setting levels; making twenty seven paths possibilities. According to the standards there are only three types of motion to perform different tests. Therefore the aim of this study is to evaluate the effect of other setting possibilities on abrasion behaviour. The Lissajous patterns which consist of the Path traced by the fabric over the abradent in Martindale tester have been drawn in continuously changing directions at different setting. The total numbers of working conditions are sixteen patterns, since some adjustments did not work or gave the same path or lines. Then the areas of all patterns have been calculated and analyzed. Three samples of knitted fabrics produced from three counts have been tested at the combinations of different path of the Martindale tester. Therefore forty eight results of abrasion resistance for all fabrics at different settings have been measured and analyzed. Using Martindale standard testing setting is not enough to determine the actual abrasion behaviour of knitted fabrics. Other probabilities of setting, producing other different patterns in area and shape, could be simulated to the actual abrasion behaviour of fabrics during the end use. It could help the textile designer and producer to understand and improve their products according to the actual performance requirements.

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Keywords: Lissajous curve figures – Abrasion resistance- Martindale-weft knitted fabric

1. Introduction

However abrasion is generally only one of several factors contributing to wear performance or durability as experienced in the actual use of the material [3], but abrasion behavior is an important property of textile materials that governs the quality and efficiency of processing and the performance of products [6].

Abrasion is the mechanical deterioration of fabric components by rubbing them against another surface [8]. Therefore it is affected by many factors in a very complex, and as yet little understood manner [5]. Many researchers have investigated the influence of raw material, yarn production technology, yarn twist and chemical treatment on the abrasion resistance property of woven, knitted and nonwoven fabric [2, 5, 6, 7, 8 12, 14, 15, 16, and 17].

The measurement of resistance to abrasion is also greatly affected by the nature of the abradant, variable action of the abradant over the area of specimen abraded, the tension of the specimen, and the dimensional changes in the specimen [9].

It is quite clear that no test can be made to forecast the service life of a fabric in so many hours, but the test conditions should imitate the required service conditions as far as possible [10].

Various types of devices have been created for testing abrasion resistance which is often defined in terms of the number of cycles of abrasion applied by a specified machine, using a specified technique to produce a specified degree or amount of abrasion. In general, abrasion resistance test findings are unreliable for prediction of actual wear life in specific end uses unless data exists showing the specific relationship between the abrasion resistance test results and actual wear in the intended end use [1].

Martindale Abrasion Tester can be used for a variety of purposes. The way in which it is used depends on the operator who must decide which method appears most applicable and suitable for the problem in hand [10]. The Path traced by the test specimens over the Abradant is known as Lissajous figure [11, 13]. This family of figures was investigated by Nathaniel Bowditch in 1815, and later in more detail by J., A., Lissajous in 1857 [4]. It changes from nearly a circle shape to gradually narrowing ellipses, until it becomes a straight line, from which progressively widening ellipses develop, in a diagonally opposite direction, before the pattern is repeated [13].

The resistance to abrasion in Martindale test method is affected greatly by the conditions of the tests, such as the nature of abradant; variable action of the abradant over the area of specimen abraded, the tension on the specimen, the pressure between the specimen and abradant, and the dimensional changes in the specimen. The Martindale tester contains three

moving parts. Consideration should be given to the nature of these moving parts. However, only three types of motion to perform different tests by Martindale Tester are used for abrasion Test, Pilling Test, and Straight Line Test. The set up for each of the three tests is described in figure 1 [11].

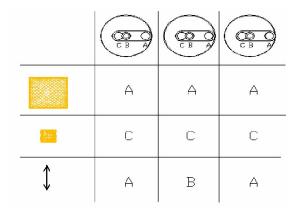


Figure 1: The standard setting for Martindale tester

For an abrasion test: All 3-bearing support blocks must be in position A, and for a pilling test: All 3-bearing support blocks must be in position C, however for a straight line test: The two outer bearing support blocks must be in position A and the inner bearing support block in position B [11].

Therefore this study was undertaken to evaluate the effect of the other setting possibilities on abrasion resistance of knitted fabrics.

2. Experimental work:

As mentioned above The Martindale instrument contains three moving parts to perform different tests by Lifting out the bearing support block and move it into the correct position on the drive crank. Adjusting each one of these three bearing support blocks (P1, P2, and P3) could be at three levels (A, B, and C); making twenty seven possibilities. According to the standards only two are applied, for testing abrasion and pilling.

The complete Lissajous Motion Diagrams for all setting possibilities were drawn by inserting the instrument pen into a specimen holder spindle bearing, so as the ball tip of the pen resting on the surface of the paper was used firstly to draw the twenty seven possibilities of paths.

The total numbers of working paths for testing fabric abrasion have been only sixteen, since some adjustments don't work or give the same path or line. The abrasion areas of the sixteen figures have been calculated using MATLAB program.

For evaluating the effect of different figures on abrasion of the fabrics, three samples of single knitted fabrics produced from three counts(Ne) 24/1, 30/1, 40/1Ne have been tested at the abrasion sixteen figures which results from the combinations of different path of the Martindale tester. The characteristics of the three knitted fabrics were determined as shown in table (1).

Table (1) the characteristics of the produced knitted fabric

Sample No.	Ne*	Weight/ m2 (gm)	Thickness (mm)	course/	Wales /cm
1	24/1	187	0.61	20	15
2	30/1	153	0.55	20	15.5
3	40/1	121	0.50	20.5	15.5

*Ne is cotton yarn count

The M235 Martindale Tester- SDL Atlas was used to determine the abrasion resistance of fabrics according to ASTM D 4966 standard. The sand paper for abradant used in testing was P1000, and the specimens were abraded under low pressure (250gm) at the standard speed (47.5r.p.m.). The abrading was continued until a hole was occurred on the fabric when one thread is broken.

Therefore the different areas of abrasion geometric pattern and abrasion resistance of the knitted fabrics were measured and analyzed.

3. Results and discussion:

The experiment has been consisted of sixteen patterns on three different fabrics depending on the yarn count. Hence the results of abrasion test for all fabrics are 48 results, rubbed in a figure eightlike motion (the Lissajous pattern) to evaluate the effect of setting possibilities of Martindale tester on abrasion resistance of weft knitted fabrics.

After drawing the abrasion paths pattern on paper using the Martindale pen as shown in figure (2), the MATLAB program was used for measuring the area of each pattern. The results are different of each pattern shape and area. It is also clear that the patterns no. 1,13 in figure(2) which are the standard for ASTM test method for testing abrasion and pilling resistance have only the square Lissajous shape, their path shapes are big and small basic Lissajous square pattern (16 Revolutions) in order. The pattern no.1 (AAA) in figure (2) has the greatest area compared with other patterns.

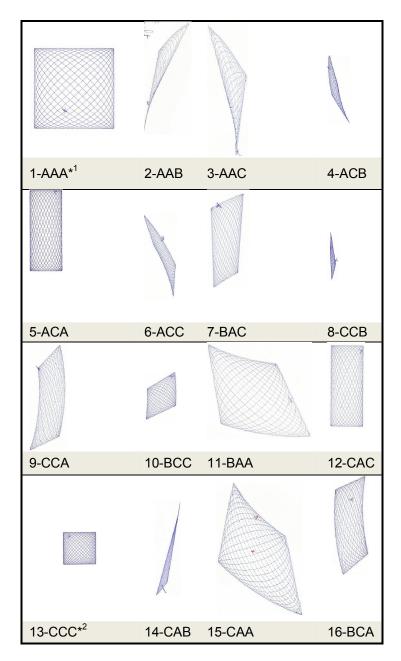


Figure 2: The patterns of the drawn paths by pen using different setting of Martindale tester P1,P2,and P3 the moving parts 1,2, and 3 in order

A,B, and C the setting levels of the moving parts where A is level 1, B is level 2, and C is level 3

- *1 the ASTM standard motion setting for testing abrasion
- *2 the ASTM standard motion setting for testing pilling

Once the areas of abrasion pattern were recorded for each path pattern, the relation between the area of abrasion patterns and the setting of Martindale tester using the regression analysis has been performed. The result is shown in equation (1). Path Area= 0.43- $0.07P_1$ - $0.19P_2$ - $0.29P_3$ + 0.17 $P_1*P_3+0.88P_3*P_2$ - 0.06 P_1* P_2* P_3 - $0.03P_2*P_3$ Multiple R=0.99 (1)

From the above equation it could concluded that the pattern area is increased by using the setting position (A) for the three moving parts in the tester. Therefore the largest area is occurred in setting the moving parts at (AAA) position which is the standard path in testing the abrasion resistance (path pattern no.1) in figure (2). The third moving part (P3) has also the greatest effect in the equation that has also

interacted and quadratic effect. When the data of paths area is arranged and drawn in figure (3), it has been confirmed that the standard path in testing the abrasion resistance (path pattern no.1) in figure (2) has the largest area of all patterns.

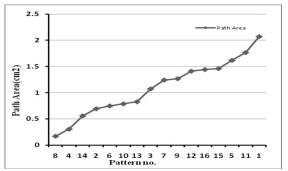


Figure 3: Arranged areas of different abrasion paths

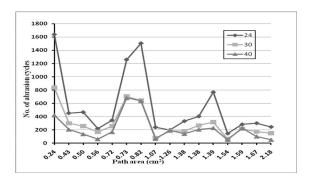


Figure 4: The relation between paths area and fabric abrasion

The results of abrasion test reveals the differences in abrasion between fabrics of the different varn count in the experiment for each path pattern of the Martindale tester. The relation between the abrasion resistance of fabrics produced from different yarn counts and abrasion pattern areas is shown in figure (4). It could be observed that the abrasion properties of the weft knitted fabrics are varied depending on varn count of the fabric and abrasion path area. There is no doubt that increasing the path area and varn fineness tend to decrease the abrasion resistance of fabrics but this relation is not linear. As it was expected the abrasion resistance of weft knitted fabrics is increased by increasing varn thickness since the weight and thickness of fabric increased as yarn thickness increased as shown in table (1).

The regression analysis has been performed for investigating fabric abrasion resistance using variables include: the setting level of the three moving parts, path area and yarn count of fabric for all samples, and is indicated in equation (2).

Abrasion= 431-120Area+118P₁+147P₂+81.7P₃+139P₁*P₃+ 85.3P₁*P₂+77.9P₂*P₃-163Ne+86.9Ne²

Multiple R = 0.87**(2)**

Trying to reveal the effect of Martindale moving setting on the abrasion resistance separately, results of regression analyzing to abrasion resistance of fabrics of each count are summarized in equations (3), (4), and (5).

Abrasion=550.4+214.3P₁+255.7P₂+178.2P₃+188.4P $_{1}*P_{3}+161.9P_{1}*P_{2}+130.9P_{2}*P_{3}$ MultipleR=0.89 (3) Abrasion=300.5+90.4P₁+132.3P₂+85.5P₃+86.6P₁*P 3+58.4P₁*P₂+62.3P₂*P₃ **MultipleR=0.89 (4)** Abrasion=224.4+72.3P₁+122.1P₂+87.1P₃+80.2P₁*P 3+36.7P₁*P₂+52.4P₂*P₃ **MultipleR=0.93 (5)**

The following results have been obtained from the initial regression analysis;

Using the setting position (A) of Martindale moving parts decreases the fabric abrasion resistance. Weft knitted fabrics have more resistance to rubbing in setting the moving parts at (C) position than (A) position. These results are in agreement with the paths pattern areas.

However the path pattern no. 1 in figure (2) (the standard setting for Martindale tester) does not have the lowest number of abrasion cycles for all fabrics although it has the largest area. That means this setting is much related to abrasion resistance but not enough to determine the actual abrasion behavior for all fabrics during the end use, where the shape of the path and the yarn count of the fabric beside to the path area have also played an important role in determining the abrasion behavior.

The surface rubbing properties of weft knitted fabrics do not show similar tendencies with the Martindale setting. These effects may be correlated with the path shape during the abrasion

Using Martindale standard testing settings which draw the square patterns are not enough to determine the actual abrasion behavior of knitted fabrics. Because the lissajous patterns produced of different settings could be simulated to the actual abrasion behavior of fabrics during the end use, it could help in studying the fabric abrasion behavior in the laboratory and helping the textile designers and producers to improve their products according to the actual performance. The changes in the surface of a fabric during processing, use, and care could be realized also.

Many researches should be conducted to predict the actual abrasion behavior of fabrics of the combination parameters of Martindale abrasion tester and fabric, and examine this phenomenon since evaluating surface wear has been a challenging and contentious issue.

4. Conclusion:

Martindale abrasion tester is most widely accepted tester although it may be the most complex. The Path traced by the test specimens over the abradant is known as Lissajous pattern. The instrument contains three moving parts each one has three setting levels. The test method standard is using only three settings for abrasion, pilling and straight line test in order. However, according to the setting of the three moving parts in the Martindale tester, other probabilities of setting could be used producing other different patterns in area and shape. This study has been undertaken to determine the area and shape of the produced patterns and evaluate the abrasion behavior of fabrics at different abrasion setting motions.

Only sixteen patterns have been produced, drawn and illustrated. The areas of all patterns have been measured and analyzed using regression analysis. The effects of Martindale abrasion motion settings on three weft knitted fabrics produced of yarn count (24/1, 30/1, 40/1) have been investigated and characterized. Therefore the experiment consisted of 48 abrasion results.

The abrasion properties have been showed remarkable differences with the patterns of abrasion paths and their areas. The increase in abrasion is occurred at the setting of Martindale moving parts at (A) position since the area of the abrasion decreases. Finer yarns have been expected to wear more quickly than larger yarns.

Using Martindale standard testing settings which draw the square patterns are not enough to determine the actual abrasion behavior of knitted fabrics. Other probabilities of setting, producing other different patterns in area and shape, could be simulated to the actual abrasion behavior of fabrics during the end use. It could help the textile designer and producer to understand and improve their products according to the actual performance requirements.

Many researches should be conducted to predict the actual abrasion behavior of fabrics of the combination parameters of Martindale abrasion tester and fabric, and examine this phenomenon since evaluating surface wear has been a challenging and contentious issue.

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Risk of Bacteraemia in Splenectomised Cirrhotic Patients after Elective Oesophageal Injection Sclerotherapy

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Abstract: Injection sclerotherapy still predominant in many Egyptian endoscopic units and is usually associated with transient bacteraemia in up to 30 % of upper GI endoscopies. The risk of bacteremia is more common in cirrhotic patients scheduled for injection sclerotherapy. The splenectomised cirrhotic patients are more susceptible to this risk. We aimed to estimate the prevalence of bacteremia in splenectomised cirrhotic patients who underwent injection sclerotherapy in our unit. Patient and Methods: A prospective observation study was conducted in our endoscopy unit, Internal Medicine department, Zagazig University Hospital, Egypt, over a period of six months from December 2009 to May 2010. One hundred and forty cirrhotic patient (78 male and 62 female were included in this study and were classified into two groups (according to absence or presence of the spleen); patient group; included 80 splenectomised cirrhotic patient and control group that included 60 non-splenectomised cirrhotic patient (35 male and 25 female). All patients were cirrhotic (Child A and B), and they were referred for scheduled elective endoscopic injection sclerotherapy. High sensitive CRP (Hs-CRP) and blood culture 10 minutes before and 20 minute post-endoscopy were taken for all patients. Presence or absence of bacteraemia was detected and recorded. Results: No positive blood cultures were detected before the endoscopy for all patients. Yo patients (\4.3%) of the whole participants had positive blood culture after injection sclerotherapy; 3 of them (5%) were in nonsplenectomised patients (control group) and 17 (21.25%) were in splenectomised patients (patients group). Positive blood cultures were more frequent in Child B patients compared to Child A (13 vs. 7) in both splenctomised and non-splenectomised patients with statistically significant difference. Hs-CRP was significantly elevated in Child B patients compared to Child A patients (P=0.018), moreover, Hs-CRP was highly elevated in positive culture cases regardless the Child status of the patients. Six types of micro-organisms were isolated in our study; Actinomyces (3), Candida Albican (2), Salmonella Typhi (3), Alpha haemolytic Streptococci (4) and coagulase negative Staphylococci (4) and Streptococcus Viridian (4). Conclusion: Prevalence of bacteraemia was higher in the injection sclerotherapy splenectomised cirrhotic group compared to non- splenectomised cirrhotic group, and in Child B patients more than Child A ones.

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Keywords: Risk; Bacteraemia; Cirrhosis; Endoscopy; Splenectomy.

1. Introduction:

The risk of infection after upper gastrointestinal (GI) tract endoscopy has been found to be infrequent (1); however, invasive endoscopic procedures can lead to various complications including remote bacterial infection (2).

The most common systemic complication of the upper endoscopic procedure is fever which is usually transitory and results from mucosal inflammation not related to infection, however, there are considerable reports of serious bacterial complications such as; brain, perinepheric abscesses, bacterial peritonitis and bacterial endocarditis(3).

Transitory bacteraemia is a frequent event after injection sclerotherapy and can occur following minor trauma even after diagnostic upper GI endoscopy. Most transient bacteraemias don't cause symptoms and have no clinical significance; however, they become important in immuno-

deficient patients and in those at risk for the developing of bacterial endocarditis (4).

Bacteraemia after endoscopic injection sclerotherapy is depending on multiple factors including; the duration of the procedure, size of the injection needle ,device contamination, inappropriate disinfection and insufficient mechanical cleaning of the devices (5). This is in addition to host factors that may predispose to bacteraemia like advanced liver cell failure, renal cell failure, diabetes mellitus, elderly patients and in patients with defective immunological response as in immuno-compromised patients like transplant recipients and patients on immunosuppressive drugs and splenectomised patients(6).

The spleen plays a vital role in the host's protection against invading microorganisms and bacterial clearance after injection sclerotherapy (7). Splenectomy significantly increases both the febrile response to bacterial lipopolysaccharide (LPS) and

the uptake of LPS by Kupffer cells. Although, splenectomised patients get proper vaccinations for capsulated gram negative bacteria, yet they still at high risk of bacteraemia following any invasive procedure including, upper GI endoscopy (8).

With the recent advances in surgical treatments in chronic hepatic disorders, the indications for splenectomy in hepatic disorders have greatly expanded. In country like Egypt which is considered an endemic area for chronic HCV and Schistosomiasis infections, splenectomy usually with vaso-ligation is a common surgical practice especially when intractable pancytopenia develops. These splenectomised patients usually attend endoscopic units for follow up reappearance of oesophageal varices and become eligible for upper GI injection sclerotherapy for eradication of varices, if any.

In the context of splenectomy and immunological deficits of liver cirrhosis, cirrhotic patients with splenectomy eligible for injection sclerotherapy are at great risk for permanent bacteraemia postendoscopy. We aimed to assess this risk after upper elective injection sclerotherapy in cirrhotic patients with splenectomy in our unit.

2. Patient and Methods

This prospective observation study was conducted in the endoscopy unit, Internal Medicine Department, Zagazig University Hospitals, Egypt, over a period of six months from December 2009 to May 2010.

140 cirrhotic patients were included in this study; 80 splenctomised patients as patient group and 60 non-splenctomised patients as control group. Patients participated in this study were all cirrhotic patients with *Child* (A) and (B) classification who attend our unit for elective injection sclerotherapy.

The exclusion criteria were:

- Advanced liver disease (*Child C*).
- Patients with any clinical or laboratory evidence of any febrile disease.
- ➤ History of antibiotic intake in the last week.
- Advanced respiratory or cardiac disease as well as renal failure patients.
- > Any patient under immunosuppressive drugs.

The purpose and details of the study were explained for each patient, oral and written consent were taken from all patients and the patients who refused consent were excluded from the study.

All the participants were subjected to detailed history taking and bedside physical clinical examination complemented with routine investigations that included; urine analysis, CBC, serum albumin, hepatic transaminases, total and direct bilirubin, PT and INR, serum creatinine

,blood urea and real time abdominal ultrasound aiming to exclude unfit patients and put the patients into their *Child's* classification category.

Patient preparation prior to elective injection sclerotherapy endoscopy was only over-night fasting and the procedure was done at 9:00 AM. After putting in the left lateral position, patient was connected to a monitoring pulse-oximeter then Midazolam Hydrochloride (Mediathetic, Amoun Pharmaceutical Company, Egypt) in weight- based dose (70 micg /Kg) was administrated in a pre-settled IV cannula 3 minutes before the procedure. The endoscopy was done using Olympus GIF3W gastroscopy (Olympus Optical, Tokyo, Japan). Size and numbers of the gastroesophageal vaices were noticed and recorded injection sclerotherapy was done using sclerosant material ethanolamine Oleate 5%(EPICO pharmaceutical company, Egypt), 3№5 ml was used for each varix and a total of 10~25 ml was used for each endoscopic session. The oesophageal varices were injected tightly intravariceally using sterile 21 French size sclerotherapy needle (Wilsoncook, USA).

Blood cultures were taken for all patients 10 minutes before the endoscopy and 20 minute after finishing of the injection sclerotherapy. After reparation of the skin with 70% isopropyl alcohol, five millilitres of venous blood were drawn, the taken blood samples were then inoculated into 45 ml tryptic Soya broth media(Oxoid\®). The blood culture was incubated aerobically and anaerobically at 37 °C for seven days. All isolates were identified and recorded (12).

Plasma of 2 ml centrifuged blood was used to measure of *Hs-CRP* using high sensitivity C - reactive protein ELISA kit (Biometrica, USA) results above 3mg/dl was considered as positive reading.

Follow up of the patients:

All patients were followed and traced by telephone for any symptoms or signs of infection for 5 days post-endoscopy and confronted for clinical examination and necessary labs if needed.

Statistical Methods:

Data were analysed by Statistical Package for Social Science (SPSS) version 14 (SPSS, Chicago, USA). Results were expressed as means and standard deviation (SD) of the means. Differences between groups were analysed by using either the chi-square test or Student's t-test and non-parametric (Mann–Whitney test) for comparison between two groups or the analysis of variance (ANOVA) test for multiple group comparison. The p value was considered significant at p < 0.05.

3. Results

Our study included 140 cirrhotic patient (78 male (55.7%) and 62 female (44.3%) with mean age $(43.3 \pm 9.2 \text{ year})$, they were classified into two groups; the patient group included 80 patient (43 male and 37 female) and control group included 60 patients (35 male and 25 female). Both sex and age were matched in our study groups.

Eighty three (59.3%) of all patient were of *Child A* and fifty seven (40.7%) of *Child B*, *Child C* patients were excluded from the start. On looking to *Child* status of both groups, we found that control group included (33 patients with *Child A* and 27 patients with *Child B*). While patient group included; (50 patients with *Child A* and 30 patients with *Child B*). We didn't found statistical difference in *Child* classification distribution among both groups (table1).

Seventy one (50.7%) of the patient group had varices; forty seven (47.4%) had grade II varices, 27(33.8%) had grade III and only seven (8.8 %) had grade IV. In the other hand, control group, we reported 60 patient had varices; twenty five (41.7%) had grade II varices, 20(33.3%) had grade III and 15 (25. %) had grade IV varices with statistically difference between both groups (table1).

No positive blood cultures were detected before the endoscopy in both groups, however, postendoscopy, we diagnosed 20 cases of positive blood culture (14.3%), 3 of them (15%) were in the control group and 17(85%) in the patient group with statistically significant difference (p=0.006) and OR(1.36).

Positive blood cultures were common in *Child B* patients (13 patient) than in *Child A* patients (7 patients) with statistically significant difference (p=0.021) table (3). Six micro-organisms were isolated from +ve blood cultures cases table (2).

Regarding serum *Hs-CRP*, no statistically significant difference was found between both group either 10 minute before or 20 minute after the endoscopy, but we noticed a significant high *Hs-CRP* in positives blood culture cases. Moreover, on correlation of Hs-CRP with *Child* status of the patients in both groups, we find statistically significant difference (p=0.018) table (4.)

4 patients of +ve blood culture -all were splenectomised cirrhotic- showed high fever and rapid clinical deterioration on follow up, 2 of them needed hospital admission where they received IV antibiotic combination according to culture and sensitivity with remarkable clinical improvement within 3 days. They stayed for one week and discharged in a stable clinical condition. No deaths were reported in our study hospitalization

Table (1): General characteristics of study groups.

item	Control group	Patient group	X2	р	OR
Age in years (mean (SD)	43.7(8.6)	43 (9.7)	0.39	0.68	
Gender: N (%)					
Male	35(58.3%)	43(53.8%)	0.29	0.58	
Female	25(41.7%)	37(46.2%)			
Child Classification: N (%)					
\boldsymbol{A}	33(55.0%)	50(62.5%)	0.8	0.37	
B	27(45.0%)	30(37.5%)			
OV Size: N (%)					
2	25(41.7%)	46(57.4%)			
3	20(33.3%)	27(33.8%)	7.46	0.02	1.36
4	15(25.0%)	7(8.8%)			(0.6-3.11)
Blood culture:					·
-ve	<i>57(95 %)</i>	63(78.7%)	7.39	0.006	3.66
+ <i>ve</i>	3(5%)	17(21.3%)			(1,28-12.45)

Table (2): Serum hs-CRP in both study groups.

Variable	Child Cla	+	n		
variable	A	В	l	þ	
hs-CRP(mg/dl)	9.5±7.6	13.4±11.3	2.38	0.018	

Table (3): Serum hs-CRP (mg/dl) before and after the endoscopy.

Time	Control group	Patients group	t	p
10 minutes before endoscopy	10.1 ± 7.78	18 ±10.5	1.07	0.28
20 minutes after endoscopy	7.76 ± 1.7	6.7 ± 1.6	0.28	0.27

Organism	Total (N %)	Control group (N %)	Patients group (N %)
Actinobacter	3(15 %)	0(0 %)	3(15 %)
Candida Albican	2(10 %)	0(0 %)	2(10%)
H. influenza	2(5%)	1(5 %)	1(5 %)
Streptococcus V.	4(20 %)	0(0 %)	4(20 %)
Coagulase -ve Staph	5(25 %)	1(5 %)	4(20 %)
Haemolytic Streptococcus	4(20 %)	1(5%)	3(15%)
	20 (100%)	3(15 %%)	17(85 %)

Table (4): Isolated micro-organisms in culture-positive cases.

Table (5): Child classification according to blood culture.

Variable	Child clas	sification	X2		OR
	A	В	A2	Р	OK
Blood culture :					
-ve	74(91.36%)	46(78.0%)	5	0.021	2.99
+ve	7 (8.64%)	13(22.0%)			(1.01-9.09)

4. Discussion:

Risk of bacterial translocation during upper GI endoscopy is high even without mucosal trauma. During oesophageal varices injection sclerotherapy in cirrhotic patients, this risk becomes high and constant especially in splenctomised cirrhotic patients (3).

To study this risk of bacteraemia after injection sclerotherapy and compare this in splenectomised and non-splenectomised cirrhotic patients, 140 cirrhotic patients were enrolled in this study. Hs-CRP measurement and blood samples for blood culture 10 minutes before and 20 minute after the endoscopy.

No positive blood cultures were detected before the endoscopy in both groups .Post- endoscopy, we diagnosed 20 case of positive blood culture (14.3%), 3 of them (15%) were in the control group and 17(85%) in the patient group.

Many previous reported discussed the risk of bacteremia after different endoscopic procedures with wide range of variations ranging from 3 up to 50 % (18.19.20) .Moreover, a considerable number of papers compared this risk between oesophageal band ligation and injection sclerotherapy with little risk in band ligated cirrhotic patients (13).

This variation in the different studies simply reflect many variables that include; type of participants ,size of varices ,changes in patient response and defective phagocytic capacities that usually present in patients with liver cirrhosis and the absence of splenic clearance of bacteremia add more risk for permanent bacteremic seeding after injection sclerotherapy(18), in addition to other factors that may contribute to this variation which including; procedure duration, size and length of injection needle, volume of injected material and of course the disinfection process of the endoscopy(19).

The incidence of bacteremia in cirrhotic nonsplenectomised patient after injection sclerotherapy is compatible with many reports (1718, 19&20). In our study we reported 17 (21.3%) cases with +ve blood culture in splenectomised cirrhotic patients. This slight high incidence of bacteremia in this patient category reflect a combination of defective immunological response and reduced phagocytes activity that are commonly seen in cirrhotic patients, in addition to, absence of the splenic clearance of the bacteria that let the injected bacteria to be permanently seeded in remote areas of the circulation. As we know, no reports assess this risk in splenectomised cirrhotic patients

Different types of microorganisms isolates have been reported in the different centres by many authors [16, 19&21]. In our study we isolate five types of microorganism namely; Actinobacter H. Influenza, Streptococcus V., Coagulase -ve Staph and Haemolytic Streptococcus.

In our study, we found more positive blood cultures in *Child B* cirrhotic patients more than in Child A patients, these results were reported by many authors (13, 14, 15,16,17,18 & 19). This predilection in Child B cases represents marked immunological and phagocytic defects and more porto-systemic collaterals that enable bacteria to bypass the reticulo-endothelial system.

Similar results of overt clinical infection after elective injection endoscopic sclerotherapy like, Chen et al. [20] reported on a patient mortality due to sepsis after injection sclerotherapy, also, Stiegmann et al. [21] reported one case of pneumonia following injection sclerotherapy.

In our study, four patients - all in splenctomised group- had clinical signs of infection on follow up, 2 of them were hospitalized, one of them had pneumonia and the other had septicaemia, no death

was reported and the two patients were discharged from the hospital after 8 days.

In conclusion, the rate of bacteremia in splenectomised cirrhotic patients after oesophageal injection sclerotherapy is higher than cirrhotic non-splenectomised cirrhotic patients. Band ligation should replace injection sclerotherapy in this category of patients. Those patients may need strong parental antimicrobial combination coverage before the endoscopy apart from they received vaccinations or not, however this recommendation needs more work up on these unique types of patients especially in Egypt.

Conflict Of Interest

No grants were received and none of the authors have any financial interest or any conflict of interests. All the authors have read and approved the manuscript.

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Moisture-dependent physical properties of paddy grains

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Abstract: In order to design of harvesting, conveying and processing equipments, it is necessary to determination of physical properties of grains and agricultural commodities. This study was carried out to evaluate the effect of moisture content on some physical properties of paddy grains. Six levels of moisture content ranging from 8 to 24% (d.b.) were used. The average length, width, thickness, equivalent diameter, surface area, sphericity, thousand grain mass, angle of repose and aspect ratio increased from 10.20 to 10.28 mm, 2.31 to 2.42 mm, 1.85 to 1.94 mm, 3.53 to 3.66 mm, 36.87 to 39.16 mm², 34.53 to 35.46 %, 24.43 to 28.27 g, 38.27° to 46.13° and 0.226 to 0.236, respectively, as the moisture content increased from 8 to 24 % (d.b.). As the moisture content of paddy grains increased from 8 to 24% (d.b.), the bulk density and true density were found to increase from 381.77 to 428.5 kg/m³, and 1328.65 to 1372.41 kg/m³ respectively, while the porosity was found to decrease from 71.27 to 68.78%. The static coefficient of friction of paddy increased linearly against various surfaces, namely, glass (0.3577-0.4973), galvanized iron sheet (0.4629-0.5295), and plywood (0.4856-0.5830) as the moisture content increased from 8 to 24% (d.b.).

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Keywords: Agricultural equipment, design, Moisture content, Paddy grain, Physical properties

1. Introduction

Rice (Oryza sativa L.) is the staple food for more than three billion people, over half the world's population. It provides 27% of dietary energy and 20% of dietary protein in the developing world. Rice is cultivated in at least 114, mostly developing, countries and is the primary source of income and employment for more than 100 million households in Asia and Africa. In Iran, rice is widely cultivated as a cereal crop for a long time and is grown on an area of about 615000 ha with an annual paddy production of about 3.5 million ton and its yield 5.56 t/ha (FAOSTAT, 2007). Main areas of rice cultivation of Iran are located in the north provinces, namely, Guilan and Mazandaran, producing 75 percent of Iran's rice product. Both high yielding and local varieties are grown in the rice cultivated areas in the country. In Guilan province however, the most popular varieties grown are local and aromatic varieties such as Hashemi and Binam. These varieties are characterized by long kernels having awns (Alizadeh et al., 2006). In the case of Hashemi variety, the presence of long awns affects the physical and morphological characteristics of the product.

During various steps of rice production, paddy arrives into the each part with definite moisture content. The moisture content of paddy decreases from 22 to 8% during harvesting to milling projects. Variation the moisture content of paddy changes the physical properties of paddy grains. If the adjustment

of various parts of the equipment was not proportional with the specific properties of the grain, it may lead to more excessive cracked and broken rice grains. Hence, in order to optimization of various stages of rice processing projects, determination of physical properties of paddy grains is essential. This information can help out the design of equipment used in harvesting, transportation, milling, processing and storage of rice. The size, shape and structural characteristics of paddy are important in designing of separating, sizing and grinding machines. Bulk density, true density and porosity (the ratio of inter granular space to the total space occupied by the grain) are used in design of storage bins and silos, separation of desirable materials from impurities. The angle of repose is used in the design of equipment for the processing of particulate solids. For example, it may be used to design an appropriate hopper or silo to store the material. It can also be used to size a conveyor belt for transporting the material. The static coefficient of friction of the grain against the various surfaces is also necessary in designing of handling and storing structures.

In recent years, physical properties have been studied for various crops such as sorrel seeds (Omobuwajo *et al.*, 2000); millet (Baryeh, 2002); groundnut kernel (Olajide and Igbeka, 2003); lentil seed (Amin *et al.*, 2004); sweet corn seed (Co kun *et al.*, 2005); linseed (Selvi *et al.*, 2006); peanut (Aydin, 2007) and jatropha seed (Garnayak *et al.*, 2008). It seems that there is not much published work about

moisture-dependent physical properties of paddy grains.

The objective of this study was to determination some physical properties of paddy grains such as axial dimensions, size, surface area, sphericity, thousand grain mass, bulk density, true density, porosity, angle of repose and static coefficient of friction on various surfaces in the moisture content range from 8 to 24% (d.b.).

2. Material and Methods

The paddy variety, Hashemi, used for this study was obtained from the Rice Research Institute, Rasht, Iran. The variety (Hashemi) used in the current study is one of the popular rice varieties in the north of Iran that characterized by long kernels having long owns (Fig. 1). Before starting experiments, the samples were cleaned manually to remove all foreign materials and broken grains. The initial moisture content of the samples was determined by oven drying method at 103 °C for 48 h (Sacilik *et al.*, 2003). The initial moisture content of the grains was 14.8% (d.b.).

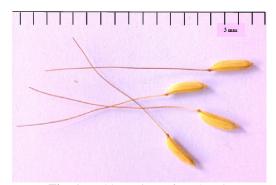


Fig. 1. Paddy variety of Hashemi.

In order to increase the level of moisture content above the initial level, the samples were moistened with a computed quantity of water by using the following Eq. (1) and conditioned to raise their moisture content to the desired three different levels (Co kun *et al.*, 2005):

$$Q = \frac{W_i (M_f - M_i)}{100 - M_f}$$
 (1)

where Q is the mass of water added (kg), W_i is the initial mass of the sample (kg), M_i is the initial moisture content of the sample (%, d.b.) and M_f is the final moisture content of the sample (%, d.b.).

To obtain three desired moisture levels below the initial moisture content, the samples were kept in an oven at a constant temperature of 43 °C until the

desired moisture content of the samples were obtained (Yang et al., 2003).

After making six levels of moisture contents, the samples were spilled in polyethylene bags and the bags were closed tightly. The samples were kept in a refrigerator at 5 °C for a week to enable the moisture to distribute uniformly throughout the sample. Before starting each test, the required quantities of the samples were taken out of the refrigerator and allowed to warm up to the room temperature for about 2 h. The rewetting technique to attain the desired moisture content in kernel and grain has frequently been used (Nimkar and Chattopadhyay, 2001; Sacilik *et al.*, 2003; Co kun *et al.*, 2005; Garnayak *et al.*, 2008). All the physical properties of the grains were determined at moisture levels of 8, 11, 14, 18, 21 and 24% (d.b.).

The shape of the paddy grain was found to be prolate elliptical with three major principal dimensions, length (L), width (W) and thickness (T). The physical dimensions were determined randomly measuring the length, width and thickness of 100 grains using dial type vernier caliper (Mitutoyo Corporation, Japan) having least count of 0.01mm.

In order to determination of the thousand grain mass, 100 randomly selected grains from the bulk sample were averaged. The thousand grain mass was measured by means of a digital electronic balance having an accuracy of 0.001 g.

Considering a prolate spheroid shape for a paddy grain, the equivalent diameter (D_p) was calculated using (Mohsenin, 1986):

$$D_{P} = \left(L \frac{(W+T)^{2}}{4}\right)^{\frac{1}{3}} \tag{2}$$

The criteria used to describe the shape of the seed are the sphericity and aspect ratio. Thus, the sphericity (ϕ) was accordingly computed as (Mohsenin, 1986):

$$\phi = \frac{\left(LWT\right)^{\frac{1}{3}}}{I} \tag{3}$$

The aspect ratio (R_a) was calculated by (Maduako and Faborode, 1990):

$$R_a = \frac{W}{L} \tag{4}$$

The surface area of the grain (*S*) was calculated using (Jain and Bal, 1997):

$$S = \frac{\pi B L^2}{(2L - B)} \tag{5}$$

where:

$$B = WT \tag{6}$$

where L is the length, W is the width and T is the thickness of grain, all in mm.

The bulk density was determined using the mass/volume relationship by filling a cylindrical container of 500 ml volume and tare weight with the grains by pouring from a constant height, striking off the top level and weighing (Garnayak et al., 2008). The true density is defined as the ratio of mass of grain to the solid volume occupied. The grain volume and its true density were determined using liquid displacement technique (Shepherd and Bhardwaj, 1986). Toluene was used instead of water so as to prevent the absorption during measurement and also to get the benefit of low surface tension of selected solvent (Sitkei, 1986; Ogut, 1998).

The porosity defined as the fraction of the space in the bulk grain which is not occupied by the grain (Thompson and Isaacs, 1967). The porosity was calculated from bulk and true densities using the relationship (Jain and Bal, 1997) as follows:

$$\varepsilon = \left(1 - \frac{\rho_b}{\rho_t}\right) \times 100 \tag{7}$$

where is the porosity (%), $_b$ is the bulk density (kg/m³) and $_t$ is the true density (kg/m³).

The angle of repose is the maximum angle of a stable slope determined by friction, cohesion and the shapes of the particles. When bulk granular materials are poured onto a horizontal surface, a conical pile will form. The internal angle between the surface of the pile and the horizontal surface is known as the angle of repose and is related to the density, surface area, and coefficient of friction of the material. In order to determine the angle of repose, an apparatus was specially made for this research which was consisted of an adjustable plywood box of 140×160×35 mm and an electrical motor to lifting the box (Fig. 2). The adjustable box was filled with the sample, and then was inclined gently by the electrical motor allowing the grains to follow and assume a natural slope; this was measured as emptying angle of repose. A similar trend has been done by Tabatabaeefar (2003).

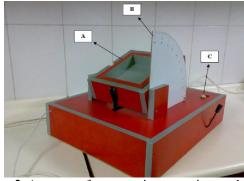


Fig. 2. Apparatus for measuring emptying angle of repose; A: Adjustable box, B: Angle gauge, C: Electrical key.

The static coefficient of friction of the grain was determined with respect to three structural materials, namely, plywood, glass and galvanized iron sheet using a cylinder of diameter 75mm and depth 50mm filled with grains (Fig. 3). With the cylinder resting on the surface, the surface was gradually raised so as not to touch the cylinder and the angle of inclination to the horizontal at which the sample started sliding was read off the protractor attached to the apparatus (Razavi and Milani, 2006). The coefficient of friction was calculated from the following relationship:

$$\mu = \tan \alpha \tag{8}$$

where μ is the coefficient of friction and is the angle of tilt in degrees.



Fig. 3. Apparatus for measuring static coefficient of friction.

The physical properties of paddy grain were investigated as a function of moisture content. At each level of moisture content, the experiments were replicated ten times and the average values were reported. The mean, standard deviation and correlation coefficient of dimensions and other characteristics of paddy grain were determined using Microsoft Excel 2003 software program. The effect of moisture content on the different physical properties of paddy grains was determined using the

analysis of variance method, and significant differences of means were compared using the least significant difference test at 5% significant level using SPSS 13 software.

3. Resaults

3.1 Grain Dimensions

The effect of moisture content on the three axial dimensions of paddy grain, namely, length, width and thickness is shown in Fig. 4. As it can be seen, upon moisture absorption, the paddy grain expands in length, width and thickness within the moisture range of 8 to 24% (d.b.). The average length, width and thickness of the 100 grains increased from 10.20 to 10.28 mm, 2.31 to 2.42 mm and 1.85 to 1.94 mm. respectively, as the moisture content increased from 8 to 24% (d.b.). Based on the statistical analysis, the effect of moisture content on the grain length was not significant, while the effect on the grain width and thickness was significant at the 1% level of probability. The relationship between length (L), width (W), thickness (T) and moisture content (M) for the paddy grain can be expressed by the regressions:

$$L = 0.004M + 10.15$$
 $R^2 = 0.928$ (9)
 $W = 0.007M + 2.251$ $R^2 = 0.980$ (10)
 $T = 0.005M + 1.797$ $R^2 = 0.961$ (11)

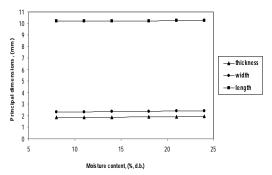


Fig. 4. Variation of principal dimensions of paddy grain with moisture content.

3.2 Thousand Grain Mass

Mean values of the thousand grain mass of paddy at different moisture contents are shown in Table 1. As the moisture content increased from 8 to 24% (d.b.), the thousand grain mass of paddy increased significantly (p<0.01) from 24.43 to 28.27g. The relationship between thousand grain mass (m_{tg}) and moisture content (M) can be represented by the regression:

$$m_{to} = 0.247M + 22.37$$
 $R^2 = 0.991$ (12)

A similar increasing trend has been reported by Sacilik *et al.* (2003) for hemp seed and Garnayak *et al.* (2008) for jatropha seed.

Table 1. Physical properties of paddy grain at different moisture contents

			,	1 1	1 2	0				
Moisture content, (%, d.b.)	Equivalent diameter, (mm)	Spne	ricity, imal	Surface area, (mm²)	Bulk density, (kg/m³)	True density, (kg/m³)	Porosity (%)	Angle of repose (°)	Thousand grain mass (g)	Aspect ratio
	3.53	3/1.53	(0.97)	36.87	381.77	1328.65	71.27	38.27	24.43	0.226
8	(0.06)		(0.97) a	(1.59)	(5.05)	(8.87)	(0.35)	(0.90)	(0.65)	(0.01)
	a		а	a	a	a	a	a	a	a
	3.55	34 65	(1.04)	37.14	390.03	1339.29	70.87	39.87	25.11	0.227
11	(0.06)		(1.04) ab	(1.56)	(2.81)	(2.07)	(0.25)	(0.83)	(0.99)	(0.01)
	ab	•	w	a	ab	ab	ab	b	a	ab
	3.56	24 92	(0.82)	37.59	397.14	1348.96	70.56	40.53	25.73	0.231
14	(0.07)		(0.82) oc	(1.59)	(4.40)	(9.17)	(0.52)	(0.93)	(0.95)	(0.01)
	bc	ı	JC	ab	b	bc	bc	b	ab	bc
0.233	26.67	42.73	69.99	1353.8	3 406.2	3 38.12	25.07	(1.16)	3.60	
(0.02)	(0.66)	(0.90)	(0.41)	(9.21)	(6.39)) (2.04)	35.07		(0.11)	18
bc	bc	c	c	bc	c	bc	, c	u	cd	
0.234	27.80	44.37	69.24	1364.9	6 419.8	1 38.61	35.27	(1.24)	3.63	
(0.02)	(0.70)	(0.96)	(0.38)	(13.07	(2.48)) (2.01))	1. 1	(0.10)	21
c	cd	d	d	cd	d	cd	c	u	de	
0.236	28.27	46.13	68.78	1372.4	1 428.5	39.16	35.46	(1.11)	3.66	
(0.01)	(0.41)	(0.30)	(0.21)	(9.47)	(5.73)) (1.94)) 33.40		(0.09)	24
c	d	e	d	d	e	d		1	e	

Values in the same columns followed by different letters (a–e) are significant (P < 0.05). Figures in parenthesis are standard deviation.

3.3 Equivalent Diameter

The experimental results of the equivalent diameter of the paddy grain at different moisture

contents are given in Table 1. Analysis of variance showed that increasing moisture content had a significant effect on the grain equivalent diameter at

the 1% level of probability. As shown in Table 1, the equivalent diameter of paddy grain increased from 3.53 to 3.66 mm, as the moisture content increased from 8 to 24% (d.b.). The relationship existing between moisture content (M) and equivalent diameter (D_P) appears linear for the paddy grain, which can be represented by the regression

$$D_p = 0.008M + 3.457 R^2 = 0.979 (13)$$

3.4 Sphericity

The average values of the grain sphericity at different moisture contents are presented in Table 1. As shown, the sphericity of the paddy grain increased significantly (P < 0.01) from 34.53 to 35.46% as the moisture content increased from 8 to 24% (d.b.). Duta et al. (1988) and Bal and Mishra (1988) considered the grain as spherical when the sphericity value was more than 0.70 and 0.80, respectively. In the current study, Paddy grain should not be treated as an equivalent sphere for calculation of the surface area. Equation (14) shows the relationship between sphericity of the paddy grain (ϕ) and moisture content (M):

$$\phi = 0.059M + 34.02 \qquad R^2 = 0.996 \quad (14)$$

Reddy and Chakraverty (2004) for raw and parboiled paddy, Altunta *et al.* (2005) for fenugreek seeds, Karababa (2006) for papcorn kernels and Yalçın *et al.* (2007) for pea seed reported similar trends of increase in sphericity with increase in moisture content.

3.5 Aspect Ratio

Table 1 shows the aspect ratio of the paddy grain determined at different levels of moisture content. As seen, with increasing the moisture content from 8 to 24% (d.b.), the aspect ratio of paddy grain increases significantly (P < 0.01) from 0.226 to 0.236.

3.6 Surface Area

The variation of surface area for the paddy grain with moisture content is shown in Table 1. It can be seen that the surface area of paddy grain increases linearly from 36.87 to 39.16 mm² when the moisture content increases from 8 to 24% (d.b.). Statistical analysis of the data showed that the grain surface area has significantly affected by the moisture content. The effect of moisture content was significant at the 1% level of probability. The variation of moisture content (*M*) and surface area (*S*) can be expressed mathematically as follows:

$$S = 0.143M + 35.61 \qquad R^2 = 0.991 \qquad (15)$$

Similar results have been reported by Altunta *et al.* (2005) for fenugreek seeds and Selvi *et al.* (2006) for linseed.

3.7 Bulk Density

The effect of moisture content on the bulk density of paddy grains (was significant at the probability level of 1%) is presented in Fig. 5. The mean values of the bulk density with respect to the moisture content are also given in Table 1. The results showed that the grains bulk density increases linearly from 381.77 to 428.5 kg/m^3 with an increase in moisture content from 8 to 24% (d.b.). This was due to the fact that an increase in mass owing to moisture gain in the sample was higher than accompanying volumetric expansion of the bulk. The relationship between bulk density ($_b$) of the grains and moisture content (M) can be expressed by the following equation:

$$\rho_b = 2.908M + 357.3$$
 $R^2 = 0.988$ (16)

Baryeh and Mangope (2002) for QP-38 variety pigeon pea and Kingsly *et al.* (2006) for dried pomegranate seeds have reported similar increasing trend in bulk density.

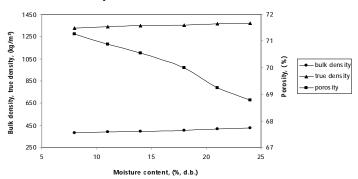


Fig. 5. Variation of bulk density, true density and porosity of paddy grain with moisture content.

3.8 True Density

Variation of the true density of paddy grains at different moisture contents is given in Fig. 5. The true density of paddy grains found to be increased from 1328.65 to 1372.41 kg/m³ as the moisture content increased from 8 to 24% (d.b.). Based on the statistical analysis, the effect of moisture content on true density of the grains was significant at 1% level of probability. The moisture (M) dependence of the true density ($_t$) was described by a linear equation as follows:

$$\rho_t = 2.624M + 1309 \qquad R^2 = 0.984 \quad (17)$$

Although the results were comparable to those reported by Bart-Plange and Baryeh (2003) for Category B cocoa beans, Co kun *et al.* (2005) for sweet corn seed and Selvi *et al.* (2006) for linseed, different trends were reported by Sacilik *et al.* (2003) for hemp seed, Yalçin *et al.* (2007) for pea seed and Cetin (2007) for barbunia bean seed.

3.9 Porosity

The variation of porosity in accordance with the moisture content is shown in Fig. 5. The results indicated that as the moisture content of paddy grains increases from 8 to 24% (d.b.), the porosity decreases linearly from 71.27 to 68.78%. The effect of moisture content on the porosity was significant at the 1% level of probability. As described at the previous sections, porosity is a function of bulk density and true density. It can be seen from Fig. 5 that both the bulk and true densities of paddy grains increases with increase in moisture content, while the porosity decreases. This was due to the fact that an increase in the true density has a lower effect on the porosity than that of the bulk density. The relationship between the porosity () and moisture content (M) of the grains can be represented by:

$$\varepsilon = -0.156M + 72.62$$
 $R^2 = 0.983$ (18) Sacilik *et al.* (2003) and Kingsly *et al.* (2006) reported similar trends in the case of hemp seed and dried pomegranate seeds, respectively. While Yalçin and Özarslan (2004), Altunta and Yildiz (2007) and Garnayak *et al.* (2008) reported different trends in the case of vetch seeds, faba bean grains and jatropha seed, respectively.

3.10 Angle of Repose

The average values of the angle of repose relative to the moisture content are presented in Table 1. As shown in Table 1, the angle of repose of paddy grains increases significantly (at 1% level of probability) from 38.27° to 46.13° in the moisture range of 8-24% (d.b.). This is due to the fact that increasing in moisture absorption leads to create a larger surface layer of moisture surrounding the particles, holding the aggregate of grains together by producing higher surface tension. Equation (19) can be used to express the relationship existing between the angle of repose () and moisture content (M):

$$\theta = 0.482M + 34.26$$
 $R^2 = 0.989$ (19)

The results were comparable to those reported by Altunta and Yildiz (2007), Garnayak *et al.*, (2008) for faba bean grains and jatropha seed, respectively.

3.11 Static Coefficient of Friction

The variation of static coefficient of friction of paddy grains against three surfaces, namely, glass, galvanized iron sheet and plywood with respect to their moisture content are presented in Fig. 6. As it can be seen, the static coefficient of friction of paddy grains increases linearly with increase in moisture content, for all the evaluated surfaces. Based on the statistical analysis, the effect of moisture content on the static coefficient of friction was significant at the 1% probability level, for all the investigated surfaces. Increase in static coefficient of friction at higher levels of moisture content may be due to the fact that the water present in the grain offering a higher cohesive force on the surface of contact (Garnayak et al., 2008). The results also showed that at all levels of moisture contents, the maximum static coefficient of friction was offered by plywood, followed by galvanized iron sheet and glass surfaces. The least static coefficient of friction may be owing to smoother and more polished surface in the case of glass comparing with the other surfaces evaluated. Similar trends have been reported by Dutta et al., (1988) and Garnayak et al. (2008) in the case of gram and Jatropha seed, respectively. The relationships between the moisture content (M) and static coefficient of friction on glass (μ_{gl}), galvanized iron sheet (μ_{gi}) and plywood (μ_{pw}) surfaces can be expressed by the following equations:

$$\mu_{ol} = 0.008M + 0.298$$
 $R^2 = 0.968$ (20)

$$\mu_{gi} = 0.003M + 0.432$$
 $R^2 = 0.975$ (21)

$$\mu_{mv} = 0.005M + 0.447$$
 $R^2 = 0.940$ (22)

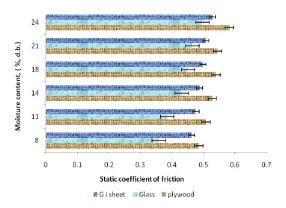


Fig. 6. Effect of moisture content on static coefficient of friction of paddy grain against various surfaces.

1. CONCLUSIONS

- (1) As the moisture content of paddy grain increased from 8 to 24% (d.b.), the average length, width, thickness and equivalent diameter increased from 10.20 to 10.28 mm, 2.31 to 2.42 mm, 1.85 to 1.94 mm and 3.53 to 3.66 mm, respectively. Except the length of the grain, the effect of moisture content was significant on all the mentioned characteristics.
- (2) The sphericity, surface area, thousand grain mass, angle of repose and aspect ratio increased significantly (p < 0.01) from 34.53 to 35.46%, 36.87 to 39.16 mm², 24.43 to 28.27 g, 38.27° to 46.13° and 0.226 to 0.236, respectively, in the moisture range of 8 to 24% (d.b.).
- (3) The bulk density and true density of paddy grains were found to increase (both significantly at 1% of probability level) from 381.77 to 428.5 kg/m³, and 1328.65 to 1372.41 kg/m³ respectively, with increase in moisture content from 8 to 24% (d.b.), while the porosity decreased from 71.27 to 68.78% (*P* < 0.01).
- (4) The static coefficient of friction increased significantly (p < 0.01) for all the evaluated surfaces, namely, glass (0.3577-0.4973), galvanized iron sheet (0.4629-0.5295), and plywood (0.4856-0.5830) as the moisture content increased from 8 to 24% (d.b.).

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Counseling for Mothers to Cope with their Autistic Children

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Abstract: This study is an experimental research aiming to evaluate the effect of counseling for mothers to cope with their autistic children (AC), through: 1) Identifying mothers' needs according to physical, social, motor, and emotional coping patterns for their autistic children, and 2) Developing counseling program according to mothers' needs and evaluating the effect of counseling on physical, social, motor, and emotional coping patterns of mothers. This study was conducted at the Special Needs Care Center in the Institute of Post-graduate Childhood Studies, Autistic and Psychiatric Clinics affiliated to Ain Shams University and Egypt Autistic Society. The sample of convenience consisted of 90 mothers providing care for their children suffering from autism. Data were collected through three tools: 1) Interviewing questionnaire to assess children's and their mothers' socio-demographic characteristics and mothers practices. 2) Family Impact of Childhood Disability (FICD) Scale, to assess subjective interpretation or primary appraisal of parent regarding to child with developmental disabilities into family systems and its impact on the family as an entity. 3) Medical records of the studied autistic children to determine the degree of disability. The main results revealed that the children were completely dependent on their mothers in basic daily activities also were prone to moderate and substantial degree of impact. There were statistically significant improvements in mothers' coping with needs of their autistic children. The study recommended that media focuses to increase people awareness with the aid of health team professionals in prompting tolerance and understanding of autism with a clear explanation, so individuals with autism will be better integrated in the society.

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Key words: Autism, Counseling, Mothers, Coping.

1. Introduction:

Autism is a complex developmental disability; it is a neurological based developmental disorder. Onset occurs before the child reaches the age of 36 months, that affects normal functioning of brain, it affects boys four times more than girls, the prevalence rates of autism in Egypt is increasing, there are 326 cases of autistic children (AC) aged from 4-12 years out from 152.234 total number of AC from total population estimated used, to listed only in the registry of Higher Institute for Children in Ain Shams, special Junior School and Egyptian Autistic Society (1).

Autism is different from all other disabilities; the characteristics of autism create additional stress for the parents and make the life of the family very hard. Usually the families are left alone to face the stressful challenge of raising a child with autism (7).

The impact of autism presents huge challenges to parents. Some life changing issues identified by parents include the child's resistance to change; the child is disparaging conduct and behaviors, sibling's ability to manage difficulties within the family dynamics and the parent's sense of isolation (*). In addition, families are also concerned with communication, education and related services, relationships with professionals and the independence of the child and his/her future concerns. The chronic

nature of autism can be draining to some parents and there is a risk of parents becoming exhausted (£). Parents having an autistic child will pass through several coping stages namely denial, anger, and guilt, bargaining and finally the acceptance; they must deal with the grief they feel over absence of healthy imagined child (°).

Coping is a process of readjusting attitude, feeling, perception and beliefs about self and others, while coping style is a particular coping mechanism used repeatedly by a person in different situations. However, coping strategies have two types; adaptive and mal-adaptive strategies. Adaptive coping strategies are mechanisms that can be used to make adverse circumstances less stressful and enhance adaptation to difficult circumstances. They include problem solving as well as emotion reducing strategies, while mal-adaptive coping strategies are mechanisms used to reduce a person's emotional response to stressful circumstances in a short term, but lead to greater difficulties in the long term (1).

The mothers of autistic children are vulnerable to psychological distress; families have been burdened by financial concerns, worries about health of autistic children. Copping with uncertainty about child's development is another source of stress, also appears to show high degree of depression and

chronic fatigue as there is inadequate support from community agencies (7).

Counseling is a scientific process, which is largely accepted by many of people. Whether its vocation guidance or coping with personal trauma counseling surely makes it easy to seek professional guidance. Counseling is a type of talking therapy. People talk to a counselor about their problems. Counselors are trained to listen sympathetically and can help people deal with any negative thoughts and feelings that they have (^).

Heiman determined that parents of children with autism either adapt flexibly and mobilize into effective action or freeze in various degrees of rigid, ineffective reactions, whereas others tend to resist or even deny the diagnosis itself. The nurse plays an important role in assessing the parents and families level of understanding about autism, their coping abilities, and their access to support groups or services, as well as their willingness to avail themselves of these services (§).

Magnitude of the Problem:

There is a dramatic increase in the incidence of autism from 1970s through 2008. This incidence increased to 150 in the last year. The prevalence rate of autism in Egypt is increasing, there is one child every 870 Egyptian children has autism ('). This indicates that a considerable number of parents are directly involved in caring of the children with autism. Furthermore, autism is a lifelong disorder that most of the families have to live and care their children on their own forever (').

The nurse plays an important role regarding to the children and their families' condition, through counseling. The nurse can help people to discuss their problems honestly and openly, deal with issues that are preventing them from achieving their goals and ambitions, and have a more positive outlook on life (17).

Aim of the study

The aim of this study was to evaluate the effect of counseling for mothers to cope with their autistic children through:

- Identifying mothers' needs according to physical, social, motor, and emotional coping patterns for their autistic children.
- Developing a counseling program according to mothers' needs.
- Evaluating the effect of counseling on physical, social, motor, and emotional coping patterns of mothers.

Research questions

 What are the coping patterns of care provided by mothers to their AC? Is AC affecting the coping mechanisms of their families?

Hypothesis

Counseling will improve the physical, social, motor, and emotional coping patterns of mothers with autistic child.

2-Subjects and Methods

Research design:

A quasi experimental research design was used to conduct this study without using a control group and random sample.

Technical design Setting:

This study was conducted at the Special Needs Care Center in the Institute of Post-graduate Childhood Studies affiliated to Ain Shams University and Egyptian Autistic Society.

Sample

The number of children who attended to the previous settings in the period of 2008 – 2009 was 160 autistic children. Those who were accompanied by their mothers were recruited for the study (90) according to this criterion: children free from chronic physical illnesses.

Tools of data collection:

Three tools were used for data collection:

I. A structured interviewing schedule developed by the researchers. It covered the following items:

- Socio-demographic characteristics of studied mothers of children suffering from autism such as: age, level of education, and occupation.
- Characteristics of studied children such as age, gender, order of birth.
- Mothers coping patterns: physical, social, motor, and emotional through asking questions regarding their care of autistic children such as hygiene (mouth care, brush teeth, cleaning nose, and bathing), feeding himself, using cup, elimination, and wearing clothes, encourage child for cooperation and communication, holding pencils, steady walking, and upwards stairs.

It included 13 items of daily activities, which suit the autistic children.

Each item has a possible three responses: 1= independent, 2= semi and 3 = dependent.

The scores of each item were summed—up and the total divided by the number of items giving a mean score of mothers' care. These scores were converted into a percent score.

 Mothers' care scored 75% and more, were considered having "Good" knowledge; "Average" knowledge scored 50 < 75%; and "Poor" knowledge scored less than 50%.

II. Family Impact of Childhood Disability (FICD) Scale

It was originally developed by Trute and Hauch (13), it aimed to assess subjective interpretation or primary appraisal of parent regarding to child with developmental disabilities into family systems and its impact on the family as an entity. It consisted of 12 items such as my child disability needs more time for caring, disruption of normal family routines, the experience of caring for child brought family closer to God, it has led to additional financial costs.). Each item was rated on a four–point Likert Scale: 1= Not at all, 2= Mild degree, 3= Moderate degree, and 4= Substantial degree.

III. The medical records of the studied autistic children to determine the degree of disability.

Validity test was done by 5 of faculties' staff nursing experts from the pediatric and community specialties.

Operational Design Ethical consideration:

The researchers emphasized to children and their mothers that the study was voluntary and anonymous. Mothers had the full right to refuse to participate in the study or to withdraw at any time without giving any reason.

Pilot study

A pilot study was carried out on 7 mothers attending to the outpatient clinic at the Institute of Post-graduate Childhood Studies, Autistic and Psychiatric clinics affiliated to Ain Shams University in order to test the applicability of tools and clarity of the included questions as well as to estimate the average time needed to fill in the sheets. Those who shared in the pilot study were excluded from the main study sample.

Field work

- Preparation of data collection tools was carried out over a period of about four months from March 1, 2010 to end of June, 2010 after being revised from experts giving their opinions, and test validated.
- Official permissions were obtained from the Deans of the Faculties (Benha & El Menoufeya Faculties of Nursing), also administrators of the

- Higher Institute for Children in Ain Shams University and the Egyptian Autistic Society.
- A pilot study was carried out to test clarity and simplicity of questions.
- Data collection was carried out over a period 5 months from beginning of June 2010 to end of October 2010, two days/week (Sundays and Tuesdays) from 10.00 a.m. to 1.00 p.m. for assessment 5 of children and their mothers/day, each mother was interviewed individually by the researchers as counselors for about 60 minutes to fill in the tools.
- At the end of the day, the implementation of the counseling program started with all mothers, in the waiting area after examination of children done by physician. To cover all the content of the counseling program for 6 mothers/day, it was taken 15 days to cover all (90) participated mothers.

Reassessment was done after two weeks during their follow up to evaluate the effect of the counseling contents on mothers' coping patterns for their autistic children.

Counseling Program construction: it included 4 phases:

- A pre-program assessment tool using an interview schedule for data collection for mothers and their children during attending to the outpatient clinics. A review of current and past, local and international related literature on different aspects of problems facing mothers of AC was done using textbooks, articles, periodicals, Internet, and magazines.
- 2. The counseling program was designed by the researchers based on results obtained from preprogram assessment tool; the content was revised and modified according to the related literature, it includes physical, social, motor, attention and concentration, and communication skills.
- 3. Implementation of the counseling program was done in the outpatient clinics in the waiting area after the children have been examined by physician, according to the general objective: improving mothers' coping patterns for their autistic children.

Contents of the counseling program:

Mothers ' care about coping patterns including daily activity needs of their autistic children as:

- Autistic child needs
- Coping patterns of mothers' care for their autistic children as:

Physical care: As hygiene (mouth care, brush teeth, cleaning nose, and bathing), feeding himself, using cup, elimination, and wearing clothes.

Social skills: As encouraging child for cooperation, and communication.

Motor skills: As holding pencils, steady walking, and upwards stairs.

The program was applied in two sessions, one hour each. In the first session, the researchers met the mothers individually in a privacy way to gain their trust after the child has been checked by a physician to discuss their problems and needs. Then in the second session, the researchers met all mothers to explain for them the objectives of the program using the type of counseling talking therapy, discussed their problems and needs honestly and openly, listened to them sympathetically to cope with their AC physically, socially, and emotionally, using discussions, role play, followed by demonstration and redemonstration. As well audio visual aids were used such as posters, handouts, booklets, using simple Arabic language for mothers.

4- Evaluation of the counseling program was done after two weeks from implementation of the program during their follow up by using the same pre-program format

Administrative Design

Official permissions were obtained from the administrators of the Higher Institute for Children in Ain Shams University and Egyptian Autistic Society.

Statistical Design

The statistical analysis of data was done using the excel program and the statistical package for social science (SPSS) program version 11. The first part of data was a descriptive one. Data were revised, coded, and statistically analyzed using the proportion and percentage, the arithmetic mean \pm standard deviation (\pm SD). Qualitative categorical variables were compared using chi-square test.

3. Results

Table (1) shows that, 67.7% of children with autism are boys, age for 47.8% of them ranged from 1-<5 years, 66.7% of them were in school age (1^{st,} 2nd & 3rd primary class), and 40 % of children were ranked as a first child. As revealed from the same table, 50% had a moderate degree of autism disabilities, and 52.3% of them their age ranged 2-<5 years when disability was discovered.

Table (2) denotes that, 50% of mothers' age were ranged from 25-<35, 42.3 % of them had university education and 68.9% were not working. As evidenced from the same table, the majority of them (83.4%) have negative family history of autism, and 72.3% of them were living in urban areas. As well

76.7 % of them had no consanguinity. The table also shows that for 68.9%, their family size was 5-6 persons.

Table (3) reveals that the children were dependent on their mothers in daily activities as bathing, elimination, wearing clothes; communication and holding pencil representing 67.8%, 51.1%, 55.5%, 47.8 and 63.4% respectively.

Table (4) indicates that the parent caregivers were prone to moderate and substantial degree of impact. All parents have a substantial degree of impact. Care of child brought family closer to God and additional financial cost, representing 100% for each of the items.

Table (5) reveals that there were improvements after the counseling program implementation for all aspects of mothers' care physical, social, emotional, motor, and communication skills. Regarding to motor skills before the program they had good score representing 36.7%, while after the counseling program they improved for 56.8% followed by physical (pre 19.5% vs post 55%); followed by social and communication skills (pre 15.1%& 42.8% vs post 48.9%,& 48, respectively).

4. Discussion

Characteristics of children with autism (Table 1)

The present study showed that more than two thirds of children with autism are boys. This result was supported by **Cohen et al.**, who mentioned that autism is four times more likely to appear in boys than in girls (14). This finding was also supported with that of **Hassan**, who studied caregivers' awareness regarding to autistic children and found that majority of children, were boys (15).

In relation to child's age, the present study finding revealed that, less than half of children with autism, their age ranged from 1-< 5. This finding was in accordance with that of **Wong**, who mentioned that the autism typically appears in the first 3 years of life (16).

The results of this study showed, that two fifths of children with autism were ranked the first child and for two thirds of them they were in the school age 1^{st} , 2^{nd} and 3^{rd} primary class.

Regarding to the degree of autism, the current study result showed that half of study sample have moderate degree of autism followed by slightly less than one third of children have mild degree, and the least representing less than one fifth of them have severe degree. This finding is inconsistent with htt//www.what is Autism - Autism Egypt_com.htm, which proved that, the degree of autism can range from mild to severe, whereas mildly affected individuals may appear very close to normal. However, severely affected individuals may have an

extreme intellectual disability and are unable to

function in almost any setting (17).

Table (1): Distribution of children with autism according to their characteristics (n=90)

Items	No	%
Gender		
Boys	61	67.7
Girls	29	32.3
Age		
1-	٤٣	47.8
5-	77	28.9
10+	21	23.3
Educational level		
Nursery	30	33.3
School age (1 st , , 2 nd & 3 rd primary class)	٦٠	7.66
Order of birth		
First	36	40
Middle	25	27.7
Last	19	21.2
Only	10	11.1
Degree of autism disability		
Mild	29	32.2
Moderate	45	50
Severe	16	17.8
Child's age (in years) when autism disability discovered		
1-	26	28.8
2-<5	47	52.3
5+	17	18.9

Table (2): Distribution of studied mothers according to their socio-demographic characteristics (n= 90)

Item	No	%
Age (years)		
25-	٤٥	٥,
35-	٣٧	٤١
45+	8	9
Education		
Illiterate	13	14.4
Read & write	20	22.2
Intermediate school	19	21.1
University	38	42.3
Occupation		
Working	28	31.1
Not working	62	68.9
Family history of autism		
Positive	15	16.6
Negative	75	83.4
Residence area		
Rural	25	27.7
Urban	65	72.3
Family size		
3-4	12	13.3
5-6	62	68.9
>6	16	17.8
Consanguinity		
Yes	21	23.3
No	69	76.7

According to research question No 1: What are the coping patterns of care provided by mothers to their AS? Table (3): Distribution of mothers according to coping patterns of care for their children with autism

	Indepe	endent	Semi-	dependent	Dependent	
Items	No	%	No	%	No	%
Physical Care						
Hygiene:						
-Mouth care	14	15.5	59	65.5	17	19.0
-Brush teeth	18	20.0	45	50.0	27	30.0
-Cleaning nose	10	11.1	39	43.4	41	45.5
-Bathing	8	8.9	21	23.3	61	67.8
Feeding himself	25	27.8	45	50.0	20	22.2
Using Cup	20	22.2	25	27.8	45	50.0
Elimination	17	18.9	27	30.0	46	51.1
Wearing clothes	11	12.2	29	32.3	50	55.5
Social Skills						
Encourage child to be	15	16.6	40	44.4	35	39.0
cooperative						
Communication	12	13.3	35	39.0	43	47.8
Motor Skills						
Holding pencils	15	16.6	18	20.0	57	63.4
Steady walking	69	76.7	15	16.6	6	6.7
Upward stairs	67	74.4	15	16.6	8	9.0

According to research question No 2: Are autistic children affecting the coping mechanism of their families?

Table (4): Impact of child with autism on family caregivers (n = 90)

Items	Not at all	To a mild degree	To moderate degree	To a substanti al degree	_×	P- value
	%	%	%	%		
My child disability needs more time for caring	-	11.1	16.7	72.2	61.66	.000***
Disruption of normal family routines	-	16.7	18.9	64.4	39.26	.000***
The experience of caring for child brought family closer to God	-	-	-	100	30	.000***
It has led to additional financial costs	-	-	-	100	30	.000***
Having a child with autism has led to an improved relationship with spouse	12.2	18.9	20.0	48.9	28.66	.000***
Having a child with autism has led to limitation in social contact outside the home	6.7	16.7	26.7	50.0	37.20	.000***
The experience of caring for a child has made us to terms with what should be valued in life	-	10.0	17.8	72.2	62.06	.000***
We have to postpone or cancel major holidays	16.7	13.3	26.7	43.3	19.60	.000***
It has led to reduction in time parents could spend with their friends	8.9	27.8	41.1	22.2	19.24	.000***
The situation led to stress with spouse	8.9	12.2	25.6	53.3	44.13	.000***
Because of the circumstances of child disability there has been postponement of major purchases	5.6	15.6	28.9	50.0	39.86	.000***
Raising a child with autism made life more meaningful for family members	10	30.0	18.9	41.1	19.68	.000***

According to research Hypothesis Counselling will improve the physical, social, motor and emotional coping patterns of mothers with autistic child.

Table (5): Distribution of the studied mothers about physical, social, motor, emotional care of their children suffering from autism pre/post counseling program (n = 90).

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	Total number of mothers (n = 90)						
Mothers' Care	Good (75% +)		Average (50-<75 %)		Poor (< 50%)		
	Pre %	Post %	Pre %	Post %	Pre %	Post %	
Physical care skills	19.5	٥٥	34.3	21.7	46.2	23.3	
Social skills	15.1	48.9	25	41.1	49.9	20	
Motor skills	36.7	56.8	22.2	27.6	41.1	37.6	
Attention & concentration skills	23.2	35.8	41.3	46.5	35.5	17.7	
Communication skills	42.8	48	32	32	25.2	20	

As regards child's age when autism was discovered, the present study result indicated that for more than half of children autism was discovered in age 2-<5. This result is to some extent supported by that of **Ray and Rutherford**, in that the patterns of autistic behavior disorders do not emerge until the child is between 18 months and 3 years (18).

Socio-demographic characteristics of mothers (Table 2)

The current study results showed that half of mothers' age ranged from 25-<35 years and more than two fifths were highly educated. As well, more than two thirds of mothers were not working and less than three quarters of them reside urban areas. These findings were in accordance with those of **Attiya**, who found in his study that, age of the mothers ranged between 31-< 38 years, more than half were housewives, and the majority of them were highly educated and living in urban areas (19).

As regards family history of autism, results of the current study showed that, the minority of studied families accounting for less than fifth had positive history. As reported by the Autism Society of America there is probably no single gene or genetic defect that is responsible for autism (20).

Mothers' coping patterns of care for their children with autism

The results of present study (Tables 3 & 5) revealed, that most children with autism were semi-dependent or dependent respectively in performing daily activities. The results indicated that the children are

in need for complete assistance in daily activities as bathing, elimination and wearing clothes (table 3). In this respect, Johnson and Myers reported that autistic children have a physical limitation and identified also that more than two thirds of autistic children are disabled in dressing, i.e. wearing clothes (21). Also the previous results are in accordance with Hassan, who found that mothers provide complete help for autistic children in most aspects of child care, as cleanliness, and wearing clothes (15). The present study results also indicated that there were improvements after the counseling program implementation for all aspects of mothers' physical care for their autistic children since they got good score as compared with before. In this respect, Cohen and Volkmar stated that parents typically are active partners in their children's education to ensure that skills learned in the educational program, they transfer to the home setting and teach their children many behaviors that are best mastered in the home and community (22). The present result showed that the mothers were using different approaches in training children with autism. About physical care skills, it was observed that washing hands before and after eating, using cup for drinking or using absorbent in drinking fluid, and using gestures when he/she has needs to go to bathroom are the most activities, where the mothers were providing training. This may be due to that these are the basic elements in daily activities in child's life, so mothers have tried very hardly to cope with their children's needs.

As regards social skills, the present study result showed that the majority of children with autism needed complete assistance in communication (table 3). The results also indicated that there were improvements after the counseling program implementation for mothers' regarding to social skills to care of their autistic children as they had good score in social and communication skills when comparing pre versus post scores (table 5). In a similar study, Rogers clarified that children with autistic disorders are typically characterized by a lack social connectedness, difficulties communication, and unusual, repetitive behaviors (23). As well, the previous results are in accordance with Zander, who mentioned that more than half of the children with autism have problems in understanding communication (24). The previous findings might be attributed to that most of autistic children have difficulty with auditory processing and avoidance to social behavior. The children with autism have significant delay in reaching developmental milestones, therefore they have low muscle tone, and additionally they have great difficulties in understanding the purpose and social meaning of behaviors. As well this may be due to that

children have no content or information, use words in the way that does not make sense, use of body movement instead of words and are not able to pay attention for long time. Moreover, most of them are living in urban areas (table 1), and this may require that mothers of the autistic children let them cope with the society.

Concerning attention and concentration skills, less than half of mothers had got average score after implementation of the counseling program (table 5). They are helping their autistic children in grasping child attention for something for long period and do some exercises that increase mouth coordination, that the autistic children have unusual sensitivities to sounds; sights and modulation of speech are often odd. The previous results are congruent with those of a study carried out by Gray, studying the effects of task difficulty on parents teaching skills and behavior problems of young children with autism, the researcher trained 15 mothers having autistic children on how to deal with problems and decrease behavioral problems and revealed that, the children's skills improved by education of their mothers (4).

As regards motor skills, the present result revealed that more than three fifths of the autistic children were dependent on their mothers in holding pencil, (table 3), while less than three fifths of mothers devoted more effort in developing motors skills for their children, that before the program more than one third had good score while after the counseling program they improved to be less than three fifths (table 5). This explanation is supported by Adams and Edelson, who found that 30% of autistic children have moderate to severe loss of muscle tone. and this can limit their gross and fine motor skills. As well, they mentioned that mothers of children with autism play a critical role in supporting their children in most learning skills (25). Generally, this improvement after implementation of the counseling program might be due to that the majority of studied mothers are highly educated (table 2), and counseling can be a positive way of addressing any unresolved issues. It can help parent to understand their problems better, rather than ignoring them and hoping that they will go away. It can also give a better understanding of parent's points of view.

Impact of child with autism on family caregivers

The results of present study (table 4) clarified that children with autism were prone to a substantial impact on their families. This may be due to that children with autism have distinct characteristics; they are not able to express their basic wants or needs. Therefore, parents are left playing a guessing game. When parent cannot determine their child's needs, both are left feeling frustrated.

Considering that all parents have financial hardship, this study finding was consistent with that of **Sivberg**, who revealed that, the cost to a family who have child with autism can be overwhelming between treatment, specialized child care (if both parents are employed), or lost income, not to mention any medical conditions associated with their autistic child. This might be due to that caring for children with autism can drain families' resources for diagnosis and follow up visits. Additionally, most of mothers might give up their job because of the care giving demands of raising children with autism, financial strains may be exacerbated by only having one income to support all of the families' needs (26).

In the current study, the experience of that caring for a child with autism brought the family closer to God; to a substantial degree as reported by all family caregivers. This finding was in accordance with **Gupta and Singhal** who investigated cultural beliefs and attitudes of a community towards disability (27). Their results revealed that one such instance is the belief in the theory of Karatma, which is often invoked to explain major life events, including the occurrence of disability. It has been shown that people tend to accept their own disability as something which has resulted from their past

Karatma or due to God's will, some parents see the child illness as having a positive impact. This reflects the spiritual domain in individual life; God is the most support among all systems. The whole family tends to accept their own disabilities as fate due to God's will (26).

Some of mothers explained that "the experience of caring for a child has made us to terms with what should be valued in life". This result is consistent with Altiere, who explained that positive perceptions could be viewed as a factor ameliorating the impact of a child's disability on family members. Positive effect might help to reinforce psychological and physical resources during stress, acts as a buffer against the adverse physiological consequences of stress and helps to protect against clinical depression (28).

Congruent with this study result, in that caring for a child with autism takes more effort and time in their study, **Rivers and Stoneman** explained that caring for a child with autism can be twenty-four hours, and seven days a week job, throughout the child's entire lifetime (29). This result is similar to that of **Montes and Halterman**, who compared functioning and coping among mothers of children with autism with general population and found that a significantly higher percentage of mothers with a child with autism reported that their children were much harder to care for than most children of their age without autism (85.6% vs. 30.8%; P < .001). Similarly, most mothers

of children with autism reported that they had given up more of their lives than expected during the previous month to meet their children's needs (68.3% vs. 40.9%; P < .001) (30). These findings might be attributed to due to increased amount of care, given by AC mothers, which requires giving time to a child with autism due to that the mother spends long time to understand his/her needs. Additionally, children with autism have resistance to change; their mothers may have little time for themselves or other family members. Majority of mothers explained that the children with autism are not able to share ideas or express feelings leading to give up all other activities in house and outside house.

Surprisingly, in the current study, while more than half of mothers reported that the situation of the presence of a child with autism in the family led to stress with spouse; to a substation degree less than half of them told that "having a child with autism has led to an improved relationship with spouse" This result is contradicting with Gray, who found that parents of children with autism are at a high risk for marital discord as more than half of the families under study had a weak affection bond between the parents (31). However, in the current study, findings might be due to that it is the first child (table 1); so both parents struggle to maintain healthy living pattern for their child. They have strong affection bound between them to overcome any stress facing them.

The parents perceived the child's illness as having a negative impact on their families that half of mothers mentioned that having a child with autism has led to limitation in social contact outside the home, which might be attributed to that caring for the child needs more time. This result is similar to that of Mulhauser, which explained that frequently families with autistic children themselves cope with judgments, criticism, and intolerance of neighbors, friends and relatives, whereas, on the contrary, they need so much solidarity and support (32). This could be due to that the child with autism needs constant supervision for 24 hours and usually no one is helping mother in caring for him and managing home activities. Most of mothers found difficulties in meeting their children's needs that lead to cancel holidays, not calling or inviting friends, adding to that they are annoyed from others comments.

Conclusion

Based on results of the current study, research questions, and hypothesis the following can be concluded:

Coping patterns of mothers' care for their autistic children included physical care as hygiene (mouth care, brush teeth, cleaning nose, and bathing),

feeding himself, using cup, elimination, and wearing clothes. Social skills include encouraging child for cooperation and communication, while motor skills deals with holding pencils, steady walking, and upwards stairs. Additionally and most of children with autism were dependent on their mothers in daily activities as bathing, elimination, wearing clothes; communication and holding pencil. A child with autism leads to substantial degree of impact on his family life and parent caregivers. Care of the autistic child brought family closer to God, additional financial costs, and needs for more effort and time. There was improvement after the counseling program implementation for all aspects of coping patterns of mothers' care physical, social, emotional, motor, and communication skills for their autistic children.

Recommendations

Based on the results of the present study, research questions, and hypothesis, it was recommended that: Continuous health education and counseling programs are necessary to improve mothers 'coping patterns toward care of their autistic children through:

- Discussing child problems and needs.
- Applying guidance including information about community resources, and comprehensive coping care needs as physical, social, emotional, motor, and communication skills to be provided for children with autism in order to meet their needs and prevent further complications.
- Reassuring the importance of follow up care.

Community awareness:

- Early detection for mothers of AC through systematic assessment and planned screening programs.
- Continuous follow up for these children through activities, school health social services, and skills in collaboration with school and related centers.
- Media awareness to aid health team professionals in prompting tolerance and understanding of autism with a clear explanation and a focus on increasing awareness, as individuals with autism will be better when integrated in the society.
- Families of children with autism should be in close contact with schools, society and related clinics of their children through families' regular meetings/conferences.
- Establishing special schools for autistic children in different provinces in Egypt.
- More researches are needed to identify most common family problems in the community, and available resources that meet family needs.

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Impact Of An Steroidogenesis Inhibitor Drug On Structure And Ultrastructure Of Mammalian Testis

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Abstract: ketoconazole, an imidazole derivative is currently used in the medical fields as an anti-fungal and steroidogenesis inhibitor drug. The present study aimed to investigate the effect of ketoconazole on the structural and ultrastructural characteristics of mammalian testis. So, twenty adult male rats weighing 150-200 g. were divided into two groups; group I were i.p. injected with 10mg/100g.b.wt. of ketoconazole dissolved in 1ml physiological saline solution daily for 15 days. Whereas, group II was injected with 1ml saline solution in the same manner. Histologically, testes of treated rats were surrounded by thickened tunica albuginea, and consisted of deformed seminiferous tubules ensheathed by irregular basal lamina and having deformed Sertoli cells, necrotic spermatogonia, primary spermatocytes and rounded spermatids, in addition to, deformed elongated spermatids exhibiting unusual amounts of residual cytoplasm extending from them into the lumen of the tubules. Deformed spermatozoa may be seen in the lumens of some of these affected tubules. Also, the interstitial tissue displayed vacuolation, necrotic Leydig cells and vasodilatation of the blood vessels engorged with stagnant blood cells are seen. Ultrastructurally, treated testes showed thickening and irregularity of the surrounding basal lamina, necrotic spermatogonia detached from the basal lamina and having pyknotic nuclei separated from the surrounding cytoplasm leaving clear zones. Primary spermatocytes and rounded spermatids exhibiting signs of necrosis, deformed elongated spermatids and malformed spermatozoa, in addition to, necrotic Leydig cells were frequently observed. In conclusion, the obtained results suggested that the testicular structural and ultrastructural alterations observed following ketoconazole administration may be responsible for the inhibition of the steroidogenesis. This decrease in steroidogenic activity has been suggested as the primary cause of spermatic production failure. Therefore, these destructive impacts of ketoconazole on the rat testes indicates that it should be used under strict medical care.

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Key words: histology, imidazole, ketoconazole, rat, steroidogenesis, testis, ultrastructure

1. Introduction:

Ketoconazole is an antifungal drug currently used in the medical field for the treatment of wide variety of yeast, dimorphic fungal, fungal infections of the gastro-intestinal tract, dermatophytic infections of the skin and fingernails and has been widely used in immunocompromised patients such as those with AIDS or those on chemotherapy (Vertzoni et al., 2006). Also, it has an 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).

Also, 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). Therefore, physicians have used ketoconazole for the treatment of resistant and hypercortisolemic depressive patients (Brown et al., 2001), treatment of prostate cancer with promising results (Kinobe et al., 2006; Liebertz and Fox, 2006),

treatment of ACTH-secreting adenomas (Gordon, 2007), for palliative treatment of primary hyperaldosteronism due to adrenal adenomas or hyperplasia, Cushing disease, adrenal tumors, adrenocortical carcinoma and ectopic corticotrophin production by small-cell lung carcinoma or carcinoid tumors autonomous, advanced breast cancer resistant to conventional chemotherapy and for ovarian hyperandrogenism syndrome, including polycystic ovarian syndrome and hyperthecosis (Lionakis et al., 2008).

Experimentally, the impact of ketoconazole has been studied from some biological aspects on different body organs (Rodriguez and Buckholz, 2003; Braddock, 2003; Amin and Hamza, 2005; Furukawa et al., 2008). Nevertheless, there seems to be an almost complete lack of information regarding its effect on testicular tissue in experimental animals. Therefore, the present work aimed to clarify the impact of ketoconazole on adult male rat testes.

2. Material and Methods

2.1. Experimental animals

Twenty male 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 kept under controlled environmental conditions, including a temperature of 25°C and a 12-h light/dark cycle.

2.2. Experimental drug used(Ketoconazole)

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 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 rats were injected with 1 ml 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 testes were fixed in Bouin's fluid for 24 hours, then subjected to the normal procedures for paraffin sectioning, 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 testis 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 studies

Histological examination of control testes displayed normal features of testicular tissues as seen 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 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.

Whereas, ketoconazole-treated rat testes illustrated destructed features of testicular tissues. The testis is surrounded by thickened tunica albuginea, containing deformed seminiferous tubules and destructed interstitial tissues as displayed in The seminiferous tubules (4-6).surrounded by irregular basal lamina and having spermatogonia, primary spermatocytes and rounded spermatids showing clear sings of pyknosis. One of the most common histopathological lesions observed after treatment with ketoconazole is the unusual amounts of residual cytoplasm that extend from the elongated spermatids into the lumen of the tubules. Deformed spermatozoa may be seen in the lumen of some of these affected tubules. Sertoli cells became irregular in shape. Large vacuoles are clearly observed in between germ cells.

The interstitial tissues between these deformed seminiferous tubules displayed vacuolation, necrotic Leydig cells and vasodilatation of the blood vessels that were engorged with stagnant blood cells as noticed in figures (4 & 6).

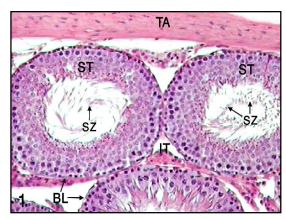


Fig.(1): Normal testicular tissue architecture of control testis revealing tunica albuginea (TA), seminiferous tubules (ST) ensheathed with basal lamina (BL) and containing spermatozoa (SZ) in their lumens, in addition to the interstitial tissues (IT). (H&E, x330)

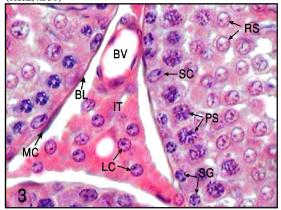


Fig.(3):Normal architecture of interstitial tissue (IT) of control testis embodying clusters of Leydig cells (LC) and blood vessel (BV) and located in between three seminiferous tubules being surrounded by basal lamina (BL) containing myoid cells (MC), having spermatogonia (SG), primary spermatocytes (PS), rounded spermatids (RS) and Sertoli cells (SC). (H&E, x1320)

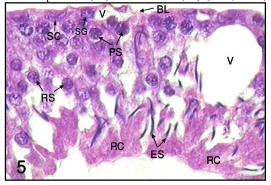


Fig.(5): Destructed seminiferous tubule of ketoconazole-treated testis surrounded by irregular basal lamina (BL) and possessing necrotic spermatogonia (SG), primary spermatocytes (PS) and rounded spermatids (RS). In addition to elongated spermatids (ES) with residual cytoplasm (RC). Also, Sertoli cells (SC) with irregular shapes and large vacuole (V) between germ cells are clearly seen. (H&E, x1320)

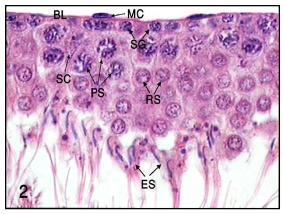


Fig.(2):Seminiferous tubule of control testis surrounded by basal lamina (BL) with myoid cells (MC) showing Sertoli cells (SC) and germ cells including; spermatogonia (SG), primary spermatocytes (PS), rounded spermatids (RS) and elongated spermatids (ES). (H&E, x1320)

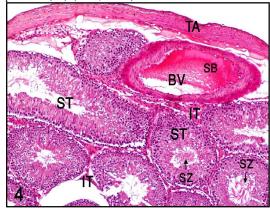


Fig.(4):Destructed testicular tissues of ketoconazole-treated rat illustrating thickened tunica albuginea (TA), deformed seminiferous tubules (ST) containing spermatozoa (SZ) in their lumens, and interstitial tissue (IT) with dilated blood vessel (BV) engorged with stagnant blood cells (SB). (H&E, x330)

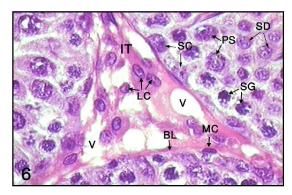


Fig.(6): Destructed interstitial tissue (IT) of ketoconazole-treated testis showing vacuoles (V) and necrotic Leydig cells (LC). Parts of three deformed seminiferous tubules surrounded by ruptured basal lamina (BL) with myoid cells (MC) and possessing necrotic spermatogonia (SG), primary spermatocytes (PS) and round spermatids (RS), in addition to irregular shaped Sertoli cells (SC). (H&E, x1320)

3.2. Ultrastructural study

Electron micrographs of control rat testes showed Sertoli cells and germ cells with cellular characteristics typical of those seen in active spermatogenesis. The germ cells in various developmental stages arranged orderly as illustrated in figure (7). The spermatogonia rest upon the basal lamina of the tubule possessing mitochondria and nuclei with one or two nucleoli, euchromatin and dense clumps of marginated heterochromatin (Fig.7). However, ketoconazole-treated testis showed necrotic spermatogonia which are detached from the underlying thickened basal lamina and having pyknotic nuclei separated from the surrounding cytoplasm leaving clear zones (Fig. 8).

The primary spermatocytes of control testes are rounded in configuration 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&9). While, ketoconazole-treated testes showing spermatocytes possessing irregular shaped nuclei surrounded by nuclear membranes, containing nucleoli and fragmented chromatin materials. The surrounding cytoplasm showing deformed mitochondria, condensed Golgi apparatus and lysosomes as observed in figure (10).

Rounded spermatids of control rat testes (Fig. 11) displayed 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. Contrarily, rounded spermatids of ketoconazole-treated testes were atrophied, surrounded by irregular plasma membrane and possessing nuclei ensheathed by ruptured nuclear membranes, with condensed chromatin materials and lacking nucleoli. The cytoplasm exhibiting deeply electron dense shrunken mitochondria, condensed Golgi apparatus and numerous vacuoles (Fig. 12).

As illustrated in figure (13), elongated spermatids of control testes is formed of elongated nuclei, covered by the acrosomal caps and forming a structure known as the acrosomal head cap.

Cylindrical bundles of microtubules -the manchettelimit the nuclei laterally, and extend caudally from a circumferential specialization of the nuclear envelopes at the posterior margin of the acrosomal caps. With the formation of the manchette, there is a marked elongation of the spermatid, with the bulk of the cytoplasm moving behind the posterior pole of the nucleus where it surrounds the proximal portion of the flagellum. This migration of cytoplasm thus concentrates mitochondria in the flagellar region. Controversely, ketoconazole-treated testes were possessing deformed elongated spermatids showing deformed acrosomal head cap with the nuclei exhibiting distortion and the acrosome revealing discontinuation. Also, the manchette occurred as a continuous patch connected to one side of the nucleus. The flagellum having disarranged mitochondria as revealed in figure (14).

The electron micrograph (15) displayed the ultrastructural features of spermatozoa. Each one is formed of the head, composed of the nucleus, which occupies most of the head and is formed of very condensed chromatin. Surrounding the anterior twothirds of the nucleus is the acrosomal cap. Following the head is the neck, a short linking segment between the sperm head with the flagellum. It is composed of the segmented columns and a dense fibrous structure -the capitulum-. The tail is the longest part of the sperm and consists of midpiece, principal piece and end piece. Only, the middle piece is seen, it is characterized by the mitochondrial Malformed spermatozoa are seen post ketoconazole treatment, as seen in electron micrograph (16), the spermatozoon exhibiting head size abnormality, including macrocephalic head formed of nucleus and surrounded by the acrosomal cap, which was partially lost, while the midpiece included vacuolated mitochondria (Fig. 16).

Sertoli cells of control testes showed distinct nuclei and cytoplasmic characteristics consistent with an active secretory state. They rest 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. Their cytoplasm contain mitochondria with distinct tubular cristae, cisternae of smooth endoplasmic reticulum, few stacks of rough endoplasmic reticulum, Golgi apparatus and lysosomes. The nuclei appear irregular in shape, devoid of heterochromatin, containing prominent nucleoli, surrounded by nuclear envelops and exhibit deep indentation as clearly observed in figure (17). Whereas, Sertoli cells of treated testes with their exhibiting plate-like nuclei or elongated configuration, having nucleoli and surrounded by irregular nuclear membranes. The surrounding

cytoplasm contained deformed mitochondria and large vacuoles (Figs. 8 & 18).

The interstitial tissues of control testes manifested normal Leydig cells having 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. Monocyte is also found in the interstitial tissue; 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. 19). While, the interstitial tissues of treated testes showed remarkable decrease in the number of Leydig cells, most of which were deformed and characterized by electron dense mitochondria, disappearance of smooth endoplasmic reticulum and pyknotic nuclei as illustrated in figure (20).

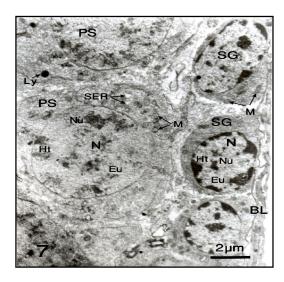


Fig.(7): Seminiferous tubule of control rat testis surrounded by thin basal lamina (BL) and formed of; spermatogonia (SG) that possessing rounded to oval nuclei containing nucleoli (Nu), euchromatin (Eu) and marginated heterochromatin (Ht), and the cytoplasm containing mitochondria (M). Primary spermatocytes (PS) which are rounded in shape having large rounded nucleus (N) containing nucleoli (Nu), heterochromatin (Ht) and euchromatin (Eu) and the cytoplasm involving mitochondria (M), smooth endoplasmic reticulum (SER) and lysosomes (Ly). (x4000)

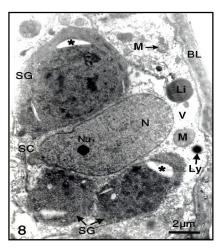


Fig.(8): Seminiferous tubule of ketoconazole-treated testis illustrating necrotic spermatogonia (SG) which are detached from the underlying thickened basal lamina (BL) and having pyknotic nuclei (N) separated from the surrounding cytoplasm leaving clear zones (*). In between these degenerated spermatogonia lying Sertoli cell (SC) having an elongated nucleus (N) with a nucleolus (Nu) and ensheathed by nuclear membrane with a notch and the surrounding cytoplasm showing deformed mitochondria (M), lysosomes (Ly), large electron dense lipid droplet (Li) and vacuoles (V). (x4000).

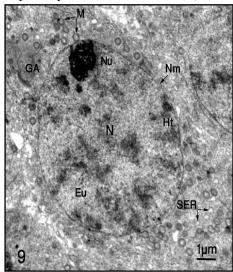


Fig.(9): Primary spermatocyte of control testis having large rounded nucleus (N) containing nucleolus (Nu), heterochromatin (Ht) and euchromatin (Eu) and surrounded by nuclear membrane (Nm). The cytoplasm containing oval mitochondria (M), smooth endoplasmic reticulum (SER) and Golgi apparatus (GA). (x6000)

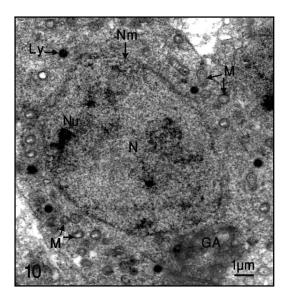


Fig.(10): Primary spermatocyte of treated testis possessing irregular shaped nucleus (N) surrounded by nuclear membrane (Nm) and containing nucleolus (Nu), fragmented chromatin materials. The surrounding cytoplasm showing deformed mitochondria, condensed Golgi apparatus (GA) and lysosomes (Ly). (x6000)

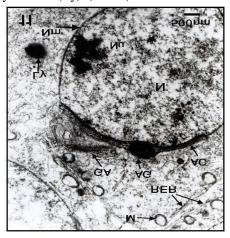


Fig.(11): Rounded spermatid of control testis illustrating the formation of the acrosome, indicated by the presence of a proacrosomal granule (AG), acrosomal cap (AC), Golgi apparatus (GA) over the anterior hemisphere of the nucleus (N) which is rounded in shape, distinct nucleolus containing homogenous chromatin materials surrounded by nuclear membrane (Nm). The cytoplasm containing vacuolated mitochondria (M), few stacks of rough endoplasmic reticulum (RER) and lysosome (Ly). (x10,000)

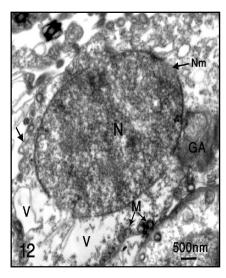


Fig.(12): Atrophied rounded spermatid of ketoconazole-treated testissurrounded by irregular plasma membrane (arrows) possessing nucleus (N) ensheathed by ruptured nuclear membrane (Nm), showing condensed chromatin material and disappearance of the nucleolus. The cytoplasm exhibiting deeply electron dense mitochondria (M) with reduced sizes. condensed Golgi apparatus (GA) and numerous vacuoles (V). (x10,000)

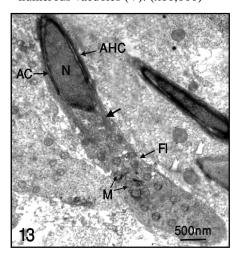


Fig.(13): Elongated spermatid of control testis illustrating the elongated nucleus (N) in the center, covered by the acrosomal cap (AC) forming a structure known as the acrosomal head cap (AHC), in addition to bundles of microtubules –the manchette-(arrow) limit the nucleus laterally. Part of the flagellum containing numerous numbers of rounded mitochondria (M) is clearly noticed. (X12,000)

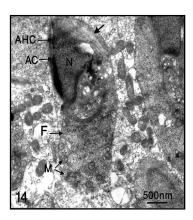


Fig.(14):Deformed elongated spermatid of treated testis showing the deformed acrosomal head cap (AHC) with the nucleus (N) exhibited distortion and the acrosome (AC) revealing discontinuation. Also, the manchette (arrow) occurred as a continuous patch connected to one side of the nucleus. The flagellum (F) having disarranged mitochondria (M). (x12,000)

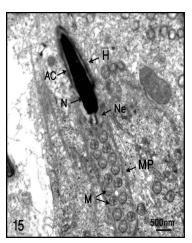


Fig. (15): Spermatozoon of control testis showing the head (H), formed of the nucleus (N) which occupies most of the head, composed of condensed chromatin and surrounded by the acrosomal cap (AC). The neck (Ne) is a very short segment connecting the head with the midpiece (MP) -the first part of the tail-which is characterized by the mitochondrial sheath formed of elongated mitochondria (M). (x15,000)

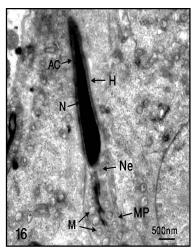


Fig. (16): Deformed spermatozoon of treated testis displaying long head (H), formed of the nucleus (N) and surrounded by the acrosomal cap (AC) that partially lost, the neck (Ne) and the midpiece (MP) containing vacuolated mitochondria (M). (x15,000)

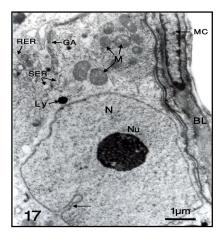


Fig. (17): Sertoli cell of control testis revealing irregularly shaped nucleus (N), devoid of heterochromatin, containing one prominent nucleolus (Nu), and enclosed with nuclear envelope that exhibiting a deep indentation (arrow). The cytoplasm containing mitochondria with distinct tubular cristae (M), 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 noticed. (x7500)

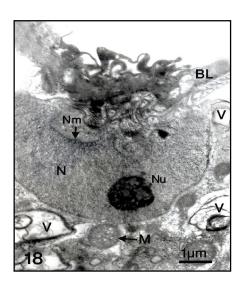


Fig.(18): Sertoli cell of treated testis illustrating the nucleus (N) with plate-like configuration, possessing nucleolus (Nu) and surrounded by irregular nuclear membrane (Nm). The cytoplasm containing deformed mitochondria (M) and large vacuoles (V). In addition, part of irregular, thickened basal lamina (BL) is also seen. (x7500)

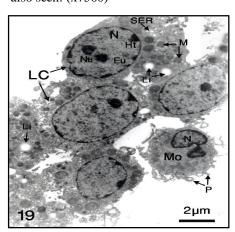


Fig.(19): Interstitial tissue of control testis revealing normal fine structure of Leydig cells (LC), characterized by cytoplasm containing mitochondria (M), smooth endoplasmic reticulum (SER) and lipid droplets (Li), in addition to oval to rounded nuclei (N) containing one or two nucleoli (Nu), heterochromatin (Ht) and euchromatin (Eu). A monocyte cell (Mo) is also noticed with its eccentrical nucleus (N) and numerous small pseudopodia (P) extending from it. (x4000)

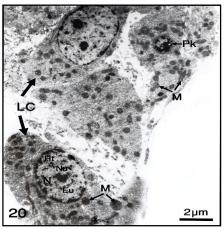


Fig.(20): Destructed interstitial tissue from treated rat testis illustrating remarkable decrease in the number of Leydig cells (LC) which possessing electron dense mitochondria (M), and nuclei (N) including electron dense nucleoli, euchromatin and heterochromatin, pyknotic nucleus is also seen. (x4000)

4. Discussion

Reproductive toxicology has been receiving interest and concern in recent years (Mangelsdorf et al., 2003). Recently, it has been shown that environmental chemicals may cause serious effects on human reproductive organs (Shin et al., 2006). One of such chemicals is ketoconazole, an imidazole derivative currently used in the medical fields as an antifungal drug with a broad spectrum of activity for the treatment of a number of superficial and systemic infections (Schimmer and Parker, Ketoconazole directly interferes with steroidogenesis by acting as potent inhibitors of steroidogenic enzymes and are known to cause endocrine disruption mainly via this mechanism (Sanderson, 2006).

The roles of the testis are producing fertile sperm for procreation and synthesizing and secreting steroid hormones for sexual and reproductive function. The testis specializes in de novo steroid production, which starts with the conversion of cholesterol to pregnenolone by CYP11A (cholesterol side-chain cleavage) that is bound to the inner membranes of the mitochondria in Leydig cells. Pregnenolone is converted to progesterone by 3 hydroxysteroid dehydrogenase (3 -HSD), which is found in both mitochondria and smooth endoplasmic reticulum. Pregnenolone and progesterone form the precursors for all other steroid hormones (Gingras et **2001**; **Simard** *et al.*, **2005**). Normal spermatogenesis depends on the testosterone secretion and gonadotropic hormonal action of Follicle-stimulating hormone (FSH) and Luteinizing

hormone (LH). FSH stimulates spermatogonial cells to develop into mature sperm, a process called spermatogenesis. FSH binds to FSH receptors on Sertoli cells and stimulates the cAMP-mediated second messenger pathway resulting in the activation of various factors required for successful spermatid production (MacLachlan et al., 2002). While, LH binds to its receptor on the Leydig cell membrane, which is also coupled to the cAMP signaling pathway, to stimulate the production of testosterone de novo from cholesterol. In concert with the actions of FSH, this testosterone is required for optimal sperm production, as well as for sexual function. LH induces the various cytochrome P450 enzymes and dehydrogenases involved in testosterone synthesis in Leydig cells, including CYP17 17,20-lyase, the key activity directing the biosynthesis of steroids toward the sex hormones (Dharia et al., 2004, Spaliviero et al., 2004). Leydig, Sertoli, and germ cells further express low levels of aromatase, which converts testosterone originating from the Leydig cells into estradiol, a step that appears to be necessary for the successful inhibition of spermatogenesis and mitosis of spermatogonia (Carreau et al., 2003).

Ketoconazole is reported by O'Connor et al. (2002) to inhibit testosterone biosynthesis by binding to the heme iron of cytochrome P450 isozymes of testosterone biosynthetic pathway. Therefore, Leydig cells are unable to produce sufficient quantities of testosterone. As a result, LH and FSH release from the pituitary are increased to stimulate testosterone production. Secondary to the decreases in levels testosterone, serum of DHT (dihydrotestosterone, the major metabolite of testosterone), and E2 (estradiol, the aromatization product of testosterone) are also decreased. As a result of the decreased androgen levels, the weights for the androgen-dependent tissues are also decreased.

Ketoconazole steroidogenesis inhibition property has been physiologically studied in intact male rats following its oral administration for 15-days by **O'Connor** *et al.* (2002). They declared that, ketoconazole decreased weights of all androgen-dependent tissues and caused hormonal alterations. Also, **Shin** *et al.* (2006) studied the toxicity of ketoconazole in male rats post 28-days of oral administration. They also reported that ketoconazole showed reduction of epididymis and accessory sex organ weights, alteration of hormonal patterns including; decrease of testosterone and increases of estradiol, luteinizing hormone (LH) and follicular stimulating hormone (FSH).

These presently reported alterations included; thickening and irregularity of basal lamina, and degenerated changes of germ cells, Sertoli cells, and Leydig cells.

The basal lamina plays an important role in maintaining the structural and functional integrity of tissues. It provides structural stability of organs and sends signals to cells through cell surface receptors. Altered basal lamina structure has been associated with severe functional impairment of the testis. It contains several proteins including laminin, type IV collagen, various heparin sulfate proteoglycans and ectatin/nidogen. Type IV collagen is a major constituent of mammalian basal lamina that is secreted by myoid cells and Sertoli cells (Dobashi et al., 2003). Interactions between Sertoli cells, myoid cells, Leydig cells, and germ cells are thought to be essential for spermatogenesis. Each of these interactions must be communicated through the basal lamina. Many reports have demonstrated that overexpression of the subtypes of type IV collagen correlates with abnormally thickened basal lamina and is related to spermatogenic dysfunction in human and other mammals (Mattias et al., 2005).

Sertoli cells are essential development and maintenance of testicular functions (McLaren, 2000). Spermatogenesis is a complex and dynamic process that results in the continual production of spermatozoa. Sertoli cells are largely responsible for orchestrating the germ cells through sequential phases of mitosis, meiosis, differentiation. Sertoli cells accomplish this task by providing hormonal, nutritional, and physical support (Mesbah et al., 2008). Sertoli cells have been reported to be the targets for various toxicants (Krishnamoorthy et al., 2005). Therefore, any agent that impairs the viability and function of Sertoli cells may have profound effects on spermatogenesis. Ketoconazole has been shown in the present study to injure Sertoli cells leading to disruption of their functions which are reflected on the development and maintaining of spermatogenesis.

Necrotic spermatogonia were observed in the present work after ketoconazole treatment. Spermatogonia were reported by De Rooij and Russell (2000) to be particularly vulnerable to toxicants and physical agents. In particular, because of their mitotic activity. They 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 ketoconazole administration may be

due to the disturbances in the microenvironment of 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 changes observed in the spermatids as a result of ketoconazole administration may cause delayed spermiation as elucidated by **Yano and Dolder (2002)** post paracetamol treatment. These authors displayed that delayed spermiation is the consequence of the large quantity of residual cytoplasm that remains connected to the spermatids and may delay the entire process of spermiogenesis. With modifications of spermiogenesis, the resulting spermatozoa may be immature or functionally defective.

The abnormalities in the size of sperm head are the result of alterations in the pattern of chromatin condensation and/or in the development of the acrosome in the developing rounded spermatids (**Pinart** *et al.*, 1998). Such malformed spermatozoa have a reduced ability to bind and penetrate the zona pellucida (**Pesch and Bergmann. 2006**).

The results of the present study showed a remarkable decrease in the number of Leydig cells after ketoconazole treatment. These results were consistent with Mesbah et al., (2008) who found pyknotic and severe depletion of Leydig cells following treatment with anabolic androgenic steroids. There is a close relationship between Leydig cells and blood vessels suggesting that these cells are at high risk of exogenous toxicants. Leydig cells are known to have receptors for LH that stimulates these cells to produce testosterone. Both LH and testosterone are responsible for normal spermatogenesis in male rats (Dharia et al., 2004, Spaliviero et al., 2004). Thus, depletion of LH receptors and decrease in peripheral LH post ketoconazole treatment result in the reduction of testosterone secretion.

In conclusion, the obtained results suggested that the testicular structural and ultrastructural alterations observed following ketoconazole administration may be responsible for the inhibition of the steroidogenesis. This decrease in steroidogenic activity has been suggested as the primary cause of spermatic production failure. Therefore, it may be recommended that ketoconazole must be used only under strict medical follow up.

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Modeling of drying Lavandula officinalis L. leaves

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Abstract: Storage of agricultural crops after harvesting is important to keep quality and quantity of the dried materials in a good level, particularly for medicinal plants and herbs because of reduction of essential oils and changes of qualitative properties such as color, which both of them influence on the economical value of the products. Drying process of *Lavandula officinalis* L. leaves was studied and modeled in this investigation. Independent variables were temperature at three levels (40, 50 and 60 C), air velocity at two levels (0.5 and 1 m/s) and product depth at three levels (1, 2, and 3cm). The experiments were performed as factorial with complete random design in three replications. Seven drying models, namely Yagcioglu, modified Page, Page, Henderson and Pabis, Lewis, two-term and Verma, were examined to fit the data. The Page model was found as the best model with highest R² and lowest ², RMSE and P-values.

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Keywords: drying; modeling; *Lavandula officinalis L*.

Introduction

The main aims of drying of agricultural products are to increase the shelf life, to prevent from biological activities including microbial and enzymes, and to reduce the weight and volume of the materials in order to facilitate packaging, transporting and storing [Simal et al., 2005]. During drying process it is important to preserve the texture, color, flavor, and nutritional value of the product. It means to reach moisture at safety level to minimize the quantity and quality losses during storage [Hall, 1980]. The amount and the type of moisture, have direct effects on drying time. The problems of research on medicinal herbs are indentifying and preserving the essential oils especially in different kinds of herbs. Lavander is an important medicinal plant of the Labiatae family. Linalool and linally acetate are the main component of lavender oils. The present study was conducted to determine the best model for drying of Lavandula officinalis L. leaves to preserve quality properties and effective chemical compounds. Panchariya examined the conditions of black tea at temperature ranging from 80 to 120 C and air velocity from 0.25 to 0.65 m/s. Experimental data was evaluated using Lewis, Page, modified Page, Two-term, and Handerson & pabis drying models with non-linear regression, and the Lewis model was selected as the best model [Panchariya et al., 2002]. Arabhosseini examined drying of Artemisia dracunculus L. leaves at temperature range of 40 to 90 C, different relative humidities and air velocity of 0.6 m/s. Although the Diffusion approach equation showed the best fit, but Page model was chosen since it had almost a similar performance but the equation is simpler as it has only two parameters instead of three in Diffusion approach model [Arabhosseini et al., 2009]. Doymaz assessed the drying behavior of mint leaves at temperatures of 35, 45, 55, and 65 C and air velocity of 1m/s. He reported that drving time reduced significantly at higher temperature. Four drying models were selected to fit the experimental data and the logarithmic model described satisfactorily the drying behavior of mint leaves [Doymaz, 2007]. Sharma examined thin layers drying of onions in a dryer using x-ray. The experiments were conducted at temperatures of 35, 40, and 45 C and air velocities of 1, 1.25, and 1.5 m/s. The resulted data was fitted to eight drying models. Following the analysis, the Page model was proposed as the best model because of highest R² and least ² [Sharma et al., 2007].

Materials and methods Drying equipment

Three experimental dryers of Kiln type were used for drying experiments. The experiments were performed at research complex of Asr-e- Enghelab, Tehran, Iran. This kind of dryer consists of two floors and usually use for drying of seeds, food stuffs, fruits and vegetables. In the first floor there is a heat generator and in the second floor, there is a container, with dimensions of 40 by 40 cm and 165cm height, to put the products for drying. At the bottom of this floor there are some holes to pass hot air generated in the first floor (Fig. 1). About 40 cm above the samples, there is a port to escape the moist air. Each dryer has two electric elements to generate required heat which

one of them was controlled by a digital thermostat and the other one was controlled manually. The current flow of the hot air was produced by a blower which is located under the elements. The aeration rate of the blowers is adjustable by a dimmer in the range of 180 to 220 m³/h. Two sensors are in the upper and lower parts of the container to measure the temperature of the drying air just before and after the samples location.

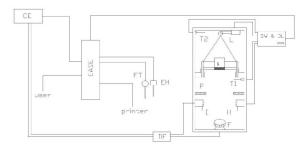


Fig 1. Experimental dryer

(F) fan, (H) heat generator, (S) sample – hold mesh, (T₁) thermometer before(s), (T₂) thermometer after(s), (Sw) switches, (DL) data logger, (CE) control electronic system, (DE) electronic driver, (EH) environment humidity sensor, (ET) environment temperature sensor.

Before starting of each experiment, the temperature was adjusted by the thermostat and the dryers were activated to reach the required heat. Having turned off the element by the switcher, means that the dryer's temperature was balanced then the samples were placed in the container. Data collection for thin layer drying experiments was performed through samples weighting at 5min time intervals using a digital balance (Sartorius, model PT210, Germany) with an accuracy of ± 0.001 g and then the results were recorded. Weighting of the samples continued until three consecutive readings showed the same value. Sample moisture was measured before and after drying experiment. The mean value of the samples dry weight was used for computations. The final moisture content of the samples was determined by drying in a vacuum dryer (model Galen Kamp) at 70 C, 150 mbar, for 8hours [Tsami et al., 1990]. The air velocity of drying air was adjusted to the desired level by adjusting the blower motor and measured by an anemometer (AM-4201, Lutron) with an accuracy of ±0.1m/s. During the experiments the ambient air temperature and RH variations in the lab were measured to be between 25 to 29 C and 31-33%, respectively. Given the small size of the samples, 35 by 35 cm metal micro-pore meshes were used as tray to keep the samples in the dryers. Aluminum frames of 35 by 35 cm cross section with 1, 2 and 3cm height were placed on the porous plates to

obtain the desired bed depths. The samples were placed in the frame while a metal mesh was used on the frame to avoid any sample skip by air current flowing.

Drying process

The used herb in the study was prepared by medicinal herb research collection of Jahad-e-Daneshgahi in May and June, 2009. The plants were harvested just before flowering and then the leaves were immediately removed from the stems. The separated leaves were cut and then the samples were stored separately in plastic bags and refrigerated at temperature of 4± 1 C to prevent from microbial spoilage. Moisture content of the leaves was found to be 61% db. In this study the independent variables were temperature at 40, 50, and 60 C, air velocity at 0.5 and 1 m/s and bed depth of 1, 2, and 3cm. The total number of treatments was 18 and all experiment was conducted at three replications. Dependent variable was drying time in order to determine the proper model for thin layer drying of Lavandula officinalis L. leaves.

Mathematical modeling of drying

For modeling of thin layer drying of Lavandula officinalis L. leaves, the moisture ratio was calculated using equation 1 initial moisture content of the sample (M_0) , equilibrium moisture content (M_e) , and sample moisture during the drying process using [Doymaz, 2007].

$$MR = \frac{M_t - M_\theta}{M_\phi - M_\theta} \tag{1}$$

In which:

MR is moisture ratio (dimensionless), M_t is moisture content at time t (d.b%), M_0 is initial moisture content (d.b%), M_e is equilibrium moisture content(d.b%). For determining the final moisture content, the samples were placed in a vacuum oven at 70 °C and 150 mbar for 8 hours. The samples were weighted before and after drying and their moisture was determined using equation 2 on the dry basis.

$$M_C = \frac{W_w - W_d}{W_d} \tag{2}$$

In which:

 M_C is moisture content (d.b%) $W_{\rm w}$ is weigh of sample (kg) and $W_{\rm d}$ is dry matter weight (kg).

After drying, the drying models in Table 1 were used to examine moisture variation during the drying process and to determine the best model.

Table 1. Mathematical equations used for modeling of drying process

Model name	Model equation	Reference
Lewis	MR=exp(-kt)	(Lewis, 1921)
Henderson and Pabis	MR=a exp(-kt)	(Westerman et al.,1937)
Page	$MR = exp(-kt^n)$	(Page, 1949)
Modified Page	$MR = \exp(-(kt)^n)$	(White et al., 1981)
Yagcioglu	$MR=a \exp(-kt)+c$	(Yagcioglu <i>et al.</i> , 1999)
Verma	$MR = a \exp(-kt) + (1-a) \exp(-gt)$	(Verma et al., 1985)
Two-term	$MR = a \exp(-k_0t) + b \exp(-k_1t)$	(Gunhan et al., 2004)

In the above equations, k, n, a, b, c, g, k_0 and k_1 are the model coefficients. Non-linear regression method was utilized to fit the data to the selected drying models. For evaluating the goodness of fit, three statistical indicators were used in addition to R^2 (Table 2). The model having the highest R^2 and the lowest Root Mean Squares Error (RMSE), R^2 , and P-value was thus determined as the best model.

Table2. Equations of indicators for evaluation of the drying models [San Martin et al., 2001]

Indicator	Equation
P- value	$n = 100 \sum M_i - M_{pre} $
	$r = \frac{1}{N} \sum_{i=1}^{N} \frac{1}{M_i}$
x^2	$x^2 = \frac{\sum_{i=1}^{2} (MR_{exp} - MR_{pre})^2}{2}$
	$x = \frac{1}{N-n}$
RMSE	$\sum_{i=1}^{n} (MK_{pre} - MK_{exp})^{2}$
	$RMSE = \frac{\sum_{i=1}^{N} \sqrt{singre}}{N}$
	· · · · · · · · · · · · · · · · · · ·

In Table2 M_i is moisture content of matter, M_{pre} is predicted moister by the model, N is number of observations, n is number of model constants, MR_{exp} is moisture ratio of experimental data, MR_{pre} is predicted moisture ratio.

Results and Discussion

Tables 3 to 5 show the obtained statistical results of R^2 , RMSE, p-value and 2 for fitting the experimental data to selected drying models in order to determine the best model. The Verma , Yagcioglu, and Two-term models were eliminated for having R^2 values lower than 0.9 while the Henderson and Pabis and Modified Page models were omitted because of undesirable 2 values. The Lewis model was eliminated due to very high RMSE. Overall, the Page model showed the best fit having highest R^2 and lowest 2 , RMSE, and P-value.

Table3. Evaluation of the models at 40°C and air velocities of 0.5 and 1 m/s

Model	RMSE ×10 ⁻¹	X ² ×10 ⁻²	\mathbb{R}^2	P- value (%)
v=0.5 m/s				
Lewis	29	13	0.98	11.12
Henderson and Pabis	33	46	0.98	26.13
Page	9	9	0.99	7.11
Modified Page	32	54	0.88	25.31
Yagcioglu	41	27	0.89	23
Verma	39	39	0.80	14
Two - term	51	20	0.88	16.41
v=1.0 m/s				
Lewis	24	10	0.95	9.30
Henderson and Pabis	53	47	0.98	18.01
Page	11	10	0.98	7.22
Modified Page	56	43	0.98	13.14
Yagcioglu	47	17	0.85	15.11
Verma	52	16	0.89	20.13
Two - term	37	17	0.88	15.14

'Table4. Evaluation of the models at 50 °C and air velocities of 0.5 and 1 m/s

Model	RMSE ×10 ⁻¹	X ² ×10 ⁻²	R ²	P- value (%)
v=0.5 m/s				
Lewis	16	20	0.99	9.13
Henderson and Pabis	22	50	0.88	13.45
Page	9	10	0.99	4.17
Modified Page	33	43	0.98	10.25
Yagcioglu	41	18	0.87	13.14
Verma	45	13	0.88	16.13
Two - term	43	31	0.90	18.31
v=1.0 m/s				
Lewis	12	12	0.99	9.40
Henderson and Pabis	44	31	0.95	18.64
Page	8	7	0.99	3.75
Modified Page	52	21	0.98	12.69
Yagcioglu	41	11	0.88	17.86
Verma	37	34	0.88	20.93
Two - term	29	47	0.89	15.14

Table 5. Evaluation of the models at 60 °C and air velocities of 0.5 and 1 m/s

Model	RMSE ×10 ⁻¹	X ² ×10 ⁻²	R ²	P- value (%)	
v=0.5 m/s					
Lewis	14	11	0.97	6.21	
Henderson and Pabis	40	21	0.98	18.35	
Page	9	8	0.99	2.12	
Modified Page	31	30	0.87	25.13	
Yagcioglu	44	17	0.88	18.16	
Verma	51	20	0.85	20.13	
Two - term	35	21	0.85	13.16	
v=1.0 m/s					
Lewis	17	13	0.88	11.31	
Henderson and Pabis	46	24	0.98	17.25	
Page	7	6	0.99	3.45	
Modified Page	31	29	0.88	11.31	
Yagcioglu	29	14	0.87	27.54	
Verma	67	14	0.87	17.10	
Two - term	64	21	0.89	24.35	

Table 6 shows the fitness of obtained data from experimental treatments using the Page model. The R^2 values are above 0.99 and p-values are below 10% for all temperature and air velocities which statistically shows the good fit.

Table 6 Coefficient of the Page equation fitted to drying data

	1 able 0	Coefficient	of the rag	ge equation intenti	our ying data		
Temperature, °C	Velocity, m/s	k	n	RMSE ×10 ⁻¹	P- value (%)	$\chi^2 \times 10^{-2}$	\mathbb{R}^2
40	0.5	0.012	0.351	9	6.42	19.31	0.998
	1	0.018	0.842	11	5.37	15.19	0.999
50	0.5	0.007	0.341	9	4.21	18.11	0.998
	1	0.025	0.472	8.34	3.42	15.11	0.999
60	0.5	0.030	0.642	11.12	3.41	17	0.999
	1	0.081	0.523	9.31	3.21	16.25	0.998

In a research Park found the Page model as the best model for drying mint leaves because it showed the best fit [Park et al., 2002]. The study on drying Artemisia dracunculus L. leaves at air temperatures and relative humidities in the range of 40 to 70 °C and 11 to 84% respectively, and constant air velocity of 0.6 m/s showed that the Diffusion approach model was the best while Page model came second. However, since the Page model has one less parameter, it was selected as the better model [Arabhosseini et al., 2009]. Also, in a research about thin-layer drying of onions using x-ray, the Page model was proposed as the best one for having the highest R² and the least ² [Sharma, 2007].

Conclusion

Among the drying models, the Page equation showed the best fit for drying of *Lavandula officinalis* L. leaves. Thus this model is suitable as a relevant equation for drying of *Lavandula officinalis* L. leaves. The "n" and "k" parameters were estimated as function of temperature for *Lavandula officinalis* L. leaves. This model is suitable to estimate the moisture content during drying in order to determine drying time and energy consumption. It is also applicable for designing of relevant dryer for this kind of crops.

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Evaluated of Egyptian buffaloes crossing with Italian buffaloes for reproductive traits

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Abstract: In 2003, MoA (Ministry of Agriculture) approved the commercial importation and utilization of Italian buffaloes (IT) semen, which is being uncontrollably spread around the country; a practice needs prior performance and genetic assessment for both milk production and reproduction traits. In a previous publication (Fooda et. al., 2011) the milk productivity was studied, and the current one handles the reproductive traits. Two of the private dairy buffalo farms that utilize Italian semen for obtaining the crossbred along with the native buffalo were selected from two different ecological zones to be included in this study being "Ganat Elreda" farm in Ismaeleia governorate (Newly reclaimed desert area) and "United Group" farm in Qaliobeia governorate (old delta). This study aims to evaluate the Egyptian Italian buffalo crosses (1/2EG.1/2IT) for some reproductive traits, in comparison to their Egyptian contemporaries (EG), to assess the crossing trial. The traits included age at first calving (AFC), number of service per conception (NS), gestation period (GP), calving interval (CI), days open (DO) and service period (SP). A total 177 records, 102 record from Ganat Elreda farm (57 record EG and 46 record ½EG.½IT; and 74 records from United Group farm (26 record EG and 48 record ½EG.½IT) was utilized, covering the period from 2007 to 2009. Results obtained indicate that the Egyptian buffaloes performed better than the crossbreed for (NS), (CI), (DO) and (SP) traits. Since the results for NS, CI, DO and SP were 1.2, 395, 71 and 38 days, respectively for EG, while for crossbred, the results were 1.87, 429, 118 and 76 days, respectively in farm1. And in farm 2, the results were 1.82, 418, 104 and 77 days for EG, but, the results were 2, 433, 119 and 85 days, respectively for crossbred. [Fooda, T. A.; Elbeltagi, A. R.; Laila R. Hassan and SetEl-habaeib S. Awad. Evaluated of Egyptian buffaloes crossing with Italian buffaloes for reproductive traits. Journal of American Science 2011;7(7):209-2131. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Egyptian and Italian buffaloes, crossing, reproduction traits.

1. Introduction

The buffalo occupies an important place among the domestic animals as a provider of dairy produce, beef and draught power. They are playing important role in Egypt's agriculture. The Egyptian buffaloes are nearly to 4 million (FAOSTAT, 2009). Their ability to convert coarse feeds to milk and meat outstanding. Which contribute 44 % (2640638 Ton) of total milk production (5960102 Ton) and 18 % (270000 Ton) of total meat production (1528789 Ton) (FAOSTAT, 2008). Reproduction efficiency is one of the most important factors for productivity and profitably of dairy animals and it's the primary factor affecting productivity in female buffalo, but is greatly hampered by late attainment of puberty, seasonality of calving, long postpartum anoestrus and subsequent calving interval.

Late or delayed oestrus in buffalo heifers is one of the major factors limiting its overall productive and reproductive performance. Feeding and general management have been reported to improve reproduction efficiency of buffaloes (Jabalkandi, 2010).

According to Bagnato and Oltenacu (1993) milk yield and fertility are the main factors that affect the profitability of milk herds. As the milk yield is related to the variations in the reproductive activity, then the shorter calving intervals can be associated to

bigger milk production during the animal's productive life, besides the possible increase in the number of calves per year.

Thus, the genetic importance of the fertility in these herds must be evaluated according to the reproductive performance of the buffalo and its relations to the milk yield. However, there is an antagonism between the milk production and the fertility of an animal. Pryce et al (2002) showed that there is a genetic correlation between milk yield and calving intervals that vary from 0.22 and 0.67. It indicates that cows with high milk yield merit have a bad reproductive performance.

However, a good management may improve the reproduction. Pasture of high quality can give the same performance as in intensive systems (Maria Larsson, 2009).

Ramos et al (2006) studied the traits of milk yield and interval between calving in buffaloes. The heritability estimates were 0.21 and 0.22 to the milk yield and interval between calving, respectively. The genetic, phenotypic and environmental correlations between the traits were -0.22, 0.01 and 0.03, respectively.

The age at first calving and interval between first and second calving traits showed low estimates of heritability, indicating that those traits should not have a good response for selection (Ramos et al (2006), long calving intervals and a large number of days open are characteristics typical of buffalo cows. These traits have low heritability, and means are associated with a large degree of variation due to numerous environmental factors (Mourad, *et al.*, 1989; Khalil, *et al.*, 1991; Afifi, *et al.*, 1992; Ibrahim, 1998 and Mourad *et al.*, 2005).

Puberty can appear at the age of 16–40 months, but average for buffaloes in Italy is 20–21 months (Maria Larsson, 2009).

Therefore, this study was under-taken to investigate and evaluate the reproductive traits for the Egyptian buffalo crosses with Italian buffaloes.

2. Material and Methods

In 2003, MoA allowed the commercial importation of Italian buffaloes (IT) semen, which spread in large scale buffalo farms. Two of these dairy buffalo farms were selected to be included in this study being "Ganat Elreda" farm in Ismaeleia governorate and "United Group" farm in Qaliobeia governorate. They keep the new purchased lactating animals under assessment, for production and health conditions, for two weeks, and then they decide to keep or cull them. It seems successful practical selection rules under the conditions of absence of pedigree and production recording system in the majority of small and medium scale buffalo holdings. For crossbreeding, they use imported Italian buffalo semen with known breeding values for various production and type traits. A total 177 records, 103 record from Ganat Al-Rada farm (57 record Egyptian buffaloes (EG) and 46 record ½ EG & ½ IT) and 74 records from United Group farm (26 record EG and 48 record ½ EG & ½ IT) through period from 2007 to 2009.

The traits were study, age at first calving (AFC), number of service (NS), gestation period (GP), calving interval (CI), days open (DO) and service period (SP).

The data were analyzed by SAS (2002) according to the following model for total milk yield: $Y_{ijk} = \mu + B_i + P_j + C_k + S_l + b_l(L)_{ijklm} + b_2(A)_{ijklm} + C(LA)_{ijklm} + E_{ijklm}$

((LA) $_{ijklm} + E_{ijklm}$ Where: Y_{ijk} : observation on the mth animals of the ith breed in the jth parity in the kth year of calving in the lth season of calving, μ : Overall mean, B_i : fixed effect due to the breed, (i: 1=EG, $2=\frac{1}{2}$ EG & $\frac{1}{2}$ IT), P_j : fixed effect due to lactation parity, (j: 1, 2), C_k : fixed effect due to the year of calving, (k: 1=2007, 2=2008, 3=2009), S_1 : fixed effect due to the season of calving (l: 1=1 Winter and 1=1 Summer), 1=1 regression coefficient of 1=1 Y on 1=1 (lactation period), 1=1 regression coefficient of 1=1 Y on 1=1 (Age at first calving), (LA): the interaction between

lactation period and Age at first calving and E_{ijklm} : random error assumed N.I.D. $(0, \ ^2e)$.

3. Results

Unadjusted means, standard deviations and number of records for reproductive traits are presented in Table (1).

For the crossing buffaloes in both farms, all reproductive trait values were higher than these traits for EG except age at first calving. In farm 1, the age at first calving for EG was higher than the crossbred population, while in farm 2, the age at first calving the same value for two populations.

The results for all trait values in farm 1 were lower than those values in farm 2 for two breeds. The averages for CI and DO in EG were lower than those reported by Mostageer et al. (1981), Kotby et al. (1989), Mourad et al. (1989), Ashmawy (1991), Khalil et al. (1991), Afifi et al. (1992) and Mourad et al. (2005) in Egyptian buffaloes Many factors affect days open in buffaloes and cows. Herd has been a significant source of variation in most studies. Cady et al. (1983) observed that the days open were significantly (P 0.01) affected by herd in Nili-Ravi buffaloes. Marai et al. (2009) reported that the values of AFC, DO and CI were 25 month, 92 days and 403 days respectively for buffaloes were reared at Khattara Provincial Buffalo Farm. Maria Larsson (2009) reported that AFC and CI values were 36 month and 400-500 days, respectively, in Italian buffaloes.

Table (2) shows the mean squares for reproductive traits in two farms. In farm 1 the effect of breed on all traits, except gestation period, was highly significant (P 0.01). While the effect of lactation parity, year and season of calving on all traits were insignificant.

In farm 2 the effect of breed on all traits considered was no significant. The effect of year of calving on NS and GP were highly significant (P 0.01). And the effect of season on NS was significant (P 0.05).

The effect of covariables (L and A) and interactions (L*A) on all traits were insignificant in two farms, except on gestation period in farm 2. Mourad *et al.* (1989); Afifi *et al.* (1992); El-Menshawy (1994) and Aziz *et al.* (2001) reported that the effect of party, year and season for calving were significant on days open in Egyptian buffaloes. Mourad *et al.* (2005) reported that the effect of parity and year of calving were significant on days open. Marai *et al.* (2009) showed that the effect of parity, year and season of calving were highly significant on DO. While the effect of parity and season of calving were highly significant on CI.

Table (1). Unadjusted means, standard deviations (SD) for reproductive traits in Egyptian (EG) and their crossing with Italian (IT) buffaloes.

Traits	Egyptia	an buffaloe	s (EG)	1/2 EG & 1/2 IT			
Trans	Mean	SD	N	Mean	SD	N	
Farm 1 ⁺							
Age at first calving (AFC, month)	29	5.38	57	27	2.42	45	
Number of service (NS, no.)	1.2	0.59	51	1.87	0.93	46	
Gestation period (GP, day)	317	6.25	51	314	5.43	46	
Calving interval (CI, day)	395	59.67	35	429	75.21	26	
Days open (DO, day)	71	48.83	27	118	75.87	26	
Service period (SP, day)	38	22.07	10	76.08	38.87	24	
Farm 2 ⁺							
Age at first calving (AFC, month)	31	2.63	26	31	2.64	48	
Number of service (NS, no.)	1.82	1.13	17	2	1.09	40	
Gestation period (GP, day)	315	5.66	17	313	5.21	40	
Calving interval (CI, day)	418	39.98	9	433	53.73	9	
Days open (DO, day)	104	36.16	9	119	61.86	8	
Service period (SP, day)	77	54.09	7	85	38.49	24	

+ Farm 1: Ganat Elreda

Farm 2: United Group

Table (2) Mean squares (MS) for reproductive traits.

Source of variation	NS		GP		CI		DO		SP			
Source of variation	d.f	MS	d.f	MS	d.f	MS	d.f	MS	d.f	MS		
Farm 1 ⁺												
Breed (B)	1	4.046***	1	37.067	1	33324**	1	36082**	-	-		
Lactation parity (P)	1	0.331	1	27.753	1	2677	1	1337	-	-		
Year of calving (C)	2	0.013	2	51.701	2	5883	2	6831	-	-		
Season of calving (S)	1	0.063	1	7.601	1	191.53	1	292.39	-	-		
Covariable												
Lactation period (L)	1	0.084	1	27.574	1	18.411	1	96.992	-	-		
Age at first calving (A)	1	0.202	1	37.818	1	410.38	1	1321	-	-		
Interactions:												
L*A	1	0.120	1	32.370	1	189.51	1	806.63	-	-		
Farm 2 ⁺												
Breed (B)	1	1.113	1	3.647	1	57.251	1	69.663	1	1104.671		
Lactation parity (P)	0	-	0	-	0	-	0	-	0	-		
Year of calving (C)	1	6.932**	1	176.190**	1	573.547	1	266.558	1	25.519		
Season of calving (S)	1	4.018*	1	23.788	1	59.908	1	367.9322	1	764.110		
Covariable												
Lactation period (L)	1	0.693	1	112.448*	1	2219.30	1	1741.04	1	54.691		
Age at first calving (A)	1	0.233	1	14.026	1	1675.63	1	1168.79	1	711.751		
Interactions:												
L*A	1	0.589	1	119.704*	1	1922.39	1	1445.21	1	36.109		

+ Farm 1: Ganat Elreda Farm 2: United Group

*: $P \le 0.05$

**: $P \le 0.01$

***: $P \le 0.001$

Table	(3) Lea	ast squ	are m	eans ((LSM)	and	their sta	ndard ei	rors (S	SE) for 1	eprodu	ıctive tı	aits.		
Effect	NS			GP			CI			DO			SP		
	LSM	SE	N	LSM	SE	N	LSM	SE	N	LSM	SE	N	LSM	SE	N
Farm 1	+														
В															
1	1.03	0.16	30	316	1.51	30	366	16.79	25	47	18.96	24	-	-	-
2	1.79	0.14	25	314	1.25	25	444	18.65	18	137	20.04	18	-	-	-
P															
1	1.32	0.13	31	316	1.16	31	415	12.29	32	99	13.05	31	-	-	-
2	1.51	0.16	24	314	1.44	24	395	20.62	11	84	21.50	11	-	-	-
Y															
2007	1.37	0.26	7	315	2.39	7	370	24.55	8	49	27.94	7	-	-	-
2008	1.44	0.12	28	313	1.11	28	415	13.32	26	107	13.91	26	-	-	-
2009	1.43	0.15	20	317	1.40	20	430	23.67	9	119	25.41	9	-	-	-
SE															ł
1	1.45	0.13	28	315	1.22	28	407	16.33	22	95	17.05	22	-	-	-
2	1.37	0.14	27	314	1.32	27	403	16.00	21	86	17.17	20	-	-	-
Farm 2	+														
В															ł
1	1.74	0.28	15	314	1.48	15	416	27.61	9	104	28.73	9	67.77	25.89	5
2	2.21	0.19	31	315	1.05	30	411	35.64	8	99	38.44	7	91.13	15.19	18
P															ł
1	1.98	0.14	46	314	0.78	45	414	27.31	17	102	29.21	16	79.45	16.19	23
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y					1.56										ł
2008	2.69	0.28	19	318	1.34	18	428	15.28	15	112	16.78	14	82.17	34.55	5
2009	1.27	0.26	27	311		27	400	56.48	2	92	59.82	2	76.74	14.50	18
SE															ł
1	1.62	0.18	23	314	0.99	23	416	29.85	11	107	30.85	11	71.78	17.21	10
2	2.33	0.23	23	315	1.28	22	412	32.51	6	96	35.62	5	87.12	21.51	13

+ Farm 1: Ganat Elreda

Farm 2: United Group

This effect could be attributed to the managerial practices, climatic elements, especially air temperature and relative humidity, photoperiodicity, and nutritional factors, particularly availability of green fodder.

Least square means and their standard errors for reproductive traits are presented in Table (3). In farm 1 the LSM for all traits in EG were lower than in crossbred. The same trend was shown in farm 2, except for CI and DO.

It can be concluded that the Egyptian buffalo reproductively better perform than its crossbreed with the Italian buffalo.

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Genetic Diversity of Some Egyptian Durum Wheat Cultivars

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Abstract: The objective of this investigation was to assess the genetic diversity among three Egyptian durum wheat i.e. Beni Suif 4, Beni Suif 5 and Beni Suif 6 and one bread wheat i.e. Sids 12 cultivars using sodium dodecyle sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and randomly amplified polymorphic (RAPD) markers. Protein electrophoreses showed that Beni Suif 4 was characterized by the absence of band-3 with 41.56 kDa. RAPD analysis showed that the number of polymorphic amplicons was 56 out of a total of 93 amplicons, thus revealing a level of 60.0 % polymorphism. The highest genetic similarity revealed by RAPD analysis (95.0%) was between Beni Suif 5 and Beni suif 6. While, lowest similarity (65 %) was found between Beni Suif 4 and Beni Suif 5. The dendrogram separated Sids 12 from all the other genotypes, thus demonstrating the distinctiveness of the genetic background of this genotype from all the other genotypes. The three genotypes constituted a subcluster divided into two groups, one group composed of Beni Suif 5 and Beni Suif 6, while the second group comprised Beni Suif 4. [Fouda, A. H.; Gad, Khaled. I. M.; Diab, A. A.; Safwat, G. and Hussein, M. H. Genetic Diversity of Some Egyptian Durum Wheat Cultivars. Journal of American Science 2011; 7(7):214-221].(ISSN: 1545-1003). http://www.americanscience.org.

Key words: Durum Wheat, RAPD, Dendrogram, Dice coefficient, Polymorphism, Turgidum.

1. Introduction:

Morphological characters have been used to identify plant species, families and varsities. However, they have many disadvantages, since they are influenced by the environment and scoring is a time-consuming process. The use of genetic molecular markers (protein and DNA-based) have become widely accepted valuable tools (Cooke, 1999). SDS-PAGE is considered as a low cost, reproducible and rapid approach (Laemmli, 1970). In the last decade, molecular markers such as RFLP, RAPD, ISSR, AFLP have been used to assess genetic variation at the DNA level, allowing an estimation of degree of relatedness between individuals without the influence of environmental variation (Gupta et al., 1999). DNA RAPD is a useful method for generating molecular markers (Welsh and McClelland, 1990) that can be used to construct linkage maps, to identify varieties (He et al.1992) and to assess genetic diversity (Koller et al., 1993). It is characterized by its low technical input and small quantity of plant DNA needed for the analysis (Hernandez et al., 1999 and Manabe et al., 1999). Also, RAPD based fingerprinting was used successfully in wheat to assess genetic diversity (He et al., 1992, Dhaliwal et al.,1993; Cao et al.,1999 Kudriavtsev et al.,2003; Munshi et al., 2003; Maric et al., 2004 and Abd-El-Haleem et al., 2009). The aim of this work were to: (1) characterize three durum and one bread Egyptian

wheat cultivars at the DNA level using RAPD markers and at protein level using SDS-PAGE and (2) determine the genetic relationships among these genotypes.

2. Materials and Methods Germplasm material

In the present study three Egyptian durum wheat (*Triticum turgidum* L.) cultivars (Beni Suif 4, Beni Suif 5, Beni Suif 6) and one bread wheat (*T. aestivum*) cultivar (Sids 12) provided by Wheat Research Dept. of the ARC, Egypt were used.

SDS-PAGE

Sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE) was used to study the banding patterns of the studied genotypes, Protein fractionation was performed on vertical slab (16.5 cm x 18.5 cm x 0.2 cm) Hoefer E600, Amersham Pharmacia biotech. According to the method of Laemmli (1970) as modified by Studier (1973).

Extraction and purification of genomic DNA

A modified CTAB (hexadecyl trimethyl ammonium bromide) procedure based on the protocol of Porebski *et al.* (1997) was adopted for obtaining good quality total genomic DNA.

Half gram of fresh leaves from each genotype were collected from one week old seedlings

germinated from seeds of each genotype and quickly frozen in liquid nitrogen and then ground using mortar and pestle. Five ml of CTAB extraction buffer (60°C), 50 mg PVP (polyvinyl pyrolidone) and 15 μl -mercaptoethanol (0.3%) were added to leaf powder. The tubes were mixed by inversion and incubated at 65°C for one hour. Then, 6 ml of chloroform: isoamyl alcohol (24:1) was added and contents were mixed by inversion to form an emulsion. The tubes were centrifuged at 5000 rpm for 20 min at room temperature. The top aqueous layer was further centrifuged at 5000 rpm after addition of 6 ml of chloroform: isoamyl (24:1). Half-volume of 5 M NaCl and two volumes of cold isopropanol were added to the supernatant and mixed well. The tubes were incubated at -20°C overnight, then centrifuged at 8000 rpm for 15 min. The supernatant was discarded, the pellet washed with 70% cold ethanol, and dried in speed vacuum for 10 min. The pellet was dissolved in 300 µl TE buffer (pH 8.0) overnight at 4-6°C, then transferred to 1.5 ml epindorfe tube. To remove RNA contamination, 4 µl (10 mg/ml) RNase A (Sigma Co., USA) were added to the DNA solution and incubated at 37°C for 2 hours. The extracted DNA was deproteinized by adding 4 µl (1mg/ml) proteinase K (Sigma Co., USA) and incubating at 37°C for 2 hours. Three hundred µl of Tris-saturated phenol-chloroform were added, and mixed by inversion. Tubes were centrifuged at 14000 rpm for 15 min in a microfuge (Eppendorf, USA). The upper layer was transferred to new tubes using wide bore pipette tip and 150 µl of TE buffer was added to the phenol phase, mixed and spun for 10 min. Then the upper layer containing the DNA was removed and added to the sample. DNA was precipitated overnight at -20°C using 0.1 volume 3 M sodium acetate (pH 8.0) and two volumes of chilled absolute ethanol. The samples were centrifuged at 14000 rpm at 4°C for 15 min. The DNA was washed with 70 % ethanol, briefly air-dried and re-dissolved in TE buffer.

Estimation of DNA concentration

DNA concentration was determined by diluting the DNA 1:5 in dH_2O . The DNA samples were electrophoresed in 0.7% agarose gel against 10ug of a DNA size marker (Lambda DNA digested with *HindIII* and Phi x 174 DNA digested with *HaeIII*). This marker covers a range of DNA fragments size between 23130bp and 310bp, and a range of concentrations between 95 ng and 11 ng. Thus, estimation of the DNA concentration in a given sample was achieved by comparing the degree of fluorescence of the unknown DNA band with the different bands in the DNA size marker.

RAPD analysis

A set of nine random 10-mer arbitrary primers (Table 1) was used in the detection of polymorphism among the four wheat genotypes. These primers were synthesized on an ABI 392 DNA/RNA synthesizer (Applied Biosystems) at AGERI. RAPD assay was preformed as described by Williams *et al.* (1990) with some modifications. The amplifications reactions were carried out in a volume of 25 µl containing 20ng genomic DNA, 25 pmoles primer, 2mM dNTPs, 2mM MgCl₂ and 2 U Taq polymerase (Fermentas) with, 1 x PCR buffer.

Table 1. Sequence of the nine ten-decamer arbitrary primers used in RAPD analysis to detect polymorphism among four wheat genotypes.

No.	Name	Sequence
1	OP-R14	5' TCCGCTCTGG 3`
2	OP-R17	5´ AGGGAACGAG 3`
3	OP-R20	5′ GGACCCTTAC 3`
4	OP-F11	5´ACGGATCCTG 3`
5	OP-F14	5′GGTGATCAGG 3`
6	OP-F15	5′ CCGAATTCCC 3`
7	OP-F16	5′GGGAATTCGG 3`
8	OP-F18	5′ GGGATATCGG 3`
9	OP-F19	5` CCAAGCTTCC 3`

Thermocyling profile and detection of the PCR products

PCR amplification was performed in a Perkin-Elmer/GeneAmp® PCR System 9700 (PE Applied Biosystems) programmed to fulfill 40 cycles

after an initial denaturation cycle for 5 min at 94°C. Each cycle consisted of a denaturation step at 94°C for 1 min, an annealing step at 36°C for 1 min and an elongation step at 72°C for 1.5 min. The primer

extension segment was extended to 7 min at 72°C in the final cycle.

The amplification products were resolved by electrophoresis in a 1.5% agarose gel containing ethidium bromide (0.5ug/ml) in 1X TBE buffer at 95 volts. PCR products were visualized on UV light and photographed using a Polaroid camera. Amplified products were visually examined and the presence or absence of each size class was scored as 1 or 0, respectively.

RAPD data Analysis

The banding patterns generated by RAPD-PCR markers analyses were compared to determine the genetic relatedness of the genotypes. Clear and distinct amplification products were scored as '1' for presence and '0' for absence of bands. Bands of the same mobility were scored as identical.

The genetic similarity coefficient (GS) between two genotypes was estimated according to Dice coefficient (Sneath and Sokal, 1973).

Dice formula: GSij = 2a/(2a+b+c)

Where GSij is the measure of genetic similarity between individuals i and j, a is the number of bands shared by i and i, b is the number of bands present in i and absent in j, and c is the number of bands present in j and absent in i. The similarity matrix was used in the cluster analysis. The cluster analysis was employed to organize the observed data into meaningful structures to develop taxonomies. At the first step, when each accession represents its own cluster, the distances between these accessions are defined by the chosen distance measure (Dice coefficient). However, once several accessions have been linked together, the distance between two clusters is calculated as the average distance between all pairs of accessions in the two different clusters. This method is called unweighted pair group method using arithmetic average (UPGMA) according to (Sneath and Sokal, 1973).

3. Results and Discussion Genetic diversity based on SDS- PAGE

SDS banding patterns was used to fingerprint three durum and one bread wheat cultivars. Dry wheat seeds were ground into soft flour and water soluble protein fraction was extracted. The total number of bands ranged from eight to seven bands (Figure 1). Sex bands were monomorphic while the others were polymorphic. Beni Suif 4 was characterized by the absence of band -3 with 41.56 kDa. Because of the very low level of a

polymorphism a dendrogram for genetic distance and similarity matrix based on SDS-PAGE could not be performed.

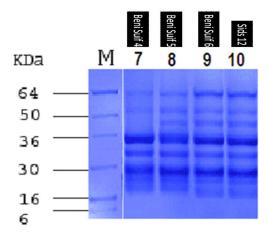


Figure 1. SDS- PAGE for four wheat genotypes

RAPD analysis for genetic diversity among wheat genotypes

Different methods are available for analysis of genetic diversity among germplasm accessions. These methods have relied on morphological, agronomic and biochemical data and recently on DNA-based marker data that allow more reliable differentiation of genotypes. In the present study, twenty ten-mer arbitrary primers were initially screened for PCR amplification of the genomic DNA for the four wheat genotypes. Only nine primers generated reproducible and easily scorable RAPD profiles.

The number of amplified fragments from the genomic DNA of each of the five wheat genotypes generated by the different primers is presented in Table (2). Each of the nine primers produced multiple band profiles with the five wheat genotypes. The highest number of amplicons (14 amplicons) was generated by the primer OPR17 in the genomic DNA of the genotype Beni Suif 4, while the primer OPF15 exhibited the only 2 amplicons, which were monomorphic across the four wheat genotypes.

As shown in Table (3) the total number of DNA fragments amplified by the nine primers was 93 with an average of 10.33 amplicons per primer. The number of polymorphic amplicons ranged from 0 to 15. Primer OPR16 amplified the highest number of polymorphic amplicons, while, the primer OPR14 revealed a total of 6 amplicons which were all monomorphic across the four wheat genotypes.

Table 2. Null	iber of ampini	eu DNA Iragillei	ns produced by	each KAPD prii	ner for the four	wneat genotypes.
Primer	Beni .4	Beni.5	Beni.6	Sids12	Total	Mean
OPR14	8	11	12	12	43	10.7
OPR17	14	11	15	12	52	13
OPR20	8	9	9	8	34	8.5
OPF11	6	4	4	8	22	5.5
OPF14	3	3	3	4	13	3.3
OPF15	2	3	3	4	14	3
OPF16	9	4	9	7	29	7.25
OPF18	5	3	4	5	17	4.25
OPF19	3	3	3	3	12	3
Total	58	51	62	63	234	58.6
Mean	6.4	5.7	6.9	7	26	6.5

Table 2 Number of amplified DNA fragments produced by each RAPD primer for the four wheat genetypes

Therefore, the different primers expressed different levels of polymorphism, ranging from 0.0% with primer OPF19 to 78.9 % with primer OPR16. The total number of polymorphic bands revealed by the nine primers was 56 and the average number of polymorphic fragments/ primer was 6.2. Thus, the average level of polymorphism was 60 %. The size of amplified fragments varied with the different primers, ranging from 250 to 4000 bp (Figures 2 and 3). In

this respect, Joshi and Nguyen (1993) investigated the genetic diversity among 15 wheat varieties (T. aestivum) using RAPD analysis. Out of 109 amplified DNA fragments, 41 were polymorphic, representing a level of polymorphism of 65%. Perenzin et al. (1997) utilized 87 RAPD primers to assay the genetic diversity among wheat genotypes. They reported that 304 polymorphic bands were generated with an average of 3.49 polymorphic amplicon / primer.

Table 3. Total number of amplicons, number of monomorphic and polymorphic amplicons and percentage of polymorphism, as revealed by RAPD primers

Primer	Total # of amplicons	#of mono amplicons	# of Poly amplicons	Polymorphism (%)
OPR14	15	6	9	60.0
OPR17	19	4	15	78.9
OPR20	15	4	11	73.3
OPF11	11	4	7	63.6
OPF14	6	5	1	16.6
OPF15	5	3	2	40.0
OPF16	12	4	8	66.6
OPF18	6	3	3	50.0
OPF19	4	4	0	0.00
Total	93	37	56	
Average	10.33	4.11	6.2	60.0

Sun et al. (1998) used 32 arbitrary primers for RAPD analysis of 46 wheat genotypes, among which 26 primers (81.3%) revealed polymorphism. A total of 279 amplicons were generated and 182 (65.2%) were polymorphic.

The number of polymorphic amplicons ranged from 2 to 20 with an average of 7 polymorphic amplicons per primer. Zheng et al. (2001) used 55 arbitrary primers in the RAPD analysis of 40 wheat cultivars. Out of 183 amplified fragments, 93 amplicons 50.8% were polymorphic, this represented an average of 1.7 polymorphic amplicons per primer. Moreover, Cao et al. (2002) screened 235 random primers against four wheat cultivars to detect RAPD polymorphism. Only, 31 (13.20%) primers produced polymorphism these 31 primers generated a total of

214 reproducible amplified fragments when used with 29 common wheat cultivars. The number of amplified fragments produced by each primer varied from 3 to 12 with an average of 6.9 and an average of 3.10 polymorphic bands per primer. Al-Naggar et al. (2004) used 17 arbitrary primers for RAPD analysis of six bread wheat genotypes. Twelve primers (70.60%) generated polymorphic profiles. The total number of amplicons was 98, of which 34 (34.69%) showed polymorphism. Also, Wjhani (2004) studied the genetic variability among 14 wheat accessions using 39 RAPD primers. The total number of amplicons was 117, including 108 polymorphic amplicons. This represented a level of polymorphism of 92.3 % and an average number of 9 polymorphic bands per primer.

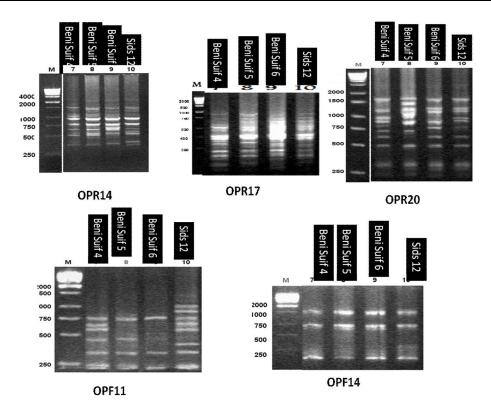


Figure 2. RAPD profile of the three bread wheat genotypes (Beni Suif 4, Beni Suif 5 and Beni Suif 6) and bread wheat genotype Sids 12 amplified with RAPD primers, OPR14, OPR17, OPR20, OPF11 and OPF14: MW: 100 bp ladder.

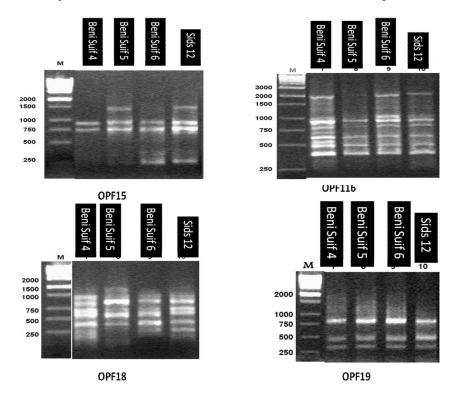


Fig 3. RAPD profile of the three bread wheat genotypes (Beni Suif 4, Beni Suif 5 and Beni Suif 6) and bread wheat genotype Sids 12 amplified with RAPD primers, OPR14, OPR17, OPR20, OPF11and OPF14: MW: 100 bp ladder.

The results of the present study are in good agreement with those reported in the literature, and confirm that polymorphism is a general phenomenon in in good agreement with those reported in the literature, and confirm that polymorphism is a general phenomenon in wheat although it is a self- fertilizing species.

Genetic relationships among the wheat genotypes

Knowledge of the genetic relationships among genotypes has several important applications in plant breeding programs and plant improvement. It permits the organization of germplasm, including

elite lines and provides for more efficient parental selection.

To determine the genetic relationships among the four wheat genotypes, the scoring data (1 for presence and 0 for absence) resulting from the nine tested RAPD primers were used to compute the similarity matrices according to Dice coefficient (Sneath and Sokal 1973). These similarity matrices were then used in the cluster analysis to generate a dendrogram using the UPGMA method. As shown in Table (4) the genetic similarity among the four wheat genotypes ranged from 68.0 to 95.0%.

Table (4). Genetic similarity (GS) matrices among the four wheat genotypes as omputed according to Dice coefficient from RAPDs.

Cocincicii	TI OIII ICIII DO			
	Beni S.4	Beni S.5	Beni S.6	Sids 12
Beni S.4				
Beni S.5	93.1			
Beni S.6	92.6	95.0		
Sids 12	68.0	65.0	70.0	

The highest genetic similarity revealed by RAPD analysis (95.0%) was between Beni Suif 5 and Beni suif 6 genotypes and followed by (93.1 %) between Beni Suif 4 and Beni suif 6, while the lowest similarity (65 %) was between Beni Suif 4 and Beni Suif 5. This reveals a great concordance between the data deduced from the RAPD analysis and the pedigree of these genotypes.

Cluster analysis as revealed by RAPDs

The Dice RAPD-based coefficients of genetic similarity among the four wheat genotypes were employed to develop a dendrogram using the UPGMA method (Fig.4). The dendrogram separated Sids 12 from all the other genotypes, thus demonstrating the distinctiveness of the genetic background of this genotype from all the other genotypes. The three genotypes constituted a subcluster divided into two groups, one group composed of Beni Suif 5 and Beni Suif 6, while the second group comprised Beni Suif 4. Thus, the dendrogram deduced from the RAPD data corresponded well with the pedigree of the studied wheat genotypes.

The results of the present study revealed, therefore that RAPD analysis is an effective tool for detecting polymorphism, distinguishing between

wheat genotypes and assessing their phylogenetic relationships. These results agree with Joshi and Nguyen (1993) who found that analysis of the genetic relationships among wheat varieties could distinguish most of the spring and winter wheat cultivars into different clusters in the dendrogram. Sivolap et al. (1999) reported that RAPD analysis proved to be one of the most powerful methods of discriminating cultivars. The dendrograms based on RAPD markers most closely conform to the pedigree data. Cao et al. (2000) used RAPD marker to assess phylogenetic relationships between 15 wheat accessions. Clusters analysis classified these accessions into five groups in agreement with morphological classification. Sun et al. (2003) found that the dendrogram prepared on the basis of RAPD data corresponded well with the pedigree of two groups of wheat genotypes. Shehata et al (2004) reported that SDS-PAG and RAPD-PCR were successfully used to construct dendrograms to arate the wheat cultivars into two main groups.

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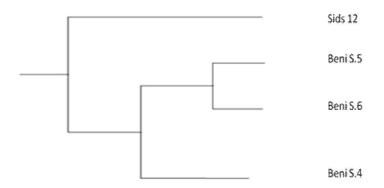


Figure 4. Dendrogram for the four wheat genotypes constructed from RAPD data using (UPGMA) according to Dice coefficients

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Novel design metrics to measure real time environment application design.

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Abstract: In this paper we have defined a set of novel design metrics for measuring the design of specially real time environment applications. The aim of the defined new metrics set is to measure the design before handing over to the implementation team. The errors in the design can cost you money and time. Majority of the methodologies leave the task of managing the issue of task deadlines for software programmers in the implementation phase at the coding language stage. LCSF is measured for various methodologies. A non real time system design is also measured for design metrics. Results are plotted and discussed.

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Keywords: Deadlines, Design Metrics, Real Time Systems, Design Measurement.

1 Introduction

Strict time limit on task deadlines is the most desired feature of real time [8] [26]. Because of this strict timing restriction real time system design is a challenge. Normally designers leave this task for the developer to cater, in the implementation phase [20]. Normally the methodologies for real time system do not handle inheritance of deadlines [3] [20] [21] and [23] . There is another property which gaining interest is usability. But the properties that lead an application to user friendliness for novices are often dissimilar from those preferred by expert users or the software designers [10]. Usability is also becoming demanding attribute but it is very not easy to quantify usability, user surveys may be useful in measuring usability [10]. Design quality is very important entity that should be taken into account in any software product [22]. This phase get 5 to 10 % of the entire effort but bulk (up to 80%) of whole effort consumed in correcting flawed design decisions [1]. There are many metrics proposed for capturing the quality of Object Oriented design [18]. Coupling and cohesion are most widely used metrics [11] . Coupling tells about how heavy is the coupling how modules are interdependent on each other is it a very spaghetti coupling or is it a very clean structured decomposition where you have a very low coupling and but there is collaboration through low coupling and very highly cohesive modules [7]. So each module is together but different modules are not very tightly coupled to each other. So this is what you would like to achieve high cohesion and low coupling [3] Class cohesion is associated to quality attributes of a software system as discovered in the empirical studies in [13] [14] [9] So independence or separation of concern is a very important principle of software engineering [6] [15] [5] There also many other design metrics that measure the design, but to measure real time system design no metrics have been defined up to best of our knowledge. In this paper we have studied various design methodologies [12] [16] and [28]. All of these methodologies are studied from the point of view of real time environment.

2 Main Contribution of this research

The main contribution of this research paper is the definition of eight new design metrics that have been related to the measurement of design of real time environment applications.

2.1 Verification using Proposed Design Metrics

We have defined the following eight new metrics for measuring a real time system design. Purpose is to measure the design before implementation.

2.2 Soft Deadline Class Factor

SDCF is defined as the ratio of the total no. of classes with soft deadlines to the overall sum of no. of classes with overridden, hard & soft deadlines.

$$SDCF = \sum_{i}^{n} \sum_{j}^{m} \frac{C_{s_{ij}}}{C_{s_{ij}} + C_{h_{ij}} + C_{o_{ij}}}$$

Where

n = Total no. modules constraint by timing restriction

m = Total no. classes per module constraint by timing restriction

 $C_{s_{ij}} =$ ith Class in the jth module with soft deadlines.

 $C_{h_{21}} = ith Class in the jth module with hard deadlines.$

Con = ith Class in the jth module with overriden deadlines.

This factor concerned about the type of the real time system. If the value of this factor is high this means the system modules may be given less attention, as the error tolerance level for meeting timing requirements is more.

2.3 Hard Deadline Class Factor

HDCF is defined as the ratio of the total no. of classes with hard deadlines to the overall sum of no. of classes with overridden, hard & soft deadlines.

$$\texttt{HDCF} = \sum_{i}^{n} \sum_{j}^{m} \frac{c_{h_{ij}}}{c_{s_{ij}} + c_{h_{ij}} + c_{o_{ij}}}$$

Where

n = Total no. modules constraint by timing restriction

m = Total no. classes per module constraint by timing restriction

 $C_{s_{ij}} = i$ th Class in the jth module with soft deadlines. $C_{h_{ij}} = i$ th Class in the jth module with hard deadlines. $C_{o_{ii}} = i$ th Class in the jth module with overriiden deadlines.

This factor is also concerned about the type of the real time system. If the value of this factor is high this means the system modules may be given more attention, as the error tolerance level for meeting timing requirements is low.

2.4 Overridden Deadline Class Factor

It is defined as the ratio of the classes having overridden deadlines to the total no. of classes having soft, hard, overridden deadlines.

$$\mathtt{ODCF} = \sum_{i}^{n} \sum_{j}^{m} \frac{C_{o_{ij}}}{C_{s_{ij}} + C_{h_{ij}} + C_{o_{ij}}}$$

Where

n = Total no. modules constraint by timing restriction

m = Total no. classes per module constraint by timing restriction

 C_{si} = ith Class in the jth module with soft deadlines.

 $C_{\rm hii}=$ ith Class in the jth module with hard deadlines.

 $C_{\sigma_{ij}} =$ ith Class in the jth module with overriden deadlines.

This factor is the very vital as it reveals about timing related complexities lying in the modules with soaring ODCF value. These complexities are due to the inheritance of task timing requirements or task deadlines. The largest part of the attention must be centered on those modules with very high ODCF.

2.5 Soft Overriding Factor

SOF factor is defined as the ratio of the Overridden Deadline Class Factor (ODFC) to the Hard Deadline Class Factor (ODFC).

$$SOF = \frac{\sum_{o=1}^{n_o} C_o}{\sum_{h=1}^{n_h} C_h} = \frac{ODCF}{HDCF}$$

SOF gives information about the overall inclination the module. Either it is tilted in the direction of hard or the soft real time approach. If the value of SOF is less than one it means timing restriction on the task have to be met at any cost.

2.6 Message Exchange Factor

No. of exchanged messages considered per second between project partitions.

$$MEF = \frac{\sum_{i=1}^{n_e} m_i}{T}$$

If the value of this factor is high this means that more the underlying component must be critically analyzed. It also tells about how heavy is the coupling how modules are interdependent on each other is it a very spaghetti coupling or is it a very clean structured decomposition where you have a very low coupling. It is also desired that there is collaboration through low coupling and very highly cohesive modules. So each module is together but different modules are not very tightly coupled to each other. So this is what you would like to achieve high cohesion and low coupling [3] and at the same time you want to achieve separation of concerns and also collaboration.

2.7 Early Decomposition Factor.

The Early Decomposition Factor (EDF)

$$EDF = \frac{\text{(No. of partitions of Project)}}{\text{(Project Stage No)}} \times \text{(Message Exchange Factor)}$$

Mathematically it can be symbolized as

$$EDF = \frac{N_p}{S_n} \times \frac{\sum_{i=1}^{n_e} m_i}{T}$$

It is also kept in mind that this metric has not as much of importance when only object oriented systems are under consideration. This early partition decision will have a serious impact on the system resources. If there are too much messages exchange between the various partitions of the projects then it

might be possible that resource consumption goes out of limits.

2.8 Deadline based Predictability Factor

The DPF Factor is defined as ratio of the total no of classes with soft deadline to the total no. of sub classes and added effect of total no. of multithreaded objects.

In Mathematical language it is symbolized as

$$\text{DPF} = \frac{\sum_{o=1}^{n_o} C_o}{\sum_{b=1}^{n_b} C_b} + \sum_{i}^{n} \text{Obj}_{mt}$$

Since multithreading enhances the predictability therefore in ideal situation the 1st factor must be than one and preferably should be close to zero and 2nd factor must be greater than one [27].

2.9 Life Cycle Support Factor

Life Cycle Support Factor is defined as the ratio of number of phases having support for timing constraints/deadlines to the total no. of phases in the life cycle plus one.

$$LCSF = \frac{No. of phases having deadline support}{(Total No. phases in the life cycle) + 1}$$

Every methodology has support for timing constraints/deadlines Software life cycle in a number of phases. Ideally this factor should be equal to 1, this imply that the methodology bear support for timing constraints/deadlines in the entire life cycle further than the code release stage and into the code maintenance phase.

3 Case Study

Now as a case study we consider the following eleven different methodologies, as listed in the table no. 1, and computed the LCSF metric for them is also listed. We studied each methodology and searched which phases carry support for the task timing limitations/deadlines and computed the LCSF factor. To make things easier we considered the following specific no. of phases for Timing constrains/deadline support reflection.

- 1 specification
- 2 design
- 3 implementation
- 4 Testing & verification
- 5 deployment
- 6 maintenance

We come to conclusion that no methodology has full life cycle support. A three dimensional bar chart of the LCFS is shown in figure 7. It is evident that HRT-HOOD [19] [27] ROOM [25] & OCTOPUS [17], ARTS [27], have good support for

the timing constrains/deadlines in different phases of the software development life cycle. JSD [2] [24] has support only in one phase. We searched many design documents for real time systems but unfortunately we were not able to get our desired real time system design examples that have considered the deadlines/timing constraints in the entire life cycle. So we are unable to compute the remaining metrics.

To compute design metrics we used the tool SDMetrics [4] which is a software design metrics measurement tool for especially for UML diagrams. UML is these days a preferred software design tool preferred by a good number of designers. SDMetrics itself is analyzed through their own tool.

Two important metrics DIT and WMC [11] have been measured. DIT tells about how deep is your inheritance tree? If it's too deep then it is considered to be complex in terms of say the behavior of different polymorphism possible or the behavior or the tracing required to understand that which method is going to be invoked through the inheritance tree.

DIT is plotted as a histogram in Figure 8. A high value of DIT means it is difficult to understand those classes inherit from a lot of classes. It is also found out that, classes having high value of DIT may not be correct specializations of every predecessor class **Error! Reference source not found.**

For the module NumOp (Number of operations) in Figure 9 we have plotted a histogram for the metric WMC (Weighted method complexity) [11], **Error! Reference source not found.**

Table 1: Life Cycle Support Factor for different methodologies.

	Phases having	
Methodology	Support	LCSF
JSD	1	0.142857
ATRS	3	0.428571
COBRA	1	0.142857
HOOD/PNO	1	0.142857
HRT-HOOD	4	0.571429
OCTOPUS	2	0.285714
OMTs	1	0.142857
OPNets	1	0.142857
ROOM	3	0.428571
RTO	1	0.142857
Transnet	1	0.142857

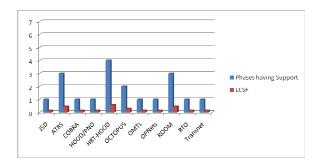


Figure 1: 3-D Plot of LCSF Factor

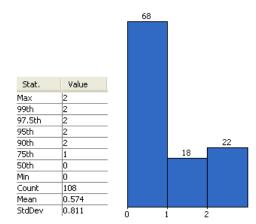


Figure 2: Histogram plot for DIT [4].

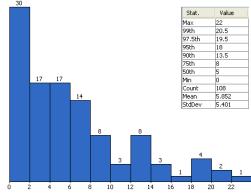


Figure 3: Histogram plot of the NumOp (WMC) [4].

The graph shown in figure 10 is a Kiviat diagram [4], showing the values of all metrics for the module ExpressionNode. Each axis (or ray) of the Kiviat diagram represents one metric, as labeled in the diagram. The range of the metric is the scale of all axes: the lowest value is to be found in the center, the highest value at where the axis ends. The scaling of all the axes is linearly done. The table on the right side of the figure 9 shows, different percentiles values against the no. of metrics whose values go beyond the percentile for the selected module.

Metrics with higher values point to inferior quality, a module design must be considered critical for which most of metric values for the module are in the higher percentiles (e.g., 90th, 95th).

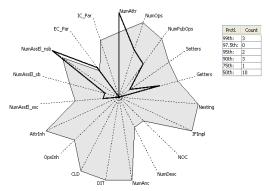


Figure 4: Kiviat Plot for the rule ExpressionNode module [4].

Figure 11 is a discovery of the design rule violation by the SDMetrics tool at the package level design. Although the severity of the design rule violation is of medium and low level, still these discovered violations may help the designers to revisit their design and try to correct those errors early and before the implementation.

Name	Rule	Value	Category	Severity	Description
SDMetrics.com.sdmetrics.app	50P2	SDMetrics.com.sdmetrics.metrics	Style	2-med	Package violates the Stable-Dependencies Principle (SDP).
SDMetrics.com.sdmetrics.app	50P2	SDMetrics.com.sdmetrics.model	Style	2-med	Package violates the Stable-Dependencies Principle (SDP).
SDMetrics.com.sdmetrics.metrics	50P2	SDMetrics.com.sdmetrics.model	Style	2-med	Package violates the Stable-Dependencies Principle (SDP).
SDMetrics.com.sdmetrics.metrics	SDP2	SDMetrics.com.sdmetrics.math	Style	2-med	Package violates the Stable-Dependencies Principle (SDP).
SDMetrics	Capitalization	SDMetrics	Naming	3-low	Package name has upper case letters.

Figure 5: Design rule violation at package level [4].

4 Conclusion

In this paper we have defined a new metrics suite for the measurement of a real time environment application design. The metrics that have been defined are targeted to especially measure the real time system design, to identify the modules needing more detailed concentration. Those designs of those modules are revised again for the purpose of quality.

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Ranking repair and maintenance projects of large bridges in Kurdestan province using fuzzy TOPSIS method

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Abstract: In this paper multi criteria decision making tools have been used for bridge risk assessment and for planning the investigation, repair and maintenance of bridges. For this purpose, at first, risks that influence bridges have been recognized and they have been classified in six groups as risks arising from earthquake and their effect on the sphere, design and traffic insufficiency, flood, structural system, structural resistance against earthquake and different design, building or maintenance problems. The risks have been assessed based on their consequence on four criteria as safety, functionality, cost and environment. Finally, a method has been proposed for planning the bridges repair and maintenance projects using multi criteria decision making tools. In a case study, large bridges in kurdestan province have been ranked based on the intensity of recognized risks using fuzzy TOPSIS method.

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Keywords: bridge, risk sources, risk assessment, repair and maintenance, Fuzzy TOPSIS

1. Introduction

Transportation as one of the most important substructures for developing economical, political and social aspects of societies has a fundamental role in development of countries, and overland transportation is one of the most important parts of transportation. Building and maintenance of overland transportation network is one of the costliest projects of construction, and a large amount of this cost is allocated for elements like bridges and tunnels.

Bridges are structures for passing from natural and artificial obstacles such as rivers and roads. They are important elements of roads and their destruction or collapse lead to problems in transportation and wasting the initial building investment, and need to spend much money for rebuilding them. Furthermore, destruction of bridges during the natural disasters make relieving operation hard and it increases damages of disasters. Recognizing the structural problems of bridges and implementation of appropriate and opportune repair and maintenance programs is a fundamental step for preventing the destruction of bridges and damages arising of it.

In this study destruction factors that influence the bridges and their risks have been recognized, and an appropriate method has been proposed for ranking the

Investigation, fund allocation programs and prioritization of bridge repair and maintenance projects.

In recent years number of researches has been done to bridge risk assessment. For example in a research done on prioritization of bridges and tunnels in earthquake risk mitigation, following the

MAKBETH approach a multi criteria model was constructed and applied in a zone of high seismic hazard in the city of Lisbon to appraise the relative benefit of retrofitting each bridge and tunnel. The model Prioritized structures according vulnerability and strategic importance of bridges and tunnels (Bana et al., 2008). A Fuzzy Analytical Hierarchy Process (FAHP) has been used as an efficient decision making tool for condition evaluation of existing reinforced concrete bridges (Sasmal, Ramanjaneyulu, 2008). Wang and Elhagh have done several researches about bridge risk assessment during 2006 until 2008. They utilized multi criteria decision making methods and other mathematical models for bridge risk assessment and prioritization of bridge maintenance projects. They proposed a fuzzy TOPSIS method based on alpha level sets, and They compared neural network, evidential reasoning and multi regression analysis in modeling bridge risks. In another research a fuzzy group decision making approach for bridge risk assessment was proposed. (Wang & Elhagh, 2006, 2007, 2008).

In a case study of two bridges in Lisbon, project back ground was overviewed and main risks were recognized. Throughout the project a great attention was given to whole life cycle costs, and gain in efficiency and cost control (Lemos et al. ,2003). A risk based approach was used to determine the optimal intervention for bridges affected by multiple hazards. It was based on levels of service to be provided by the bridges (Adey et al. ,2003). In another research for bridge risk assessment, a broad overview of reliability—based assessment methods was presented and decision making tools were

applied for updated time-dependant estimates of bridge reliabilities considering a risk-ranking decision analysis. The reliability-based safety assessment was related to the effects of bridge age, current and future traffic volume and loads, and deterioration on the reliability and safety of ageing bridges (Stewart et al. 2001). The Literature review shows that multi criteria decision making tools are efficient for bridge risk assessment.

The remainder of this paper is organized as follows. Section 2 briefly introduces the fuzzy TOPSIS method. Section 3 presents the method to recognizing, assessment and modeling the bridge risks. Section 4 investigates a case study including the application of the proposed model for prioritization of bridges. The paper is concluded in section 5.

2. The fuzzy TOPSIS method

TOPSIS method is a technique for order preference by similarity to ideal solution and proposed by Hwang and Yoon (1981). The ideal solution (also called positive ideal solution) is a solution that maximizes the benefit criteria/attributes and minimizes the cost criteria/attributes, whereas the negative ideal solution (also called anti- ideal solution) maximizes the cost criteria/attributes and minimizes the benefit criteria/attributes. The so-called benefit criteria/attributes are those for maximization, while the cost criteria/attributes are those for minimization. The best alternative is the one, which is closest to the ideal solution and farthest from the negative ideal solution (Wang & Elhagh, 2006).

This method and other classic multi criteria decision making methods don't handle the uncertainty of issues. By using fuzzy theory and assimilate it with multi criteria decision making tools,

uncertainty in problem is modeled in fuzzy environment and produce more accurate answers.

The fuzzy TOPSIS method used in this study can be summarized as follows:

Step1: Every MCDM problems have m alternatives (A_1, \dots, A_m) and n criteria (C_1, \dots, C_n) . It concisely expressed in matrix format as follows:

$$\widetilde{B} = \begin{matrix} C_1 & C_2 & C_3 & \dots & C_n \\ A_1 & \widetilde{x}_{12} & \widetilde{x}_{13} & - & \widetilde{x}_{2n} \\ \widetilde{x}_{21} & \widetilde{x}_{22} & \widetilde{x}_{23} & - & \widetilde{x}_{2n} \\ \widetilde{x}_{31} & \widetilde{x}_{32} & \widetilde{x}_{33} & - & \widetilde{x}_{2n} \\ \vdots & \vdots & \ddots & - & \vdots \\ A_m & \widetilde{x}_{m1} & \widetilde{x}_{m2} & \widetilde{x}_{m3} & - & \widetilde{x}_{mn} \end{matrix}$$

Numbers in fuzzy MCDM problems are fuzzy numbers. Triangular fuzzy numbers are used to express linguistic variables. It can be defined by a triplet (a_11, a_12, a_13) where: $0 \le a < b < c \le 1$.

Step2: Weights of attributes reflect the relative importance in decision making process. We can not assume that each evaluation criterion is of equal importance. Weights vector is defined as $\vec{W} = [\vec{w}_1, \vec{w}_2, \dots, \vec{w}_n]$

Step3: The normalized fuzzy decision matrix denoted by \vec{R} is indicated as:

$$\tilde{R} = \left[\tilde{r}_{ij}\right]_{m+n}$$

If $(\tilde{x}_{ij}, I=1, 2,..., m, j=1,2,...,n)$ are triangular fuzzy numbers, then normalization process can be performed by

$$\ell_{ij}^{c} = \left(\frac{a_{ij}}{c_{j}^{c}}, \frac{b_{ij}}{c_{j}^{c}}, \frac{c_{ij}}{c_{j}^{c}}\right) \quad i = 1, 2, \dots, m, j \in E.$$
 (2 - 2)

$$\tilde{\eta_{ij}} = \begin{pmatrix} a_{ij}^{-}, a_{ij}^{-}, a_{ij}^{-} \end{pmatrix} \quad i = 1, 2, \dots, m, j \in \mathcal{C}, \tag{2-3}$$

Where B and C are the set of benefit criteria and cost criteria, respectively, and

$$c_j^* = \max_{i \in I} j \in B$$
 (2-4)

$$a_j^- = \min_{\mathbf{i} \, \mathbf{a}_0} \quad j \in \mathcal{C} \tag{2-5}$$

Step4: The weighted fuzzy normalized decision matrix denoted by $\tilde{\mathbf{v}}$ is calculated from (2-6):

$$= \vec{x} * \vec{W} \tag{2-6}$$

Step5: Positive ideal solution A^+ and negative ideal solution A^- are determined from (2-7), (2-8):

$$\begin{aligned} &\text{A}\mu^{1} + = \{ (\max_{T} i \ [V_{\mu j}] \ | \ j \in J_{1}), (\min_{T} i \ [V_{\mu j}] \ | \ j \in J_{1}) \ | \ i = 1, 2, ..., n \} \quad (2 - 7) \\ &\text{A}\mu^{1} - = \{ (\min_{T} i \ [V_{\mu j}] \ | \ j \in J_{1}), (\max_{T} i \ [V_{\mu j}] \ | \ j \in J_{1}) \ | \ i = 1, 2, ..., n \} \quad (2 - 8) \\ &A^{+} = (\tilde{v}_{1}^{+}, \tilde{v}_{2}^{+}, ..., \tilde{v}_{k}^{+}) \\ &A^{-} = (\tilde{v}_{1}^{-}, \tilde{v}_{2}^{-}, ..., \tilde{v}_{k}^{-}) \end{aligned}$$

Step6: The distance from the positive ideal solution and the negative ideal solution for each alternative are calculated from (2-9), (2-10), (2-11). The distance between two triangular fuzzy numbers $\mathbf{A_1} = (\mathbf{a_1 1}, \mathbf{b_1 1}, \mathbf{c_1 1})$ and $\mathbf{A_2} = (\mathbf{a_1 2}, \mathbf{b_1 2}, \mathbf{c_1 2})$ is calculated as:

$$d(A_1, A_2) = \sqrt{\frac{1}{3}[(a_1 - a_2)^2 + (b_1 - b_2)^2 + (a_1 - a_2)^2]} (2 - 9)$$

$$\begin{aligned} d_i^+ &= \sum_{i=1}^k [d(\tilde{v_{ij}}], \tilde{v_j}^+), & i &= 1, 2, ..., m \\ d_i^- &= \sum_{i=1}^k [d(\tilde{v_{ij}}], \tilde{v_j}^-), & i &= 1, 2, ..., m \end{aligned} \tag{2 - 10}$$

Step7: The closeness coefficient (CC) is calculated from (2-12) for each alternative and they are ranked in descending order. The alternative with the highest CC value will be the best choice.

$$cc_i = \frac{d_i^-}{d_i^+ + d_i^-}$$
 (2 - 12)

3. Modeling the bridges risk

In this study according to technical reports and the researches have been done by Ministry of Road and Transportation, the most important risks which influence bridges have been recognized and they have been classified in six main groups. They are risks arising from earthquake and their effect on the sphere, design and traffic insufficiency, flood, structural system, structural resistance against earthquake and different design, building or maintenance problems. These risks have been assessed considering their effect on four main criteria. These criteria determined based on literature review and engineering judgment. They are safety, functionality, cost and environment. The recognized risks are indicated in table 1.

Table 1. Recognized risks

X1	Risks arising from earthquake and their effect on the sphere
X2	Risks arising from design and traffic insufficiency
X3	Risks arising from flood
X4	Risks arising from structural system
X5	Risks arising from structural resistance against earthquake
X6	Risks arising from different design, building or maintenance problems

Relative importance of risks have been determined on the basis of interview with e team of bridge experts (DMs). They expressed the consequences of each defined risk event on safety, functionality, cost and environment of bridge by linguistic terms indicated in table2.

Table 2. Consequences rating of risk events

Tuble 2. Consequences running of risk events							
Consequence rating	Symbol	Fuzzy number					
Very High	VH	(0.85,0.85,1)					
High	Н	(0.5, 0.85, 1)					
Medium	M	(0.15,0.5,0.85)					
Low	L	(0,0.15,0.5)					
Very Low	VL	(0,0,0.15)					
None	N	(0,0,0)					

Consequences rating assessed by seven DMs have been indicated in table3.

Table 3. Consequences rating assessed by seven DMs

		X1	X2	Х3	X4	X5	Х6
	C1	VH	Н	Н	VH	VH	VH
DM1	C2	VH	Н	Н	VH	VH	VH
DIVIL	C3	VH	M	M	M	VH	M
	C4	VH	M	M	M	VH	Н
	C1	VH	VH	VH	H	VH	VH
DM2	C2	VH	VH	Н	L	VH	VH
DMZ	C3	VH	VH	M	VH	VH	L
	C4	VL	VL	VH	M	L	L
	C1	Н	Н	VH	Н	M	M
DM3	C2	M	Н	Н	M	Н	L
בויום	C3	Н	L	Н	Н	Н	L
	C4	M	L	Н	VL	VL	N
	C1	VH	VH	Н	H	M	Н
DM4	C2	VH	M	VH	VH	VH	Н
DNIT	C3	VH	M	VH	VH	VH	M
	C4	M	L	Н	M	M	L
DM5	C1	VH	H	VH	Н	VH	VH

	C2	Н	VH	VH	VH	VH	Н
	C3	Н	Н	VH	Н	Н	Н
	C4	M	M	Н	M	M	M
	C1	M	M	L	M	VH	Н
DM6	C2	M	Н	M	M	Н	VH
Divio	C3	H	Н	VH	Н	VH	Н
	C4	M	VH	M	VH	M	Н
	C1	VH	VH	VH	VH	VH	Н
DM7	C2	VH	Н	Н	Н	Н	Н
DNI	C3	Н	Н	VH	Н	Н	M
	C4	L	Н	M	M	M	L

According to fuzzy numbers in table 2 and consequences rating in table 3, relative importance of risk events have been calculated by averaging of seven DMs assessment. They are indicated in table 4.

Table 4. The relative importance weights of risk events for each criterion

risks	C1	C2	C3	C4
X1	$W_{11} = (0.7, 0.8, 0.98)$	$W_{12} = (0.6, 0.75, 0.96)$	$W_{13} = (0.65, 0.85, 1)$	$W_{14} = (0.21, 0.43, 0.72)$
X 2	$W_{21} = (0.7, 0.85, 1)$	$W_{22} = (0.5, 0.75, 0.96)$	$W_{22} = (0.38, 0.65, 0.89)$	$W_{24} = (0.19, 0.43, 0.69)$
X3	$W_{31} = (0.63, 0.75, 0.93)$	$W_{32} = (0.55, 0.8, 0.98)$	$W_{12} = (0.6, 0.75, 0.96)$	$W_{34} = (0.4, 0.7, 0.94)$
X 4	$W_{41} = (0.55, 0.8, 0.98)$	$W_{42} = (0.48, 0.65, 0.89)$	$W_{4B} = (0.55, 0.8, 0.98)$	$W_{44} = (0.23, 0.48, 0.77)$
X 5	$W_{\rm F1} = (0.65, 0.75, 0.96)$	$W_{\rm fig} = (0.7, 0.85, 1)$	$W_{\rm FR} = (0.7, 0.85, 1)$	$W_{\text{FA}} = (0.21, 0.43, 0.72)$
X6	$W_{51} = (0.55, 0.8, 0.98)$	$W_{62} = (0.53, 0.75, 0.93)$	$W_{62} = (0.21, 0.5, 0.79)$	$W_{\text{c4}} = (0.16, 0.38, 0.62)$

Bridge risks have been assessed as the product of likelihood and consequences of defined risk events as follows:

Risk= Likelihood*Consequences

(3-1)

Where L1 and C1 Likelihood and Consequence of risk event X1 for each criterion. Likelihood fuzzy numbers are indicated in table 5.

Table 5. Likelihood rating of risk events

Table 3: Extermode rating of risk events							
Consequence rating	Symbol	Fuzzy number					
Certain	C	(1,1,1)					
Very High	VH	(0.85, 0.85, 1)					
High	Н	(0.7, 0.85, 1)					
Slightly High	SH	(0.5, 0.7, 0.85)					
Medium	M	(0.3,0.5,0.7)					
Slightly low	SL	(0.15, 0.3, 0.5)					
Low	L	(0,0.15,0.3)					
Very Low	VL	(0,0,0.15)					
Imposible	N	(0,0,0)					

Total risk of each bridge for each criterion is calculated from additive weighting of six risk events as follows: $\mathbf{a}_{11} = \mathbf{w}_{11} * \mathbf{x}_{1} + \mathbf{w}_{21} * \mathbf{x}_{2} + \mathbf{w}_{31} * \mathbf{x}_{3} + \mathbf{w}_{41} * \mathbf{x}_{4} + \mathbf{w}_{51} * \mathbf{x}_{5} + \mathbf{w}_{61} * \mathbf{x}_{6}$ (3 – 2)

Where all is total risk of first bridge (A1) for first criterion (C1).

After calculating of total risk for all bridges and all criteria, decision matrix has been built as follows.

$$\widetilde{D} = \begin{pmatrix}
C_1 & C_2 & C_3 & C_4 \\
A_1 & \widetilde{a}_{11} & \widetilde{a}_{12} & \widetilde{a}_{13} & \widetilde{a}_{14} \\
A_2 & \widetilde{a}_{21} & \widetilde{a}_{22} & \widetilde{a}_{23} & \widetilde{a}_{24} \\
\widetilde{a}_{31} & \widetilde{a}_{32} & \widetilde{a}_{33} & \widetilde{a}_{34} \\
\vdots & \vdots & \ddots & \vdots \\
\vdots & \vdots & \vdots & \vdots$$

Bridge structures can be ranked for repair and maintenance projects on basis of decision matrix in (3-3) using fuzzy TOPSIS method in section 2.

Relative importance of criteria have been calculated by averaging of seven DMs assessment of consequences rating in table 3. They are indicated in table 6.

Table 6. Fuzzy weights of criteria					
criteria Fuzzy weights					
Safety	(0.63, 0.79, 0.97)				
Functionality	(0.56, 0.76, 0.95)				
Cost	(0.51, 0.73, 0.94)				
Environment	(0.23, 0.47, 0.74)				

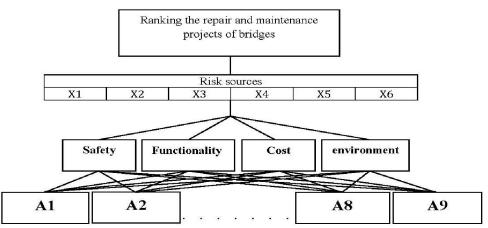


Figure 1.General model of problem

Table 7. l	Intensity o	of risk events	for	bridge A1
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risks	<i>C</i> 1	C2	C3	C4
X1	(0.15, 0.425, 0.7)	(0.15, 0.425, 0.7)	(0.045,0. 25,0.595)	(0.045,0. 25,0.595)
X2	(0.25, 0.525, 0.85)	(0.075, 0.35, 0.723)	(0.075, 0.35, 0.723)	(0,0.105,0.425)
X3	(0.15, 0.425, 0.7)	(0.15, 0.425, 0.7)	(0.15, 0.425, 0.7)	(0.045, 0.25, 0.595)
X 4	(0,0.075,0.35)	(0,0.075,0.35)	(0.045, 0.25, 0.595)	(0,0.075,0.35)
X5	(0,0.023,0.15)	(0,0.075,0.255)	(0,0.075,0.255)	(0,0,0.045)
X6	(0,0.025,0.45)	(0.023, 0.15, 0.425)	(0,0.045,0.25)	(0,0,0.075)

4. Case study

There are more than fifty large bridges in Kurdestan province. We select nine bridges of two main routes as our case study. General model of problem has been indicated in figure 1. These bridges have been investigated by bridge experts. They determined the likelihood and consequences of each risk event according to each criteria. Intensity of risks has been calculated for all bridges and all criteria. Calculated risks for bridge structure A1 are indicated in table 7as an example.

Total risk for all bridges considering the criteria have been calculated to define decision matrix (3-3). For example, total risk for bridge A1 and criterion C1 (4-11) has been calculated using (3-2) as follows.

 $\mathbf{\tilde{a}_{11}} = (0.7, 0.8, 0.98) * (0.15, 0.425, 0.7) + (0.7, 0.85, 1) * (0.25, 0.525, 0.85) + (0.63, 0.75, 0.93) * (0.15, 0.425, 0.7) + (0.55, 0.8, 0.98) * (0,0.075, 0.35) + (0.65, 0.75, 0.96) * (0,0.023, 0.15) + (0.55, 0.8, 0.98) * (0,0.025, 0.45) = (0.374, 1.218, 2.916)$

Other elements of decision matrix has been calculated like 311. They are indicated in table 8.

The normalized fuzzy decision matrix has been calculated using (2-2), (2-3), (2-4), (2-5) as indicated in table 9.

The weighted fuzzy normalized decision matrix has been calculated by multiplication of weights of criteria in table 6 and normalized decision matrix in table 9 as described in (2-6). This matrix will be the basis of bridge ranking and it has been indicated in table 10.

Positive ideal solution and Negative ideal solution are determined by (2-7), (2-8) on the basis of weighted fuzzy normalized decision matrix in table 10 as follows:

 $A^{\parallel} = \{(0.087, 0.364, 0.970), (0.056, 0.325, 0.951), (0.006, 0.024, 0.151), (0.005, 0.115, 0.744)\}$

 \overline{A} = {(0.003,0.075,0.430),(0.021,0.175,0.624),(0.011,0.058,0.936),(0.000,0.020,0.270)}

The distance from the positive ideal solution and the negative ideal solution for each alternative have been calculated from (2-9), (2-10), (2-11). They are indicated in table 11.

Table	Q	Fuzzy	decision	matriv
rabie	٥.	FUZZV	decision	maurix

	C1	C2	<i>C3</i>	C4
AI	(0.374, 1.218, 2.916)	(0.222, 1.146, 3.006)	(0.172, 1.045, 2.94)	(0.027, 0.363, 1.63)
A2	(0.198, 0.985, 2.838)	(0.296, 1.319, 3.334)	(0.141, 1.019, 3.08)	(0.018, 0.212, 1.1)
A3	(0.486, 1.623, 3.526)	(0.372, 1.604, 3.741)	(0.245,1.193,3.143)	(0.027, 0.282, 1.289)
A4	(0.256, 1.174, 3.055)	(0.33, 1.473, 3.492)	(0.116, 0.923, 2.931)	(0.018, 0.194, 1.028)
A5	(0.229, 1.244, 3.356)	(0.256, 1.36, 3.445)	(0.165, 0.96, 2.852)	(0.037, 0.421, 1.74)
A6	(0.177, 0.969, 2.88)	(0.195,1.193,3.288)	(0.057, 0.608, 2.416)	(0.018, 0.214, 1.152)
A7	(0.016, 334, 1.563)	(0.144, 0.866, 2.456)	(0.039, 0.499, 1.875)	(0,0.072,0.632)
A8	(0.046, 0.489, 2.144)	(0.139, 0.896, 2.546)	(0.074, 0.556, 2.005)	(0.009, 0.137, 0.863)
A9	(0.215, 0.888, 2.397)	(0.178, 1.008, 2.779)	(0.105, 0.525, 1.783)	(0.023, 0.239, 1.072)

Table 9. Fuzzy normalized decision matrix

	1 4010 / 1 1	azzj normanzea acers	TOTAL TRANSPORT	
	C1	C2	C3	C4
AI	(0.106, 0.345, 0.827)	(0.059, 0.306, 0.804)	(0.013,0.038,0.228)	(0.016,0.209,0.937)
A2	(0.056, 0.279, 0.805)	(0.079, 0.353, 0.891)	(0.013, 0.039, 0.279)	(0.011, 0.122, 0.632)
A3	(0.138, 0.460, 1.000)	(0.100, 0.429, 1.000)	(0.013, 0.033, 0.161)	(0.016, 0.162, 0.741)
A4	(0.073, 0.333, 0.866)	(0.088, 0.394, 0.933)	(0.013, 0.043, 0.340)	(0.010, 0.112, 0.591)
A5	(0.065, 0.353, 0.952)	(0.068, 0.363, 0.921)	(0.014, 0.041, 0.239)	(0.021, 0.242, 1.000)
A6	(0.050, 0.275, 0.817)	(0.052, 0.319, 0.879)	(0.016, 0.065, 0.686)	(0.01, 0.123, 0.662)
A7	(0.004, 0.095, 0.443)	(0.039, 0.231, 0.656)	(0.021, 0.079, 1.000)	(0.000, 0.041, 0.363)
A8	(0.013, 0.139, 0.608)	(0.037, 0.239, 0.681)	(0.020, 0.071, 0.530)	(0.005, 0.079, 0.496)
A9	(0.061, 0.252, 0.680)	(0.047, 0.269, 0.743)	(0.022, 0.075, 0.376)	(0.013, 0.138, 0.616)

Table 10. Weighted fuzzy normalized decision matrix

	C1	$\frac{C2}{C2}$	СЗ	C4
AI	(0.67,0.283,0.802)	(0.033,0.232,0.764)	(0.007, 0.028, 0.214)	(0.004,0.099,0.697)
A2	(0.035, 0.221, 0.781)	(0.044, 0.267, 0.848)	(0.007, 0.028, 0.261)	(0.002, 0.058, 0.471)
A3	(0.087, 0.364, 0.97)	(0.056, 0.325, 0.951)	(0.006, 0.024, 0.151)	(0.004, 0.077, 0.551)
A4	(0.046, 0.264, 0.841)	(0.049, 0.299, 0.888)	(0.007, 0.031, 0.319)	(0.002, 0.053, 0.44)
A5	(0.041, 0.279, 0.923)	(0.038, 0.276, 0.876)	(0.007, 0.030, 0.224)	(0.005, 0.115, 0.744)
A6	(0.032, 0.218, 0.793)	(0.029, 0.242, 0.836)	(0.008, 0.047, 0.642)	(0.002, 0.058, 0.493)
A7	(0.003, 0.075, 0.43)	(0.022, 0.175, 0.624)	(0.011, 0.058, 0.936)	(0.000, 0.020, 0.27)
A8	(0.008, 0.11, 0.59)	(0.021, 0.182, 0.647)	(0.01, 0.052, 0.496)	(0.001, 0.037, 0.369)
A9	(0.038, 0.199, 0.659)	(0.027, 0.204, 0.706)	(0.011, 0.055, 0.352)	(0.003, 0.065, 0.458)

Table 11. The distance of alternatives from positive and negative ideal solution

Criteria		C1		C2	(C3	(C4	1	D
Distance	d^+	d^-	d+	d ⁻	d+	d ⁻	d+	d^-	D+	D^-
AI	0.111	0.246	0.121	0.087	0.036	0.417	0.029	0.251	0.297	1.002
A2	0.140	0.220	0.069	0.140	0.064	0.390	0.161	0.118	0.434	0.868
A3	0.000	0.357	0.000	0.208	0.000	0.454	0.113	0.166	0.113	1.185
A4	0.098	0.262	0.040	0.169	0.097	0.357	0.179	0.100	0.414	0.887
A5	0.062	0.309	0.053	0.157	0.042	0.411	0.000	0.279	0.157	1.156
A6	0.137	0.226	0.084	0.128	0.284	0.170	0.149	0.130	0.653	0.654
A7	0.357	0.000	0.208	0.000	0.454	0.000	0.279	0.000	1.298	0.001
A8	0.268	0.094	0.195	0.014	0.200	0.254	0.221	0.058	0.884	0.420
A9	0.205	0.152	0.159	0.050	0.118	0.337	0.167	0.112	0.649	0.651

The closeness coefficient (CC) has been calculated from (2-12) and table 11 for each alternative and they are ranked in descending order as follows:

Table 12. Closeness Coefficient and bridge ranking

Bridges	CC	Ranking
AI	0.771	3
A2	0.667	5
A3	0.913	1
A4	0.682	4
A5	0.880	2
A6	0.500	7
A7	0.001	9
A8	0.322	8
A9	0.501	6

According to the ranking indicated in table 12, The bridge A3 is at the first in prioritization and the bridge A7 is the last one. The repair and maintenance projects should be plan considering this ranking, and it helps to do appropriate and opportune operations and prevents the destruction of bridges.

5. Conclusion

In this paper we have proposed a method to planning the bridges investigation and maintenance projects according to risks that influence the bridges. At first the main risks have been recognized and they have been classified in six groups. They are risks arising from Earthquake and their effect on the sphere, design and traffic insufficiency, flood, structural system, structural resistance against earthquake and different designing, building or maintenance problems.

These recognized risks have been assessed based on a multiple criteria decision making (MCDM) method known as TOPSIS in fuzzy environment. So the fuzzy weights of these risks have been determined according to four criteria: safety, functionality, cost and environment. Further in a case study, repair and maintenance projects of bridges have been prioritized using the proposed method. Analyzing the results presents that the proposed method is efficiently applicable for bridge prioritization and decision making about allocation of funds and performing maintenance projects. There is not limitation for number of bridges or risks in the proposed method and it can be applied in different conditions or regions.

6/21/2011

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Evaluation of soil erosion and sediment yield using semi quantitative models: FSM and MPSIAC in Eivaneki watershed and the sub basins (Southeast of Tehran/Iran)

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Abstract: Soil erosion and sediment yield are the most important environmental problems that should be considered. Erosion is not only cause of soil degradation but also fills dam reservoirs; irrigation structures and decreases their capacity. Because of no sediment reservoir (check dams) at the Eivaneki watershed outlet that can show the yearly sediment yield, both of the semi-quantitative models (FMS and MPSIAC) are used to evaluate the annual rate of sediment in five Eivaneki watershed sub basins. In modified FSM model five factors: topography, vegetation, gully erosion, lithology and watershed shape with the score range of 1 to 3 were studied and scored. The nine MPSIAC model factors consist of: lithology, soil, climate, run off, topography, vegetation cover, land use, surface erosion and channel erosion. The specific sediment yields that were evaluated by using FSM model are 0.91 ton/ha/y and 3.21ton/ha/y with MPSIAC. Also rainfall simulator was used in order to classify the erodible formation in Eivaneki watershed. After evaluating the rate of sediment in Eivaneki watershed, these quantitative values compared with each other and the result of Eivaneki gauging station (0.93 t/ha/y). Results showed that FSM evaluation was nearer to SSY than MPSIAC.

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Keywords: Sedimentyield, FSM, MPSIAC, Rainfall simulator, Eivaneki watershed.

Introduction:

Erosion is the result of weathering of rocks and soil loss (Feiz Nia, 2008). Soil erosion is one of the important environment problems that should be considered. Every year million tons of sediments, deposit in the rivers, lakes, reservoirs and dams that will be accumulated and we spend heavy cost for dredging them (Goldman &colleagues, 1986). The frequent flooding causes of destruction of farmlands, roads, and contaminates of drinking water.

Sedimentation yield potential in Eivaneki watershed is high due to natural conditions such as: formation erosion, human activities, agriculture and animal husbandry. Therefore estimating of the sediment yield and sensitive erosion areas for soil conservation in this region is necessary. Due to lack of tanks or reservoir at the end of this watershed, information and statistics of water discharge and annual precipitation amount is not available .So it was so appropriate to use empirical methods to estimate the rate of soil erosion and Sediment Yield (Refahi, 2009).Selected models is based on weather conditions in the region, being practical and usable.

(Refahi, 2009). PSIAC model with nine factors: lithology, soil, climate, runoff, topography, vegetation, land use, surface and channel erosion, was presented by the American Water Management Committee in 1968 to estimate annual sediment yield in the watershed. In 1982, Johnson & Gebhardt modified this nine environmental factors into numerical equations that brought this model to the semi quantitative model (MPSIAC, Table 1). Because this model is consist of most factors that affecting soil erosion, it is suitable for evaluating of erosion and annual sediment yield in the watershed. A second semi-quantitative model is Factorial Scoring Model (FSM), one of the newest models of estimating the annual sediment yield. Verstraeten & their colleagues presented FSM in 2003 and it was used to evaluate the erodibility of watersheds in Spain. De Vente and poesen modified this model in 2005, and khoddami and his colleages used that for the first time in Iran to evaluate annual sediment yield in Latshoor watershed in 2006.

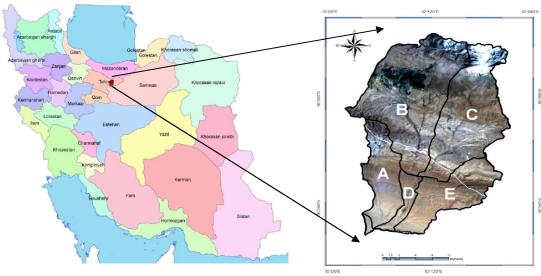


Fig 1.Location of Eivaneki watershed and its sub basins (A, B, C, D, E)

Study area

Eivaneki river watershed with an area of 800 square kilometers. is part of central desert basin in Iran and is located in south east of Tehran .The study area is located between northern latitude 52⁸, 01 to 52⁸, 219 and eastern longitude 35,209 to 35,439 Northern part of the central Alborz Mountains and southern part of the city that is known Eivaneki. The main river with the same name flows from north to south of watershed with the length of 50 Km. Mainly older and more rigid geological formations are located in the northern areas and erodible formations such as Neogene are in the middle to the end of area.

Considering the physiographic data and information that obtained from topographic and lithology maps, five sub basins A, B, C, D and E were assigned (Figure 1).

Material and methods

In this research, in order to evaluate of erosion rate and sediment yield of Eivaneki (SSY) watershed and its sub basins using MPSIAC and FSM, we had to determine the watershed area. For this purpose first the basic topographic maps with the scale of 1:50,000 (Army Geographic Organization, 2002 and lithology maps with scale 1:100000 (Garmsar region 2004 & Damavand 2003) were studied and digitized. Also satellite images (LANDSAT 2001/ASTER 2006 /Google Earth 2009) in GIS environment were used to draw the watershed and its sub-basins border line. Collection data for the scoring gathered by study on site and incorporated with geological maps, topography, geomorphology, slope, land units, land use maps that were obtained in GIS environment (Mohamadiha, 2009).

MPSIAC Model

In this semi-quantitative model, nine erosion factors depending on levels of erodibility were scored between one to ten, then using the equation for each factor, values were modified, (Johnson and & Gebhardt 1982, Table 1.)

After scoring and adding the factors, the MPSIAC index is obtained. The relation between the specific sediment yield (t/km²/year) and MPSIAC index is shown in equation [1]:

$$Qs=SSY=0.253e^{R0.036}$$
 [1]

Notice: In this research, Surface soil sampling in each land unit was taken in order to determine soil texture and scoring soil factor(X2) in MPSIAC model.

Factorial Scoring Model is a quantitative model that consists of five factors(table2, Verstraeten et al., 2003; de Vante et al.,2005) .In This model each factor is scored between 1-3, after field study and additional information that was extracted from various data sources(see materials and methods), topographic map and watershed physiographic .This model is based on drainage area(A:km2) and FSM index that obtained by multiplication of the five erosion factors(de Vante et al 2005, equation[2]):

SSY=4139*A^{-0.44}+7.77*FSMIndex-310.99 [2

Rain fall simulator

Lithology is one of the important factors in both of semi quantitative erosion models that should be classified. Scoring was based on their erodiblity in the watershed. Therefore in addition of using Shariat Jafari et al(2006) and Feiznia (1996) methods for scoring this erosion factor , we used portable rainfall

simulator on erodible formation (on site) to evaluate run off rate and the relative erodibility (Fig 2).

Rain fall simulator with surface dimension of precipitation 25×25 cm with elevation of precipitation 40 cm was used. Before using the device it was calibrated with intensity 30 and 60 mm per hour. The tests were done only on accessible formations with gentle slopes (less than 30 percent) with two repeats, overall twenty seven plots were examined. Samples were transferred to the laboratory and the volume of runoff and weight of deposits were determined. At last the formations were classified with Duncan technique (Mohamadiha, 2009, Table

3). In each land unit on site, soil sampling was taken in order to determine soil texture for scoring soil factor(X2) in MPSIAC model (Table 3).

Results and discussion

After studying on prepared maps that mentioned before, field surveying analysis results of rain fall simulator (Table 3) soil texture and physiographic of Eivaneki watershed, factors in MPSIAC and FSM semi quantitative models in this area and the sub basins were scored and modified (table 4 & 5). Also annual erosion rate was classified in this watershed (table 6).

Table 1. Nine MPSIAC factors and their modification are sh (Johnson and Gebhardt, 1982).

FSM Model

Erosion factors	Modified factors	parameters
lithology	Y1=X1	X1=Geological erosion index
Soil	Y2=16.67X2	X2=Soil erodibility factor
climate	Y3=0.2X3	X3=6-hour rainfall with a 2-year return period
runoff	Y4=0.006R+10Qp	Q _p = annual specific Debi (m ³ /skm ²) R=annual of runoff Height (mm ³)
topograghy	Y5=0.33X5	X5=Percentage of the average basin slope
vegetation	Y6=0.2X6	X6=Percentage of land without vegetation
Land use	Y7=20-0.2X7	X7=Percentage of vegetation cover
Surface erosion	Y8=0.25X8	X8=total surface soil factor scoring in BLM*
Channel erosion	Y9=1.67X9	X9=Gully scoring in BLM*

^{*}BLM: Breau of Land Management (Refahi 2006)

Table 2. Description of the Factorial Scoring Model (FSM) (Verstraeten et al., 2003; de Vante et al., 2005).

Factor	Score	Description
	1	very gentle slopes, elevation difference <200 m within 5 km
Topography	2	moderate slopes, elevation difference 200-500 m within 5 km
	3	steep slopes, elevation difference >500 m within 5 km
	1	good contact cover of soil(>75% protected surface)
Vegetation cover	2	moderate contact cover (25-75% protected surface)
	3	poor contact cover (<25% protected)
	1	bank and ephemeral gullies are very rare
Gullies	2	few bank and/or ephemeral gullies
	3	many bank/or ephemeral gullies
	1	limestone, sandstone, conglomerate(low weathering degree)
Lithology	2	Neo gene sedimentary deposits(gravel, silt, etc)
	3	strongly weathered(loose) material and/or marls
	1	elongated watershed shape, one main river channel draining to the reservoir
watershed shape	2	between elongated and semi-circular watershed shape
•	3	semi-circular, circular watershed shape with many rivers draining to the reservoir



Fig 2.rainfall simulator that was used on site to evaluate the relative erodibility of formations.

Table 3 - Comparison of average runoff and sediment lithology units earned in Eivaneki watershed results obtained from the rain simulator classification with Duncan technique (Hassanzade nofuti et al 2008, mohamadiha, 2009)

the fam simulator elassification with Banean teering			teeninge (THESSENIERGE HOTER ET AL 20	oo, moment	
Lithology factor scoring MPSIAC		Sediment average amount(g)	Runoff average volume(cc)	* * * *	Lithology unit	Formation
6	Very high	32.57	410	alluvial	Q	terrace
5	Very low	3.3	283	Conglomerate, sandstone	Plc	Kahrizak
10	Very high	75.66	820	Marl, shale	M3	Upper red
8	high	53.58	650	Marl, sandstone	M2	Middle red
5	medium	27.06	603	Marl, sandstone, shale	M1	Lower red
4	medium	27.52	620	Chalk, marl, limestone	Om	Qum
9	Very high	69.61	690	Marl, chalk	Ekn _{gy}	Kond
2	low	11.04	366	tuff	Ek _{tms}	Karaj
9	Very high	70.65	855	Red shale	Ks	Cretaceous red shale

Table4.Scoring erosion factors of MPSIAC model in Eivaneki watershed and its sub basins.

Erodible factors	Sub A	Sub B	Sub C	Sub D	Sub E	Eivaneki
lithology	7.10	5.87	6.01	8.14	7.44	6.59
soil	6.32	5.68	5.69	7.24	6.36	6.16
weather	3.47	4.25	4.1	3.14	3.26	3.98
Run off	2.87	11.48	9.42	0.3	1.76	7.48
topography	5.93	6.57	7.64	3.66	7.65	6.84
vegetation	10.36	7.23	7.12	9.05	8.93	8.47
Land unit	16.48	15.31	14.69	15.20	16.06	12.92
Surface erosion	11.93	10.54	10.79	14.30	12.06	11.57
River erosion	6.91	5.30	6.20	9.07	8.27	6.78

g factors of 1 51v1 model in Livaneri watershed and its sub basins.					
itershed	FSM index	Area Km2	SSY(ton/km2/y)	SSY(ton/ha/y)	
A sub-basin	22.18	108	390	3.90	
B sub-basin	31.36	319	260	2.60	
C sub-basin	30.17	241	294	2.94	
D sub-basin	22	36	719	7.19	
E sub-basin	18.9	131	320	3.20	
Eirron alri	24.12	900	05	0.01	

Table 5- Scoring factors of FSM model in Eivaneki watershed and its sub basins.

Table 6.Erosin class and annual sediment yield in Eivaneki watershed and the sub-basins according to MPSIAC semi quantitative model.

watershed	Perimeter (km ³)	Total score	$SSY(m^33km^3)$	SSY(ton3ha)	Erosion class	Erosion rate
A sub-basin	108	71.26	261.83	3.56	III	medium
B sub-basin	319	72.24	251.75	3.42	III	medium
C sub-basin	241	71.68	247.39	3.36	III	medium
D sub-basin	36	70.10	250.72	3.41	III	medium
E sub-basin	131	71.79	268.22	3.64	III	medium
Eivaneki	800	71.59	262.83	3.57	III	medium

Table 7. Evaluation of annual SSY in Eivaneki watershed by using gauging station data. (Mohamadiha 2009).

Suspension load(ton/ha/y)	Bed (ton/ha/y)	load	SSY(ton/ha/y)
0.78	0.156		0.93

Due to lack of reservoir or dam in the outlet of the watershed in order to compare SSY with results of MPSIAC and FSM semi quantitative models, we compared these results with the Annual sediment yield evaluation by using gauging station data in this watershed (mohamadiha 2009). Annual sediment yield in Eivaneki watershed equal to 0.93 ha. Per year was estimated (table 7). The amount of suspension load was evaluated in direct measurement (Walling, 1994). With using recently 22 years data gauging station at the outlet of watershed (WRO, 1983-2005)due to mean of Eivaneki guaging station that should be added with the bed load .There was several problems due to lack of information to estimate the real bed load rate(Webb, Walling 1987). The average ratio of bed load to suspended load in rivers plain 7 percent and 23 percent in mountainous rivers were determined (Walling and Webb, 1987). In Iran with considering of geographic and climate conditions, bed load was determined between 15 to 30 percent (Hakimkhani & Faiznia, 2003, Arabkhedri 1998). According to the conditions of Eivaneki watershed the bed load in this area was

considered as 20 percent. Also the FSM results should be lower than actual rates because in large watersheds depends on their physiographic (especially in large and long watershed), the sediments would be trapped and remain in the back of point bar in areas where the slope is too low. Therefore, the amount of sediment at the end of watershed could be less than real rate.

Table 8. Estimated annual sediment (SSY) in Eivaneki watershed used following methods.

The methods have been used in estimating SSY	SSY(ton/ha/y)
Gauging station	0.93
FSM model	0.91
MPSIAC model	3.21

Conclusion

Analyzing the results of this study indicated that:

-Evaluation of SSY using semi quantitative MPSIAC, classified Eivaneki watershed and the sub basins in medium erosion rate (class III). Also showed that the maximum erosion rates were belonged to A and E sub basin (table 6).

-Results of FSM model showed that maximum erosion in Eivaneki watershed respectively is in D, E and A sub basins. The cause of large amount of erosion in sub D is that the channel in this sub basin is the major channel in Eivaneki watershed and brings lots of

sediment from upper area .Also the exaggeration of this amount is because of small area and physiographic characteristic of D sub basin that is considered in FSM semi quantitative model.many researches are showed that the marl basins like sub A, D and E have more erosion and sediment yield than the basin with limestone, sandstone and schist (Feiznia, 1995, Lahloh,1988, Woodward, 1995).

- -The results of rain fall simulator test on the lithology formations is consistent with Shariat Jafari et al (2006) and Feiznia (1996) methods for scoring the erosion factor and also with sediment yield and is recommended to use as a method in the same research. Also was found that erosion rate in the middle and lower sub basins (sub A, E) in Eivaneki watershed is more than upper sub basin in according to the lithology, areas and physiographic (Table 6).
- Compare of evaluating the annual sediment yield (SSY) by using gauging station, semi quantitative FSM and MPSIAC model results showed that FSM has more near amount with gauging station result than FSM model (Table 8).
- -The large amount of SSY in MPSIAC model and the difference between FSM and MPSIAC is according to area and physiographic of watershed that mentioned in FSM.
- -MPSIAC model showed the maximum of erosion and needs more modification. It has been suggested that soil and lithology factors in MPSIAC model, be combined and also channel erosion factor be replaced with sediment and hydraulic characteristic of the channel (Strand & Pemberton 1987).
- -It seems In FSM model , in long and large watershed(Eivaneki) a big amount of sediments has trapped in point bar and low land dip of Eivaneki braided river.

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6/22/2011

The comparative investigation of the customer's and manager's views of the Non-profit employment agencies about the relationship of the mixed factors of marketing of the services with customer attraction

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Abstract: Today, paying deep attention to customers and customer-centered centers is the secret of employment market .The purpose of this investigation is to do a comparative investigation about the customers' views and managers of the non-profit employment offices about the relationship between the mixed factors of the marketing of services in order to improve the performance of non-profit employment offices to satisfy customers and attract them more .The investigation sample includes managers and customers of the non-profit employment offices of Khuzestan province (N=260).According to the resources existing in the special quarries, the effect of the mixed factors of the marketing of services with customers attraction and the characteristics of non-profit employment offices, the researcher-made quarry has been used. Two tests have been used in this research .The test of the total ranks and that of Fredman, according to the fact that there are two types of independent statistic societies (statistic society of managers and customers) exist, these tests have been used to test these tests. The results show that there is a meaningful disagreement between the viewpoints of customers and managers of non-profit employment offices about the mixed factors of marketing of the services.

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Keywords: Mixed marketing of the services; customer; marketing of the services; Employment Services

1. Introduction

Considering the importance and role of nongovernmental job search in employment market, identification of significant factors which are effective in attracting individuals who search job as well as investigation of critical factors in cooperation of private sector in job search provides the opportunity to concentrate on opportunities in job market and find the job need of society's individuals and provide services by which the job seekers can find their favorite job according to their interests, specialty, degree, and capabilities. The present paper aims to investigate the amount of concordance between opinions of clients and managers of nongovernmental job search agencies concerning the relationship between factors of service marketing mix and client attraction.

Non-governmental job search agencies are created with the goal of adapting the offer and demand regarding work force, without supporting the job seekers or job applicants. It should be noted that there is always a gap between the services provided and the services understood. Therefore, job finding agencies should identify the expectations of their clients concerning their services in order to identify and fill the service gap. Indeed, the main question of the study is that whether there is a significant difference between opinions of clients and managers of non-governmental job search agencies concerning the factors of service marketing mix.

One of the main justifications of the study subject originates from theoretical and practical foundations of the study which emphasize on identification of factors effective on client attraction for profit organizations as a critical issue. In spite of theoretical and practical confirmations, it has been neglected to seriously pay attention and understand the point that not only providing all services must be accomplished for customer and satisfaction of the customer, but also it is favorable to employ all facilities and resources for reaching full satisfaction of the customer.

The goal of the present study is to identify the attitude of clients and managers of nongovernmental job search agencies concerning the relationship between factors of service marketing mix and client attraction, and to compare them.

Herein, the service marketing mix includes the following seven factors: services, price, place, promotion, personnel, physical assets, and processes (Mojtahedi, 1991). Philip Cuttler and Garry Armstrong in their book "principles of marketing" consider marketing as a kind of social and managerial process by which individuals and groups can satisfy their needs and desires through production, as well as exchange of products and values with others (Lovlak, 2006).



Figure 1: Concepts of marketing

According to Fig. 1, marketing includes the factors of demand, desire, request, goods, value, price, satisfaction, exchange, and trade, considering the relationships among markets and marketing methods (Mojtahedi, 1991).

Marketing management means analysis, planning, implementation, and control of defined programs with the purpose of providing favorable exchanges with desired markets for reaching the organizational goals. Marketing management typically emphasizes on determination organization's products based upon needs of the desired market, as well as making use of effective pricing, communication, and distribution with the intention of informing, motivating, and providing services to market (Venus et al, 2007).

As mentioned above, Herein, the service marketing mix includes the following seven factors: services, price, place, promotion, personnel, physical assets, and processes. Concordance and prioritization of clients and managers of non-governmental job search agencies can lead to more client attraction. In contrast, if the clients' priorities concerning factors of are different from those of the managers, certainly the clients would not more be attracted to these agencies. The following model demonstrates the framework of the present study.

As the above model exhibits, managers have opinions concerning the priority of service marketing mix according to their experiences, and clients have their own specific prioritization. What satisfies the interests of both sides is the managers' knowledge of clients' prioritization, shown with dash line in this model. Due to wideness of the factors of service marketing mix and time limitation, in this research only some of these factors have been studied, including: services, place, promotion, personnel, and physical assets.

2. Research Methodology

Regarding its goals and nature, the methodology of this study is practical. Also concerning data collection in testing hypotheses, it is of survey-descriptive type (Fig. 2).

From statistical point of view, this study is deductive since it generalizes the samples to the population (Azar, 1991). In addition, it is a descriptive study as it investigates what exists. Using a questionnaire, the researcher tested the study hypotheses. In this

research, we used five-point Likert scale for measurement of responders' attitudes.



Figure 2: Full model of research

The scope of this study is issues relate to marketing of services provided by non-governmental job search agencies, and compares the opinions of clients and managers of non-governmental job search agencies concerning the relationship between the effect of each factor of service marketing mix and client attraction. Time duration of the present study has been the recent two years. This research has been conducted in geographical scope of Khuzestan Province.

Research goal is to identify the attitudes of clients and managers of non-governmental job search agencies concerning the relationship between factors of service marketing mix and client attraction, as well as their comparison.

The population under study included clients and managers of non-governmental job search agencies in Khuzestan Province in 2009. Due to existence of two statistical populations, the samples were divided into two groups: 1) statistical population of managers; 2) statistical population of clients.

Among search finding agencies, 28 centers were randomly chosen for this study. The managers were also randomly selected and were asked questions. Sample sizes of clients and job search managers have been calculated using n formula.

In this study, the tool for collecting data was a researcher-made questionnaire. Validity of the questionnaire was confirmed using the opinions of experts and managers of job search agencies. To determine the reliability of the questionnaire, Kronbach alpha was used [1] which yielded the value of 0.87. Statistical analysis of research data was accomplished using SPSS statistical software. Descriptive statistics was utilized for data description, while deductive statistics was accomplished using Mann Whitney U test (ranking test) and Friedman test (Azar, 1991).

3. Data Analysis

According to the statistical results, 63.5% of responders were male and 36.5% of them were females. Also, 60% of managers were male and 40% of them were female. The educational degree of clients was as follows: 4.6% under diploma; 26.2% diploma; 33.8% above diploma; 33.7% M.A.; and 2.7% postgraduate or higher. Also, the educational degree of managers was as follows: 16% above diploma; 74% M.A.; and 10% postgraduate or higher. To rank the factors of marketing mix from viewpoint of clients and managers, the test of Friedman's analysis of variance was performed. The results of the test indicated that the significance value for all factors of service marketing mix is lower than 0.5. Hence, the hypothesis H0 is rejected and H1 is confirmed. In other words, there is a significant difference between priorities of service marketing mix.

- a) Test of ranking the service mix: The first and second priorities from clients' viewpoint were the use of novel computerized system of providing service and increase of work hours of non-governmental job search agencies, while the first and second priorities from managers' viewpoint were providing services via internet and the use of novel uniform computerized system.
- b) Test of ranking place mix: The first and second priorities from clients' viewpoint were increasing the number of non-governmental job search agencies in general societies and increasing the number of non-governmental job search agencies in cultural societies, while the first and second priorities from managers' viewpoint were increasing the number of non-governmental job search agencies in cultural societies and increasing the number of non-governmental job search agencies in economic societies.
- c) Test of ranking promotion mix: The first and second priorities from clients' viewpoint were giving gift or prize and advertisement through specialized magazine, while the first and second priorities from managers' viewpoint were entertaining the clients when visiting the agencies and giving gift or prize.
- d) Test of ranking personnel mix: The first and second priorities from clients' viewpoint were appearance and experience and expertise, while the first and second priorities from managers' viewpoint were good appearance and suitable encounter.
- e) Test of ranking physical assets mix: The first and second priorities from clients' viewpoint were the position of reception desk and architectural features of the building, while the first and second priorities from managers' viewpoint were the position of reception desk and decoration.

Table 1. Hypothesizes

Hypothesizes	Mean	Value	Z	Significant
Hypothesizes	Managers	Customers	Statistics	Value
1st	201.37	146.68	-3.971	0.000
2nd	192.71	148.34	-3.224	0.001
3rd	214.59	144.14	-5.099	0.000
4th	181.82	150.44	-2.286	0.022
5th	193.07	148.28	-3.247	0.001
6th	147.74	156.99	-0.674	0.480

4. Discussion and Conclusion

Results of statistical analysis confirm the hypotheses of the study. Therefore, different types of services offered by non-governmental job search agencies are not in concordance with viewpoints of their clients. Additionally, the test results in each of the services showed a considerable gap, such that all hypotheses 1 to 6 were confirmed. However, the gaps between existing status and the conditions expected by clients were not identical concerning different job search services.

Findings obtained from analysis of first hypothesis indicate that the use of novel uniform computerized system for providing services is of first priority for clients, but of second priority for managers. To attract the clients, their priorities should be considered and a uniform and continuous connection with other agencies should be formed by equipping the job search agencies, such that the clients will not have to visit other agencies for searching job opportunities. Increase in number of work hours is another service gap and the managers should increase the time of providing services for at least two work shifts so that the clients can get access to their services at different times. Regarding the issue of providing services via internet, some clients do not tend to perform activities related to their employment virtually, or their efforts in internet has not been fruitful and their physical presence can better lead to their employment. In other cases, providing services via internet avoids waste of time and can offer services at every time and place, which prevents unnecessary travels, traffic, and several other problems of attending the place in reality.

Findings of this research are in agreement with those of the study by Nikou (2002) regarding service factor of service marketing mix, as well as those of the study by Kheftan (2002). The results acquired from analysis of the second hypothesis indicate that being the place of job search agencies in general places with easy access is of first priority for clients and third priority for managers. So, the managers should try to establish these centers in places with easy access. Increase in number of job search agencies is the second and fourth priority of clients and managers, respectively, and high number of such

centers decreases the waiting time and results in easy access. Findings of the present research are in concordance with those of the study by Nikou (2002) concerning place factor of service marketing mix, as well as those of the study by Kheftan (2002).

Summary of the results obtained from analysis of third hypothesis shows that giving gift or prize is the first priority of clients. Therefore, the least activity for satisfying this priority is to send the clients short messages (SMS) at their birthday or religious and national celebrations, so that the clients' sense of attachment to job search agencies increases. This also holds in the case of invitation for attending seminars and advertisement via specialized magazines. Findings of the present research agree with those of the study by Nikou (2002) concerning promotion factor of service marketing mix, but not with those of the study by Kheftan (2002).

The results of analyzing the fourth hypothesis show that good appearance of personnel is the first priority of both clients and managers, which indicates its importance since it implies the personnel's interest in work and his/her discipline and hence the clients will observe that the tasks are performed orderly. Experience and expertise of personnel in job search agencies is another priority in clients' opinion since those personnel who have experience in job search and related techniques have appropriate knowledge of job market, so they can continuously analyze job market and find job opportunities.

Findings of the present research are in concordance with those of the study by Nikou (2002) concerning personnel factor of service marketing mix, as well as those of the study by Kheftan (2002).

Regarding the findings obtained from analysis of fifth hypothesis, the position of reception desk is the first priority of clients since it can express the importance of job search for clients. The clients are interested in a building which is appropriate for following their employment tasks, so that they will be interested for future visits.

Findings of the present research are in concordance with those of the study by Nikou (2002) concerning physical assets factor of service marketing mix, as well as those of the study by Kheftan (2002).

Regarding the findings obtained from analysis of sixth hypothesis, interior decoration, architectural features, and buildings are the first to third priorities of clients and managers should pay much attention to priorities of clients for them to be attracted and use the services.

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Therefore, if managers of service-provider organizations pay enough attention to make use of service marketing mix for attracting clients, a considerable change will occur in service-providing jobs. As was explained and confirmed in the present study, its prerequisite is the identification of clients' priorities and considering these priorities.

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The role of soft power in foreign policy of Islamic Republic of Iran

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Abstract: Since the ideological elements entered into Iranian's orientation and guideline, the Islamic revolution of Iran brought Iran's foreign policy to a paradigmatic shift. After this revolution, the secular and west-driven Iran changed into an ideologic and independent player, so that it has defined its orientations, aims, and national benefits in an Islamic ideological framework to a great extent. As far as religion is concerned, Islamic revelation of Iran has a lot in common with many countries in the Middle East, and these common aspects have made Iran more influential among Shiites and Islamic movements. This article intends to study and examine the effect of ideology on foreign policy of Iran and that how this ideology has formed the frame of Iran's foreign policy as a source of soft power. [Ebrahim Anousheh. **The role of soft power in foreign policy of Islamic Republic of Iran.** Journal of American Science 2011;7(7):266-270]. (ISSN: 1545-1003). https://www.americanscience.org.

Keywords: Islamic Republic of Iran; Ideology; Shiism; Middle East; Soft power

1. Introduction

Ideology can be defined as the most important and influential element of soft power in Islamic Republic of Iran. As Nye (1990) puts in, soft power in the ability to achieve what you want by attraction, not by reward or compulsion. Because soft power is based on the ability to form others desires and preferences, it uses intangible subjects, such as personality and cultural attractions, political and institutional, as well as appealing policies that are legitimate and have ethical values (Nye, 2004/50).

Middle East offers a textbook example of Iran's direct and indirect impact on Muslim policies. Just as David A. Long mentions the reflection of Iran revolution on Saudi Arabia and other Arabic countries, many in the Western region and capitals, and the thoughts of the Persian Gulf Conservative kingdoms, and would end up in desolation.

Good news about the Persian Gulf could be reported (Sposito/2003/83).

The role of Islamic Republic of Iran in the Middle East changes is an obvious and undeniable reality. Traditionally, Iran has been the master of soft power in the Middle East, and is able to use the means of culture and policy to pursue its strategic benefits. Iraq is a small example that shows how Iran interacts with its neighbors. Iran is active in southern Shiite and northern Kurd communities, and generally has a great impact on Iraq (www.chathamhouse.com).

Further, mentioning the aspects of Iran's soft power in the Middle East, we can refer to the influence of Iran on Hezbollah, and the fact that Hezbollah is called as Iran's poster child. Along with Hezbollah, there are many other radical Palestinian groups that are closely connected to Iran. Besides all those we can mention, Iran's contributions to Shiites is important. Speaking of Iran's role in the Middle East, some even talk about the issue of Shiite

crescent and that how Iran is intending to establish a new order in the Middle East to achieve its goal in this way.

2. Ideology and the foreign policy of Islamic Republic of Iran

After establishment of the Islamic regime in Iran, foreign policy of the country affected by Islam as the basis of the system, and as a result the foreign policy underwent a drastic change compared to the past. Rashed Al. Ghonoushi, a Tunisian thinker, had made a comment before the victory of Islamic Republic of Iran:

Apparently, the strong base of Islamic Revolution of Iran is shiitism, but this revolution is connected to a global current whose purpose is to rise the Islamic spirit of nations and guide them to the stage of leading global civilization (Hadi Nakhei, 1997, page 281).

To have a better understanding of the ideology in foreign Policy of Islamic Republic of Iran, we had better get familiar with the characteristics of Islamic Republic of Iran. The second tenet of the Islamic Republic of Iran's constitution reads:

Islamic Republic is a system based on believing in:

- 1- The only God, allocation of sovereignty to him and necessity of submission to his commands.
- 2- Divine revelation and its constructive role on human evolution towards God.
- 3- Future life and its constructive effect on human's evolution towards God.
- 4- Divine justice in creation and religion.
- 5- Continual leadership and its fundamental role in durability of the Islamic Revolution.
- 6- Human greatness and value, and his freedom associated with his responsibility towards God.

Islamic worldview is the basis of Islamic ideology. Worldview is the human's view to the world, environment, and himself.

In his book, entitled "Iran's revolution and its global reflection", Sposito defines ideological elements of Iranian foreign policy as:

- 1- Further emphasis on Islam as an impeccable life style.
- 2- Believing in the fact that acceptance of the secular and western role-model segregation of religion and government is the source of economical, social, political and military problems.
- 3- Firm belief in the fact that regaining Muslim's power and success requires returning to Islam and divine sovereignty instead of western and Russian capitalism inspired by Marxism and Socialism.
- 4- Reintroduction of Islamic jurisprudence as an Islamic plan for an ideal society consisting of fain and moral pious men.
- 5- Willingness to jihad (holy war) against all injustice and dishonesty, even if it demands bearing difficulties or suffering martyrdom for God (Sposito, 2003, 49).

Therefore, we can acknowledge that considering the place and the role of ideology in Islamic Republic of Iran, this factor can account for many Iranian foreign policy tendencies.

Table 1

1 abic 1				
Country	Populatio n	Entire	Shiites	
Country	%	Population	Population	
	70	(Million)	(Million)	
Iran	90	7.68	8.61	
Pakistan	20	8.165	2.33	
Iraq	65	8.26	4.17	
India	1	4.1095	11	
Azerbaijan	75	8	6	
Afghanistan	19	31	9.5	
Saudi	10	27	7.2	
Arabia	10	21	1.2	
Lebanon	45	9.3	7.1	
Kuwait	30	4.2	0.00073	
Bahrain	75	0.7	0.00073	
UAE	6	6.2	0.00016	
Qatar	16	0.89	0.00014	

3. Results

One of the aims of foreign policy of Islamic republic of Iran is to propagate revolution, and its source, which is laid in Iranian governors' ideological views. Revolution propagation can be searched in Ayatollah Khomeini's religious interpretations, and his ideologies (Sposito, 2003, 17).

Richard Katem said: Imam Khomeini can be considered as a real pious man who has no campaign, and is proud of having Ideology (Bary Rozen. 2000, 15).

Professor Ramezani explained about revolution: As the US and The USSR have fallen back on development of revolution aims for some reasons; Iran had also been trying to guarantee the world for Islam (Sposito, 2003, 20).

Ideological impact on foreign policy of Islamic Republic of Iran and its beat aspect can be studied in the policy of Iran's support for revolution propagation. Iranian help to some Islamic and Shiite movements which has caused some disorders and riots in some countries especially those in the Middle East originates from this ideological view of Iran in foreign policy. Imam Khomeini says: we should propagate our revolution to the world as quickly as possible, and put aside the illusions of disability for propagation because there is no difference between Islamic countries, and as we are supporters of deprived people, we cannot confine ourselves to a limited area. We should show the superpowers that we confront the world with beliefs.

4. Ideology and the soft power of Iran

Ideology, as one of the tools of Iranian power in the Middle East consists of several elements such as martyrdom, jihad anticipation of the 12th Imam, interpretation of divine law, guardianship and dissimulation.

In Ayatollah Motahari's point of view, martyrdom has a magnificent power in Islam. If someone is aware of Islamic concepts, they will see the aura of light surrounding these words, and in Islam's opinion, the martyr is one who has achieved the greatest degrees and positions a human being can achieve (Samih Farson, 2008, p121).

Marvin Zonis says: Imam Hussein sacrificed him and his comrades' life in the 7th century to rule Shiite sovereignty to all Muslims and Ayatollah Khomeini has revived the idea of sacrifice and martyrdom to materialize Islamic aims. Martyrdom was the best and most honorable way to define their beliefs. Attack on the enemy showed their boldness and courage, not disappointment and violence or terrorism (Robin write, 1993, 26).

Promotion of martyrdom culture began from the very first days of revolution, and Imam Khomeini says: our nation has turned from weakness into strength, and wishes martyrdom. Such a nation has no fears (Naghib Zadeh, 2002, 227).

The word jihad means effort in Arabic which got a vast deep meaning during the centuries and is now, known as fight against cruelty and injustice. This fighting is encouraged in Koran, because anyone who

believes in god must fight for his approval. This is a duty for a real Muslim because he can have a clear conscience only in a free land (Robin write, 1993, 28). Many cases are mentioned in Koran about jihad. Verse 19, in Baqarah surah says that: Fight for God's sake against those who fight you, but do not invade their lands. War for God is the highest degree of Islam, and is the most important and valuable work which leads to God's intimacy.

Anticipation, which is neving have and stability, and believing in appearance of the last Imam, has made Shiites more stable and had saved them from all dangers. This belief has been the real cause of shiites survival (www.montazar.net).

Verse 3b, in Nahl surah, says that fighting against cruelty and supporting deprived people has been one of the main aims of prophets (Sedghi/2007/55). Imam Hussein's rise is an ultimate symbol of fighting against cruelty and injustice in shiites culture and ideology.

Imam Khomeini says: we hate cruelty even against one single person and you (God) know that we have risen just to bring justice and offer it to deprived people. We support those who are oppressed by any means, and Palestinians are oppressed, too (Naghib Zadeh, 2002/225).

Islamic ideology, especially Shiite ideology does not confine life to this world and believes that real prosperity is something beyond this materialistic world. It does not look at death as the end of life, rather the beginning of a new life. So, losing properties and above all, fear of death is not reasonable at all.

In fighting cruelty and injustice, an Islamic society is seeking for fulfilling of and completing its responsibilities more than victory. A Muslim, winner or loser, is considered winner due to completing his duties. Moreover, anyone who thinks of duty fulfillment and achieving god's satisfaction, bear all troubles and difficulties, and is not disappointed by failure. Imam Khomeini says: we are supposed to fulfill our duty not caring about the result (Manuchehr Mohamadi, 2008).

5. Iran and Shiism

Iran was conquered in the first century after hegira, but it was in the second century after hegira that Shiism entered Iran. Shiism first appeared in late 2nd and 3rd century, when Iran was ruled by Abbasids and Imam Reza was staying in Khorasan. Then, Shiism was developed in Al-e Bouye's reign, and finally accepted as the official religion in Safavid's time. Shah Esmail let religious men in the government.

During Shah Tahmasb's reign, religious clerics were promoted to important positions like judge, and at last in Shah Abbas reign some of them could serve Shiites throughout the government. On the whole, Safavids period was the period of Shiites blossom and power (Hoseinian, 2001/171). Rey and Qom are mentioned as Shiite centers in Iran.

Shiites are scattered in many countries in the Middle East. They are in majority in some countries like Iran, Iraq, and Bahrain, and in the minority in some countries such as Qatar, Saudi Arabia and UAE. Shiites are totally powerful in some countries, like Iran and Iraq after Saddam's fall but they have no power in many countries in the Middle East. Considering the importance of ideology in foreign policy of Islamic Republic of Iran, many of these powerless Muslims in several countries are supported by Iran.

Graham Fuller defines Shiite geopolitics and Iranian's effort to become the political center in the world after revolution.

Walter Posh considers that Iran is demanding too much, which is caused by Shiite geopolitics. Shiite crescent came into existence after Lebanon crisis in 2006, and consists of a geopolitical crescent starting from Iran, covers Iraq and Syria, and ends in Lebanese Hezbollah and Palestinian Hamas. (Hojtahed Zadeh, 2007, 67).

Shiites significance in the region is due to their geopolitics and geostrategic status in the Middle East. In fact, Shiite's geographical status and geopolitics in the Middle East forms a political and economical belt in the region, since shiites are situated in the center of the biggest and richest part of the Middle East. The region contains 75% of the whole world's oil resources and Shiites in Iran, Iraq, and Azerbaijan have access to 30% of the resource. If we add Shiites in Saudi Arabia, it will sum up to 50%. So, Arab Shiites and Iranians can take control of almost all oil supplies in the Middle East and Iran, with the majority of 90% Shiites (65 million), is the heartland of Shiite geopolitics.

Thus, Shiite crescent or Shiite geopolitics is a region which starts from Iran, and after passing Iraq and Syria, gets to the south of Lebanon and Palestine and includes Iran, Iraq and Syria government, and Lebanese Shiites known as Hezbollah movement (Javadani Moghadam , Gohari Moghadam, 2008, 145).

Undoubtedly, Shiism is the main cause of unity between Iran and Iraq. Before having Shiism as the official religion in Iran, Iraq was the locus of Shiite propagation, and Najaf had the main role in educating religious men. The role gradually shifted to Iran by establishment of religious school in Qom, Iran.

Today, both Najaf and Qom play a fundamental role in Shiite faith. Important religious characters such Ayatollah Sadr, Ayatollah Hakim, and Ayatollah Sistani played an important role in the union of the two countries. Ayatollah Sadr and Ayatollah Khomeini shared opinions of religion and guardianship. So, some authors believe the guardianship theory to be proposed by both. It was during the Islamic revolution when Ayatollah Sadr announced his support of Ayatollah Khomeini.

Ayatollah Mohammad Baqer Hakim was born in Najaf, but lived in Iran for 23 years fearing from Iraq's government. Ayatollah Hakim who was the boss of Shiite house had close relations with Iran sovereignty and was the link road between Shiites in Iran and Iraq. Also, Ayatollah Sistani, originally from Iran, is the first guide of Shiites in Iraq, and has very close relations with Iranian leaders.

So, it can be noted that Iran has had a noticeable influence on Iraq because of Iraqi Shiite characters during Saddam's reign. The influence has increased after Saddam's fall. In this case, Iran's role in renovation of Iraq and providing security can be pointed out.

After 2003, Iran played a constructive role in Iraq. Iran was the first country in the region which sent an official representative to negotiate with Iraq's ruling council (Nasr 2006). Islamic Republic of Iran has had an essential role in the formation of new Iraq so far. For instance, Iran had official recognized all political changes in Iraq in the last 4 years including public election and ratification of constitution (Barzegar, 2006, 43).

Involvement of Shiite elements in Iraq's policy and power had ended in reinforcement of Iran's role not only in Iraq changes, but also in the whole region of Arab world, especially Lebanon (Barzegar, 2009).

In order to limit Iran's influence on Arab world particularly Iraq, U.S.A is supporting those Arab sovereignties opposed to Iran. To fulfill this aim, Washington is trying to strengthen the military power of the Persian Gulf countries. Nicole Berter states that one basic aim of selling weapons to the Persian Gulf countries is strengthening their defensive force, and creating a detergent against Iran's ambitions in the future (Nasr and Takeyh, 2008).

Close relations between Iran and Lebanon (Shiites) started when Iran accepted Shiism as the official religion in Safavid period, and Iran's relations with Lebanese shiites was developed in two aspects. First, Safavid government invited all Shiite clerics around the world to propagate this new faith over Safavid's territory, second Lebanese Shiites were in bad conditions in competition between Iranian Shiites and Ottoman Sunnis, and headed to Iran under Ottoman pressure. So, the relations between Iranians and Lebanese developed.

Lebanese Shiite's are the largest and the first Shiite sectarian community in the Arab world. When

keeping an eye catching political power is considered, the most important reason is of course Imam Mousa Sadr's role (Fuller and Franke, 2005, 398).

Apart from Imam Mousa Sadr, who was born and educated in Iran, there were other people who were educated in Iran, including Hosein Mousavi, the leader of the Amal Movement. He was particularly supported by Mustafa Chamran, defense minister of Iran, and set up the "Amol Movement" with Tehran's assistance. In a few months, another group of warriors joined the region's Shiite clerics and established another organization called "Hezbollah" (Robin write, 2000, 63).

Outward and inward pliability of Hezbollah from Iran was the reason to consider it as an Iranian party in the world (Asadollahi, 2003, 171).

The main characteristic of Hezbollah is acceptance of Imam Khomeini's guardianship and leadership theory. Iran has always supported Hezbollah with its political, military, spiritual, and material help. For example, the 33-day-war between Hezbollah and Israel in summer 2006 increased Iran's role in Lebanon and the whole region in strategic terms.

Following the victory of the Islamic revolution, Iran entered into the Palestinian's combats. Even before the victory of revolution, Imam Khomeini said: "we are on oppressed people's side, no matter whom or where they are, and Palestinians are oppressed. Israel is oppressing them, so we support them." (Vehayati, 2007, 25).

During the first years of the revolution, Iran opposed to Israel and was supportive of Palestinians (SAF). Iran used to know SAF as the representative of Palestine and Palestinian groups purposes. But later after SAF's reconciliatory policies and its support of Saddam made Iran reconsiders its approach toward SAF.

In late 1995, Iran established its relations with Hamas, which was limited and pale, but got stronger after 1992. In 1999 (10 December), Palestinian leaders arranged a meeting with Iranians and appreciated Iran's financial contribution support against Israel. Some has announced Iran's contributions to be as much as 30 million dollars per year. These were of course apart from military help, such as sending weapons and military trainings.

Even after the victory of Hamas in 2006 election, which had followed international sanctions, it was reported that Iran is ready to pay 120 million dollars to Hamas, when following his victory in elections Khalid Mashaal in a meeting had stipulated Iranian leaders that they have a special plan to develop a radical Islam (Warmser, www.hudson.org). Some analysts believe that Iran looks at Hamas as a profit in its regional ambitiousness. Therefore, the purpose

of Iran's help must be analyzed considering this aspect.

6. Conclusion

Ideology in foreign policy of Islamic republic of Iran acts as a source of soft power in the Middle East. A soft power which has managed to increase the influence of Iran on many countries highlights the role of Iran in geopolitical dynamic. It is within such framework that Iran's actions have influenced the region and such deeds have disrupted the current order in many cases. Although even the boundaries between soft and hard power have been violated by this process, and the soft power has changed into hard power due to some contributions to others, something that is obvious is the importance of ideology in Iranians behavior and that they are following their aims and benefits based on this ideology.

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Comparing the behavior of reinforced HSC beams with AFRP bars and confined HSC beams with AFRP sheets under bending

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Abstract: By increasing the use of FRP composites in civil engineering, they seem highly essential to be studied. The purpose of the study is comparison of the behavior of AFRP reinforced HSC beams (reinforced with AFRP bars) and steel reinforced HSC beams which confined with AFRP sheets under bending. Eighteen beams have been modeled with ANSYS. Three beams are HSC which reinforced with AFRP bars. After modeling, the results have been compared with experimental results and then software has been calibrated. Then twelve steel reinforced HSC beams which confined with AFRP sheets (with different number of laminates) have been modeled. In addition three simple steel reinforced HSC beams have been modeled as the base of comparison. At the end behavior of aforementioned beams has been compared and corresponding graphs have been sketched.

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Keywords: HSC beams; AFRP bars; bending; modeling; ANSYS

1. Introduction

Fiber-reinforced polymers (FRP) are using in the form of sheets or laminates to confinement and bars to reinforcement the concrete members. In both they have some advantages to steel jackets and steel bars. Steel is an isotropic material and its modulus of elasticity is high, thus the steel jackets stand the great part of axial forces which lead to buckling of steel. On the other hand Poisson ratio of steel is greater then concrete, thus the two materials act separately. Corrosion and hard performance are the other problems of steel jackets (Hoseini et al., 2004). Although using the FRP bars as the main reinforcement isn't common yet, it seems they will play an important role as a main reinforcement soon. Fiber-reinforcement polymers (FRP) in the form of bars or sheets, usually made from one of the three basic types of fibers such as Aramid (AFRP), Carbon (CFRP), and glass (GFRP), represent one of the most promising new developments in the area of structural concrete. High strength, but lightweight fibers encapsulated in a polymer matrix possess noncorrosive, non-conducting, and nonmagnetic purpose structures. The non-corroding characteristics of FRP reinforcement could also significantly increase the service life of ordinary concrete structures (Vatani, 2004, Rashid, 2005). In the case of flexure, the very high strength FRP bars, which exhibit elastic response up to failure, could perhaps be effectively used in combination with high strength concrete (HSC). However the majority of reported research works (Cosenza et al., 1997, Toutanji et al., 2000) dealt only with normal strength concrete (fc 41MPa), while some other (Benmokrane et al.,1996, Masmoudi et al.,1998, Grace et al.,1998) considered concrete with maximum compressive strength (fc) of up to 70 Mpa. Only Theriault and Benmokrane (1998) used concrete with (fc) as high as 100 Mpa. Some other researchers worked on the effect of confinement of RC beams (Dathinh et al., 2004). In this study behavior of HSC beams reinforced and confined with AFRP under bending have been compared. ANSYS 9 has been used for modeling the beams.

2. Modeling with ANSYS

ANSYS is suitable software for nonlinear analysis. Designing with ANSYS has three parts; preprocessor, solution, and postprocessor (Jamshidi et al., 2005). Between more than 100 elements exist in the software, concrete 65; link 8 and solid layer 45 have been used for modeling of concrete, bars or stirrups and sheets respectively (Fig. 1) (Zareinezhad et al.).

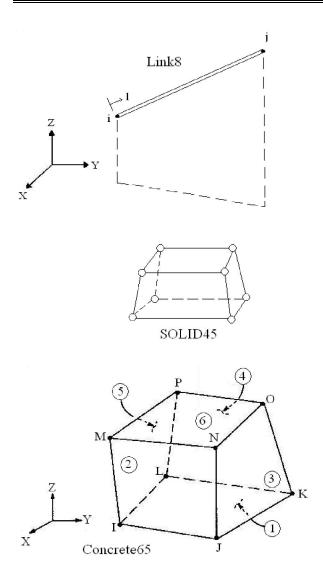


Figure 1: Used elements 18 HSC beams all 3 meters length (Fig. 2) have been modeled.

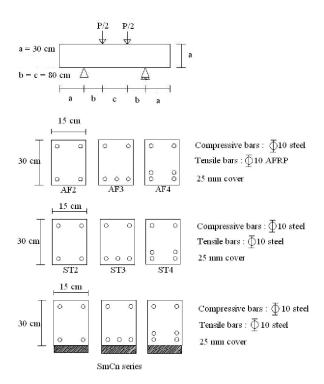


Figure 2: Modeled beams

Three beams are in first group AF2, AF3, and AF4. In these beams tensile bars are AFRP bars but compressive ones are steel because compressive strength of AFRP is less than 20% of its tensile strength. The number in the names determines the number of tensile bars. As supplied by manufacturer the tensile strength and the modulus of elasticity of AFRP bars are 1760 Mpa and 53 Gpa, respectively. Second group has three beams too; ST2, ST3, and ST4. They have steel tensile bars and the number in the names determines the number of tensile bars. This group is the base group and the other groups' beams have been compared with these beams. Tensile strength and modulus of elasticity of steel are 533 Mpa and 2.1×105 Mpa respectively.

The last group has twelve beams which have steel tensile bars and AFRP sheet(s) attached at the bottom of the beams. The tensile strength and modulus of elasticity of AFRP sheets are 2900 Mpa and 120 Gpa respectively. The third group name is SmCn. S and C imply Steel and Confine and m and n are two numbers that determine number of tensile bars and number of AFRP sheet layers respectively. All layers of AFRP have 0.3 mm thickness. All the compressive bars are steel. 26 steel stirrups have been distributed monotonously along the beams. Compressive strength of concrete (f'c) has been considered 84.5 Mpa in all beams. More details are shown in Figure 2. Before modeling of main beams, two experimental results of beams compared with ANSYS results. It can help to check the software. AF-control beam is a

represent of first group. It has AFRP bars as tensile bars and its experimental results have been shown by Rashid et al. (2005) (DF3T1).

Figure 3 compares the results of experimental and modeling beams. After the formation of great cracks, the software couldn't converge the equations and couldn't continue up to complete failure.

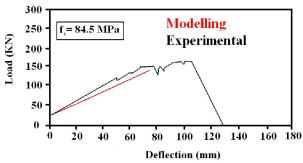


Figure 3: AF control beam

STC-control beam is a represent of third group. It has steel tensile bars and a layer of FRP attached at the bottom. Its experimental results have been shown by Sadr Momtazi et al. (2006) (G1). Figure 4 compares the results of experimental and modeling beams.

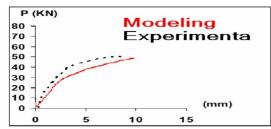


Figure 4: STC control beam

3. Comparing the behavior of beams

HSC beams which reinforced with AFRP exhibit elastic response up to failure. Figure 5 compares the response of AF2, AF3, and AF4 (First group).

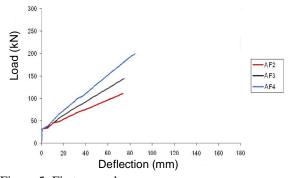


Figure 5: First group beams

HSC beams which reinforced with STEEL exhibit nonlinear behavior after yielding. Figure 6 compares the response of ST2, ST3, and ST4 (second group).

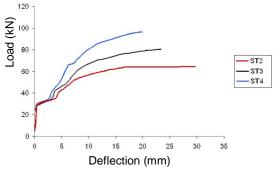


Figure 6: Second group beams

Comparing the behavior of third group beams is shown in figures 7, 8, 9, 10 which show third beams with one, two, three and four AFRP covering layers respectively.

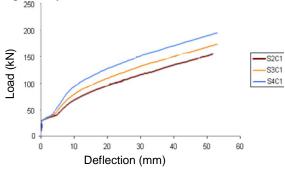


Figure 7: Third group with one layer

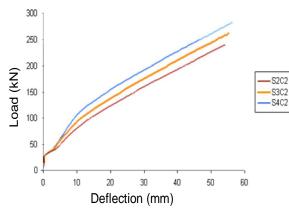


Figure 8: Third group with two layers

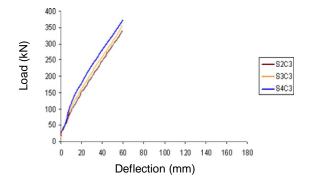


Figure 9: Third group with three layers

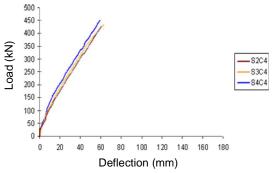


Figure 10: Third group with four layers Figure 11, 12 and 13 show the comparing of beams with 2, 3 and 4 tensile bars respectively.

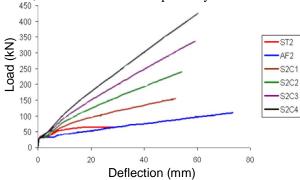


Figure 11: Beams with two tensile bars

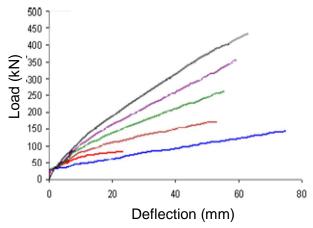


Figure 12: Beams with three tensile bars

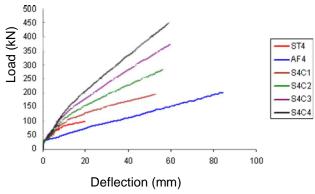


Figure 13: Beams with four tensile bars

4. Conclusions

- T1. Beams reinforced with AFRP bars (first group) have linear behavior up to failure. Their fracture is in brittle manner that can be a disadvantage but They have large deflection before failure which can be a caution.
- 2. maximum deflection in HSC beams covered or reinforced with AFRP is higher than HSC beams reinforced with steel bars. Furthermore increase the number of bars. Furthermore increasing the number of tensile bars increases the Maximum deflection tensile bars increases the Maximum deflection of AFRP reinforced and covered beams (first and third groups) but decreases it in steel reinforced beams second group).
- 3. Failure force of AFRP reinforced and covered HSC beams are much higher than steel reinforced. Effect of tensile bars increasing on failure force in AFRP reinforced HSC beams is higher than AFRP covered and steel reinforced ones, furthermore it would be increased by increasing the number of tensile bars in first group and be decreased by increasing the number of bars in second and third groups.
- 4. Failure force in AFRP reinforced HSC beams is less than even one layer AFRP covered HSC beams.
- 5. Failure forces in third group are higher than first group and in all cases their maximum deflections are less than first group. Furthermore in third group effect of tensile bars increasing on failure force is less than the other groups. The mentioned effect become less and less when the number of AFRP layers increased because higher amounts of load are bearing by AFRP covers and number of tensile bars has less effect.
- 6. HSC beams with AFRP covers (third group) have higher ductility than uncovered beams (second group). Ductility factor (μ) increases by increasing the number of AFRP covers.

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Environmental Factors in Iranian Architecture

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Abstract: Evolution of architecture is influenced by many external factors including environmental, ethnical, demographical, cultural, and religious factors. Among these, we consider environmental factor as the most active and powerful factor considering its objectivity and remaining constant. This article deals with the environmental conditions of Iran by zoning its territory and considering that the traditional principles in Iranian architecture and urbanism is directly connected with the country's nature, as well as regional characteristics of individual regions. Moreover, problems of construction design zoning, and also traditional designs and materials in architecture of civil buildings depending on climatic, seismic, wind conditions and other objective factors are discussed. Predominant influence of the spiritual Islamic culture on traditions of Iranian architecture is addressed. The author concludes that the coincident use of modern Iranian architecture, just like other countries, and the traditional principles and the forms is not anachronism, and the organic continuity of architecture development is historically justified, functionally useful, and compositionally effective. Naturally, this provision does not preclude the active search for improvement of these guidelines and forms, while maintaining their unity with the natural and climatic conditions. [Journal of American Science 2011;7(6):-]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Climate and environment of Iran; Construction design zone; Traditional architecture

1. Introduction

In today's world, the idea of organic architecture has become increasingly popular. Numerous lectures have been presented and many famous architects proudly identify themselves as adherents of this trend. The essence of organic architecture from its very definition is most appropriate according to the architectural forms of social processes, just as the forms of living organisms, plants or animals that are most suited to the life of these organisms in a particular environment. Broad prospects are in view considering shifting the foundations of wildlife in the building structure, organic form, and principles of operation of an architectural practice. However, there is a fundamental difference between architecture and natural forms (William et al, 2007).

Wildlife is a self-organizing system that has no other purpose than to maintain the constancy of life. The entire course of evolution ever confirmed that it is perfect and best fulfills its mission. Architecture is the inanimate nature. Buildings that are created by a human being can be tailored to serve its specific needs, in particular, protection from adverse influences of nature and society. Nevertheless, depending on many factors, these structures are not always prove successful, and are often ambiguous and sometimes just wrong for the purpose (Moradchelleh, 2008).

Traditional architecture is an area in which the most viable forms and objects of architectural activity have arisen, tested, and approved by seeking harmony with the natural environment and the

internal content. Operating factors in traditional architecture are similar to factors of natural evolution in terms of its time period, the desire to achieve the greatest effect by the lowest means, the continuity of the most successful solutions, and no sharp qualitative leaps. Traditional architecture accumulates many centuries of experience in use and creation of architectural forms in the local environment from local materials, and thus from generation to generation synthesizes optimal functional home and design schemes and systems. The above-stated issue gives grounds to assert that now it is still relevant to carry out further in-depth study of the objective foundations of the traditions of architectural shaping of all aspects of architectural design and their successful use in modern architecture

2. Environmental conditions of Iran

For centuries, traditional housing architecture of Iran protected its people from the harsh climate. Much of Iran is situated in the tropical continental climatic zone. Average July temperature is +29.5°C, but occasionally reaches +40°C - 50°C in day time. Rainfall does not exceed 200-400mm per year, except in the Persian Gulf coast (Alijani, 2002; Kasmai et al, 2003; Tavassoli, 2002). Occasional incursions of cold masses from north are accompanied by temperature decrease, strong winds, and dust storms mainly under clear skies. Given the high volatility in excess of the amount of precipitation in 10-15 times, it becomes clear how serious the issue of lack of moisture is.

The desert climate of the Iranian Plateau is characterized by an extreme continental pattern, i.e., sharp daily and annual variations in temperature, and low humidity and low rainfall. Summer is without rains and hot, and lasts about four months - from May to August. The warm weather is accompanied by persistent dry hot winds. The average temperature is about +30°C in summer months and about -2°C in winter months. Relative humidity is low, especially in summer times. Agriculture is possible only with the use of artificial irrigation.

Nature and climate of Iran are significantly varied. Considering the temperature and precipitation, Iran can be divided into six environmental zones (EZ), conventional boundaries of which are related to geographical location, topography and landscape (Fig. 1):

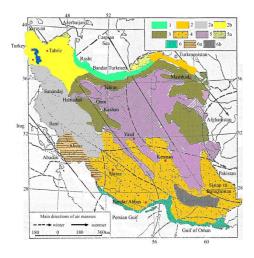


Fig 1: Principal environmental zones of Iran (1 - zone of humid subtropical climate of southern Caspian shores, 2 - zone of mountain subtropical climate of Kopet-Dagh, 2a - zone of mountain subtropical climate of south-western Iran, 2b - zone of mountain subtropical climate of north-western Iran, 3 – zone of mountain semi-arid climate of northern and eastern Iran, 4 - zone of mountain arid subtropical climate of southern Iran, 5 - zone of climate of subtropical deserts of Iranian plateau, 5a - zone of climate of subtropical deserts of Gorgan-Atrek valley, 6 - zone of climate of southern tropical deserts of the shores of Persian Gulf and Gulf of Oman, 6a - zone of climate of southern tropical deserts of Karun valley, 6b zone of climate of southern tropical deserts of Jezmurian valley).

- Zone of damp subtropical climate (EZ-I);
- Zone of mountain subtropical climate (EZ-II);

- Zone of mountain semi-arid climate (EZ-III);
- Zone of mountain arid subtropical climate (EZ-IV);
- Zone of subtropical desert climate (EZ-V);
- Zone of southern tropical desert climate (EZ-VI) (Alijani, 2002; Kasmai et al, 2003).

Zone 1(EZ-1): A characteristic feature of the damp subtropical climate of the southern coast of the Caspian Sea (Gilan, Mazandaran, Gorgan) is the large annual rainfall (over 500 mm) in the northern slopes of Elburz and in the Southern Caspian lowland (Talsheskie Mountains - from 500 to 800 mm) with an annual average temperature +8°C. In the mountainous area, 2000m or more above sea level, precipitation does not ensure the development of forest vegetation, so the upper belt of Elburz Mountain range is treeless. The western part of the area is saturated with moisture stronger than the eastern one. Maximum precipitation falls during the autumn, and the least in the summer. Temperature of the zone is favorable for development of agriculture and the general infrastructure of civil buildings locates in rural settlements. The average annual temperature hovers around +16°C. Maximum temperatures in summer reach +40°C.

Sometimes droughts take place, so irrigation is needed especially in Eastern part of the Caspian shore. Considering the difficulty in bearing warmth and high levels of humidity, climate of this zone is hard to live in for the human. Climate of mountain districts is much softer. Crops are harvested twice a year and during the cool winter, plants of temperate latitudes are grown (Alijani, 2002; Kasmai et al, 2003).

Zone II (EZ-II): Formation of mountain-steppe and mountain-forest subtropical climate of western Iran (Lorestan and Iranian Azerbaijan) is associated with the presence of mountain ranges and the influence of Atlantic air masses that bring precipitation in the winter-spring period. As a result, western and northwestern regions of Iran are moistened considerably stronger than the central and eastern parts. Annual precipitation here is 500-600mm. summer and winter average temperatures reach +25°C and -1°C, respectively. Summers are hot and dry. As in any mountainous area, there are three vertical climatic zones

- The alpine zone is located 2000m above sea level. The climate is dry and cool. Autumn, winter and spring are relatively rainy, while summer is almost cloudless.
- Mid-belt forests of mountain slopes, valleys, and hollows. Winter is relatively mild and snow melts fast. Summer is hot and almost with no rains. The climate of mountain valleys lying at an altitude of

1200-2000m above sea level is characterized by very dry and hot summers. In the middle mountain belt of Lorestan, there are individual areas of mixed forests, thickets of pistachios, pomegranate, and figs trees.

- Foothill lower semi-desert belt is drier and very hot. It lies below the forest and is characterized by abundant winter rains, with no snowfall. Summer is dry with no rain, so all the vegetation fade. Vegetation only begins in October after the first rains.

Zone III (EZ-III): The zone covers mountainous semi-desert climate mountain ranges of northern and eastern Iran, bordering the desert of Dasht-e-Kavir. The climate of dry mountains of this part of Iran has a distinctly continental character with large amplitudes of diurnal and annual temperatures, dry and cold winters, and the classical alternation of seasons. Semi-mountainous desert area of Iran includes extensive uplands, where depending on the topography, climate is strongly differentiated. The inter-mountain valleys and foothills in the Iraqi highlands have a climate milder than the upper belt of mountains.

In the mountain valleys of northern and eastern Iran, spring begins in late March and lasts until early May, when grass cover fades. Hot and very dry summer lasts from May to September. Maximum temperature reaches +43°C. The average temperature of the hottest months is + 24.8°C. Winter starts in December with rains and sometimes with snow. Snow melts fast in the mountain valleys, but it remains until spring in mountains and closes the passes. At an altitude of about 1500m above sea level, the average temperatures in January is close to 0°C, and frequently reach minus 25-30°C. The characteristic features of semi-desert mountains of northern Iran are its dryness and annual rainfall 200-300mm, mostly in the spring (Alijani, 2002; Kasmai et al. 2003: Tavassoli. 2002).

Zone IV (EZ-IV): The Zone of mountain arid subtropical climate includes mountain and foothill areas bordering the Dasht-e-Lut Desert at the south and the mountains of central and southern Iran, including Mekran Mountain. The northern areas of this region have a more severe winter than the southern parts (Baft, Bam, Shiraz, Behramabad, and Mekran).

In the northern districts, lemon and orange trees are cultivated and in southern districts, date-palms can be found. In general, the climate of this zone is hot, arid continental climate similar to the southern Turkmenistan. The average annual temperature in the foothills is about +17°C. The annual rainfall is over 1100mm. Maximum precipitation falls in winterspring period. Precipitation is greater in the western districts of the zone. Winters are mild, occasionally

there are frosts (minus10-11°C), and average January temperature is considerably above zero. Snow in the foothill areas is rare and melts fast. Spring begins in March, in southern areas - in late February. Summer comes in April. It is very hot, with maximum temperature +45°C.

In the districts, closest to deserts, sandstorms are usual.

Zone V (EZ-V): This zone includes all desert plains of Iranian Plateau including Dasht-e-Kavir, Dasht-e-Lut, Sistan and the surrounding desert valleys Gavhane, Shurab and others. Desert climate of the Iranian Plateau is characterized by extreme continental pattern (abrupt diurnal and annual variations in temperature, low humidity, and low rainfall). Summers are hot and without rain and lasts for about four months. Average temperature of summer months is about +30°C. Autumn is dry and warm and the winter is very wet with precipitation. In winter months, the average temperature is about minus 2°C, and rainfall is less than 250mm. Maximum rainfalls occur in the winter-spring period and the least in summer. The vegetation in this area is rather scarce.

The arid subtropical climate of Gorgan-Atrek lowlands is characterized by mild winters; with temperatures not lower than 10°C. Summers are hot and dry (+43°C in the shade). Autumn is also dry and without rains (Alijani, 2002; Kasmai et al, 2003).

Zone VI (EZ-VI): This zone extends along the coast of the Persian Gulf and the Gulf of Oman in a narrow strip, almost from the lower reaches of the river Shatt al-Arab in the west to the borders with Pakistan in the east. The climate of the coasts of the Gulf of Oman and the Persian Gulf is tropical and the climate of Jaz Murian basin is transitional from tropical to subtropical climate. The climatic features of the Persian Gulf and the Gulf of Oman are developed by considerable protection from the cold masses formed in the interior of Asia in winter. Based on the special climatic conditions and proximity to water, this area may well be regarded as a promising tourist area of Iran (Alijani, 2002; Kasmai et al, 2003).

Four basic modes of weather can be recognized on the coast of the Persian Gulf and the Gulf of Oman:

- Winter anticyclone regime, which is characterized by a small cloudiness and a predominance of relatively cold north-westerly winds.
- Winter cyclonic regime caused by cyclones and coming from the west, which is characterized by a change of cold northwest winds by warm winds, increased cloud cover, frequent fogs and drizzling rains, and the appearance of thunder squalls.
- Transient regime comes at a time from September to November and from March to May and represents

a gradual shift of summer-type weather to winter, and vice versa.

- Summer type weather prevails from June to August and is characterized by exceptionally low rainfall, insignificant cloudiness, and high temperatures of air. The coast is characterized by irregular rainfall seasons: winter (rainy season) and summer (dry season), the transitions between which are weakly significant. Average June temperature is up to +33°C and the maximum reaches +48°C. The temperature in winter on the coast is about +10°C (Alijani, 2002; Kasmai et al, 2003; Tavassoli, 2002).

Speaking of the active natural factors shaping architectural form/design/.... you cannot ignore those called seismic factors. The territory of Iran belongs to the Mediterranean belt of seismic activity of the Earth, which accounts for more than 50% of earthquakes through the world. The Iranian plateau may be described as a zone of active faults, and some regions are vulnerable to devastating earthquakes. Data on earthquakes of Iran show that the greatest activity is concentrated along the Zagros fold belt traction, and smaller activity is observed in central and eastern Iran. Considering the number, borders of the zones vary in different sources, and are based on the analysis of seismic history, mobile hub for the past few decades, the tectonic environments, active faults, regional geomorphology, as well as plate boundaries (Zomorshidi, 1994).

3. Traditional means of architectural microclimate optimization

Main parameters and features of the natural environment of Iran in general, and its individual regions determine the lifestyle of the population. Moreover, in the final analysis, it is to a great extent the centuries-old human exposure to these special environmental conditions determined the anthropometry and the very nature of the indigenous peoples of Iran.

Climatic factors - gelioclimate (streams of sunlight and heat treatment) and air movement (wind flows and precipitation patterns) provide the greatest influences on shaping of the architectural formbuilding. These factors largely determine the logic of buildings' three-dimensional solutions, especially the residential parts, their premises, exterior wall coverings, fences, and roofs.

The impact of the earthquakes (landslides, avalanches, floods, mudslides, tsunamis, etc.) should also be taken into account when designing buildings, structures and systems to be developed in seismic areas. Considering seismic factors is including the effect of these factors in the project-estimated documentation and carrying out follow-up projects of special events ensuring the seismic resistance of

buildings and structures to see if the probable seismic effects have a significant impact on the architectural formation. However, the issue is beyond the scope of this study. The attempts of human to reduce the negative impacts of climatic factors and making use of their positive influence since ancient times are reflected in the traditional folk architecture, traditional transformation of the natural environment into an artificial environment - architecture.

Not surprisingly, the main challenges in designing civil buildings has been associated with the formation of their functional space and designing-planning structure related to the protection of the premises from direct rays of the sun, wind, rain, overheating and hypothermia, and making use of favorable characteristics of the ambient air including variations in temperature throughout the day, increasing energy efficiency of buildings with direct use of solar energy and wind energy and so on. Over the time many original effective solutions in architecture and urbanism have been developed in the Middle East to protect people's life against the negative impact of climatic conditions. To this end, an extensive system of traditional architectural forms at all levels of organization of an architectural environment - from planning settlements to furnish equipment and facilities have been created.

Residential areas of historic towns contained a maze of narrow streets, winding and often dead-ends (Fig. 2).

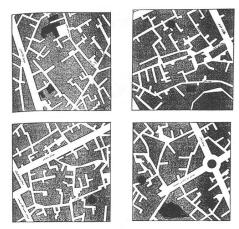


Fig.2. Traditional planning of living city quarters (Ganjnameh, 1996; Ganjnameh, 1998).

Twisted streets traced to ensure freshness and protect against prolonged winds. For protection from hot winds, private manors were enclosed with high walls, forming a maze impervious to hot winds coming from the desert. Residential and business premises squatted inside to the outside wall, forming a patio hyatt, partially shaded at any position of the sun. Condensed structure of the build-up area was a key

factor that prevented the high temperature and air flows to penetrate the city. For that reason, such a build-up area was considered as a way to resist unwanted heat (Ghobadian, 1998; Tahbaz, 2008; Tavassoli, 2002).

Each mansion was a kind of fortress with an autonomous state isolated the inner world from outsiders'. Moreover, a condensed build-up area with a closed patio provided protection from the heat and winds, as well as meeting the requirements of Islam and the people's life by allowing the closing of the inner world of a family. Entrances to the manor were developed to prevent people passing the street or lane seeing what was happening in the vard. Central entrance portal of the building (hashti) and half open transit rooms, where guests could expect a host, had doors that were located not in a row. If necessary, the patio was shielded by a special partition. In order to enter the premises of the house, one should go through the hyatt, which played a role in the perception of the architecture, comparable to the role of the European facade of the building. Hyatts were usually equipped with water basins for more aeration, planted trees, flowers and climbing plants to absorb heat and act as parks and squares (Fig. 3).

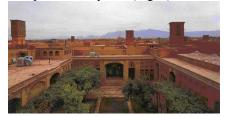


Fig.3. Mansion Larigha, Yazd, *Hayat* (Ganjnameh, 1996).

Evening recreation patio has always been an important part of everyday life, so the owners tried to organize the most pleasant microclimate, due to which you can relax after a hard day stay in the hot sun.

Fruit trees were preferred among trees, especially common fig, mulberry, apple, plum, and pomegranate trees. In coastal areas where the climate is damper, orange and tangerine trees grow. Grapes are capable of absorbing heat and, its vines entwine pergolas and façades in the yards or on rooftops. Pomegranate trees are the best protection from heat. The forms and images of leaves and inflorescences of many plants went into the traditional mosaic designs, moldings and carvings (Kasmai, 1980; Zomorshidi, 1994).

The hot climate with a large difference in temperature between day and night in summer and winter is reflected in the nature of the buildings layout, as well as the set and location of the premises. This, in particular, was applied to a certain orientation of premises to the cardinal points, as well as a large number of summer outdoor spaces. Ayvans, galleries, terraces, and roofing played a significant role in regulating the microclimate of the home and making optimal use of its space.

Traditional life prompted the best pastime destination during the day (Moradchelleh, 2008) (Fig. 4).

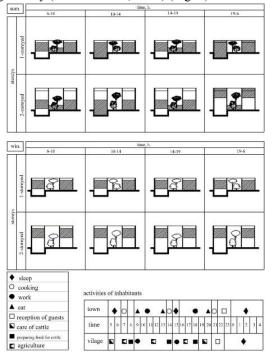


Fig. 4. Functional structure of traditional Iranian dwelling (Main locations of inhabitants in traditional Iranian dwelling).

Many household functions could occur in the open loggias - ayvans. Moreover, the same room had almost no furniture, people sat and slept on mats in the lower zone of the room where cool air collects. Furthermore, members of the family ate, sat on the carpeted floor, blankets and pillows (often on a low podium), read, sewed, and wove carpets. Most of the rooms connected to the hyatt were additionally ventilated by doors, but windows were equipped with sun-barred or stained glass. Houses were built with thick walls made of bricks (adobe), large thermal inertia of which allowed them to keep cool during the daytime and heat at night. High vaulted ceilings allow warm air to rise up, maintaining constant comfort conditions in the space of human presence. Roofs were made flat; they could arrange with pergolas or sleeping places in the summer.

In mitigating the effect of high temperatures on people, a variety of sun protection devices such as grilles and shutters with fixed or movable elements were traditionally of great importance. The final elements which closed the external windows and, partly, doorways played an active role in the external appearance of the buildings (Fig. 5).

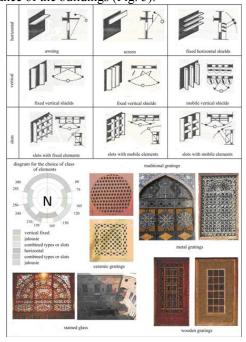


Fig. 5. traditional and modern solar-protection devices (Moradchelleh, 2008).

One of the most important traditional means of aeration and ventilation of premises were – bhudgeers (air traps), power vent pipes that went down to the cellars and underground wells and air ducts, provided a continuous natural ventilation and aeration of rooms (Ghobadian, 1998; Tahbaz, 2008; Tavassoli, 2002; Zomorshidi, 1994) (Fig. 6).

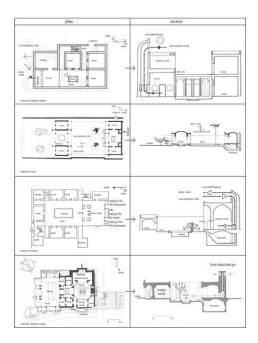


Fig. 6. Windtraps as traditional means of climatization (Ghobadian, 1998).

The most common use of wind-traps was to cool and ventilate the summer living rooms on the ground and basement floors of buildings: the air trapped in the tower, sank, chilled, and in turn cooled the rooms by convection and evaporation. When the wind was weak or missing, air rose up in the tower, whose walls were heated by the sun, thus drawing the cool, humid air from the patio and the basement through the summer rooms. Light bamboo screens were often arranged across the mines on which set the jugs with water to further cool and humidify the air (Ghobadian, 1998; Tayassoli, 2002).

Wind towers are found throughout the Middle East, from Pakistan to North Africa, where they were built since ancient times. Their design and shape are very diverse, but they all perform a common function, directing down the caught wind on the roof of the building to cool and ventilate the rooms below. Wind towers, bhud-geers, over the roofs of Persian buildings and housing, and public houses, as the chimneys of the old European buildings, create a completely unique silhouette of buildings of Iran and the Middle East (Fig. 7).

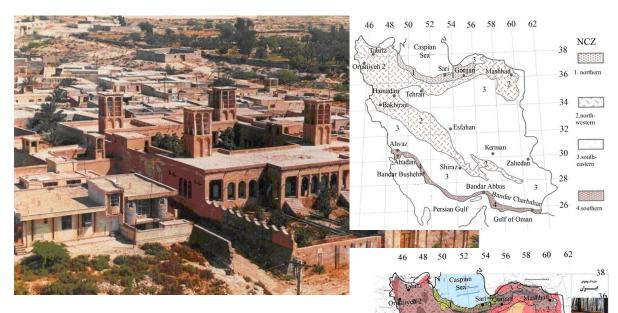


Fig. 7. *Bad-girs* in traditional housing, Bandar Langeh.

These and many other features of traditional houses meet the objective conditions of climate, religion and way of life in Iran. These three major factors shaping the architecture of homes remained unchanged for centuries, and have remained virtually unchanged and retained their importance nowadays.

4. Features of regional architecture

Organic time-tested methods of building, forms and designs are local, natural, and best way suitable for use; the materials were the result of successful work of local architects. Data analysis of six major climatic and environmental zones in Iran have made it possible to suit the local climate (geoclimate and movement of air masses), the seismic activity of the Earth, availability of the basis of design and construction in a particular area, and well-established traditions of public life, and highlight four construction design zones (CDZ): Northern, Northwestern (central), South-eastern and Southern (Fig. 8).

Persian Gulf of Oman

EZ-I

EZ-II

EZ-IV

EZ-VI

Fig. 8. Main design and construction zones (DCZ)

Fig. 8. Main design and construction zones (DCZ) and their connection with environmental zones (EZ) (Moradchelleh, 2008).

The Northern construction design zone coincides with the first environmental zone (EZ), of warm damp subtropical climate of the southern coast of the Caspian Sea. The ethnographic and historical centers of the North CDZ are towns of Qazvin, Gorgan, and Rasht.

The North-western construction design zone includes two environmental zones: the second zone (EZ-II), mountain-steppe and mountain-forest climate of Western Iran and Kopet-Dag and the third zone (EZ-III), mountain semi-desert climate of Northern and Eastern Iran. Ethnographic and historical centers of the zones are Tehran, Orumiyeh, Bakhtaran, Tabriz, Mashhad, and Hamadan.

The South-eastern construction design zone is characterized by hot, arid climate and also includes two environmental zones: the fourth zone (EZ-IV) mountain arid subtropical climate of southern Iran, and the fifth zone (EZ-V) subtropical desert climate (with sub-districts). The ethnographic and historical

centers of the zone are Shiraz, Kerman, Zahedan, Esfahan, and Birjand.

The Southern construction design zone is characterized by hot, damp climate, coincides with the sixth environmental zone (EZ-VI) climate of southern tropical and subtropical deserts of the Persian Gulf and the Gulf of Oman (with subdistricts). Ethnographic and historical centers of the zone are towns of Bushehr, Bandar Abbas, Ahvaz, and Abadan.

Let us consider the four formed construction design zones (CDZ) in more detail with the specification of the features of their architectural traditions.

The Northern construction design zone (N CDZ) with hot summer weather is characterized by gallery-type, low-rise residential building, which is based on planning methods to ensure cross-ventilation (to lower the temperature and humidity). This is achieved through proper design of a house; the arrangement of broad galleries, terraces, and deep summer room.

In the traditional architecture of the region, buildings are arranged separately standing on plinths, with the orientation of the dwelling spaces to the east and west. Relief and the possibility of visual perception of marine views from each house are taken into account for the location and planning of buildings. This zone is identified by the use of low-density build-up areas of separately standing and blocked buildings. Two types of low-density building formation are offered (Moradchelleh, 2008):

- Spot build-up area, sparse staggered and mansion staggered buildings, and group staggered type of build-up area, which provide broad guidance and taking into account the prevailing wind direction (west, north-west), as well as daytime and night breezes. Sparse and staggered homes (necessarily with patios which provide aeration of build-up area and houses), the disclosure of the main facade to the sea, and the visual perception of the sea are recommended. For nature conservation, it is advisable to trace transport links in the build-up area parallel to the sea at the distance over 300 400m.
- Blocked line type of building, linear with ledges and a concave front of build-up area and blocked (group) with ledges and a curved front of building. Front side of the build-up area is chosen, depending on the nature of the coast outlines (its topography) and the provision of recreational areas. In order to minimize heat loss at night and overheating during the day, it is suggested to block houses and use various types of buildings; fan-shaped, staggered, jagged, sparse, and linear.

In the traditional architecture of North-western DCZ, two- and four-sloped roofs are usual, and flat roofs are rare due to high precipitations. Living rooms usually faces SE, S, and SW. To protect inhabitants from the chill of ground, foundations are high. Bhudgeers are found rarely. Dwelling houses are usually blocked to decrease heat losses (Ghobadian, 1998; Tahbaz, 2008).

In the mountainous region, terraced houses and two-tier type are distributed. On this basis, we should build a manor blocked and carpet build-up area. The manor type of a house may have a rectangular, dotted, Γ -shaped and Π -shaped in plan with the latitudinal and meridian orientation, and placing a central priority on home within the garden area. In the blocking and carpet types of build-up areas , houses are arranged around the yard with a garden and have O-shaped perimeter, Γ -shaped and Π -shaped in plan. The structure may include galleries, ayvans and terraces.

The South-eastern construction design zone (SE CDZ), which occupies a significant area of the country, due to unfavorable climate is sparsely populated (the lowest population density in Iran). Seismic activity reaches 7-8. These are the least urbanized provinces. The industry, construction, production, and design facilities are underdeveloped there. This requires the active use of the design-construction base of adjacent regions of Iran (Zomorshidi, 1994).

In the traditional residential architecture of the region flat and dome roofing are dominated, and particularly in sultry provinces double roofs for the condensation of warm air and heating at night are arranged. To protect from the sun, buildings are placed mainly not on the plinth, but on the ground, and a highly developed application of bhud-geers of all types for natural ventilation is widely used. To be protected from the sun, premises are built blocked (Ghobadian, 1998; Tahbaz, 2008; Zomorshidi, 1994).

In the hot and arid climates of SE CDZ, materials of great strength are used for public buildings, characterized by a compact (point) and the perimeter shape of the plan with one or two, more courtyards, a large number of windows and door openings (with a focus on the south-west and south). Bright and light colors are used in decoration of facades.

In the climatic conditions of South-eastern CDZ, common gallery and terraced houses, complexes with patios - from half-open to closed- are widespread. Build-up area is recommended, depending on the landscape to form a sparse mansion type to the group and carpet blocked one. In order to improve the microclimate in the build-up areas, the followings are recommended depending on climatic sub regions (Moradchelleh, 2008):

- arrangement of traffic and pedestrian links, yards, pools and fountains, natural ventilation (bhud-geers), and vertical and horizontal shading;

- planting, watering, shading and landscaping of areas, parking lots, patios, utility yards, streets and pedestrian linkages;
- locating the transport link in the direction of southwestern, southern, and south-eastern winds and the entrances of the houses on the leeward side to protect them from wind, sand and dust;
- providing high-density aeration (to increase the shade), reducing the area of external walls and coverings, mutual shading of buildings, streets, yards;
- designing the predominant location of pedestrian streets from north to south.

The following requirements emerged by designing civil buildings: compactness, space-planning solution with one or two patios; protection from excessive heat (horizontal sun shading); increase in the (cubic) space of premises; ventilated attic spaces, open spaces with transforming guards for evening and night stay; arrangement of modern ventilating shafts, vineyards on terraces and galleries; aeration facilities, i.e., arrangement of pools, fountains, and paddlings; high quality thermal protection, fencing (hollow), and ventilation of multi-layer structures).

The Southern construction design zone (S CDZ) with a hot damp climate (on the coast of the Persian Gulf and the Gulf of Oman, south of the country) has fairly comfortable environmental conditions for development of spa and recreation centers.

In the traditional architecture (housing), flat and domed roofs are dominant; the main living premises are oriented to the south or south-east, the buildings are often placed on the ground or on a small plinth, and for natural ventilation, it is a very popular to arrange bhud-geers; and building lines in the plan are detached. In the civil architecture of South CDZ building materials of not-high strength; a large number of window and door openings; and a bright color palette of building facades can be used (Ghobadian, 1998; Zomorshidi, 1994).

The main types of residential build-up areas on the coast are homes, formed around a half-open or enclosed patio (two, three yards). Different types of housing groups can be used. In order to improve the microclimate in the building, the following items are recommended (Moradchelleh, 2008):

- protection of public playgrounds, walkways, patios and dwellings from the scorching desert north-west (with sand and dust) and north-east winter winds;
- formation of a high-density compact construction, in order to combat overheating;
- planting, watering, landscaping and shading of open spaces.

By designing civil buildings, the following demands emerged: the linear arrangement of buildings along the beachfront, orientation of rooms and public spaces of long stay to the sea, transparent (through) and angular airing of buildings, protection against the premises overheating in summer (increasing thermal protection by multi-layer protections, vertical and horizontal sun shading, arrangement of vineyards, and arrangement of open summer premises (hyatts, galleries, terraces)).

Main features of traditional Iranian architecture are represented in (Fig. 9) and (Table 1).

Northern DCZ (warm humid climate)

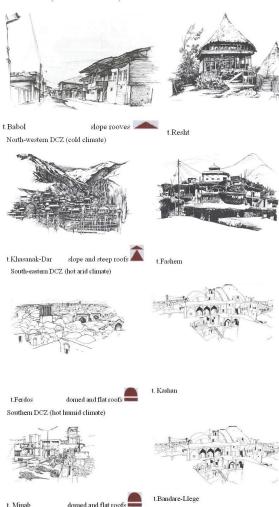


Fig. 9. Influence of environmental conditions over the forms of traditional housing (Moradchelleh, 2008).

Tab. 1. Characteristic of traditional architecture in vario	ne regions of Iran

DCZ, climate	materials used	plan	roof	facing	Floor, foundation	windows	use of natural ventilation	housing	colours
Northern, warm, humid	limited heat transmission resistance	extended	sloped	E, N, W	high foundation	large	medium	separate	free
North- western,	high heat transmission resistance	compact	steep	SE-SW	on ground	small	Errile	blocked	dark
South- eastern, hot, arid	high heat inertia	compact	flat, domed	S-SE	on ground	small	mach	blocked	bright
Southern, hot, humid	Limited heat inertia and heat transmission resistance	extended	flat	S-SE	on ground	medium	much	bright	ярыне

5. Trends in development of architectural and urban practice

Modern development of world civilization is becoming more global. At the same time, broad anti-globalization movements show this process to be largely one-sided. Lifestyles of developed European and North American countries are actively extending to the so-called third world countries, including even the large states of Asia and Africa, many of which have ancient cultures that cause some resistance. In such countries, particularly in Iran, the following two trends opposing each other in the architectural and urban policy and directly in design: successful development of architectural structural morphology in accordance with national cultural characteristics of the nation as well as active implementation of a national architecture, and the methods and means of international architecture.

In recent decades, rapid development of new production technologies in general and construction in particular in the Western world and many Eastern countries led to Western technology aggression toward the east. Many Iranian architects are educated abroad. In recent years, most built or designed objects in Iran are provincial imitation of western architecture with more or less successful use of sun protection technologies, borrowed from the architectural practice of the southern regions of the developed countries (Fig. 10).

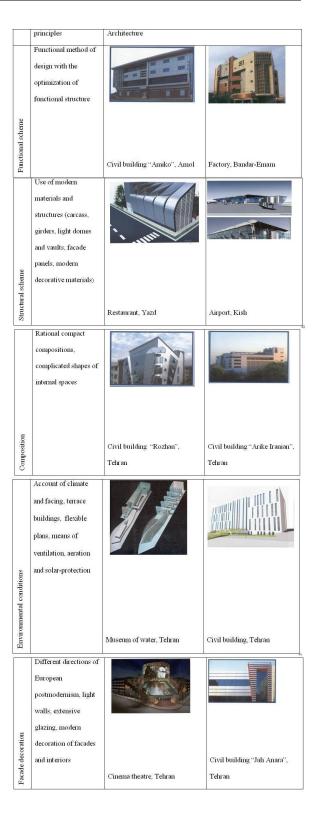
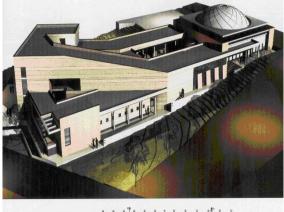


Fig. 10. Influence of international architecture over the civil buildings in Iran (Moradchelleh, 2008).

In part, this is logical - the typology of traditional architecture meets the little challenges facing modern

architecture. Traditional architecture with many, as the Iranians and foreigners is associated exclusively with its outside stereotypical elements: arches, ornaments, Persian carpets, finishes, and mazes of medieval towns. Accordingly, the monuments of traditional architecture can be considered exclusively as historical monuments. At the same time, Iranian architects are increasingly eagerness for careful study of the cultural heritage and even the world's best achievements, not just borrowing the elements. Among the architectural competitions in recent years there were projects with features of traditional national structures: a low-rise even with a large total floor space, using half-closed internal spaces such as patios (courtyards) and alleys, extensive galleries, walls lined with local natural materials such as sandstone, marble and ceramics with high reflectivity, and thermal protection.

Among recent projects Zourkhane - a complex of traditional sports- can be identified in "Enghlab", Tehran (Fig. 11).



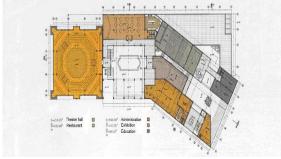


Fig. 11. Zourkhane "Enghlab", Tehran.

Some examples of traditional architectural forms given here are the author's project of individual residential house (Fig. 12), the Iranian ambassador residence in Seoul, South Korea, Fereshteh Administrative Complex in Tehran, Literature and Science Administrative Complex, Educational Institution of Tehran





Fig. 12. Design of a mansion for the construction in Iran.

The problem is that modern architecture meets not only the western way of life, but also a new way of life in eastern countries. Indeed, many functional elements for a traditional house are secondary or simply decorative for modern living. For example, a wood-burning fireplace is only a toy for the modern urban dwellers, not a vital heating system. Modern buildings are constructed with more limitations of place and time. It is difficult to imagine the modern life without modern furniture or, for instance, found the space for a TV and a computer in the traditional structure of everyday life.

The transition from the principles, elements, and forms of Iranian traditional architecture to the principles and forms of the so-called international architecture is logical and desirable in the case of applying to buildings and facilities that cannot be built using the traditional designs and materials (such as skyscrapers); or may not have functional and spatial volume counterparts in the Iranian traditional architecture. However, at the same time and in this case, some particular architectural forms that are linking the modern with the traditional architecture can be found.

However, it is unacceptable to neglect the enormous experience of optimizing microclimate space facilities, obtained by traditional architecture for centuries by the most natural, simple and accessible means. Means of folk architecture do not require the equipments such as air conditioners and fans with additional energy consumption, or expensive materials that are often imported from other countries like sunscreen materials such as architectural glass.

This provision does not preclude the fact that the current pace and nature of construction works require certain changes in the use of traditional materials primarily related to adaptation of their tasks to construction industrialization (for instance, transition from bricklaying to mounting of large blocks; a complement of traditional metal line of modular ferro-concrete designs, development of modular floor panels and coatings based on traditional brick vaults, and the introduction of long-span spatial structures using modern synthetic materials).

5. Conclusion

In this study, the tendency for studies and full use of modern architectural and construction practices of historically formed types of planning structures of civil buildings, as well as the traditional architectural forms and details was outlined in the development of Iranian civil architecture. The experience of Iranian traditional culture and traditions of architecture throughout the long history of civic buildings was explained with a lot of amazing examples, reflecting the attitude of society to solve this problem. Analyzed architectural analogues and references provide an information base for research and can become the basis for comparative scientific analysis.

Analysis of construction and planning methods and characteristics of the regional architecture is a strong basis for understanding the living conditions of the population. The proposed zoning of the territory of Iran on four construction design zones, in addition to natural and climatic features of the country, describes the architectural and building community-orientation and commonality of individual regions. These suggestions on area development, construction, use of organic forms and details, and making use of materials provided by effective technologies is the basis of successful solutions of the problems of architectural and urban practice.

It is hoped that the observed trends and developments be successfully used in the design of civil buildings in the Muslim world and further in-depth researches into the problems of tradition in structural morphology of modern civil architecture be carried out.

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The effect of yoga training with different sessions on mental health and some blood factors in non-athlete women

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Abstract: This research was done to investigate the effect of 6 weeks yoga training with different sessions on mental health and some blood factors (Glucose, Cholesterol, LDL, HDL and Triglycerides) of female teachers in Avaz. 100 female non-athlete and healthy teachers with the mean age of (35±2.5) were divided into 4 groups randomly. The first group was session yoga training in a week group, the second were 2 sessions yoga training in a week, the third group were 3 sessions' yoga trainings in a week and the forth group was the people without yoga training or control group. Every yoga session is taking 90 minutes (including Asana, Pranayama and Shavasana training). The survey instruments were international questionnaire of SF36 used for measuring mental health, related components and the required equipments for blood test to measure blood factors measured as pre-test and post-test. In the statistical analysis at first one-way ANCOVA and Sequential Bonferroni test were used and for all the hypotheses significance level was used 0.05. The results showed a significant difference between the studied blood factors and mental health eight components in the third group with the control group. The current data can be effective in the design of yoga trainings programs to improve mental health and life quality and improving blood factors for different people.

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Keywords: Mental health; Yoga trainings; Glucose; Cholesterol; HDL; LDL

1. Introduction

As women are including half of the population in the world, they are important from different aspects and they should be considered in various planning of the community (Abbott et al, 2010). The general attitude of a woman to her body and her physical performance had direct influence on her general attitudes because her body and mental health form her social relationship with the others (Abbaszadeh et al, 2009; Vempati et al, 2002). It is obvious that women emotional security increase the general security of the family (Augner et al. 2010: Leforge, 1999). On the other hand, each member of the family especially women health had direct influence on the general health of the family (Abbott et al, 2010; Augner et al, 2010). Thus, providing body and mental health for women namely female teachers who are responsible for children education is of great importance. Canadian Mental Health Association defines mental health as "the ability to adapt with our selves and others vies and facing with life daily problems". The physical and mental health of the people is influenced by different factors (Sharma, 2009). One of the most essential human being needs that are including the main conditions of mental health, are assurance, feeling secure and happiness and sport is one of the ways to achieve this important case (Padav et al, 2004; West et al, 2004). Sport and physical activities have crucial role on mental health. As especial physical trainings improve life indices including mental disorders, emotional health and fatigue, physical and mental health, thus, women by exercise can achieve good behavior, morality and personality characteristics for a healthy and happy life (American Psychiatric Association, 2002; Ashok et al; 2005; Goldstein, 2004). Many researches showed that sport in addition to being a valuable tool for physical health, has close relationship with mental health namely prevention of mental disorders (Deshpande et al, 2009; Kauts et al, 2009; Macdonald et al, 2009; Malathi, 2001).

Malathi (2001) believes that one of the physical activities that can has crucial role on the physical and mental health is yoga. The reality is that by doing this sport we can guarantee the mental and physical health (Apatuff, 2001; Barnes et al, 2004 Theodore, 2000). The pioneers of this field were scholars who can make some principles based on medicinal science, education and psychology that can have influence on physical and mental health (McCartney, 2001). Yoga reduces depression and anxiety and increases self-confidence (Barota et al, 2001; Ventis, 2002). Generally, the people who do yoga are having high intelligence, less fatigue, order and motivation, self-confidence and more output (Perez-De-Albeniz, 2000). Participating in yoga activities, help socialization, achieving skill, adequacy, and also making friends and health

relationship with peers (Rao et al, 2008). The researches show that yoga has positive effect on cognitive performances and intelligence (Rozzano, 2001). Some of the researchers believe that there is not such relationship (Rangan et al, 2009).

Researches showed that after yoga trainings even there should be recovery in cognitive performance of old patients with mental problems and this is due to this fact that unavoidable involvement of the brain in physical activities is an important factors in recovering and hindering cell-body destruction of aging in which mental capabilities of the old people will be changed positively (Anonymous, 2005; Brown, 2005).

The researchers also found that the old people who took part in yoga training for 1 hour in a day for 3 times in a week during 4 months their performance got better in doing memory tests (Chauhanss et al, 2005). The various researches showed that yoga increases creativity, independence, stress release and more close relationship with the people (Paluska et al, 2000; Lindwall et al, 2005). Also, yoga increases popularity and social adaptability of the people (Alfermann et al, 2000). On the other hand, yoga as some medicinal compounds releases serotonin, Norepinephrine and Dopamine (Khalsa, 2010).

The effect of yoga on job behavior is investigated. Doing this physical activity is with the considerable reduction in job absence. These activities are related to mental health and reduction of heart problems that are the most important reasons of absence in work place (Goldstein, 2004; Rani et al, 2002). The people after doing physical activities of yoga observe a kind of positive or health and improvement of life quality are observed (Wilmore, 2001; Holmes et al, 2003; Agrawal, 2003). Therefore, yoga physical activity has great share in mental and social security for people and providing mental health and healthy life (Goldstein, 2004; Delmonte, 2000).

Although there are many researches about the effect of yoga, most of these studies are about the diseases, conditions and physiological disorders. Also, in our country yoga is less common. This question is raised that whether we can improve our mental health by this physical activity? If this is the case, how much exercise in a week can apply this effect? Here in this study we are going to investigate the effect of different yoga trainings on the mental health of female teachers to take a great step toward improving the health of female teachers.

This research is semi-experimental and field survey in which the effect of independent variable (yoga trainings with different practice sessions) in dependent variable (mental health) with the pre-test post-test design and it was investigated by control group and the research data was collected in Jan 2009.

a. Statistical population and the selection methods of subjects

Statistical population of this research was non-athlete teachers and volunteers participating in Yoga trainings who were informed by call for invitation in Education office of Ahvaz who were teaching in 2009-2010. The statistical sample of this research are 100 female teachers, the personal characteristics questionnaire of these subjects are used to determine personal indices such as age, weight, marital status, the number of children and education level, physical activity, physical and mental health and etc. and it showed that the subjects were physically and mentally healthy and they didn't do any especial physical activity, they had all BA or MA degree and the mean age was between 33to 37. The subjects before starting yoga training stated their written agreement and participated as volunteer in the research. Before yoga training the subjects were divided as randomly in 4 groups:

- 1- Yoga training group 1 session in a week (25 persons)
- 2- Yoga training group 2 sessions in a week (25 persons)
- 3- Yoga training group 3 sessions in a week (25 persons)
 - 4- Control training group (25 persons)
 - b. Research instrument

Research instrument questionnaire was SF 36 that is globally used for the measurement of the subject's mental health. This questionnaire is consisting of 36 questions and measures two general dimensions and 8 components related to mental and physical health. Two general dimension of this questionnaire are physical and mental health and each of these two dimensions includes four components. General dimension of physical health are physical performance activity, physical problems, physical pain and public health that are measured. And the general dimension of mental health is related to measurement of happiness, excitement limitations, social performance and mental health. This questionnaire is used in most of local and international researches and its validity and reliability are proved. For example, Hadi (2006), Montazeri 92005), Taherkhani (2003) in their study reported the reliability of this questionnaire respectively as (0.85), (0.95) and (0.87).

To calculate the reliability of this questionnaire in the current research, Cranach's alpha coefficient is used and it was reported equal 0.89 and the validity of this questionnaire was reported as 0.6 by Montazeri and Gondak (2005). This questionnaire was filled out by subjects of four groups before

holding the first session of the training (pre-test) and after the final session of yoga training (post-test).

c. Training protocol

Training conditions for all the subjects were similar and the subjects according to the program they received from the researchers, participated in the training sessions. Training duration was 6 weeks and the number of training sessions was different for different groups. Each training session takes 90 minutes and in each session the subjects after about 10 minutes warm up (including walking, mild stretching and respiratory training), they did the main stretching and respiratory trainings for 75 minutes and finished training session with 5 minutes cooling process including (respiratory training and Relaxation training). The subjects exercised the trainings in group and the researcher was controlling all training process in all exercise sessions. Control group only filled out SF 36 questionnaire in pre-test and post-test and they didn't participate in training sessions.

d. Statistical methods

For data analysis in this research the following statistical methods are used:

- 1- Descriptive statistical methods such as the calculation of frequency, percent, mean and standard deviation.
- 2- One-way ANCOVA: in ANCOVA, confounding variables are controlled, it means that their effect is removed from test scores and then the remaining scores mean of the research groups are compared. In this research in hypothesis test, in post-test stage, confounding variable is controlled. It means that its effect is removed from post-test scores and then the remaining score mean of the experimental and control group were compared. Also, sequential Bonferroni test was used for the comparison of the groups.

To analyze the collected data, SPSS software, version 17 was used. Also, for all the hypotheses the significance level of a=0.05 was used.

2. Results

Descriptive findings of this research including statistical indices such as mean,

Standard deviations of mental health of the subjects are shown in table 1.

As it is seen in table 1, in pre-test stage, mean and standard deviation of mental health of each groups are respectively 1 session yoga training 50.22 and 13.93, 2 sessions of yoga training 51.33 and 15.10, 3 sessions yoga trainings 50.22 and 16.47, control group 50.89 and 14.17 and in post-test stage the mean and standard deviation of each groups are respectively 1 session yoga trainings 51.78 and 15.30, 2 sessions of yoga training 51.56, 15.57 and 3

sessions of yoga training 62.22 and 15.29 and control group are 47.11 and 13.48.

Table 1: Mean, standard deviation of mental health score of experimental groups and control groups in pre-test and post-test stages

	Statistical index		Average	SD	N	
	Stage	tage Group				
_		1 session yoga training	50.22	13.93	25	
	Pre- test	2 sessions yoga training	51.33	15.10	25	
	-	3 sessions yoga training	50.22	16.47	25	
Mental health		Control (without practice)	50.89	14.17	25	
	Post -test -		1 session yoga training	51.78	15.30	25
		2 sessions yoga training	51.56	15.57	25	
		3 sessions yoga training	62.22	15.29	25	
		Control (without practice)	47.11	13.48	25	

As it is seen in table 2, by pretest control among female teachers, the experimental group and control group are significantly different in terms of mental health (p < 0.027, F=3.23), the significant difference between the groups by one-way ANOVA doesn't show that between which group there is difference so after this test, Sequential Bonferroni test was used and its results are shown in table 3.

As it is seen in table 3, there is significant difference between post-test mean of mental health of female teachers of group test 3 (3 sessions yoga training) and control group (without training), in other words, 3 sessions yoga training per week considering the average of experimental group

mental health of the female teachers of group 3 in comparison with the average of female teachers of control group increased mental health of female teachers of experimental group 3.

Table 2: The results of one-way ANCOVA the comparison of the post-test mean of the mental health of female teachers participating in experimental and control groups with pre-test control

Changes source	The sum of squares	Freedom degree	Mean of squares	F	P significance level
Pre-test	1.23	1	1.23	0.005	0.941
Group	2118.72	3	739.57	3.23	0.027
Error	15171.21	67	236.43		_

Table 3: The results of Sequential Bonferroni test between mean scores of post-test of mental health among female teachers participating in experimental and control groups with pre-test control

	Groups	Mean	1 session training	2 sessions training	3 sessions training	Control (without practice)
1	1 session yoga training	51.78				
2	2 sessions yoga training	51.56				
3	3 sessions yoga training	62.22				(0.022)
4	Control (without practice)	47.11				

So, the first hypothesis is supported. There is no significant difference between groups 1 and 2 of yoga training session in a week and control group. This case has the lack of significant influence of 1 and 2 yoga sessions in a week on mental health.

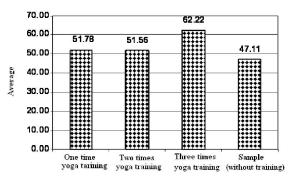


Chart 1: The comparison of post-test mean of mental h of female teachers in experimental group and control group.

3. Discussion and Conclusion

One of the most essential human being needs that are including the main conditions of mental health, are assurance, feeling secure and happiness and yoga is one of the ways to achieve this important case. Yoga plays an important role on mental health (Ashok et al, 2005).

The results of the current research showed that yoga improves mental health of female teachers participating in the test. As it was seen in the table, 3 sessions yoga in a week had significant influence on mental health of subjects of this group at significant level of a=0.05 but 1 and 2 sessions yoga in a week didn't have significant influence on mental health of the subjects. So, it can be said that by increasing the length of training, we can change this variable in participants.

These results are compatible with Leforg et al (1999) and Macartni (2000). By different researches, they showed that yoga training improves life indices including mental health. This is due to increasing endrophines of the subjects that is increased influenced by sport activities and can make the person happy by influencing the central neural system. Sport activity can increase self-confidence (Goldstein et al, 2004; Harinath et al, 2004; Anderson et al, 2010; Chaya et al, 2008).

Often the shortage of neurotransmitters (such as GABA) enzyme is seen in depressed people. In a test carried out on people who practice yoga, GABA is increased. According to the researches, yoga for 1 h in a week increases GABA as 27%. Thus, yoga can decreases stress and anxiety and prevents depression (American Psychiatric Association, 2002; Barota et al, 2001; Cohen, 2005).

Therefore, continuous sport trainings increase blood circulation in the brain. The increased in blood circulation increase oxygen and better feeding of brain neurons and prevents brain arteries narrowing these influences prevent Alzheimer and

destruction of mental capabilities in old people (Brown et al, 2005).

Keeping the body healthy by yoga and good nutrition helps the mental health (Deshpande et al, 2009; Gupta et al, 2006). This is due to this fact that yoga changes the amount of chemical compounds in the brain and increases blood circulation and oxygen attraction. These changes can influence central neural system and make the person happy (Brown et al, 2005). Yoga also gradually changes mental nature and physical activity can hinder disturbing and negative thoughts in the mind (Chaya et al, 2008).

The people, who do yoga often, can control their emotions and steam off their anger and anxiety through training (Kauts et al, 2009; Rozzano, 2001; Delmonte, 2000).

As the body and soul have close relationship and disorder in one of them influence the health of the other (Padav et al, 2004, McCartney, 2001) and the type of life especially in big and industrial cities deprived them of their natural needs and prepare the ground to suffer from mental diseases. Therefore, in the current societies, most of the people are not in good mental and physical health and some sports such as voga can increase mental health (Leforge. 1999; Macdonald et al, 2009; Malathi, 2001; Rangan et al, 2009; Alfermann et al, 2000). Meditation claims to activate the parasympathetic-limbic pathway that relaxes body and mind (Lindwall, 2005; Tulchinsky, 2000). In meditation, parasympathetic neural system is activated to counteract the parasympathetic system, responsible for bodily nourishment and recuperative functions, such as resting and restoration (Theodore, 2000; Nagendra, 2008; Anand, 2001). parasympathetic-limbic activation achieved through the meditation relaxes us by bringing us "into the "center" (Barota, 2001; Nagendra, 2008). A person who is doing sport in comparison with the person who does not do sport, consumes less energy and apply less pressure to his body (Macdonald et al, 2009). The general influence of the other regular trainings helps the growth of body (Malathi, 2001). Regular trainings in women improve their breathing, digestion, bowl system and make the muscles strong (Padav et al, 2004; Rozzano, 2001; Khalsa, 2010). Sport allows women and girl release their stored emotions (Leforge, 1999) and increases their tolerance against problems in life (Harinath et al, 2004).

Naturally, human being is a social creature who wants to communicate with others and others want to have this communication either. This social instinct can be fulfilled by yoga (Barnes et al, 2004). Yoga makes you achieve social values such as teamwork, loyalty and sport morale (Apatuff, 2001). Friendly environment of sport often is a good

opportunity for social relationships and forming morale (Harinath et al, 2008) and yoga makes the timid and shamefast girls and women more social to adapt with different people in their daily life (Khalsa, 2010; Anand, 2001).

But if we ignore intensity and duration of the training attribute, the research results are compatible with the results of Oji (2001), Taherkhani et al (2003), Hadi et al (2006), Alferman (2000), Rezano (2001), Deshpande et al (2008), Kats et al (2009), Rengan et al (2009), Macdonal and firedman (2009) and there is not incompatible research result.

The results of this research showed that yoga training for 3 sessions in a week can have significant influence on all 8 factors of mental health and improve them. Also, yoga training for 1 session in a week except for physical performance components didn't have any significant effect on other 8 factors of mental health. Thus, to achieve the required result, training duration should be increased. Yoga training for 2 sessions except for physical performance component didn't have any significant influence on 8 factors of mental health.

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Effect of honey bee venom on Lewis rats with experimental allergic encephalomyelitis as regards changes of GABA and glutamate

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Abstract: Multiple sclerosis (MS) is a progressive, neurodegenerative disease of central nervous system (CNS). Experimental allergic encephalomyelitis (EAE) is a widely accepted animal model for MS. Honey bee venom (Apis mellifera) contains a variety of different low and high molecular weight peptides and proteins including melittin, apamin, adolapin, mast cell degranulating peptide and phospholipase A2. Bee venom (BV) also could exert antiinflammatory and antinociceptive effects on the inflammatory reactions. Glotamic acid and γ -aminobutyric acid (GABA) are among neurotransmitters of central nervous system and participated in excitatory and inhibitory processes. In EAE the amount of GABA reduces and the level of glutamate will increase. Tracing them in brain could useful in monitoring the influences of drugs. In this research, hematoxylin and eosin methods for inflammation, ELISA to study tumor necrosis factor-alpha (TNF- α) and HPLC, to study the amount of GABA and glutamate were used for assessment. In this study, we showed that in EAE level of GABA has reduced and the amount of glutamate has increased and bee venom decreases pathological changes and the level of serum TNF-α, and level of glutamate and increases the level of GABA in EAE rats induced by spinal cord of guinea pig. [Akbar Karimi, Kazem Parivar, Mohammad Nabiuni, Saied Haghighi, Sohrab Imani, Hosein Afrozi. Effect of honey bee venom on Lewis rats with experimental allergic encephalomyelitis as regards changes of GABA and glutamate. Journal of American Science 2011;7(7):295-3001. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Bee venom; Experimental allergic encephalomyelitis; GABA; glutamate

1. Introduction

Multiple sclerosis (MS) is a progressive, neurodegenerative disease of central nervous system (CNS). This disease recognized by symptoms like the inflammation, demyelination and the destruction of neurologic actions (Urbach-Ross and kusnecov, 2007). Experimental allergic encephalomyelitis (EAE) is considered as a valuable animal model for MS research and the scientists who use it both for the evaluation of the process and treatment of diseases (Hedruel, Gillett, Olsson, Jagodic and Harris, 2009).

EAE is created in animals by injecting the tissue of myelin basic protein (MBP), CNS, or myelin oligodendrocyte glycoprotein (MOG) along with the adjuvant. EAE and MS are similar diseases pathologically and immunologicaly. In EAE certain symptoms are observed such as paralysis, inflammation, ataxia, elevated interferon- γ (IFN- γ), the brain-blood barier damage, and the penetration of CD4+T cells and macrophages to CNS (Ferguson, Sarlieve and Vincendon, 1990; Mao, Lu, Wang and Xiao, 2007).

The venom of bee (Apis Melifera) consists of different types of peptides light and heavy chain and proteins such as melittin, apamin, adolpin, phospholipaseA2 (Mirshafiey, 2007).

The healing bee poison is largely effective in treating chronic anti-inflammatory disease (Han, Lee, Yeo, Kweon, Woo, Lee, Beak, Kim and Park, 2007). Moreover, anti-inflammatory specifications of bee venom in rat model having infused arthritis has been reported, and it is observed that the injection of bee venom suppress leukocytes migration reduces the level of TNF-α (Mirshafiey, 2007). Bee venom contains several bioamines, such as apamin, histamine, procamine, serotonin, and norepinephrine. which facilitate nerve transmission and healing in a variety of nerve disorders. This gives BV the ability to travel along the neural pathways from the spine to various trigger points and injured areas to help repair nerve damage and restore mobility (Son, Lee, Lee, Song, Lee and Hong, 2007).

Changes in the level of glutamate, GABA is accompanied by neurological disorders such as Alzeighmer's, Schizophrenia, and Epilepsy (De freitas saliva, Ferraz and Riberio, 2009)

Increase in the amount of glutamate was seen in the cerebrospinal fluid of patients with a range of central nervous system diseases from MS to meningitis and acute encephalitis. Activated macrophage and microglia produce and release significant amount of glutamate (Werner, Barn-Schieber and Raine, 2004).

MS disease may be associated with deletes the serum levels of GABA and its synthetic enzyme glutamic acid decarboxylase (Bhat, Axtell, Mitra, Miranda, Lock, Tsien and Steinman, 2010).

The concentration of GABA and glutamate are important biomarkers for disease states and drug effect (Eckstein, Ammerman, Reveles and Ackermann, 2008).

The aim of this study is examination the effects of anti-inflammation of bee venom on the rat with EAE and in addition to studying these effects has paid special attention to the level of GABA and the glutamate in brain of the rat EAE, and the groups under treatment to observe associate bee venom with the change levels of GABA and glutamate in brain of the rats with EAE.

2. Material and Methods

After anesthetizing guinea pigs, their spinal cords were extracted and mixed with equal volume of water 4 °C to acquire homogeneous mixture. The guinea pig spinal cord homogenated (GPSCH) were emulsified in 1:1 ratio of complete Freund's adjuvant (CFA), consisting of 1mg/ml mycobacterium tuberculosis (Sigma-Aldrich, F5881).

EAE was created by subcutaneous injection of 0.2 ml of GPSCH-CFA to the adult female Lewis rats (weight 180-200 g, Laboratory of Animal Center Darupakhsh pharmaceutical company. Tehran. Iran). Also, for the control group, 0.2 ml of CFA was used. The animals used in this research were kept under standard situation and fed with water and food adlibitum. The experimental procedures were done in accordance with the Guide for the Care and Use of Laboratory Animals published by the National Academy Press (Washington, D.C. 1996).

EAE was induced in 30 rats, randomly placed in 3 groups of 10:

Group 1: Named E-S which received normal saline every day.

Group 2: Named E-BV which received 0.2 mg/kg bee venom every day.

Group 3: Named E-BV which received 0.5 mg/kg of bee venom everyday.

It is worth mentioning that the treatment started from the first day post of immunizing by GPSH-CFA and lasted until the tenth day.

After 19 days post of immunizing, rats were anesthetized after injection combinatory of ketamine and xylazine (Alfasan, Holand). Then their brain and spinal cords were removed. They were kept under the process of histotechnique for 24 hours in 10% formalin as a fixative. After that, the sections of brain and spinal cord were stained with hematoxylin and eosin (H & E) for inflammatory cell infiltration The intensity of inflammatory cell infiltration was

assessed according to the protocol Okuda, Sakodo, Fujimura, Saeki, Kishimato and Yanagihara (1999) and classified according to the obtained scores as follows: Score zero: the absence of inflammation, score one: the penetration of cells around blood vessels and meninges, score two: subtle penetration of cells in parenchyma (1- 10/section), score three: average penetration of inflammatory cells in parenchyma (1-100/section) (Okuda, Sakodo, Fujimura, Saeki, Kishimato and Yanagihara, 1999). The rate of serum TNF-α was specified by using rat TNF-α ELISA KIT (Abcam, UK).

The brains of rats were taken out of skull and put them on ice-cold plate so as to separate the brain stem and then weighed and placed inside tubes of microcentrifuge (1.5 ml) .The samples were homogenized in 15 vol. of methanol/water (85/15, v/v) then centrifuged under conditions (7800×g, for 15 min at 4°C) and stored at -20 centigrades until derivatisation for GABA/glutamate analysis. To determine the amount of GABA and glutamate we use HPLC method which was used by De Freitas Silva (De Freitas Saliva, Ferraz and Riberio, 2009). Data were analyzed using the SPSS statistical program (version 17 for windows). In all of the cases for comparison between groups Mann-Whitney U test was used. Significance level was set at p<0.05 throughout the experiment.

3. Results

Effect bee venom on the penetration of inflammatory cells central nervous system of EAE rats

Following the staining sections and analyzing the samples, in tissue samples related to control group, no penetration of inflammatory cells to brain parenchyma and spinal cord was observed. The sample of tissue which contains signs such as penetration mononuclear inflammatory cells in parenchyma, the existence of inflammatory cells around blood vessels and meninges belonged to treelabel groups. These signs were observed with varying intensity in the specified groups. The intensity of pathological changes and the penetration of inflammatory cells both in brain tissue and spinal cord of group E-S was noticeable. The intensity of pathological changes in groups E-BV1, E-BV2 had significantly decreased. This decrease was seen both in brain parenchyma and in tissue of spinal cord (Figures 1 and 2).

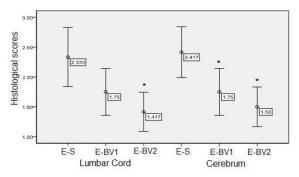


Figure 1: The treatment with bee venom reduces the penetration of inflammatory cells in cerebrum and lumbar cords of EAE rats induced by GPSCH-CFA. Pathologic changes in rats assessed with using of semi-quantitative score as described in experimental procedures section. (*p<0.05 compared with E-S group and n = 4 for all groups.)

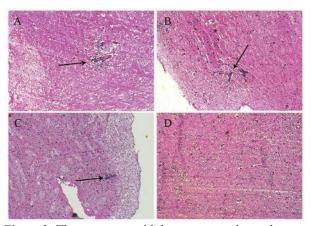


Figure 2: The treatment with bee venom reduces the penetration of inflammatory cells in brain of EAE rats induced by GPSCH-CFA. (A) E-S group, (B) E-BV1 group, (C) E-BV2 group, (D) Control group

Result show that the bee venom can meaningfully decrease penetration inflammatory cells into CNS in rat EAE induced by GPSCH.

The amount of TNF- α had decreased in under treatment groups in comparison with E-S and this reduction process in group and E- BV2 is salient (Figure 3).

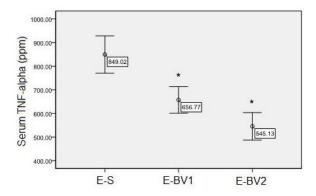


Figure 3: The treatment whit bee venom reduces the rate of TNF- α in serum of rats induced by GPSCH-CFA. ELISA method for TNF- α was used for assessment. The level of TNF- α in different groups compared to E-S (*p<0.05 compared with E-S group)

These results show that bee venom decreases the amount of TNF- α in the serum of rats which induced with GPSCH-CFA considerably.

The amount of glutamate in E-S group rats increased as compared to control group but the amount of GABA in E-S group had meaningfully decreased compared to control group. The amount of glutamate in E-BV2 decreases significantly in comparison with E-S group. But instead the amount of GABA in E-BV1 and E-BV2 in comparison with E-S had increased significantly (Figures 4 and 5).

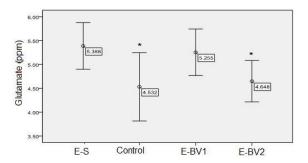


Figure 4: Level of glutamate in brain stem of EAE rat increases in compared to control group and bee venom in dose 0.5 mg/kg decreases amount of glutamate in brain stem of EAE rats. The level of glutamate (ppm) in different groups compared to E-S (*p<0.05 compared with E-S group)

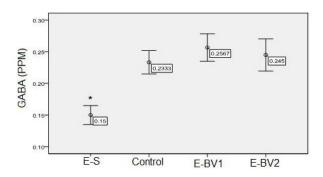


Figure 5: Level of GABA in brain stem of EAE rat decreases in compared to control group and bee venom increases amount of GABA in brain stem of EAE rats. The level of GABA (ppm) in different groups compared to E-S (*p<0.05 compared with E-S group)

The results show that bee venom can increase the amount of GABA and decrease glutamate in the brains of EAE rats induced with GPSCH.

4. Discussions

Multiple Sclerosis (MS) is an autoimmune disease of CNS which shows pathology characteristics like the penetration of macrophages and lymphocytes into CNS, demyelination, axonic damage and ect. Etiology of this disease in is an unknown yet, but it is a kind of disease in which T cells and B cells attack on myelinated parts of nervous system (Chen, Chen, Wang, Wu, Yang, Xu, He, Wang, Chen and Zheng, 2010).

Medical properties of bee products have been known from ancient times and today the bee venom is used extensively for the treatment of arthritis and other inflammatory, autoimmune and destructive diseases (Han, Lee, Yeo, Kweon, Woo, Lee, Baek, Kim and Park, 2007). Bee venom includes some kinds of peptides, enzymes, and active amines and other composites which can be effective in the treatment of various diseases. For example the melitin (main substrate of bee venom) is one of the most effective anti- inflammatory factors which are known. Also adolapin is another effective anti-inflammatory substrate that suppresses the activity cyclooxygenase (COX) (Son, Lee, Lee, Song, Lee and Hong, 2007). It is reported that bee venom presents the production of Interleukin -1B (IL- 1B) from macrophages in rats in response to inner stimulation by bacterial lipopolysaccharides (Kwon, Lee, Han, Mar, Kang, Yoon, Beitz and Lee, 2002). Primary allergic compounds of bee venom such as histamine and phospholipase A2 induced the producing of the Interleukin -10 (IL-10) by the Thelper cells and suppress the proliferation of T-cell and also they can be effective in the reduction of

inflammation and finally the reduction of demyelination (Jutel, Akdis and Blaser, 2007).

The Immune suppression and anti-inflammatory effects of bee venom are reported in MS disease, rheumatoid arthritis and their laboratory models (Mirshafiey 2007).

The present study has also evaluated the result similar to those of studies on the effects of bee venom on inflammatory autoimmune diseases and anti-inflammatory and immune suppressing activities (Kwon, Lee, Han, Mar, Kang, Yoon, Beitz and Lee, 2002; Jutel, Akdis and Blaser, 2007).

TNF- α and interferon- γ are some kinds of proinflammatory cytokines each are mainly secreted by autoimmune T-cells and directly destruct bloodbrain barrier and induce the apoptosis of oligodendrocytes also considered as a demyelination factor (Akassoglou, Bauer and Kassiatis, 1998). Plasma level of TNF- α has relationship with the severity of EAE and MS and it also explains the immune status (Polka, Ovadia, Orion, Weidenfeld and Yirmiya, 2003).

In the rats of an EAE model serum level of TNF- α has the increasing regulation in the beginning of disease and it shows that TNF- α has an important role in the commencement and spread of disease (Schneider, Shuetz and Zollner, 2009).

During the present study we have observed that TNF- α decrease in the groups treated with the bee venom. Bee venom can prevent the production of proinflammatory cytokines like TNF- α (Nam, Je, Lee, Han, Lee, Kang and Mar, 2003).

In our research we observed that the amount of glutamate in the brain of EAE rats increases substantially and instead the amount of GABA will decrease

Death of neural cells are susceptible to expose with high amounts of excitatory amino acids (EAA) was for the first time discovered by Olney in 1978. Exciotoxicity emerges following imbalance between excitatory processes from one side which leads to increasing glutamate on the other side, inhibitory processes which are mediated by GABA. (Gonsette, 2008)

Glutamate excitatory is proposed as a pathological mechanism in MS and it still has a place for discussion. The T cells stimulated by antigens, macrophages, and microglias are become activated and attracted into white matter of central neural system. These glutaminase-positive cells produce high amounts of glutamate. In parallel, the capacity of the tissue to absorb the additional glutamate is reduced (Werner, Barn-Schieber and Raine, 2004).

Excitotoxicity damages myelin but it seems that axons are more resistant, excitotoxicity contributes to

blood brain barrier (BBB) dysfunction via endothelial cell EAA receptors damage (Gonsette, 2008).

GABA is the principal inhibitory neurotransmitter in the central neural system which is necessary for normal performance of the brain, neuronal activity, information processing, flexibility, network synchronization and in diseases. Prescribing GABAergic is used to treat anxiety, alcohol consumption and epilepsy and making soothing (De freitas saliva, Ferraz and Riberio, 2009).

GABA treatment reduces production of inflammatory cytokines in the peripheral macrophages. GABAergic factors directly influence the antigen-presenting cells (APCs), and reduce MAPK messages and lead to deleting inflammatory responses to myelin proteins (Bhat, Axtell, Mitra, Miranda, Lock, Tsien and Steinman, 2010).

The results of work of Bjurstom, Wang, Ericsson, Martin, Liu, Kumar-Mendu, Issazadeh-Navikas and Birnir in 2008 specify that extracellular GABA protect the neurons from the potential damage caused by pathogenic T cells and low physiological concentrations of GABA do activate GABA channels on the T lymphocytes and do decrease activated T cell proliferation. (Bjurstom, Wang, Ericsson, Martin, Liu, Kumar-Mendu, Issazadeh-Navikas and Birnir, 2008).

The amount of GABA is available in the composition of bee venom up to 1% of its dry weight (Son, Lee, Lee, Song, Lee and Hong, 2007).

In this research we observed that bee venom has increased the amount of GABA in EAE rats' brains. After that we can remember it as a boosting factor of GABA. Regarding the role of GABA in preventing from inflammatory reactions, preventing from T cells propagation and its protective role in brain and it could be said that bee venom can potentially reduce the signs and effects of EAE. Regarding the role of bee venom in reducing inflammation and glutamate and increasing GABA we can use bee venom to prevent from EAE effects and finally treatment of MS.

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Relations of serum aldosterone and microalbuminuria to left ventricular hypertrophy in patients with essential hypertension

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Abstract: Background: The identification of risk factors for the initiation of left ventricle hypertrophy (LVH), which is an independent risk factor for cardiovascular mortality and morbidity in hypertensive patients, is very important. The present study examined the role of aldosterone and microalbuminuria in LVH and geometry in patients with essential hypertension (EHT), and investigated the contribution of myocardial fibrosis to the process of LVH. Methods: The relationship of the plasma aldosterone concentration (PAC) to LVH and left ventricular (LV) geometry was investigated in 57 patients with EHT; mean age, 51 ± 10.2 years. Twenty-five had LVH. When evaluated according to the geometrical patterns of LVH, 14 patients had concentric LVH (CH), 11 had eccentric LVH (EH), and 12 had concentric remodeling. Twenty patients had normal left ventricle geometry. Two weeks after the cessation of antihypertensive medications, sodium, potassium, total protein and microalbumin in 24-hour urine samples and plasma aldosterone levels, plasma renin activity and serum procollagen type III amino-terminal peptide (PIIINP) were measured. Results: PAC of the patients with LVH was found to be significantly higher (23.0±5.6 versus 12.9±3.72 ng/dl, p=0.0001) than those without LVH. The difference between plasma renin activities was not statistically significant. Linear regression analysis revealed that plasma aldosterone level and age were independent parameters increasing left ventricle mass index (LVMI), PAC correlated with both LVMI (r=0.913, P=0.0001) and relative wall thickness (RWT: r=0.744, P=0.0001). In patients with LVH (LVMI 134 g/m²), the serum concentration of PIIINP, a marker of myocardial fibrosis, correlated with RWT (r=0.422, p=0.001) and LVMI (r= 0.664, P=0.0001). The serum PIIINP concentration was significantly higher in the CH group than in the EH group (0.74±0.11 vs 0.66±0.19 ng/ml, respectively; p<0.05). Twenty-four hour urine microalbumin concentrations of the patients with LVH were found to be significantly higher (P=0.003) and positively correlated with LVMI and PAC (P=0.0001). Conclusions: Aldosterone may be involved in LVH and LV geometry, particularly in the development of CH. Myocardial fibrosis seems more strongly involved in the hypertrophic geometry of CH than with EH. A strong relation between microalbuminuria with aldosterone and LVMI was detected. The value of selective aldosterone blockers in preventing target organ damage awaits further investigations.

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Key Words: Aldosterone; Essential hypertension; Left ventricular hypertrophy; Left ventricular geometry; Procollagen type III amino-terminal peptide; Microalbuminuria.

Introduction:

Many patients with essential hypertension may present with overt or subclinical target organ damage (TOD) involving the heart, kidneys, central nervous system or retina at the time of their initial diagnosis. The cost effectiveness of BP reduction using drug therapy is greater in the presence of target organ abnormalities and/or co-morbidities. In this context, assessment of sub-clinical TOD has become the key element in evaluating hypertensive patients ⁽¹⁾

Left ventricular hypertrophy (LVH) represents an independent risk factor for cardiovascular mortality and morbidity in patients with hypertension (HT) ⁽²⁾. In particular, concentric LVH is associated with a higher risk of cardiac arrhythmias, and even sudden death, and predicts the development of heart failure ⁽³⁾. Hemodynamic load is strongly involved in the development of LVH in HT, but blood pressure and the degree of LVH do not necessarily correlate. The development of LVH is influenced by various neurohumoral factors; the renin-angiotensin system is thought to play an important role in the pathogenesis of LVH ⁽⁴⁾. In morphological findings obtained from *in vivo* and *in vitro* studies, increased levels of aldosterone in the circulation were found to be related with the excessive accumulation of collagen

causing myocardial fibrosis ⁽⁵⁾. However, it is not clear whether aldosterone plays an independent role in the development of hypertrophy in hypertensive patients ^(6,7).

Serum procollagen type III amino-terminal peptide (PIIINP), is formed during the conversion of procollagen type III to collagen type III and released into the blood, then cleared from the blood via hepatobiliary elimination. The serum concentration of PIIINP is used as a marker of collagen type III synthesis in various organs, including the liver under conditions of preserved bile excretion ⁽²⁾. High serum levels of PIIINP gained attention as reflecting ongoing fibrosis in the heart ⁽⁸⁾.

Microalbuminuria (MA) is one of the earliest indications of kidney injury in patients with diabetes mellitus and hypertension and is associated with high incidence of cardiovascular morbidity ^(9,10,11). The National Kidney Foundation of the United States defines MA as urine albumin excretion of approximately 30-300 mg/day (20–200 µg/min) in at least two out of three consecutive samples of non-ketotic sterile urine or albumin creatinine ratio of 3–30 mg/mmol (30–300 mg/g) ⁽¹²⁾.

The association between MA and hypertension was described long time ago. A renewed interest in MA and essential hypertension occurred when several studies pointed out the importance of MA as a predictor of excess cardiovascular morbidity and mortality in non-diabetic hypertensive patients ⁽¹³⁾. MA has proved to be highly specific in identifying patients with LVH and carotid atherosclerosis ⁽⁹⁾, because MA possibly reflects a state of increased renal endothelial permeability and is considered an early marker of diffuse endothelial dysfunction ⁽¹⁴⁾.

The aim of the present study was to investigate the relationship of aldosterone and microalbuminuria with LVH and different geometrical patterns of left ventricle that develop in hypertensive patients. In addition, the degree of ongoing fibrosis associated with various geometrical patterns of LVH was examined by assaying the serum PIIINP concentrations.

Subjects and Methods:

Patients

We enrolled 57 male patients with essential hypertension (EHT), randomly selected from the Out Patients Clinic of Specialized Medical Hospital, Mansoura University, with mean age, 51±10.2 years and 20 non-hypertensive normal male subjects of matched age and body weight as control group. Patients with the following diseases were excluded

from the study: secondary HT, coronary artery

disease, valvular heart disease, atrial fibrillation, LV systolic dysfunction (LV ejection fraction; LVEF 50%), renal disorder (serum creatinine level 1.5 mg/dl) or electrolyte imbalance. Conditions associated with elevated serum concentrations of PIIINP were likewise excluded (liver disease, bone disease, malignant disease, diabetes mellitus, pulmonary fibrosis or collagen disease). All patients gave written informed consent to participate in the study and the investigations conformed to the principles outlined in the Declaration of Helsinki. The study protocol was approved by local ethics committee of the hospital.

Height, weight, body mass index (BMI), blood pressure, heart rate, the period they were aware of their hypertension and the medication they were using were recorded for each patient. BMI was calculated by the formula: body weight (kg)/ height (m²). Blood pressure and heart rate were measured with the patient seated, after a 5-min rest period. Two measurements were obtained at 5-min intervals, and then averaged. The criteria for HT were: systolic blood pressure (SBP) 140 mmHg and diastolic blood pressure (DBP) 90 mmHg. In addition, blood and urine tests and echocardiography were performed within 2 weeks of the initial examination, while the patient was untreated.

Biochemical Determinations:

Prior to initiating the study, all antihypertensive medications were stopped for two weeks and the patients were recommended to consume a diet with a normal amount of salt. Ten patients who had uncontrolled elevations during the no medicated period were administered amlodipine since it would have the least effect on the measurements to be carried out. However, this medication was also stopped 48 hours before obtaining blood samples.

Fasting blood samples were collected while the patient was supine and had rested for 20 min and delivered into 2 tubes. Three ml of them was collected in K₂EDTA-containing tubes and the samples were centrifuged for 5 minutes at 3000 rpm at 4°C. Plasma was stored at -70°C until analysis of plasma renin activity (PRA) and plasma aldosterone concentration (PAC). The rest of blood sample collected in biochemical tube to obtain serum. The serum samples were obtained by centrifuging blood samples at 3000 rpm for 15 min at 4°C. Serum was stored at -70 °C until analysis of serum PIIINP, lipid profile, and electrolytes.

- Plasma renin activity (PRA) was measured using commercially available coat-A-count solid phase radioimmunoassay kits supplied by Diagnostic

Products Corporation (Los Angeles, CA, USA), according to the manufacture instructions (15).

- Plasma aldosterone concentrations (PAC) were measured using commercially available coat-A-count solid phase radioimmunoassay kits supplied by Diagnostic Products Corporation (Los Angeles, CA, USA), according to the manufacture instructions (16). -Serum PIIINP concentrations were measured using commercially available immunoradiometric assay kits, (Riagnost PIIIP, CIS. Biointernational, Saclay, France), that employs monoclonal antibody to PIIINP (17)

At the same time, urine were collected for 24 hours, urine volume measured then 10 ml was stored in Falcon tubes at -70°C till assay of urine total protein, microalbumin and electrolyte. The patients were asked to avoid exercise prior to the urine collection.

- Electrolyte measurements were carried out by ionselective electrodes using AVL 988 analyzer (Roche Diagnostics, Germany).
- Microalbuminuria (MA) was assessed using an immunoassay kit (Roche Diagnostics GmbH, Basel, Switzerland), according to the manufacture instructions.

Echocardiographic Measurement:

Comprehensive 2-dimensional echocardio-graphy was performed using an ESAOTE XP-10 with 2.5 MHz transducer (USA). Recordings were obtained at rest according to the recommendations of the American Society of Echocardiography Measurements included LV dimension at diastole (EDD), dimension at systole LV interventricular septal thickness (IVST) and posterior wall thickness (PWT) and left atrium (LA) size at end-systole. LVEF was calculated in the parasternal long-axis view. LV mass was normalized for body surface area and expressed as the LV mass index (LVMI), which was calculated using Devereux's formula (1993) (199): (LVMI =1.04 [(EDD + IVST $+PWT)^{3} - (EDD)^{3}$] -13.6). An LVMI value > 134

g/m² was taken as indicating LVH. The relative wall thickness (RWT) was calculated as PWT × 2/EDD and a value of more than 0.44 were accepted as indicating an increase (20). Patients were divided into 4 groups according to their LV geometry (21): N group, normal LVMI and RWT; concentric remodeling (CR) group, CR indicated by normal LVMI and increased RWT; eccentric hypertrophy (EH) group, EH indicated by increased LVMI and normal RWT; and concentric hypertrophy (CH) group, CH indicated by increased LVMI and RWT. In addition, pulse Doppler echocardiography was used to assess LV diastolic function. Peak velocities of the early diastolic filling wave (E wave) and atrial filling (A wave) were recorded and the E-to-A ratio (E/A) was calculated. Deceleration time (DcT) of the E wave was then determined.

Statistical Analysis:

Statistical analyses were performed using SPSS software (SPSS Inc. Chicago, IL). Data are expressed as means \pm SD. Unpaired samples t test was used to compare the mean values in 2 groups and one-way ANOVA was used for groups of three or four. The relationships between variables were assessed using univariate linear regression analysis and Pearson's correlation coefficient. A P value <0.05 was accepted as having statistical significance.

Results:

Table (1): Compares the clinical and echocardiographic data of hypertensive patients and controls. The mean SBP, DBP, LVMI, IVST, PWT, RWT, EDD, LA, EF, mitral E/A ratio and DcT were significantly higher in HT patients compared to controls (P<0.05).

Table (2): Shows the laboratory data of the hypertensive patients and controls. There were significant higher levels of PAC, PRA and PIIINP in HT patients than controls (P<0.05). HT patients had high prevalence of MA (46.7%), with mean MA levels 44.3±13.7 mg/L (Figure 1).

Table (1): Clinical and echocardiographic data of hypertensive (HT) patients and controls

Table (1): Cunical and echocaralographic data of hypertensive (111) patients and controls						
Parameters	HT patients	Controls	P value			
	N=57	N=20				
Age (year)	51±10.2	50.9±7.9	0.960			
Duration of HT (year)	6.1±3.8					
Weight (Kg)	82.7±13.9	83.9±12.7	0.730			
<i>Height</i> (cm)	164±21.1	166±23.2	0.740			
BMI (Kg/m ²)	30.0±3.21	30.4±2.5	0.680			
SBP (mmHg)	170.0±27.6	115±8.1	0.000			
DBP (mmHg)	106±15.8	74.5±6.8	0.000			
LVMI (g/m ²)	128.0±20.3	89.0±36.5	0.000			
IVST(cm)	1.41±0.32	0.84 ± 0.36	0.000			
PWT (cm)	1.26±0.32	0.88 ± 0.29	0.000			
RWT	0.50 ± 0.11	0.37 ± 0.24	0.000			

EDD (cm)	5.35±0.86	4.64±0.1.25	0.006
LA (cm)	3.74±0.77	3.26 ± 0.73	0.018
<i>EF</i> (%)	61.1±10.1	66.3±12.1	0.066
Mitral E/A ratio	0.89 ± 0.21	1.43 ± 0.64	0.000
DcT (msn)	184.0±31.7	168±45.9	0.077

BMI= Body mass index, SBP= Systolic blood pressure, DBP= diastolic blood pressure, LVMI= LV mass index, IVST= Interventricular septal thickness, PWT= Posterior wall thickness, RWT= Relative wall thickness, EDD= LV dimension at diastole, LA= Left atrium size at end-systole, EF= LV ejection fraction, E/A= Early/atrial transmitral Doppler flow velocity, DcT= Deceleration time of early transmitral Doppler flow.

Table (2): laboratory data of the hypertensive patients and controls

Parameters	HT patients, N=57	Controls, N=20	P value
Serum creatinine (mg/dl)	0.97±0.18	0.91±0.15	0.240
Serum potassium (meq/L)	3.93±0.46	3.84 ± 0.42	0.441
Serum sodium (meq/L)	140±6.7	138±6.0	0.182
Serum Cholesterol (mg/dl)	208±33	141±23	0.000
Serum triglycerides (mg/dl)	112.0±30.7	89.2±22.6	0.003
HDL-C (mg/dl)	40.1±6.01	46.8±6.68	0.000
LDL-C (mg/dl)	145.0±33.0	76.4±24.0	0.000
Plasma aldosterone (ng/dl)	17.3±6.86	8.46±3.27	0.000
Plasma renin activity (ng.ml ⁻¹ .h ⁻¹)	1.67±0.74	0.80 ± 0.51	0.000
PIIINP (ng/ml)	0.61±0.18	0.35 ± 0.07	0.000

Significant P: <0.05

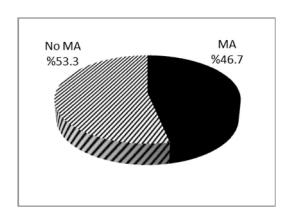


Figure (1): Prevalence of microalbuminuria in hypertensive patients

Of the 57 hypertensive patients participating in the study, 25 had LVH diagnosed echocar- diographically. When the patients were evaluated according to their left ventricle geometries, 14 patients had concentric LVH, 11 had eccentric LVH, and 12 had concentric remodeling. Twenty patients had normal left ventricle geometry. Twenty patients did not use any antihypertensive medications before, 6 were on betablockers, 7 were taking ACE inhibitors, 5 were receiving angiotensin II receptor blockers, 5 were on calcium antagonists, and 1 patient was receiving an alpha-blocker. Thirteen patients were receiving

combined medical treatment.

When blood pressure levels were compared, the patients with LVH had higher SBP, compared to the patients without LVH (P=0.028), while no significant difference between DBP levels was found (P=0.670). The BMI of the patients with LVH was significantly higher than that of the patients without LVH (P=0.0001). The differences between the total cholesterol, triglyceride, HDL-C and LDL-C levels were not statistically significant (P>0.05). There was no statistically significant difference in duration of hypertension between patients with LVH and those without (6.8±3.2 versus 5.4±3.8) (*P*= 0.078) (Table 3).

The two-dimensional and Doppler echocardiographic parameters of the patients grouped according to LVH are presented in Table 3. Left ventricular ejection fraction did not show a statistically significant difference between the groups (*P*=0.077). The patients with LVH had significantly higher LVMI (*P*=0.0001). Diastolic functions of the patients with LVH were significantly disturbed. In patients with LVH, the mitral E wave deceleration times were statistically higher (*P*=0.046), and the mitral E/A ratios were significantly lower (*P*=0.001) (Table 3).

Patients with LVH had significantly higher 24-hour urine protein and microalbumin values than the patients without LVH (P=0.028 and P=0.003 respectively) in patients with LVH, plasma

aldosterone levels were higher than those without LVH (23.0 \pm 5.6 versus 12.9 \pm 3.72 ng/dl, P=0.0001), and the difference between plasma renin activity was not statistically different (1.87 \pm 0.72 versus 1.50 \pm 0.73 ng.ml⁻¹.h⁻¹, P=0.062) (Table 4; Figure 2).

When a comparison was made according to geometrical remodeling of the left ventricle, the SBP levels of the patients with concentric LVH were statistically significantly greater than that of the patients with concentric remodeling (195.0±30.5 versus 157.8±14.8 mmHg, P=0.0001). There was no difference between DBP levels significant (106.4±16.3 versus 100.2±8.4 mmHg, P=0.510). BMI, duration of hypertension, and serum lipid levels did not exhibit significant differences between the groups (P>0.05). The LVMI, RWT, IVST and PWT of the patients with concentric LVH were statistically significantly higher than that of the patients with concentric remodeling (P=0.0001) (Table 5).

When the groups were compared according to the geometrical remodeling of the left ventricle, the patients with concentric LVH had significantly higher levels of plasma aldosterone (25.3 \pm 4.5 ng/dl) when compared to the patients with normal geometry (13.3 \pm 5.0 ng/dl) and to patients with concentric remodeling (14.5 \pm 3.3 ng/dl) (P=0.0001). The plasma levels of aldosterone did not differ between patients having concentric hypertrophy and

eccentric hypertrophy (P=0.053). The geometrical patterns of the left ventricle did not demonstrate significant differences with regards to plasma renin activity (P=0.612). The differences between the measured levels of 24-hour urinary microalbumin (P=0.543), sodium (P=0.771), and potassium (P=0.570) were not significant while urine protein levels were significantly higher in concentric LVH (Table 6).

Spearman's correlation showed positive correlations between PAC with PRA (r=0.672; p=0.0001), PIIINP (r=0.647; p=0.0001) and MA (r=0.694; p=0.0001) (figure 3). Also there were a positive significant correlations of MA with PRA (r=0.642; p=0.0001) and PIIINP (0.661; P=0.0001), in addition significant positive correlation was found also between PRA and PIIINP (r= 0.732; p=0.0001). Moreover, PAC, PRA, PIIINP and MA showed significant positive correlations with LVMI, IVST, RWT, EF, EDD and DcT while significant negative correlations were found with E/A ratio (p<0.05) (table 7; figure 4,5&6).

When independent parameters influencing LVMI were analyzed with linear regression analysis, there was a significant continuing relationship between LVMI and plasma aldosterone level and a significant relationship that was evolving with age (table 8).

Table (3): Comparison between hypertensive cases with LVH (LVMI>134 gm/m²) and those without LVH (LVMI<134 gm/m²)

	(LVMI<134 gm/m)		
Parameters	No LVH (N=32)	LVH (N=25)	P value
Age (year)	50.2±9.8	51.9±10.8	0.550
BMI (kg/m ²)	28.44±3.56	33.5±2.87	0.0001
SBP (mmHg)	163±21.4	179±32.2	0.028
DBP (mmHg)	105±15.3	107±16.5	0.670
$LVMI(g/m^2)$	117.0±16.1	143.0±15.8	0.0001
IVST (cm)	1.21±0.14	1.68±0.29	0.0001
PWT (cm)	1.05±0.18	1.53±0.24	0.0001
RWT	0.41 ± 0.004	0.61±0.003	0.0001
EDD (cm)	5.30±0.85	5.41±0.87	0.634
LA (cm)	3.66±0.80	3.84±0.73	0.400
EF (%)	59.0±10.3	63.8±9.35	0.077
Mitral E/A ratio	0.97±0.22	0.80±0.24	0.0017
DcT (msn)	175.5±28.3	190.0±28.9	0.046
Serum Cholesterol (mg/dl)	211±31.6	203.0±34.9	0.384
Serum triglycerides (mg/dl)	113.0±27.7	110.5±34.7	0.716
<i>HDL-C</i> (mg/dl)	41.0±6.34	39.0±5.48	0.211
LDL-C (mg/dl)	148.0±32.2	142.0±34.5	0.550

LVH= Left ventricular hypertrophy

Significant P: <0.05

BMI= Body mass index, SBP= Systolic blood pressure, DBP= diastolic blood pressure, LVMI= LV mass index, IVST= Interventricular septal thickness, PWT= Posterior wall thickness, RWT= Relative wall thickness, EDD= LV dimension at diastole, LA= Left atrium size at end-systole, EF= LV ejection fraction, E/A= Early/atrial transmitral Doppler flow velocity, DcT= Deceleration time of early transmitral Doppler flow.

Table (4): Twenty-four hour urine finding, plasma aldosterone, renin activity and PIIINP in hypertensive cases with LVH and those without LVH

Parameter	No LVH (N=32)	LVH (N=25)	P value
24-hour urine:	(11-32)	(14-23)	
Protein (mg/day)	110.5±52.6	146.0±69.3	0.028
Microalbumin (mg/day)	39.7±12.5	50.3±13.2	0.0031
Sodium (mEq/L)	219.7±66.2	177.9±79.4	0.034
Potassium (mEq/L)	52.3±23.5	57.8±21.8	0.377
Plasma renin activity (ng.ml ⁻¹ .h ⁻¹)	1.50±0.73	1.87±0.72	0.062
Plasma aldosterone (ng/dl)	12.9±3.72	23.0±5.6	0.0001
PIIINP (ng/ml)	0.55±0.16	0.67±0.17	0.0097

LVH= Left ventricular hypertrophyl; Significant P: <0.05

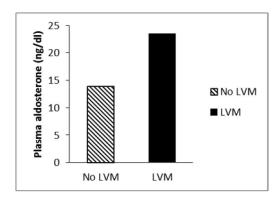


Figure (2): Plasma aldosterone in hypertensive cases with LVH and those without LVH hypertensive group

Table (5): Echocardiographic parameters according to ventricular Geometry

	Normal	Concentric	Eccentric	Concentric
	Geometry	Remodeling	LVH	LVH
	(n=20)	(n=12)	(n=11)	(n=14)
IVST (cm)	1.26±0.23	1.32±0.25	1.61±0.40	1.68±0.25**
PWT (cm)	1.05±0.19	1.30±0.28	1.31±0.35	1.59±0.23**
EDD (cm)	5.32±0.86	5.03±0.76	5.81±0.83	5.26±0.87
$LVMI(g/m^2)$	106.8±17.4	118.3±13.0	154.0±15.9	162.8±19.7**
RWT	0.42 ± 0.02	0.59±0.02	0.45±0.01	0.62±0.02**
LVEF (%)	60±9.2	59.5±10.6	61.4±11.2	64.4±10.8
E/A	0.90±0.19	0.87±0.17	0.85 ± 0.22	0.94±0.25
DcT(ms)	178±33.9	176±22.9	179±23	194±29.7

^{**}P=0.0001 when compared with patients having normal geometry

LVMI= LV mass index, IVST= Interventricular septal thickness, PWT= Posterior wall thickness, RWT= Relative wall thickness, EDD= LV dimension at diastole, EF= LV ejection fraction, E/A= Early/atrial transmitral Doppler flow velocity, DcT= Deceleration time of early transmitral Doppler flow.

Table (6): Twenty-four hour urine finding, plasma aldosterone, renin activity and PIIINP values according to ventricular Geometry

	Normal Geometry (n=20)	Concentric Remodeling (n=12)	Eccentric LVH (n=11)	Concentric LVH (n=14)
24-hour urine:				
Protein (mg/day)	98.3±54.0	124.6±42.1	147.6±55.6	162.2±79.7
Microalbumin (mg/day)	41.1±13.2	45.4±13.8	47.3±13.8	46.8±15.1
Sodium (mEq/L)	203.7±57.1	208.5±107	180.2±81.5	185.3±82.8
Potassium (mEq/L)	50.8±24.0	55.6±25.2	53.6±17.4	62.3±22.2
Plasma renin activity (ng.ml ⁻¹ .h ⁻¹)	1.58±0.78	1.56±0.74	1.66±0.65	1.92±0.77
Plasma aldosterone (ng/dl)	13.3±5.0	14.5±3.3	20.3±6.7	25.3±4.5**,#
PIIINP (ng/ml)	0.54±0.17	0.55±0.15	0.66±0.19	$0.74\pm0.11^{**,#}$

^{*}P=0.0001 when compared with patients having normal geometry

Table (7): Correlation of PAC, PRA, PIIINP and MA with SBP, DBP, BMI and echocardiographic findings in hypertensive patients

	PAC		PR	A	PIIIN	P	MA	
	r	P	r	P	r	P	r	P
SBP	0.179	0.182	0.078	0.564	0.172	0.201	0.132	0.327
DBP	0.307	0.023^{*}	0.106	0.433	0.076	0.574	0.019	0.888
BMI	-0.383	0.057	-0.211	0.120	-0.079	0.657	-0.018	0.895
LVMI	0.913	0.000^{**}	0.675	0.000^{**}	0.664	0.000^{**}	0.662	0.000^{**}
IVST	0.816	0.000^{**}	0.420	0.001^{**}	0.477	0.000^{**}	0.48	0.000^{**}
PWT	0.010	0.939	0.02	0.833	0.042	0.755	0.224	0.093
RWT	0.744	0.000^{**}	0.379	0.004**	0.422	0.001^{**}	0.445	0.001^{**}
EDD	0.336	0.011^{*}	0.356	0.007^{**}	0.271	0.041^{*}	0.367	0.005^{**}
LA	0.202	0.132	0.008	0.954	0.205	0.126	0.306	0.021^{*}
EF	0.413	0.001^{**}	0.277	0.037^{*}	0.273	0.040^{*}	0.396	0.002^{**}
E/A ratio	-0.691	0.000^{**}	-0.501	0.000^{**}	-0.490	0.000^{**}	-0.482	0.000^{**}
DcT	0.679	0.000^{**}	0.571	0.000^{**}	0.602	0.000^{**}	0.526	0.000^{**}

^{*}Correlation is significant at the 0.05 levels

Table (8): Linear regression analysis of the independent factors affecting LVMI

	Unstandardize	d Coefficients	Standardized Coefficients		8
	В	Std. Error	Beta	t	p
PAC	2.434	0.252	0.817	9.648	0.000**
PRA	1.244	2.405	0.045	0.517	0.607
PIIINP	11.591	9.966	0.102	1.163	0.250
MA	0.003	0.123	0.002	0.026	0.979
SBP	-0.030	0.045	-0.040	-0.666	0.509
DBP	-0.092	0.077	-0.071	-1.188	0.241
BMI	0.283	0.196	0.154	1.529	0.117
Age	1.603	0.223	0.462	3.126	0.029

Dependent Variable: LVMI

^{*}P=0.0001 when compared with patients having concentric remodling

^{**} Correlation is significant at the 0.01 levels

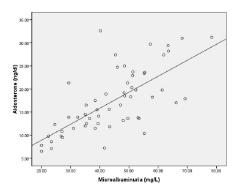


Figure (3): Positive correlation between aldosterone and microalbuminuria in hypertensive patients

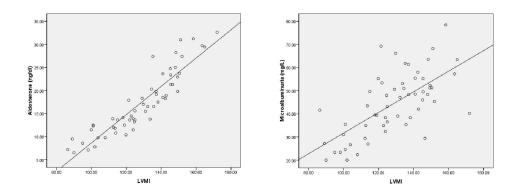


Figure (4): Correlation between LVMI with aldosterone and microalbuminuria in hypertensive patients

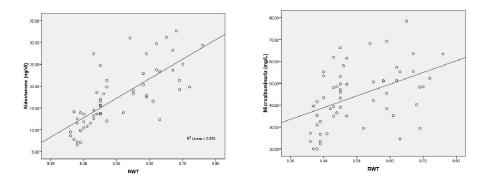


Figure (5): Correlation between RWT with aldosterone and microalbuminuria in hypertensive patients

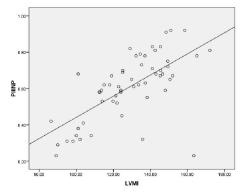


Figure (6): Correlation between LVMI with PIIINP in hypertensive patients

Discussion:

In hypertension, the major indicator of the degree of LVH is systolic blood pressure. Finding higher values of systolic blood pressure in our patients with LVH Than those without LVH (P=0.028) supports this. However, only 50% of the variances observed in left ventricular mass of hypertensive patients can be explained by the differences in systolic blood pressure and this is a very low rate ⁽²²⁾. The reason behind this is having several mechanisms responsible for the increase in cardiac mass. Non hemodynamic mechanisms such as the activities of the reninangiotensin system and sympathetic nervous system might have an important role in the development of myocardial hypertrophy ⁽⁷⁾.

In the present study, plasma aldosterone levels were significantly higher in HT patients when compared to controls and was positively correlated with DBP (p= 0.023). Moreover, EHT patients with LVH, especially those with concentric hypertrophy, had higher levels of plasma aldosterone and that PAC was positively correlated with LVMI and RWT. These findings indicate the possibility that plasma aldosterone, is involved in the development of hypertensive cardiac hypertrophy and can cause increases in LV mass and concentric changes. These results in agreement with the results of Soylu et al., (2004) (7); Vasan et al., (2004) (23); Nakahara et al. (2007) (29) and (Gaddam et al., 2010) (24).

Nakahara et al. (2007) (2) found that, the coexistence of arterial hypertension with high levels of aldosterone in the circulation was closely related to excessive collagen accumulation leading to myocardial fibrosis. Aldosterone is influential on myocardial tissue, especially non-myocyte cells (endothelial cells, cardiac fibroblasts) (7). Nonmyocyte cells are thought to be important in the development of pathological left ventricular hypertrophy. The synthesis of aldosterone is partially controlled by angiotensin-II and plasma levels of aldosterone are not always related to renin activity and angiotensin-II concentrations (25). Increased levels of angiotensin-II in the circulation cannot by itself predict the fibrous tissue response. A study by Brilla and Weber (1992) (26) demonstrated that cardiac fibrosis in patients with left ventricular hypertrophy was

guided by aldosterone rather than angiotensin-II and renin. There is increasing evidence of the presence of a cardiac renin-angiotensin system with local aldosterone formation. Local aldosterone formation in the heart may contribute to the pathogenesis of cardiac hypertrophy ⁽⁷⁾. Yamamoto, et al (2002) ⁽²⁷⁾

had demonstrated that aldosterone is produced in the hypertensive human heart. Although cardiac aldosterone synthesis may be regulated by both the systemic and local renin-angiotensin system, the precise mechanisms for the induction of aldosterone in the hypertensive heart are not clear. Indeed, increased wall tension in the myocardium due to high blood pressure may be a main stimulus for activation of cardiac aldosterone production by way of the renin-angiotensin system in patients hypertension. The amount of aldosterone produced by cardiac tissue is small compared with the amount of plasma aldosterone, suggesting that the biological function of cardiac aldosterone may be autocrine or paracrine (28). However, cardiac aldosterone synthesis and its retention may be important for the pathogenesis of the hypertensive heart (2).

In our study, we found high PRA and positive correlation between PRA and LVMI in HT patients; however, the plasma levels of renin did not differ between different geometrical patterns of the left ventricle (P=0.610). In renovascular hypertension (high renin), the primarily identified geometrical pattern was concentric hypertrophy and there are studies demonstrating high levels of renin in EHT patients with concentric hypertrophy (29). Furthermore, in several studies performed in patients with essential hypertension, different results have been observed with regards to the relationship between the reninangiotensin system and the left ventricular mass. In research in which univariate analysis has been implemented, a significant relationship was found between PRA and left ventricular mass, yet this has not been possible in other studies. A possible explanation for this is that the relationship between renin and the left ventricle might be influenced by some cofactors. Age, blood pressure, sodium intake, plasma volume and levels of angiotensin II were positively correlated with LVMI, while inversely related to renin (7).

Primary aldosteronism is characterized by volume loading and when compared with renovascular hypertension, eccentric LVH is observed more frequently in primary aldosteronism (24). In previous studies, aldosterone levels were found to be high in EHT patients with concentric hypertrophy as well, yet higher values were found in patients with concentric remodeling of the left ventricle and eccentric hypertrophy (29). In our study, both in patients with eccentric and concentric hypertrophy, plasma aldosterone levels were observed to be higher, however; this only reached the limit of statistical significance in patients with concentric hypertrophy. When parameters such as

blood pressure, BMI, and age were added, the relationship between aldosterone and concentric hypertrophy still continued. Thus, we might speculate that there is an independent relationship between aldosterone and LVH (especially concentric hypertrophy). Independent of the effects of the factors increasing blood pressure, aldosterone might play a role in cardiac hypertrophy. Although eccentric LVH is more commonly seen in primary aldosteronism which is characterized by volume loading (24,30), etiology is multifactorial in cases of EHT and the geometry of the left ventricle might change depending on the degree of neurohumoral activity.

Diastolic dysfunction is identified frequently in EHT with LVH. Correlations between PAC and impaired LV diastolic function have been described in EHT patients (7). We investigated the relation of aldosterone with diastolic dysfunction and we found correlation between PAC and diastolic filling velocities of the left ventricle. Considering these findings together with the present results, leads to the following concepts. If the aldosterone-induced myocardial fibrosis progresses, impaired LV diastolic function and concentric hypertrophy appear. In such patients, activation of aldosterone receptors in the heart may be strongly potentiated, or aldosterone production in myocardial tissue may be accelerated. Further progression of myocardial fibrosis would gradually lead to impaired LV systolic function, followed by enlargement of the LV chamber, a decrease in the movement of the LV wall, and development of a state of hypertensive heart failure (2).

Several reports have suggested the possibility that aldosterone directly promotes myocardial hypertrophy and interstitial fibrosis by stimulating the synthesis of myocardial collagen and the proliferation of fibroblasts in experimental conditions (2). Weber et al (1991) (31) used a hypertensive rat model and showed that aldosterone administration increased both blood pressure and interstitial and perivascular fibrosis, while co-administration of spironolactone, an aldosterone receptor antagonist, completely inhibited the development of fibrosis even at dosages that did not demonstrate an antihypertensive effect. In addition, aldosterone has been shown to increase extracellular matrix and collagen deposition in the myocardium by enhancing the expression of cardiac collagen type I and III genes (2).

PIIINP is released into the blood at the time of collagen synthesis, and has recently gained attention as a marker of ongoing tissue fibrosis in the cardiovascular organs ⁽²⁾. Matoba et al (1998) ⁽³²⁾ administered delapril hydrochloride, an ACE inhibitor, for 12 months to hypertensive patients with

accompanying LVH and reported that serum PIIINP concentrations and LV mass were both reduced by this treatment. Sato et al (2002) (33) added spironolactone to an ACE inhibitor as drug therapy for EHT patients, and found that this combination significantly reduced both LVMI and the serum PIIINP concentration. In addition, Tsutamoto et al $(2000)^{(34)}$ performed cardiac catheterization to collect blood from the coronary sinus and aorta in chronic heart failure patients, which showed that the index of aldosterone incorporation into the heart correlated positively with LV end-diastolic volume and serum PIIINP concentration. Moreover, the Randomized Aldactone Evaluation Study (RALES) showed that the outcome in patients with severe chronic heart failure was strikingly improved when spironolactone was added to the treatment regimen (2). Zannad et al (2000) (35) performed subanalysis of the RALES results and demonstrated that 6 months' administration of spironolactone brought about a significant decrease in serum PIIINP concentration compared with placebo, that outcome was better in the low-PIIINP-concentration group compared with the high concentration group. These reports suggest that aldosterone may be directly incorporated into cardiac tissue and is strongly involved in the development of remodeling of the LV.

The present study found that the serum PIIINP concentration was high and significantly correlated with RWT and LVMI in the combined LVH group (EH + CH group). Moreover, the serum PIIINP concentration was significantly higher in the CH group than in the EH group. These findings suggest that the development of interstitial fibrosis is more strongly involved in CH than in EH, and that aldosterone likely influences the development of fibrosis. Taniguchi et al (2006) (36) reported that the addition of spironolactone significantly reduced LVMI only in the concentric LV hypertrophy subgroup of hypertensive patients during angiotensin II receptor blocker treatment.

Another finding obtained in our study was that EHT patients with LVH had higher levels of microalbumin excretion in 24-hour urine samples compared to those without LVH (P=0.003). There was also a significant positive correlation between MA with LVMI and RWT. However, results regarding the relationships between MA and geometric pattern of LV did not showed statistically significant difference between the 4 groups of HT patients. Similarly, in the previous studies, high urinary microalbumin excretion by hypertensive patients was found to be in correlation with electrocardiographic LVH and the risk of myocardial infarction (37). Also, similar to the report of Busari et

al. (2010) (12) which showed that MA was independently associated with ECG abnormalities such as ECG LVH, QTc prolongation and ventricular arrhythmias in adult non-diabetic Nigerians with hypertension. Moreover, Bulatov et al. (2001) (38) found linear correlation between LVMI and albumin excretion rate. Assadi (2008) (13) found that MA and C-reactive protein (CRP) levels are predictors of increased risk for LVH and the strength of association between LVH and CRP is comparable to that of MA in children and adolescents with essential HT nephropathy.

The pathogenic mechanisms leading to the development of MA are not yet fully known: blood pressure load and increased systemic vascular permeability, possibly due to early endothelial damage, seem to play a major role (39). MA itself has been recognized as a sign of hypertensive target organ damage and since it reflects the influence of so many clinically relevant parameters, it can rightly be considered an integrated marker of cardiovascular risk, a unique feature among the several available prognostic predictors for stratifying risk in hypertensive patients. Effective antihypertensive treatment, especially with drugs counteracting the renin angiotensin system, has been found to reduce urinary albumin excretion. More recently, regression from microalbuminuria to normoalbuminuria has associated with an amelioration cardiovascular outcome, regardless of achieved blood pressure levels and type of drug (13).

In the present study, MA showed significant positive correlation with plasma aldosterone, this is in agreement with Baldoncini (1999) (40) and could suggest an important role for aldosterone in the pathogenesis of renal impairment in HT patients due to impaired vascular reactivity. Also, our results are coinciding with those of Smilde et al. (2005) (41) who found that subjects with mild renal impairment have substantially higher risk of LVH than those without renal dysfunction.

Conclusion:

Aldosterone may be involved in LVH and LV geometry, particularly in the development of concentric hypertrophy. Myocardial fibrosis seems more strongly involved in the hypertrophic geometry of CH than with EH. Also, the role of combined aldosterone and microalbuminuria on LVH was illustrated. The determination of MA is recommended in the initial work-up of subjects with EHT. The value of selective aldosterone antagonists on kidney, CV dysfunction awaits wide studies.

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Correlates of Physical and Psychosocial Functioning Among Burn Patients

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Abstract: The burn injury can one of the most serious and devastating injuries among people of all ages. The aim of the study was to identify correlates of physical and psychosocial functioning among burn patients. The study was conducted at the burn units of El-Mansoura University Hospital. Design: descriptive correlational design was used. Tools which were used for data collection: 1) Sociodemographic data and clinical data. 2) Brief Burn Specific Health Scale is adopted from (**Kildal** *et al.*, **2001**), to assess physical and psychosocial function in individual suffering from burn injury. The results of this study showed a statistically significant improvement in the physical and psychological functioning scores among patients from admission to discharge from hospital. This study concluded that Patients with burn injury suffer from a multitude of physical problems that alter their physical and psychosocial functional. Consequently, regular and comprehensive nursing intervention for follow up of these patients is necessary for life saving. Burn patients experience low functional outcome on the admission of hospital, which slightly improves during, by the discharge from hospital. This study recommended replication of the study on a larger probability sample from different geographical areas, to achieve more generalizable results.

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Key words: Burn injury, Physical, Psychological functioning

1. Introduction:

The burn injury can one of the most serious and devastating injuries among people of all ages. Burn injury resulting in tissue loss or tissue damage. This tissue injury occurs when energy from heat source is transferred to the tissues of the body, as a result of direct contact or exposure to any thermal, chemical, electrical, or radiation are termed burns (Gomez and Cancio, 2003). Burns severity depends on its depth and the body surface affected. Burn care classified according to the depth of tissue destruction and identified superficial, partial thickness and full thickness injuries (Edelman, 2007).

Burn injuries cause significant physical and psychological complications that require comprehensive rehabilitation treatment coordination with the acute care burn team. This interdisciplinary rehabilitation treatment is focused on preventing long-term problems with scarring, contractures, and other problems that limit physical function. Adequate pain management and recognition of psychological issues are important components of treatment after burn injuries (Esselman, 2007). Kildal et al. (2002) showed that perceived health problems after burn injury can persist for several decades. In addition, between 13% and 23% of patients develop depression, and 13-45% develops posttraumatic stress disorder (PTSD) after hospital discharge (Van Loey & Van Son, 2003).

Burns represent an extremely stressful experience for both the burn victims as well as their families. An extensive burn profoundly affects the patient's physical, psychological, economic and family. Patients who suffer from extensive burn injuries frequently die, while others suffer from painful physical recovery. In addition to their dramatic physical effects, burn injuries frequently cause deleterious psychological complication (Hosseini *et al.*, 2007, Jaiswal *et al.*, 2007). The aims of the present study were to identify correlates of physical and psychosocial functioning among burn patients.

2. Subjects and Methods Research design:

The research design used is a descriptive correlational design. This design allows the researcher to describe and summarize data obtained from empirical observation.

Study setting:

This study was carried out at the Burn Units of El-Mansoura University Hospital.

Subjects of study:

The subjects of the present study were selected as a convenience sampling. They consisted of fifty patients with burn; the following inclusion criteria were included in this study: Age were 18-60

years old, both sex, post emergency (the patient was first able to respond to the questionnaire, and the pre discharge stage), willing to participate in the study and free from any chronic disease.

Tools of data collection:

The data for this study were collected using three different types of tools:

Demographic and clinical data:

Demographic data and medical information sheet was designed by the researcher to elicit subjects, patient's name, age, sex, and level of education, marital status, occupation, number of family members, length of hospital stay, site of burn, total body surface area, depth of burn, causative agent, & place of burn.

Brief Burn Specific Health Scale (BSHS-B):

It is adopted from Kildal et al.(2001). To assess physical and psychological functioning in individual suffering from burn injury. This scale was constructed to identify more specifically the morbidity and other sequelae of burn injury. It consists of 40 items and is used to measure dysfunction and distress across four domains of health physical, mental, social, and general. The physical domain has sub domains of simple ability, hand function, heat sensitivity, and treatment regimens. The mental domain has sub domains of body image and affective status. The social domain has sub domains of interpersonal relationship, sexuality, and work. Overall the instrument measures perceived psychosocial and physical status. It using a 4-point rating scale ranging from 0 (extreme(ly)) to 4 (not/none at all). For each category to give a total scores ranging from 0-160, higher indicated better physical and psychosocial status.

Procedure:

Permission was obtained from the Director of El-Mansoura University Hospital for conducting the study in the burn unit. Informed patients consents were obtained before data collection after explaining the purpose and nature of study to them. Subjects were informed about their voluntary right to accept or refuse participation in the study, and confidentiality was assured. At the beginning of the study demographic data were collected by interviewing subjects individually, while medical information was obtained from patients medical records.

Brief Burn Specific Health Scale was measured by BSHS-B that was filled by the investigator through a structured interview for each subject within 20-30 minutes to measures physical and

psychosocial status. At the first alert stage and pre discharge from hospital.

Statistical Analysis:

Data entry and analysis were done using Statistical Package of Social Sciences SPSS version 18.0 appropriate statistical methods were applied. Frequency, mean, and standard deviation, Pearson correlations, *t* tests, chi-square analyses, and analyses of variance were used to examine associations between demographic and medical factors and key study variables. *P* value of .05 was considered significant for all statistics.

3. Results:

Table 1: showed the demographic characteristics of patients involved in the study. The highest percentages of the studied were less than 25 years old. Also more than third (36%) were secondary school. The same table illustrated that more half (54%) were men and half (50%) stayed in the hospital for less than 15 days.

Table (2) revealed the frequency and percentage distribution of sample in relation to degree of burns and location of burns. It points that nearly two thirds (60%) of TBSA were (21-25%). Nearly one fourth incurred (24%) were (15-20%). While (16%) of TBSA were (26-30%). As regard location for burns is not mutually exclusive so that percentages add to more than 100%. The most common location for burns was arms (80%), while the burn location with the least occurrence was buttock (2%).

Table (3) showed distribution of patient's physical and psychosocial status scores on BSHS-B over two times of treatment. It indicates that there is an increase of mean scores of subject total physical and psychosocial status from (73.31) from admission to (88.70) before discharge. There was highly statistically significant difference between admission and pre discharge from hospital regard each domains of physical and psychosocial status (p<0.01).

Table (4) showed that correlation between BSHS-B, length hospital, percentage burn, location burn and pain at admission. There are statistically significant associations, those patients who had longer stay in the hospital had negative correlation of physical domain on simple ability and mental domain on affect, social domain on personal relationships and work (p<0.05). Percentage of burn had negative correlation with social domain on work (p<0.05). Also location of burn had negative correlation with social domain on personal relationships (p<0.05). In addition, there are positive correlation between mental domain on affect and pain (p<0.05).

Table (1): Demographic characteristics of the sample.

Items	No of patients	% of patients
Sex		
Male	27	54%
Female	23	46%
Age (yr)		
<25 years	21	42%
25-35 years	10	20%
35-45 years	10	20%
> 45 years	9	18%
Eudecation levels:		
Illiterate	9	18%
Primary	15	20%
Secondary	18	36%
University	8	16%
Length of hospital stay(days)		
1-15	25	50%
16-28	19	38%
> 28	6	12%

Table (2): Degree of burns and location of burns

Items	No of patients	% of patients
Percentage of burn		
15-20%	12	24%
21-25%	30	60%
26-30%	8	16%
Location of burn		
Face and neck	19	38%
Hand	22	44%
Forearm& shoulder	40	80%
Chest	20	40%
Back	3	6%
Abdomen	5	10%
Buttock	1	2%
Thigh	19	38%

Table (3): Distribution of patient's physical and psychosocial status scores on BSHS-B over two times of treatment.

Items	At admission	Pre discharge	T-test	P- value
	Mean ± S.D	Mean ± S.D		
Physical domain:				
-Simple abilities	3.08±1.80	5.82 ± 1.52	16.90	.000
-Hand function	6.64±7.58	9.40 ±4.92	12.70	.000
-Heat sensitivity	8.06±5.47	8.52 ±2.81	4.15	.000
-Treatment regimen	7.74±3.03	9.02 ± 2.37	11.10	.000
Mental domain:				
-Affect	12.30±2.83	13.68 ±2.71	7.17	.000
-Body image	5.39±1.63	7.36 ± 1.39	7.54	.000
Social domain:				
-Personal relationships	9.72±2.17	9.78 ± 1.94	4.16	.001
-Sexuality	8.20±1.76	9.56 ± 1.09	5.89	.000
-Work	7.00±3.03	7.56 ± 2.06	5.23	.000
TBSHS-B*	73.31±16.44	88.70 ±11.34	17.67	.000

BSHS-B *: Brief Burn Specific Health Scale.

Items Length hospital Percentage of burn Location of burn Pain **Physical domain:** -Simple abilities -0.04* -0.0570.063 0.088 -Hand function 0.109 -0.106 0.055 -0.066-Heat sensitivity 0.097 0.102 0.054 0.083 0.054 -0.099 -Treatment regimen 0.062 0.146Mental domain: 0.037* -Affect -0.038* -0.130 -0.052 -Body image 0.150 0.500 0.107 0.120 Social domain: -Personal relationships -0.034* -0.108 -0.041* 0.060 0.092 -0.088 0.077 -0.083 -Sexuality -Work -0.044* -0.010* 0.146 -0.090 -0.145 $-0.1\overline{73}$ TBSHS-B* 0.102 0.143

Table (4): Correlation between BSHS-B, length hospital, percentage burn, location burn and pain at administration

Table (5) showed that correlation between BSHS-B Length hospital, percentage burn, location burn and pain at discharge. There are statistically significant associations, those patients who had longer stay in the hospital had negative correlation

of physical domain on hand function (p<0.05). Regard location of burn had negative correlation with physical domain on heat sensitivity. Also there are positive correlation between location of burn and mental domain on affect (p<0.05).

Table (5): Correlation between BSHS-B Length hospital, percentage burn, location burn and pain at discharge.

Items	Length hospital	Percentage of burn	Location of burn	Pain
Physical domain:				
-Simple abilities	0.134	0.090	160	098
-Hand function	-0.043*	-0.097	098	.081
-Heat sensitivity	-0.054	-0 .070	044*	075
-Treatment regimen	-0.116	0.059	0.081	105
Mental domain:				
-Affect	-0.173	0.125	0.040*	061
-Body image	-0.073	-0.059	-0.075	084
Social domain:				
-Personal relationships	-0.146	-0.039	0.103	.089
-Sexuality	.0196	-0.020	0.104	.112
-Work	0.041	-0.105	-0.004	.069
TBSHS-B*	0.115	-0.119	0.159	.185

4. Discussion

Burn injury results in significant impairment of physical and psychosocial function. The spectrum of burn severity and functional loss can be quite broad, and in many cases physical rehabilitation is necessary to improve function and to prevent secondary complications (Sliwa *et al.*, 2005). So the study aimed to identify correlates of physical and psychosocial functioning among burn patients.

The present study revealed that half of the study was males. This result agrees with Khan and Malik (2006) who reported that males were more than females. This might be explained by the higher

incidence of industrial and recreational burns among males. Also Abdel-Ghafour (2000) inconsistent with the result of the present study as regard to gender of patients who reported that two thirds of the study group was females.

As regard to age, results of this study revealed that more than third of subjects were aged less than twenty five years. This result supported by the work of Edlich *et al.*(2008) who concluded that the highest incidence of serious burn injury occurs in young adults (20-29y).

In relation to educational level, more than half of study have levels of education (secondary&

^{*} Significant at p<0.05

university education), while few of them were illiterate. This finding inconsistent with Ahmed (2003) who found that more than two thirds of the groups study were illiterate or could just read and write.

As regard to length of hospital stay, results revealed that the mean days of the study group were around twenty one days. This result supported with Moi *et al.*, (2008) who reported that the mean length of hospital stay was 22.2 days.

The results of the present study reported that more than half of group were having total body surface ranged from fifteen percentages to twenty percentages in study group. This is supported Willebrand *et al.* (2004) who found that the average TBSA around twenty percentage. While Baker *et al.* (2007) stated that total body surface area (TBSA) of burns were 30% or greater.

As regard burn location, in the present study the majority of burn site occur in upper limb for group. Also around half of subjects in study group have burn in chest and face. This finding agrees with Park *et al.* (2008) and Wu *et al.*(2007) reported that most common site of burn patients had in upper limb injury when comparing to other parts of the body.

The results of the current study showed a statistically significant improvement in the total physical and psychological functioning scores among patients from admission to discharge from hospital. This may be attributed to burn process control, response for nursing intervention, and rehabilitation program. This result agrees with Sliwa *et al.* (2005) who reported that significant improvements of functional outcome from admission to discharge among patients admitted for inpatient rehabilitation after a burn injury.

Results of the current study documented that subjects' length of hospital stay was negatively correlated to physical domain on simple abilities, social domain on personal relationship and mental domain on affect at admission. Which means that the high length of hospital stay increase psychological disturbance. These findings were similar to those obtained by Barker et al. (1996) who noted that there was negative correlation between length of hospital and physical and psychological functioning. Attia et al. (2000) who reported that length of hospital stay is an important measure of morbidity. Therefore, the length of stay is positively correlated with total length of time off work and the post-burn complications requiring physiotherapy, occupational therapy and surgical intervention.

There is a significant correlation between the location of burn and social domain on personal

relationship. Which a means that decrease in location of burn is associated with, relatively improvement in personal relationship. These findings are congruent with those of White (1989), who reported that burn severity was associated with social status.

In the present study, there was negative correlation between pain and physical domain on hand function at admission. These findings are congruent with Ullrich *et al.* (2009) have noted that pain and depression may have interactive effects on physical functioning following burn injury.

Results of this study showed there was significant correlation between location of burn and physical domain on heat sensitivity and hand function at the discharge. These findings are congruent with those of White (1989), who stated that full-thickness burns damage the dermal appendages, including the sweat glands, resulting in problems with thermoregulation. The inability to adequately regulate body temperature and sensitivity to heat affects a person's ability to complete physical activity and return to work in hot environments.

Also there are significant correlation between location of burn and mental domain on affect. Agree with some authors have found that psychological distress does not tend to decrease over time (Novelli *et al.*, 2009). A study carried out by Wallace and Lees (1988) who found that the patients who suffer significant psychological disturbances at the time of discharge will still have them six months later.

One weakness of the study is the small sample size and it was selected from one geographical area in Egypt. Another limitation is that the scope of the study was also limited as it was restricted to those patients who voluntarily agreed to participate.

In conclusion, Patients with burn injury suffer from a multitude of physical problems that alter their physical and psychosocial functional. Consequently, regular and comprehensive nursing intervention for follow up of these patients is necessary for life saving. Burn patients experience low functional outcome on the admission of hospital, which slightly improves during, by the discharge from hospital. This study reported length of hospital stay was negatively correlates with physical and psychosocial dimension at admission and predicharge and referral to the location of the burn predicted certain areas of physical and psychological functioning at the firstalert and predischarge stage. It is recommended that replication of the current study on a larger probability sample from different patients' geographical areas, to achieve more generalizable results.

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Effect of Soybean on Bone Health of Male and Female Albino Rats

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Abstract: Litanies of health benefits are frequently attributed to soy but it's also considered as endocrine disruptors, indicating that it has the potential to cause adverse health effects as well. Consequently the present study investigated whether consumption of soybean has health benefits or adverse effects on bone health. Each sex was randomly divided into 4 groups, control group fed on the basal diet (AIN93 G), and three treated groups given 30, 60 and 90 g cooked soybeans/70 kg human body weight (b.w.) for three months . Female and Male rats showed that soybean increased serum parathyroid hormone (PTH) and decreased calcium (Ca) level in bone and serum. In the present study found that soybean have adverse effects on bone of male and female

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Keywords: Soybean, bone PTH, Ca, rats.

1. Introduction:

Considerable interest has been focused on the role of soy protein and is flavones on osteoporosis, the most common chronic bone disease and the major public health problem worldwide which is characterized by deterioration of skeletal architecture, resulting in increased bone fragility and risk of fractures. Although osteoporotic bone loss can be caused by a variety of factors, such as nutrient deficiency, chronic alcohol intake and sex steroid deficiency

Since osteoporosis is difficult to treat, early prevention of this disease is becoming of great interest. In particular, building adequate bone during period of rapid growth in early development is critical to increase peak bone mass and reduce the effects of bone loss later in life (Chen *et al.*, 2008).

Estrogen plays a critical role in the premenopausal acquisition and maintenance of peak bone mass (Dhuper *et al.*, 1990 and Sowers *et al.*, 1998). This observation in turn has led to speculation that the estrogen-like compounds (isoflavones) contained in soy reduced risk of fracture (Valachovicova *et al.*, 2004); increased bone mineral content (BMC) and bone mineral density (BMD) (Chen *et al.*, 2008).

Whereas others have observed no effects of soy on BMC and BMD of human (Anderson *et al.*, 2002 and Balk *et al.*, 2005); in mice (Erlandsson *et al.*, 2005) and in monkeys (Lee *et al.*, 2007)

In contrast Kerstetter *et al.* (2006) found that soy consumption elevated PTH which accelerates skeletal resorption and decreased bone calcium content.

2. Material And Methods

Experimental Animals:-

Male and female Wister albino rats with average body weight 120 g obtained from the private market Abou-Rawash, Giza, Egypt, were used in the present study. They were kept on vegetables and water *adlibitum* for one week 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(Group I): Rats were kept on the basal diet (AIN 93 G) according to (Reeves, 1997) and water *adlibitum* for three months.

Three treated groups: Eashgroup was fed individually on the following quantities of cooked soybean 30, 60 & 90 g /70 kg human b.w. for groups II, III, and IV, respectively, 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 *adlibitum* through out the experimental period.

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 hemaggluttinins (Sat and Keles, 2002)

1- Analysis of hormones:

Determination of PTH in serum was measured by enzyme-linked immunosorbent assay (ELISA) according to the method of Kao *et al.* (1992), Ca in serum was measured by Synchron CX4 according to the method of (Prince *et al.*, 2003) were Ca in bone are extracted from tibia bone according to method of

Lotinun *et al.*, 2003; Puntheeranurak *et al.*, 2006 and Charoenphandhu *et al.*, 2007, then measured by Synchron CX4 according to the method of Prince *et al.*(2003).

3. Results

Table (I) shows that female rats fed only on 60 and 90 g soybean / 70 kg human b.w. showed significant reduction in bone Ca++ and serum Ca++ with -23.13% and 30.00% for bone Ca++ and -14.01% and -20.88% for serum Ca++, respectively. This accompanied with significant increase in serum level of PTH with 19.75% and 35.93%, respectively.

Table (I): Effect of soybean on serum PTH, Ca⁺⁺, and Ca⁺⁺ content in right tibia of female rats treated for three months with three different doses.

Parameters		PTH pg/ml)	Serum Ca ⁺⁺	(Ca ⁺⁺) content
Groups			mg/dl)	intibiabone(mg/g)
Control (Group I)	Range	5.67 - 7.15	11.25 — 12.11	19.18 — 22.00
	Mean \pm S.E	6.43 ± 0.14	11.78 ± 0.9	20.40 ± 0.22
Group II	Range	6.00 — 6.94	9.00 — 12.00	15.30 — 20.00
(30 g / 70 kg b.w.)	Mean \pm S.E	6.35 ± 0.11	11.35 ± 0.26	19.61 ± 0.85
	% of change	-1.24	-3.65	-3.92
	P value	N.S.	N.S.	N.S.
Group III	Range	6.92 — 8.84	9.74 — 10.54	14.20 — 18.00
(60 g / 70 kg b.w.)	Mean \pm S.E	7.70 ± 0.15	10.13 ± 0.06	15.68 ± 0.31
	% of change	19.75	-14.01	-23.13
	P value	P < 0.001	P < 0.001	P < 0.001
Group IV	Range	8.42 — 9.00	8.12 — 11.00	13.48 — 15.22
(90 g / 70 kg b.w.)	Mean \pm S.E	8.74 ± 0.07	9.32 ± 0.24	14.28 ± 0.17
	% of change	35.93	-20.88	-30.00
	P value	P < 0.001	P < 0.001	P < 0.001
	ANOVA	F = 82.20	F = 38.15	F = 139.45
		P < 0.001	P < 0.001	P < 0.001

P= probability

N.S. = non significant

S.E= standard error

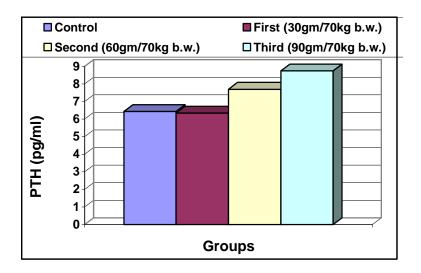


Fig (1a): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on serum PTH level of female rats

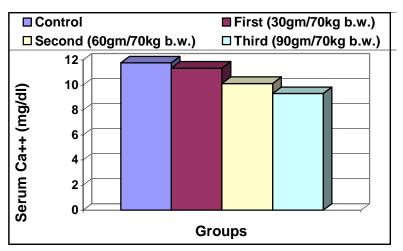


Fig (1b): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on serum Ca⁺⁺ level of female rats

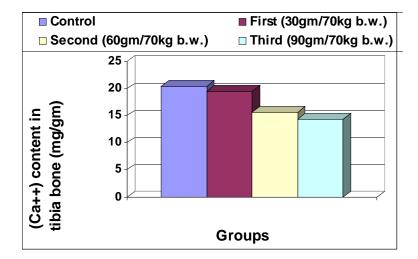


Fig (1c): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on Ca⁺⁺ content in tibia of female rats

Table II shows that bone Ca++ content and serum Ca++ level decreased significantly in male rats fed only on 60 and 90 g soybean/70 kg human b.w. with (-15.80% and -17.82%) for bone Ca++ content

and (-8.22% and -19.00%) for serum Ca++ level respectively. This was associated with significant increased in serum level PTH of rats fed only on 90 g soybean/70 kg human b.w. with (23.23%).

Table (II): Effect of soybean on serum PTH, Ca⁺⁺, and Ca⁺⁺ content in right tibia of male rats treated for three months with three different doses.

Parameters		PTH pg/ml)(Serum Ca ⁺⁺ mg/dl)((Ca ⁺⁺) content in tibia bone
		pg/mm/(mg/ui/(mg/gm)(
Groups				g/g/(
Group I	Range	5.43 - 6.80	12.00 - 12.31	19.95 — 22.75
(Control)	Mean ± S.E	6.20 ± 0.16	12.05 ± 0.10	20.82 ± 0.28
Group II	Range	5.10 - 6.85	10.50 - 12.44	17.00 - 22.00
(30 g / 70 kg b.w.)	$Mean \pm S.E$	6.04 ± 0.17	12.20 ± 0.49	20.01 ± 0.36
	% of change	-2.58	1.24	-3.89
	P value	N.S.	N.S.	N.S.
Group III	Range	6.00 - 6.90	9.50 — 12.44	14.33 — 19.60
(60 g / 70 kg b.w.)	Mean ± S.E	6.46 ± 0.10	11.06 ± 0.89	17.53 ± 0.50
	% of change	4.19	-8.22	-15.80
	P value	N.S.	P < 0.01	P < 0.001
Group IV	Range	7 — 8.45	9.00 — 10.12	14.02 — 20.90
(90 g / 70 kg b.w.)	Mean ± S.E	7.64 ± 0.18	9.76 ± 0.37	17.11 ± 0.78
	% of change	23.23	-19.00	-17.82
	P value	P < 0.001	P < 0.001	P < 0.001
	ANOVA	F = 20.05	F = 36.98	F = 13.62
		P < 0.001	P < 0.001	P < 0.001
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P= probability

N.S.= non significant

S.E= standard error

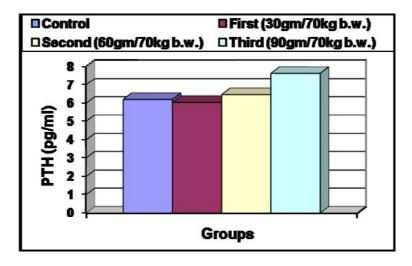


Fig (2a): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on serum PTH level of male rats

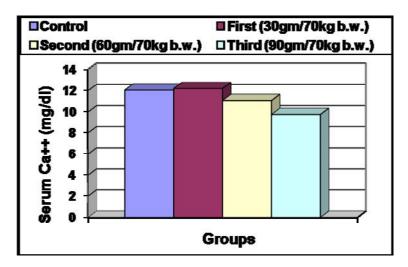


Fig (2b): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on serum Ca++ level of male rats

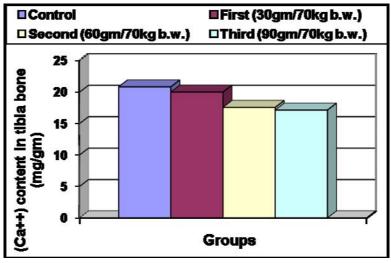


Fig (2c): Effect of 30, 60 and 90 gm soybean/70 kg b.w. on Ca++ content in tibia bone of male rats

4. Discussion

The present data indicated that female and male rats fed on only 60 and 90 g soybean/ 70 kg human b.w. showed significant reduction in Ca++ in bone and serum , this was accompanied with a significant increase in serum level of PTH.

The present study runs in full agreement with Kerstetter *et al.* (2005) who found that soy consumption elevated PTH which accelerates skeletal resorption and decreased bone calcium content.

The decrease in bone calcium during consumption of soy-based diet may be due to impaired intestinal calcium absorption, the high phytic acid content of soy foods may play a role. Phytic acid, inositol hexaphosphate, is a phosphorus-rich compound that occurs naturally at very high levels in soy foods. Phytic acid strongly chelates multivalent metal ions, particularly zinc, calcium, and iron, resulting in the formation of insoluble salts that are poorly absorbed in the gastrointestinal tract (Zhou and Erdman, 1995). Several investigations showed

that phytic acid interferes with calcium absorption (Greer and Krebs, 2006).

Another interpretation of decreased calcium content in bone may be due to both anti-estrogenic and anti-androgenic actions of isoflavones. It is well known that E2 is not only essential for bone growth, but also for maintenance of skeletal integrity as shown by skeletal changes following sex steroid deficiency in rodents study (Vandenput *et al.*, 2004).

In addition, the regulation of male skeletal growth and maturation appears to be a tale of two sex hormone (androgen and estrogen) signaling pathways. Animal studies as well as relevant clinical observations provide evidence that estrogen and ER activation stimulate longitudinal growth and induce epiphyseal growth plate closure at the end of puberty, whereas androgens appear to have no effect on longitudinal growth via the androgens receptor (AR). In contrast, androgens and AR activation play a dominant role in the acquisition of male trabecular bone moreover both androgen and E2 are essential in

the maintenance of skeletal integrity in males (Callewaert et al., 2009).

Adverse effects of soy on bone health may be interpreted due to its high protein content. The previous studies observed that high-protein diets induce a significant decline in intestinal calcium absorption with an accompanying fall in urinary calcium reabsorption and a rise in PTH (Kerstetter *et al.*, 2005).

Park et al. (2008) cited that estrogen receptors modulate tubular calcium reabsorption in the kidneys and urinary calcium excretion significantly increases with the decrease in estrogen, indicating that renal tubular reabsorption of calcium decreases in estrogen deficiency state. So it's logic to hypothesis that the anti-estrogenic and/ or weak estrogenic action of isoflavones may be a reason for decreased calcium level in bone and serum.

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Institutional Governance Effect on the Shadow Economy in Asia

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Abstract: This paper analyses how institutional governance, affect the shadow economy, using an Asian country data. The literature strongly emphasizes the quantitative importance of these factors to understand the level and changes of shadow economy. However, the limited number of studies uses cross-sectional country data with a relatively few number of observations, and hardly any paper has investigated governance and provides evidence using within country data. Using more than 35 proxies that measure institutional governance factors and political behavior we find strong support that its increase leads to a smaller shadow economy. Furthermore, an increase in poverty and political stability increases the size of the shadow economy.

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1. Introduction

Considered planning for economic development needs to awareness of general operation of country economy, but in all countries more or less a part of economic activities, because of evaded and enacted limits or non-comprehensiveness of laws and regulations of country, is performed as hidden or non-registered. Producing goods and services in this group of generating activities which is named shadow economy, in each rate that are out of information collection related to general operation of official economy, relative to volume they have, they can cause deviation of correct recognition of situation and prescription of incorrect policies. Separate from this aspect, recognition of nature, size, trend of evolutions, cause and effect of these phenomena can be reimbursed in formative manner of encountering to it, specially, in respect to its illegal part.

While fluctuations of shadow economy in comparison with relative changes in formal economy are much, eliminate it in programming and policy making; reduce foreseen strength and accuracy of economy strictly. In four last decades, measurement of underground economy size and investigation of its causes and effects is considered by economists more than before and bigger part of economic literature is dedicated to this matter. Hidden nature of underground economy, make difficult measurement and direct study of it, for this reason most common measurement methods are indirect estimate of volume of these activities and are together with

limiting assumptions. Experiences related to measurement of shadow economy in different countries emphasize that rate of shadow economic activities are spread general operation of economies and more expended volume of this phenomenon in under developing countries.

However, illegal activities (smuggling, drug dealing and the similar to) are infrequently included. In addition, terms such as the shadow, underground, hidden or grey economy, the informal sector, and undeclared or illicit work are used, but not always consistently and correctly. Several methods have been developed to measure the size of the shadow economy. Furthermore, measuring the shadow economy also poses a challenge to researchers, mainly due to its nature: by definition the shadow economy is covered and therefore it is often impossible to measure its volume directly. The shadow economy has both negative and positive sides. The shadow economic activities causes the revenue authorities to collect less in taxes, may origin damage to official economy firms, as they features higher costs (and are thus decrease competitive), and may make consumers inferior, as they have no warranty for the services and products they buy in the shadow economy. On the other hand, the shadow economy has positive consequences as well. Firms engaged in the shadow economy can operate at lower (employment) costs and more people can be employed.

The Shadow economy has serious macro and micro consequences for the economy. It worsens poverty and acts as a check on development. Some argue that the Shadow economy is not a problem since it exists in all nations or that it recycles incomes within the country and generates employment. It can be verified that since the Shadow economy is the only main cause of all the overall and micro problems the economy has confronted (Kumar, 1999).

Shadow Economic activities occur and extent of these activities is vital for building a good effective and efficient decision regarding allocation of resources in this area. Moreover the Shadow Economy called the informal, Black, parallel economy, or, underground, includes illegal activities and unreported income from the production of permissible goods and services, either from monetary or barter transactions. The expansion of the Shadow economy can cause a destructive cycle. Transactions in the Shadow economy run away taxation, thus keeping tax incomes lower than they otherwise would be. A raising Shadow economy may give strong incentives to be a focus for domestic and foreign employees away from the official economy.

Shadow economy is characterized by disobedient economic behaviors linking evasion, abuse, circumvention, avoidance, and corruption of the rules, as well as accompanying efforts to conceal these illicit behaviors from the vision of public authorities (Feige, 97).

Although todays, the shadow economy literature especially on definition, methods to estimate and core causes has improved well, the effects on official economic expansion are yet uncertain. Summarizing the literature, all in this field attended on a case study for a particular country. Thus, the subject needs to be approach because of empirical work cross the countries to prove the relation between shadow economy and economic growth (Nikopour, Shah Habibullah and, Schneider, 2008).

For instance, Árvay (1993), Feige and Ott (1999), European Commission (2004), Feige and Urban (2005), Nastav and Bojnec (2007), Schneider (2007), and many others apply various methodologies and provide an insight into shadow economy activities in developing countries. They, as well as other studies (e.g. (Johnson et al., 1999), (Schneider, Enste, 2002), (OECD, 2002), (Choi, Thum, 2006), have identified high tax burdens, corruption, administrative barriers, and nonexistent or deficient rule of law as the main causes of the existence and development of the shadow economy.

Thus, for proper comparison a common methodological approach needs to be considered. One such attempt is from Schneider (2004), with a data update used in the econometric part for the

period 2000–2005. At first glance, the results on the size of the shadow economy are surprising in their magnitude and trend. The latter in particular is of relatively very low intensity. We follow this line of thought by using Schneider's (2007) latent-variable and currency-demand-method estimates of the shadow economy in the countries studied and in the time frame analyzed.

2. The Shadow Economy: Appearance and Expansion Reasons

From the outlook of micro economy we must search the proper answer in the way and producer of rational decision-making by individuals and institutes as well. Within such a frame, individuals compare this illegal method with legal method and costs and other expenses in order to get some benefits. If the former is preferred compared with the latter, naturally partnership in secret and illegal production will be selected. A number of researchers made efforts to analyze human behavior in this domain, especially the tendency to avoid paying tax to government. For instance Alm et al. (1998) show that more lack of needed trust and rejection and avoidance of law regulations are increasing.

Researches related to a suitable approach to macro economy study and analyze the shadow economy have mostly been aimed to test statistic correlation between macro variables (which chiefly demonstrate the presence of government in economic scene) related to the procedure in this phenomenon.

Tanzy (1980) assumes that taxes and limitations are the two economic factors in producing shadow economy due to considerable effect of taxes in every country (income tax in the US, social welfare taxes, extra cost in Europe, and foreign trade tax in developing countries) all emphasize on the development of this phenomenon. Frey and Weck-Hunneman 1983, 1984 mention the imposed burden by government sector to individuals (including tax burden, lawmaking burden, law limitations) unemployment, level of development at a low level as factors responsible for the appearance of hidden economy and add other factors such as tax badtemperedness in the industrial countries in the experiment. Giles, et al. (1999) mentions burden of taxes, inflation, additional incomes, decline in standards of morality and ethics and claims that these factors support the idea. Giles 1998 emphasizes the government role in the development of shadow economy by public tax burden, combination of taxes and imposing more comprehensive regulations on job markets and productions as factors increasing this phenomenon in a variety of countries in the world. Schneider (2000) in his research for the effective factors on shadow economy in eighteen developed

countries to the burden of direct and indirect tax as the main reason for economy and tax culture and peoples attitude toward government as a non-economic factor. Draeseke and Giles (1999) also emphasize on the rate of tax and the level of regulations (approval and execution related to legal limitation) under existing conditions.

Ahn and De La Rica (1997) emphasize the effect of unemployment rate on the development rate on the strongly believe that this factor can direct the individuals decision to select a job in official sector or private sector and insists that unemployment is affected by this factor and attracts individual to secret economic activities. Tanzi (1999) also emphasize developed connection between secret economics and the rate of unemployment in OECD countries. Giles and Johnson (1999) verify the connection and positive correlation between effective tax rate and approximate volume shadow economy in Newlands. Also in this connection Giles et al. (2001) have measured the amount of reaction due to synchronism of shadow economy proportional to effective tax rate, fluctuation of rate and has concluded that no significant difference is observable in these reactions. Giles and Caragata (2000) pointed to such a connection suggest that it is of great importance in underground activities even in the absence of taxation system and try to deal with its calculation. Fiege (1990) argues that; the more historic economic development literature, has pointed to this condition as an informal development due to limitation of employment, the import of new technology and investment related to the world of development based on this outlook a heterogeneous economical structure in formal firms with a high amount of capital with high gain compared with a firm with low amount of capital and little payoff may exist in market. The only way out for the latter firm to exist and continue its activity to survive is to reduce the transaction costs and avoid tax regulations and the laws governing the organizations. However, what seems to be of great importance is the fact that the process of decisionmaking and selection of individual and firms within the frame of formal limitations, formal or informal is common considering the executive methods and operation is this direction occurs all the time. Considering the lack of trust and other factors such as tax morality, commitments about micro economy mentioned before, all from a link to the way out of institutionalization. Accordingly, manifestation part of formal limitations within the frame of macro policies and economic development shows some sort of approaches related to macro insights and development.

It seems that institutionalization is a suitable ground to harmonize these outlooks and make them

convergence for deep understanding and take illegal economic activities under careful consideration. North is of the opinion that: Institutions affect economies through imposing some sort of pressure an exchange and production costs. Institutions and the use of technical knowledge and expenses related to business transactions and expenses for change (production) determine the total costs. The complexity created in communities and individual interactions taken place in the world all have had some sort of role in the combination of institutions. Basically institutions and organization have come into existence to reduce the lack of trust and confidence in mutual operations between individuals, obviously the complexity in current affairs has affected these interactions. As for the combination of institutions, movement and transition from informal restrictions to formal ones in long term is due to move complexity in communities which in its own turn has a close connection with specialization and job division which are getting higher and higher every day. As a matter of fact formal restrictions are the solution to more complicated exchange.

The institutional economist's prepare a theoretical frame suitable for analyzing the effective factors on laws and regulations and the ways they are executed and supervision methods in order to bring about formal limitations of the institutes and economic application. From this viewpoint the increase in social complexity will be due to development of communities and the volume of social communities. On the other hand the urgent need to institutes to decrease insecurity in economic exchanges is increasing constantly, besides the changes of informal institution such as culture and customs affects formal institutes intensively. These formal institutes are at the thought of encountering some sort of exchange and ban and set limitations for other activities. The lack of efficiency in establishing the institutes (law making and society regulations) and execution and supervision bring about a condition which creates avoidance and ignorance to laws and regulations. The continuation of this situation in its turn breaks the connection between "cause and effect" and fails to meet economic needs and follows developed and widespread destructive, political, and social effects. Consequently the approach of institutionalized thought is created in this field which plays an effective part in non-economic development of the communities, besides, some sort of connection and convergence is created between micro and macro economics to encounter the phenomena of shadow economy and other consequences beyond it.

Considering the emphasis of the present research on the criteria of illegality in definition of shadow economy it is clear that our concentration on formal restrictions is something made up of the total amount of institutions. Within this frame shadow economy is due to "bureaucracy gambit" (over emphasizing the rules and regulations) by individuals and organization which in its own turn is due to restrictions or executive methods and supervision to operations. That is to say bureaucracy games have been designed in such a way that and are being put into operation and execution that tempt and direct both individuals and firms to get involved in illegal economic activities.

3. Theoretical Framework for shadow Economy in All Economic Activities

Within the frame of macro economical theories the research on the reasons for the appearance and effects of this phenomenon can be depth with. The role of financial policies, money, exchange, and commerce is shaping and development of shadow economy and development of shadow activities on different markets and effectiveness of governing policies on national accounting is highly considerable. Economic development literature has not ignored the important understanding of this domain related to production to realize the process of economic development. The role of factors such as poverty, unemployment, and expand of migration; have provided important basis for shadow economic growth which should be taken under consideration.

Most authors trying to compute the shadow economy face the difficulty of how to define it. One commonly used functioning definition is all currently unrecorded economic actions, which contribute to the formally practical Gross National Product. The definition bellow which has been defined as figure1 is combination of other's definitions such as Thomas (1999), Schneider (2004), author's elaboration. All economic activities are divided in two legal or illegal parts. Each of these activities has been divided into reported or unreported. Feature of these underground activities is that unrecognized activities divided two part of activity; householder sector and informal and it is not illegal but black economy is more dark and ambiguous, so that their calculation and measurement would is become stringent and essence of this section is become more unknown. This definition present by considering legal and illegal market transactions and non-market transactions and separation underground economic sections from each other and has considered to manner of their encountering to tax.

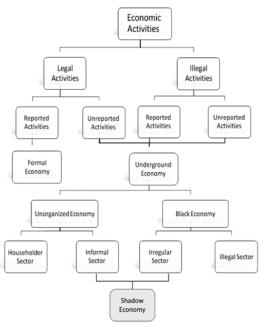


Figure 1: Shadow economy in economic activities framework

Black economic activities are all illegal actions with the characteristics of classical crimes like burglary, robbery, drug, smuggling tax evasion, and etc. The shadow economy includes all market-based legal production of goods and services that are consciously concealed from public authorities for the following reasons (Schneider, 2004). The status of lots of countries may be making clear by beneath institutional governance and political situations. Good institutions seem to increase formal GDP, while at the same time reducing informal GDP. Institutional governance reduces the volume of the shadow economy in developed and developing countries. However, the informal sector plays an important role in transition countries. Knowing the shadow economy causes is a tendency to control illegal activities through measures such punishment, prosecution, economic growth or education (Schneider and Enste, 2002). With doing this study the governments will find out that which institution reduce shadow economy and which one increase it. From the demand side, a lack of transparency may distort the information flows, thus making difficult market competition and an efficient comparison of goods and services. So there are two views about the relationship between these two variables. One of these argues the relationship between shadow and official economy is negative and the other one emphasizes is positive.

4. The relationship between corruption and shadow economy

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Economists have classified corruption as a special relation of governance-society and differentiate "Political corruption", "bureaucratic corruption" and "financial corruption", and they also define corruption as a process "pressure from up" with "distribution to down". But because of companionship of power corruption and financial corruption, practically these two understanding are closer to each other and have created a non-separable condition. World Bank has defined financial corruption, to abuse of government power and authorities for providing personal resources. Corruption, effort for gaining wealth and power through illegal manner; private interest instead of public interest; and or to abuse of governmental power is for personal benefits and is considered an anti-social behavior which has awarded benefits out of rule and against moral and legal norms and is weakening strength of improvement of life condition of people. Studies about governments' corruption indicate that corruptions mainly are made in two levels: first level, corruptions that mainly are related to political elites and high grade staffs and superiors of governments are involved in this type of corruption. Public sector officials may have low motivation for performance of their work and may be the reason is official scales of worthless amount and low level of internal supervision in their organizations. They may create delays and other barriers in their works, therefore bribes can act as rewards motivating. Illegal economic activities often purchase corrupt benefits from government. In some cases, illegal economic activities and ruler of organized crimes through corruption and intimidation are dominant to disciplinary force and other government sections. Therefore bribes permit criminal activities.

Second level, includes the simple activities that doing by low level personnel. Some employees carry out unlawful activities such as illegal gaining to abuse of authorize as bribery.

Friedman et al. (2000) show empirically that countries with further corruption have a higher share of unofficial economy. In countries where corruption is systemic and the state's budget, lacks transparency and accountability (VA) the obligation of paying taxes cannot be presume an accepted social rule. Institutional unsteadiness, lack of transparency and rule of law (RL) weaken the willingness of aggravated citizens to be active in the formal economy.

Bureaucratic and political corruption enjoys of an association and enhances each other reciprocally. Political corruption is expanded by political corruption and political factors in high rank and political group by corruptive behavior expand

bureaucratic corruption. For control of corruption, economists recommend cases which the government should do it: Privatization and decrease government size (GEF), economic freedom (EF), information freedom, transparency of economic activities, political stability, enhance regulation quality, voice and accountability (VA), government effectiveness (GE), rule of law (RL), property rights (PR), restrict monopoly, financial freedom (FIF), international cooperation, press freedom.

Some of these recommendations that have introduced and calculated by Kaufmann and World Bank and heritage foundation that published in several years, in empirical results of this research have been used and their relation with shadow economy for Asian countries have been studied. Institutional governance can reduce corruption and shadow economy which is focused in this research. Corruption in all its various type is influenced on shadow economy. Dreher and Schneider (2006) have studied the correlation between shadow economy and corruption and they observe in developed countries, corruption operates as substitute and causes expansion of shadow economy and developing countries; corruption is accounted as complementary of shadow economy and decreases it. In countries where corruption is systemic and the government budget lacks transparency and accountability the obligation of paying taxes cannot be assumed to be an accepted social norm. Institutional instability, lack of transparency and rule of law undermine the willingness of frustrated citizens to be active in the formal economy.

5. The Relationship between Shadow Economy, Government Size and Institutional quality

It is advisable to investigate the recent political economy literature on the importance of governance and institutions permit to know the plane and the changes of the shadow economy. If citizens realize that, their preferences are properly represented in, political institutions and they obtain a passable supply of public goods, their classification with the state increases, their enthusiasm to contribute increases. On the other hand, in an ineffective state where corruption is extensive the citizens will have little reliance in authority and thus a low incentive to cooperate. More encompassing and legitimate state increases citizens' willingness to contribute. If the government and the administration have, a great discretionary power over the allocation of resources corruption enhanced. A sustainable tax system is base on a fair tax system and responsive government, attained with a powerful connection between tax payments and the supply of public goods (Bird et al. (2006).

Shadow economy rises when individuals want the leave option quite than voice option as the reaction to growing burdens (Schneider and Enste, 2000). In new societies government has a profound role including setting laws and rules, defending outside forces, providing public goods and services, infrastructure, security and justice, and undertaking policies to make possible domestic calmness. However, the authority of government may augment general welfare or reduce it. Friedman (1997) observed "Government has a crucial role in a freedom society. Karras (1996) argued that "the good government size is 23 percent for the average country but choices 14 percent for the average OECD country and 33 percent for South America. Interestingly, both the quality of governance and the state imprison index are correlated with the change in share of state expenses in GDP. This can be explained by the fact that the small decrease in state expenditure as a percentage of GDP made possible the sufficient financing of social programs, so individuals and firms did not need to resort to illegal activities.

economies, developing privatization, liberalization, fairer taxation, and less regulation were all associated with a smaller underground economy and smaller state capture. Better provision of public goods to the official economy was associated with a relatively larger official economy. Developing countries with less tax and regulatory systems collected more tax income and provided more public goods to their official economies. There was a positive relationship between governance, privatization, regulation, bureaucratic discretion, and corruption in developing countries. Progress in privatization was associated with a higher quality of governance in these countries (Johnson and 2001). The relationship Kaufmann government expenditures and economic performance is a subject of continuing discussion in economics and public policy making. Considering both lines of theoretical argument about the effects of government size on government effectiveness, the effects of an increase in the size of the shadow economy on government effectiveness may be ambiguous.

6. The Relationship between Institutional Governance and Shadow Economy

Not only the economic, but also the political system affects formal and informal economic activities. The outcome in many countries may be explainable by underlying political conditions. Bird et al. (2006) stress that "Countries may tend to achieve an equilibrium position with respect to the size and nature of their fiscal systems that largely reflects the balance of political forces and institutions, and stay at this position until 'shocked' to a new equilibrium. A

sustainable tax system is based on a fair tax system and responsive government, achieved with a strong connection between tax payments and the supply of public goods (Bird et al., 2006). This has the negative consequence that citizens lose their trust in the authority. Furthermore, there might be a crowdingout effect of morality among the tax administrators when there are a great number of corrupt colleagues. Moreover, regulatory restraints and bureaucratic procedures not only limit competition and the operation of markets, but also provide a better fundament for corrupt activities. If individuals and businesses believe that neither contracts will be neither enforced nor productive efforts protected, their incentive to be active in the shadow economy increases. Citizens will feel cheated if they believe that corruption is widespread, their tax burden is not spent well, their government lacks accountability, and that they are not protected by the rules of law. This increases the incentive to enter the informal sector. Giles (1997a, b, 1999) and Giles et al. (2002) investigate the relationship between the shadow and official economies for New Zealand and Canada, and find clear evidence of Cause from official GDP to the shadow economy and only very mild evidence of Granger Causality in the reverse direction. Considering both lines of theoretical and empirical argument, the relationship between the shadow economy and institutional governance with medium Conceptions is shown in figure 2.

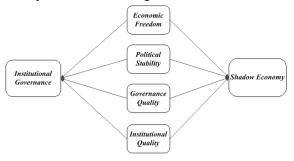


Figure 2: Relationship between the Institutional Governance and the Shadow Economy

The above shape is indicating large part of theorize that will examine in this research. It is shown the relation between institutional governance and shadow economy is connected by some indexes.

7. Panel Data Analysis for Institutional Governance indicators on Shadow Economy in Asian Countries

The estimates of relationship between institutional governance and shadow economy present about 35 Asian countries. First, we present results of Fixed Effect models in table 1. Then we will present GMM models in table 2. Variables used in these models are

extracted from valid statistical resources and is resulted to different specifications.

Depended Variable: Shadow Economy (SE)	Model 1	Model 2	Model 3	Model 4
Fiscal Freedom (FF)	0.08 (3.2)***			
Control of Corruption (CC)	-0.33 (-1.4)*			-0.005(-3.1
Political Stability (PV)	-0.13 (-1.8)*	-0.13 (-3.1)***		
Regulation Quality (RQ)		-0.18 (-2.6)***		
Growth Rate of Labor Force(GL)		-0.007 (-2.1)**		
Voice and Accountability (VA)		-0.09 (-1.9)**	0.01 (3.5)***	
Financial Freedom (FIF _{t-1})			-0.002 (-4.7)***	
Government Spending(GEF)			-0.07 (-7.1)***	
SE*GEF			-0.008 (-6.7)***	
Poverty			0.02 (2.5)***	0.001(3.7)
SE*RL				0.68 (3.9)
Business Freedom (BF)				-0.01 (-2.7)
Rule of Law (RL)	0.49 (2.7)***	0.41 (5.3)***		-0.68 (-4)
Government Effectiveness(GE)	-0.21 (-1.7)*	-0.41 (-1.89)**	-0.02 (-1.76)*	
Property Rights (PR)	-0.08 (-2.3)***	-0.06 (-1.42)	-0.02 (-6.7)***	
Constant	-0.71 (-3.4)***	-0.46 (-10)***	1.5 (1.89)**	-2.2 (3.75)
R ²	0.42	0.27	0.62	0.50
Observations	296	296	185	185
F-test	3.6	7.3	4.6	3.1
Normality test	(192)***	(369) ***	(189)***	(795)***
Test cross-section period fixed effects	(79)***	(64)***	(121)***	(110)***

^{*-}In all specifications, * denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level.

In table 1 all models are OLS and most used variables in these models are consistent with shadow economy. Fiscal Freedom (FF) which in the first model has been significant indicates a measure of the burden of government from the revenue side, extends shadow economy. In first model clearly it is seen that control of corruption (CC) cause decrease in volume of shadow economy. This matter in 4th model which is a logarithmic model also occurs. Political stability (PV) in first and second model has been significant. These models indicate that this variable causes limitation of shadow economy in Asian countries. Regulation quality (RQ) is indicating of institutional quality in societies and it is anticipated that decreased shadow economy by increasing it. This variable which has been significant in both model, authenticates this matter. Growth Rate of Labor Force (GL) in formal economy results in decrement in shadow economy actives. This problem has been indicated in second model. One of the democracy indications is that importance of governance corporation debate not only before decision making, but also after that and in execution performs well. For this matter voice and accountability (VA) has introduced. This variable which has used in 2nd and 3rd model, results in decreasing of shadow economy volume. Independence monetary policy from government control has shown with financial freedom (FIF). Financial freedom and business

freedom (BF) cause limitation of shadow economy and each of them have been significant in one model. One of the issues in shadow economy study is subject of applicability and efficiency of government. Whatever the government is more effective, it can practice more effectiveness against non-efficient bureaucratic and shadow economy. Government Effectiveness (GE) variable has been significant in three models and confirm this subject. Rule of Law (RL) is one of the key variables in institutional studies concerning shadow economy that could be resulted in good governance. Only in fourth model this variable is consonant with theoretical bases, that there is in another two model coefficient of this variable has been positive. Third and fourth models indicate that poverty causes expansion of shadow economy. Property rights (PR) also cause limitation of shadow economy and this variable has been significant in three models. In the following we consider to table 2 which investigate two step dynamic panel GMM models. To experientially test the relationship between institutional governance and shadow economy, a two-way model is considered. These models are explored using two step GMM method with t-values and analysis statistics.

Table 2: Component of the Shadow Economy in Asian countries (GMM Models)

Depended Variable: Shadow Economy*	Model 2	Model 3
SE (-1)	-0.34 (-6.4)***	-1.23 (15.7)***
Freedom of Corruption (FC)	0.03 (2.33)**	
Growth Rate of Labor Force (GL)	-1.4 (-1.9)*	
Rule of Low (RL)	-2.71 (-2.76)***	
Political Stability (PV)	1.57 (1.89)*	1.7 (5.1)***
Fiscal Freedom (FF)		0.06 (7.3)***
Regulation Quality (RQ)		-1.25 (-3.3)***
Dummy2002	-0.02 (-0.27)	-0.21 (-4.5)**
Dummy2003	-0.14 (-1.7)	-0.14 (-2.3)**
Dummy2004	0.18 (1.5)	0.08 (1.7)*
Dummy2005	-0.15 (-1.4)	-0.07 (-1.1)
Dummy2006	0.004 (0.03)	0.08 (1.6)
Dummy2007	-0.07 (-0.8)	-0.21 (3.6)***
Total panel observations	222	259
Sargan statistic	0.75	0.15
Jarque-bera	204	46
Arellano-Bond test AR(1)	0.003	0.00
Arellano-Bond test AR(2)	0.006	0.21

^{*-}In all specifications, * denotes significant at 10% level; ** significant at 5% level; *** significant at 1% level. Variables used in table 2 have been explained and most of them have consonant with shadow economy literature.

Two models include a place of year dummies. In two specifications, levels equation and year dummies are used as instrument variables because every other regresses are not sternly exogenous. Two types of test are used for the empirical models. The first test is proposed by Arellano and Bond (1991), which examines the hypothesis that the residual from the estimated regressions is first-order correlated but not second order correlated. This test examines the statistics, AR (1) and AR (2) for presence of serial correlation in the first differenced residuals of first and second order, reported as the asymptote standard normal distribution values. The equations for Asian

countries fit the data well as indicated by the regression statistics in two specifications, due AR (1) statistics, reported in table 2 are significant, but AR(2) there is not significant for second model.

Second test is the Sargan test of identifying restrictions under the null hypothesis of the validity of the instruments. The results of the Sargan test in system GMM estimator are reported in table 2. Based on the Sargan test statistic for all models, the high p-value point to that the null hypothesis of no over-identifying restrictions fail to reject. Consequently, the Sargan test statistics indicate that two specifications are well specified and that the instrument vector is appropriate. Statistical resources of variables used in above models and some of their statistical characteristics would be considered in paper Appendix.

8. Conclusion

Major parts of studies have not made use of policy recommendations suitable for all the capability patterns. Consequently there exists some gaps between the assumption of shadow economy and political implications, and, the methods to measure this phenomenon exist and the studies mentioned before were aimed to unravel this problem or avoid it.

The empirical results of this study indicate that in Asian countries, increasing poverty, corruption, and fiscal freedom leads to increase shadow economy. Participate in the shadow economy increase the standard of living for a large of these participants. However, the empirical results of this study show that for Asian countries, increases growth rate of labor force in formal sector (GL), decreases shadow economy. Also, the observed results of this study indicate that increasing political stability, control of corruption, regulation quality, growth rate of labor force, voice and accountability, financial freedom, government spending, business freedom, and government effectiveness leads to decrease shadow economy. In fact, as the results show, institutional governance can decrease shadow economy for developing countries. Therefore:

- 1. In order to raise the necessary possessions for financing of key development tasks outlined in the developing governments need to restrict shadow economy.
- 2. The governance and corruption problems are effective on shadow economy in Asian countries and these should not be considered as a reason for moving into shadow economy. It implicitly recommends that the size of government should be optimal.

The analysis of the causes and consequences of the increase of the shadow economic activities is much

more important. The important issue to consider is to dominate whether to encourage and support this economic trend or make an attempt to limit or vanish it completely, and above all, how can we get to the desired goal and what sort of political tools and authority do we possess to achieve our goal. Naturally, assignment of proper policies should ideally be based on possibilities and required costs to put them into operation and basically they should be based on the cognition and philosophy of their appearance and reform in hidden activities in illegal way. So it is considered that the discussions in this section are some sort of political recommendations and prescriptions to deal with shadow economy effectively. We need to do three recommendation and suggestions for restriction shadow economy:

- 1. Reducing the pleasant appearance evasion of tax and regulations,
- 2. Increasing the opportunities for influencing the formal institutions in the accurate direction, and
- 3. Change informal activities to formal, simplification of rule, tight perform rule, and knowledge enhancement.

Appendix: Sources and characteristics of sample data

Variables	Mean	SD	Min	Max	Data Sources
Shadow Economy	29.3	12.5	10.3	60	Schneider et al. (2010)
Poverty	1.8	1.1	0	4	ICRG
Fiscal Freedom (FF)	79.9	13.0	99.9	39.0	Heritage Foundation
Control of Corruption (CC)	-0.1	0.9	2.4	-1.4	Heritage Foundation
Political Stability (PV)	-0.3	0.9	1.3	-2.4	World Bank
Regulation Quality (RQ)	-0.1	0.8	2.0	-2.0	World Bank
Growth Rate of Labor Force(GL)	0.6	0.7	4.3	-0.1	World Bank
Voice and Accountability (VA)	-0.6	0.7	1.0	-1.8	World Bank
Financial Freedom (FIF)	44.0	18.9	90.0	10.0	Heritage Foundation
Government Spending(GEF)	75.4	15.6	95.4	33.2	Heritage Foundation
Business Freedom (BF)	62.7	14.2	100.0	39.2	Heritage Foundation
Rule of Law (RL)	-0.1	0.8	1.8	-1.5	World Bank
Government Effectiveness(GE)	0.0	0.8	2.4	-1.4	World Bank
Property Rights (PR)	46.9	21.5	90.0	10.0	Heritage Foundation

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Clinical utility of plasma NT-proBNP in ruling out heart failure among Egyptian patients

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Abstract: Natriuretic peptides (BNP and NT-pro-BNP) represent useful biomarkers in heart failure diagnosis. So the aim of the present study was designed to assess the diagnostic and prognostic value of serum concentrations of NT-proBNP relative to cardiac troponin I (cTnI) and creatine kinase isoenzymee. The study was conducted on 83 patients with congestive heart failure (chronic), 20 patients with acute heart failure and 20 healthy subjects served as control group. All the biochemical parameters were determined on admission in patients with either acute heart failure or with chronic heart failure at different clinical stages of severity. The results showed that serum creatine kinase isoenzyme MB (CK-MB), serum cardiac troponin I (cTnI) and plasma concentration of N-terminal pro-brain natriuretic peptide (NT-proBNP) levels in acute heart failure (group 1) were increased as compared to the serum levels of control group. The mean levels of CK-MB, cTnI and plasma concentration of NT- proBNP were significantly increased (p<0.05) in chronic heart failure group (group 2) as compared to the acute heart failure group (group 1) as well as to the control group. Plasma NT-proBNP levels were related with chronic heart failure severity; they were particularly increased in more advanced New York Heart Association (NYHA) classes (stage II, III, IV), and these increments were matched with the increased serum levels of CK-MB and cTnI with the advance of disease severity. In conclusion in heart failure, measurement of NT-proBNP is among the diagnostic biomarkers of all relevant clinical diagnostic aids and is useful across the whole spectrum of heart failure disease severity. High NTproBNP levels are related to chronic heart failure stages, their increase is directly related to more advanced NYHA classes and to poor prognosis. So NT-proBNP can facilitate diagnosis and can be used as a guide for heart failure therapy.

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Keywords: heart failure, diagnosis, echocardiography, NT-proBNP

1. Introduction

Heart failure is a clinical syndrome characterized by systemic perfusion inadequate to meet the body's metabolic demands as a result of impaired cardiac pump function. This may be further subdivided into systolic or diastolic heart failure. In systolic heart failure, there is reduced cardiac contractility, whereas in diastolic heart failure there is impaired cardiac relaxation and abnormal ventricular filling. Congestive heart failure is a condition in which your heart can't pump enough oxygen-rich blood to meet your body's needs. When your heart doesn't pump efficiently, blood may back up into your lungs and other tissues. The severity of congestive heart failure depends on how much pumping capacity your heart has lost. As they age, most people lose some pumping capacity. However, in congestive heart failure, your heart has very little pumping capacity. Congestive heart failure often results from damage caused by a heart attack, high blood pressure, diabetes or other conditions (Swedberg et al., 2005).

B-type natriuretic peptide (brain natriuretic peptide [BNP]) is a small, ringed peptide secreted by

the heart to regulate blood pressure and fluid balance. (American Heart Association, 2008) This peptide is stored in and secreted predominantly from membrane granules in the heart ventricles in a pro form (Pro BNP). Once released from the heart in response to ventricle volume expansion and/or pressure overload, the N-terminal (NT) piece of 76 amino acids (NT-Pro BNP) is rapidly cleaved by the enzymes corin and/or furin to release the active 32 amino acid peptide (BNP)(Van Kimmenade *et al.*, 2006)

Both BNP and NT-Pro BNP are markers of atrial and ventricular distension due to increased intra-cardiac pressure. The New York Heart Association (NYHA) developed four stages functional classification system for congestive heart failure (CHF) based on the severity of the symptoms. Studies have demonstrated that the measured concentrations of circulating BNP and/or NT-Pro BNP increase with the severity of CHF based on the NYHA classification (Quyen *et al.*, 2001, Swedberg *et al.*, 2005)

NT pro-BNP is the inactive form of B type natriuretic peptide and is founded in circulating

plasma also in physiologic status; during heart disease with increased activation of neuroendocrine systems plasma levels of pro hormone are elevated. We must distinguish between chronic and acute disease, in fact because of slower metabolism respect to the active form (i.e. BNP), the pro-hormone appear less sensitive to recognize reactivation and transitorial status. For these reasons, during congestive heart failure diagnostic and prognostic values of two markers Appears similar (Michele *et al.*, 2007).

There is no agreed-upon first-line test for the diagnosis of heart failure and no simple method of measuring the adequacy of cardiac output in relation to normal levels of activity. Heart failure usually is diagnosed in persons with known heart disease who present with nonspecific symptoms breathlessness, ankle swelling) and signs (e.g., basal lung crackles). To confirm clinically suspected heart failure, physicians rely on surrogate measures of cardiac function such as left ventricular ejection fraction. However, it is clear that a large proportion of patients with heart failure, particularly older patients and women, have preserved systolic function (i.e., diastolic heart failure). The best way to diagnose and treat these patients is unclear. BNP increases when cardiac myocytes are strained; therefore, BNP is an effective method for detecting heart failure with or without systolic dysfunction (Doust et al., 2006).

The use of biomarkers is one of the most important strategies for risk stratification among the increasing number of patients admitting to hospitals for acute coronary syndrome. The revolutionary benefit of using cardiac-specific troponins in this setting is the excellent specificity and sensitivity for myocardial injury, and several studies have confirmed the superiority of troponins as compared with creatine kinase-MB (CK-MB) for this purpose. The discovery of troponins as valuable markers for predicting mortality in unstable angina (Morrow et al., 2007) led to 'The Joint European Society of College Cardiology/American of Cardiology Committee Consensus for the redefinition of myocardial infarction' from 2000 which included elevated troponins as an obligatory criterion in the diagnostics of acute myocardial infarction (Alpert et al., 2000).

The cardiac isoform of troponin is a highly specific and sensitive marker of myocardial injury and is useful for risk stratification. However, the sensitivity of cardiac troponin is insufficient for early identification of myocardial injury, particularly within 6 hours following the onset of an acute ischemic event, because the initial rise in troponin in the peripheral blood of patients with myocardial infarction is seen after 3 to 4 hours due to release

from the cytosolic pool. Therefore, a single test value on presentation is unsuitable for risk stratification (Masaru *et al.*, 2005).

Neurohormonal activation is a hallmark of heart failure and influences its clinical evolution. various neurohormones have acted as biomarkers in chronic heart failure, but B-type natriuretic peptide (BNP) or N-terminal pro-B-type natriuretic peptide (NT-proBNP) is the most widely embraced marker, particularly, given the availability of a rapid point-of-care assay (Na Li *et al.*, 2007). So the present study was designed to assess the diagnostic and prognostic value of serum concentrations of NT-proBNP relative to cardiac troponin I (cTnI) and creatine kinase isoenzyme MB (CK-MB) determined on admission in patients with acute heart failure and with chronic heart failure at different clinical stages of severity.

2. Patients and Methods

Eighty-three patients who developed congestive heart failure (CHF) on a top of myocardial infraction were screened for this study. All had dilated cardio-myopathy. The diagnosis of idiopathic dilated cardiomyopathy was made in the presence of a depressed left ventricular ejection fraction (impaired left ventricular systolic function) [L.V ejection fraction <40% on two dimensional echocardiography], and in the absence of significant coronary artery disease and other specific heart muscle disease. The patient had symptomatic heart failure New York Association (NYHA) class II to IV. So the diagnosis of dilated cardiomyopathy was based on history, physical as well as radiological examination and echocardiographic findings.

Also the present study comprised 20 patients who were diagnosed as having acute myocardial infarction, who had chest pain lasting >30 minutes. Persistent ischemic ECG changes : evolution of pathological Q waves $\geq\!0.04$ seconds or $\geq\!0.1 mv$ segment deviation in at least contiguous leads (ST-elevation MI) or $\geq 0.1 mv$ ST segment depression or definite T-wave inversion (non-ST elevation MI) or new left bundle branch block (LBBB). Beside 20 healthy subjects served as a control group.

Exclusion criteria

Patients were excluded if they have active myocarditis, pericarditis, severe hepatic or pulmonary disease and renal impairment.

Sampling:

Five ml fasting venous blood samples were collected from all subjects of the study and separated into two parts:

1. Two ml of blood sample was taken into EDTA containing tube, and then centrifuged at 3000 rpm

- for 5min. at 4°C and the separated plasma was rapidly frozen at -80 °C for storage until the time of assay of N terminal pro-brain natriuretic peptide (NT pro BNP).
- 2. Three ml blood sample were collected in dry tube without anticoagulant, allowed to clot at room temperature for 30 min, centrifuged at 3000 rpm for 10 min, and the separated serum was stored at -20 °C until the time of assay of troponin I (cTnI), and creatine kinase isoenzyme MB (CK-MB).

Methods:

- 1- Plasma concentration of N-terminal pro-brain natriuretic peptide (NT- proBNP) was measured using immunoassay method based on sandwich formation with un-extracted EDTA plasma according to Karl *et al.*, 1999.
- 2- Serum creatine kinase isoenzyme MB (CK-MB) was measured by immunochemi-luminometric assay using kits supplied by Chemilumi ACS, centaur, Bayer medical co Ltd, Tokyo ,Japan as described by Piran *et al.*, 1987.
- 3- Serum cardiac troponin I (cTnI) was measured by immunometric assay according to Cummins *et al.*, 1987 using kit purchased from Bio-Check, Inc 323 Vintage Park Dr. Foster City,

Statistical analysis

Statistical analysis was performed by SPSS for windows, version 11 software (SPSS Inc, Chicago, Illinois). All data were described as mean ± standard deviation, unless otherwise specified. Baseline characteristics were analyzed by the unpaired t –test. Because NT-proBNP values are not normally distributed, natural logarithmic transformation of data was used for statistical analysis when needed. The significance of changes in NT-proBNP levels was evaluated using the paired Student's t -test. A p-value <0.05 was considered statistically significant.

3. Results

The present study was conducted on 103 subjects, who were classified into two groups:

Group 1: it included 20 patients who were diagnosed as having acute myocardial present infarction of mean age of $55-60\pm2.114$ years who had chest pain lasting >30 minutes, and they were 18 males and 2 females.

Group 2: it included 83 patients who developed congestive heart failure (CHF) on a top of myocardial

infarction were screened for this study. All had dilated cardio-myopathy. Heart failure severity was evaluated clinically according to the New York Heart Association (NYHA) classification: 26 were in class II, 25 were in class III, and 32 were in class IV, respectively. The patient had mean \pm (SD) age of 48-60 \pm (2.645) years and they were 74 males and 9 female

Beside **control group:** it included 20 healthy subjects of the same age range and sex served as a control group and they were 17 males and 3 females.

The demographic data and the clinical data (history of hypertension, diabetes mellitus and hypercholesteremia) and the vital signs (heart rate and blood pressure) in the patients with acute and chronic heart failure were illustrated in table (1).

The serum creatine kinase isoenzyme MB (CK-MB), Serum cardiac troponin I (cTnI) and Plasma concentration of N-terminal pro-brain natriuretic peptide (NT- proBNP) levels in acute heart failure (group 1) were increased with a mean levels of 3 \pm 0.2ug/L, 18.84 \pm 2.79mg/L, and 73.115 \pm 16.33 pmoL/L, respectively and these increments were significant (p<0.05) as compared to the serum levels of control group as shown in table (2).

The serum CK-MB, cTnI and plasma concentration of NT- proBNP levels in chronic heart failure (group 2) were increased with a mean levels of 7.66 ± 1.47 ug/L, 35.59 ± 7.24 mg/L, and 105.678 ± 15.129 pmoL/L, respectively and these increments were significant (p<0.05) as compared to the serum levels of control group as shown in table (3).

The mean levels of CK-MB, cTnI and Plasma concentration of NT- proBNP were significantly increased (p<0.05) in chronic heart failure group (group 2) as compared to the acute heart failure group (group 1) as shown in table (4).

The mean serum levels of CK-MB in the different stages of chronic heart failure (stages II, III, IV) were 6.5 ± 1.235 , 7.236 ± 1.5 and 8.875 ± 0.37 ug/L, respectively, there were statistical significance variations between the three stages as the mean levels were increased with increased the stage of disease. The mean serum levels of cTnI were 30.226 ± 5.06 , 33.44 ± 6.3 and 41.61 ± 4.69 mg/L, respectively; there were statistical significance variations between the three stages. The mean Plasma concentrations of NT- proBNP were 90.90 ± 3.48 , 101.42 ± 6.49 and 121.0 ± 11.08 pmol/L respectively; there were statistical significance variations between the three stages of chronic heart failure as shown in table (5).

Table (1): Demographic and clinical data of the patient's groups

	Acute HF (Group 1)	Chronic HF (Group 2)
Number	20	83
Age (mean + SD) years	$55-60 \pm (2.114)$	$48-60 \pm 2.645$
Male/ female	18/2	74/9
<u>History</u>		
Hypertension	7 (35%)	44 (53.2%)
Diabetes mellitus	9 (45%)	35 (42.1%)
Hypercholesterolemia	8 (40%)	37 (44.6%)
Current smoker	10 (50.0%)	21 (25.3%)
Prior myocardial infarction	4 (20%)	23 (27.7%)
Angina	3 (15%)	37 (44.6%)
Stroke	0 (0%)	8 (9.6%)
Initial vital signs (mean ± SD)		
Heart rate, beats/min	95.6 ± 16.7	85.6 ± 22.8
Systolic blood pressure, mmHg	150 ± 30.0	144.3 ± 26.5
Diastolic blood pressure mmHg	89 ± 15	85 ± 12
Onset to presentation < 3 h	18 (90%)	29 (34.9 %)

Table (2): Statistical significance of the studied parameters in acute heart failure group.

	Control group	Group (1) Acute HF	P value
Number	20	20	
Sex Male/female	17/3	18/2	
Age Range Mean ± SD	61-54 57.05 ± 2.235479	55-60 57.55 <u>+</u> 2.1145	0.2359
CK.MB (ug/L) Range Mean ± SD	1.7-3.9 2.6695 ± 0.5666	2.7-3.4 3 ± 0.2127	0.0096*
CTnI (mg/L) Range Mean ± SD	5.7-12.3 8.89±2.33844	10.1- 22.7 18.84 ± 2.7934	4.975E-15*
NT-ProBNP (pmoL/L) Range Mean ± SD	58.1 -25.5 36.32 ± 9.7286	57.5- 99,5 73.115 ± 16.33	8.023E-11*

^{*}P value <0.05 considered significant, (CK-MB): creatine kinase isoenzyme MB (cTnI): cardiac troponin I, (NT-proBNP): N-terminal pro-brain natriuretic peptide

Table (3): Statistical significance of the studied parameters in chronic heart failure group.

	Control group	Group (2) Chronic HF	P value
Number	20	83	
Sex			
Male/female	17/3	74/9	
Age Range Mean ± SD	54-61 57.05 ± 2.24	48-60 56.3979 ± 2.65	0.1536
CK.MB (ug/L) Range Mean ± SD	1.7-3.9 2.6695 <u>+</u> 0.5666	5.1-9.2 7.6641 <u>+</u> 1.4748	1.9658E-27*
cTnI (mg/L) Range Mean ± SD	5.7-12.3 8.89 ± 2.34	24.9- 47.5 35.59 ±7.25	3.5739E-30*
NT-ProBNP (pmoL/L) Range Mean ± SD	25.5-58.1 36.32 ± 9.73	88- 145.6 105.68 ± 15.13	2.4393E-36*

^{*}P value < 0.05 considered significant

Table (4): Statistical significance between the studied parameters in acute and chronic heart failure.

	Acute HF	Chronic HF	P value
	(Group 1)	(Group 2)	
Number	20	83	
Age Range Mean ± SD	55-60 57.55 <u>+</u> 2.114486	48-60 56.3979 <u>+</u> 2.64574	0.07305
CK.MB (ug/L) Range Mean ± SD	2.7-3.4 3 ± 0.2127	5.1-9.2 7.66 ±1.47	7.90402E-26*
CTNI (mg/L) Range Mean ± SD	10.1- 22.7 18.84 ± 2.79	24.9- 47.5 35.59 ±7.25	4.82947E-17*
NT-ProBNP (pmoL/L) Range Mean ± SD	57.5- 99.5 73.115 ±16.33	88- 145.6 105.68 ±15.13	1.69281E-13*

^{*}P value <0.05 considered significant

Table (5): Biochemical markers and their statistical significance in the different stages of chronic heart failure.

ranure.	Stage II	Stage III	Stage VI
NT I)	Ü
Numbers	26	25	32
CK.MB (ug/L)			
Range	5.1- 8.5	5.1-9.1	7.9- 9.2
Mean <u>+</u> SD	6.5884 + 1.2355	7.236 <u>+</u> 1.5027	8.875 + 0.3724
Deschar	0.3004 <u>1</u> 1.2333		
P value			
Stage II: Stage III	0.0493*		
Stage III: Stage IV		9.55E-08*	
Stage II: Stage IV			2.79E-14*
<u>cTnI (mg/L)</u>			
Range	24.9- 36.2	24.9 - 42.5	25.6 - 47.5
Mean <u>+</u> SD	30.2269 <u>+</u> 5.0665	33.444 <u>+</u> 6.3045	41.6281 <u>+</u> 4.6992
		33.444 ± 0.3043	11.0201 <u>-</u> 1.0332
P value			
Stage II: Stage III	0.024835*		
Stage III: Stage IV		2 21 22 25 25 4	
Stage II: Stage IV		3.31038E-07*	1.44803E-12*
NT-ProBNP (pmoL/L)			1.110032 12
Range	88.3 - 100.6	112.8 - 90.6	145.6 - 98.3
Mean +SD		101.42 <u>+</u> 6.4926	121.0062 + 11.0839
Wedit 15D	90.9038 <u>+</u> 3.4806	101.121 0.4520	121.0002 11.003)
P value			
Stage II: Stage III	1.3693E-09*		
Stage III: Stage IV		8.00959E-11*	
Stage II: Stage IV Stage II: Stage IV		0.00/3/L-11	2.77139E-19*
Diago II. Diago I V			2.11137L-17

^{*}P value < 0.05 considered significant

4. Discussion

BNP measurements have been shown to add important information to clinical judgment in establishing a final diagnosis of CHF (Mohammed and Januzzi, 2009). Thus, our findings indicated that plasma concentrations of NT-proBNP were increased in acute and chronic heart failure groups and the increment in chronic heart failure group was higher than the acute heart failure group. An increase in plasma BNP concentration results in improved myocardial relaxation and has an important regulatory role in response to acute increases in ventricular volume by opposing vasoconstriction, sodium retention, and the antidiuretic effects of activated renin- angiotensinaldosterone system. However, plasma NP levels are elevated in patients with acute myocardial infarction and LV dysfunction; this increase persists during late phases of cardiac remodeling. (Palazzuoli et al., 2010).

The exact mechanism of natriuretic peptides rise in coronary disease is not completely understood. Ischaemia may constitute an independent stimulus for BNP release towards transient decrease of systolic function and

compliance, reflecting not only the impairment in left ventricular function, but also the severity of ischaemic insult Palazzuoli *et al.*, 2010.

The results of this study were in accordance with large-scale studies demonstrating the feasibility of detection of left ventricle abnormalities, the use of NT-proBNP for the acute evaluation of dyspneic patients with possible congestive heart failure (CHF) was then explored in three recent studies. In the first such study, Lainchbury and colleagues demonstrated NTproBNP to be of value in the evaluation of patients with dyspnea and suspected acute CHF in the emergency department. Subsequently, Bayes-Genis and colleagues found that NT-proBNP levels were significantly higher in patients with decompensated CHF, and also demonstrated the value of the marker for identifying those patients with 'masked' heart failure, defined as those patients with LV dysfunction and concomitant pulmonary disease. Furthermore, Bayes-Genis and others demonstrated as the heart failure was treated, NT-proBNP levels fell in tandem Bayes-Genis et al., 2004 and Bettencourt et al., 2004).

The utility of NT-proBNP testing for diagnosing heart failure in patients presenting to

the Emergency Department (ED) with acute dyspnea has been extensively validated in prospective observational studies, including the single-center PRIDE study (ProBNP Investigation of Dyspnea in the Emergency Department; N=599) (Jannuzzi et al., 2005) and the multi-center, multinational ICON study (International Collaborative of NT-proBNP; N=1256) These studies assessed a single cut-off value of 300 pg/mL for exclusion and age-stratified cut-off levels for ruling in HF Januzzi et al., 2006. In this multi-centre, international study, NT-proBNP testing was valuable for diagnostic evaluation and short-term prognosis estimation in dyspneic subjects with suspected or confirmed acute HF and should establish broader standards for use of the NTproBNP in dyspneic patients.

The results of the present study showed that, the plasma levels of NT-proBNP in chronic heart failure increased with the increment of the stage of the disease. There are more definitive data supporting the use of NT-proBNP in the Emergency Department were reported. In a blinded prospective analysis of 600 patients presenting with acute dyspnea, the ProBNP investigation of Dyspnea in the Emergency Department (PRIDE) Study investigators demonstrated NT-proBNP levels to be markedly elevated among patients with decompensated CHF. NT-proBNP was highly sensitive and specific for the diagnosis of acute CHF, and correlated with the severity of CHF symptoms. Among all the factors evaluated, an elevated NT-proBNP proved to be the single strongest independent predictor for the final diagnosis of acute CHF. Lastly, in the PRIDE Study, NT-proBNP was superior to clinical assessment for the identification of acute CHF. However, the combination of NT-proBNP testing plus clinical assessment was the most superior tool for patient evaluation (Januzzi et al., 2004).

Also, Muller and colleagues findings indicate that BNP and NT-proBNP may be equally useful as an aid for the diagnosis of CHF in patients consulting an emergency department with shortness of breath as a chief complaint. Of course, different cut off concentrations have to be considered for the analyses BNP and NT-proBNP. This is a consequence of a slower plasma clearance of NT-proBNP than of the biologically active peptide BNP resulting in higher circulating concentrations of NT-proBNP, although both peptides are released by cardiomyocytes on an equimolar basis. Furthermore, the different mechanisms of plasma clearance (neutral endopeptidase clearance receptors for BNP versus renal clearance for NT-proBNP) result in an only

moderate correlation of plasma concentrations of the two analysts McCullough *et al.*, 2003.

In previous studies NT-proBNP showed a higher absolute and relative increase related to heart failure, so it could be a more sensitive marker for left ventricular wall stress, and a diagnostic tool useful in the detection of ischemia-related left ventricular dysfunction during exercise. Baseline NT-proBNP levels and exercise induced increase in NT-proBNP levels are significantly higher in subjects with documented myocardial ischemia (demonstrated by perfusion images) (Staub *et al.*, 2005).

Bay and colleagues published one of the first large studies revealing the utility of NTproBNP in predicting LV dysfunction. From 3,236 hospitalized patients with symptomatic and asymptomatic congestive heart failure (CHF), NTproBNP had a sensitivity of 73%, specificity of 82%, and, most impressively, a negative predictive value of 98%. The diagnostic value to predict a left ventricular ejection fraction (LVEF) <40% as represented by the area under the receiver operating characteristic curve (AUC) was 0.85. Overall, the study revealed that NT-proBNP added significantly more diagnostic power to the clinical history. Subsequently, other studies revealed that not only was NT-proBNP elevated in CHF from LV dysfunction, but was also in forms of CHF with normal LV function (diastolic dysfunction), although the levels of NT-proBNP among patients with non-systolic CHF are typically lower than those with systolic dysfunction and CHF Yamamoto et al., 1996.

Importantly, the results of the present study appear to confirm previous findings, plasma NT-proBNP levels were significantly higher in patients with chronic HF than in those with acute heart failure, and showed very good diagnostic precision. Also, the NT-proBNP level increased with the severity of disease, confirming the results of other studies Lainchbury et al., 2003 and Bayes et al., 2004. Interestingly, the NT-proBNP values were similar in patients with CHF and an LVEF of above or below 45%. This indicates that NTproBNP levels are useful in the diagnosis of CHF preserved systolic function. supporting this is the fact that the patients with an impaired ventricular diastolic pattern had significantly higher NT-proBNP levels than those who had normal diastolic function—something also reported in earlier studies Tschope et al., 2005. Natriuretic peptide (NP) levels are strictly related with HF severity; they are particularly increased in more advanced New York Heart Association (NYHA) classes and in patients with poor outcome. Therefore elevated NP levels were found to correlate with the severity of left ventricular systolic dysfunction, right ventricular dysfunction and pressures, and left ventricular filling alterations. However, the optimal use of NP determination agrees with patient history, physical examination, and all other diagnostic tools Palazzuoli *et al.*, 2010.

5. Conclusion

It has been demonstrated that NT-proBNP levels can facilitate diagnosis of heart failure (acute and chronic). Measurement of NT-proBNP considered among the diagnostic biomarkers of all relevant clinical diagnostic aids and is useful across the whole spectrum of heart failure disease severity. High NT-proBNP levels were related chronic heart failure stages; their increase was directly related to more advanced NYHA classes and to poor prognosis. So NT-proBNP can facilitate diagnosis and can be used as a guide for heart failure therapy.

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Serum Neopterin Level in Early Onset Neonatal Sepsis

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Abstract: Background: Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30-50% of the total neonatal deaths each year in developing countries. Diagnosis of neonatal sepsis remains a major challenge, as early signs of sepsis are often non-specific and the laboratory criteria are also not fully reliable. This leads to unnecessary exposure to antibiotics before the presence of sepsis has been proven with potentially poor outcomes. Several attempts have been made to use physiologic parameters, hematologic indices, and cytokine profiles, at the time of onset of the suspected sepsis episode to identify accurately neonates with sepsis. Elevated serum level of neopterin has been shown to be an early specific and sensitive marker responsible for activation of the cellular immune system and has also been proposed to aid in the diagnosis of bacterial infection. Objective: To evaluate the usefulness of serum neopterin level as an accurate diagnostic tool for neonatal sepsis and compare it with Rodwell's hematological sepsis score and C-reactive protein for predicting infection and outcome in neonates with sepsis. Methods: The study comprised 20 neonates with a clinical proven sepsis, 20 neonates with a clinical suspicion of sepsis and 20 healthy neonates of matched gestational age who were considered as the normal control group. All groups were subjected to full history taking and clinical examination. Laboratory investigations done were complete blood count, total and differential leucocytic count, blood culture, serum levels of CRP and neopterin. Results: Serum neopterin levels were significantly higher in the infected and suspected groups compared with the control group (p =0.0001) and correlated positively with both CRP levels (r=0.8, p =0.0001) and the Hematological Sepsis Score (r=0.5, p=0.04). Significant positive correlations were detected between serum neopterin level, maternal age (r=0.5, p=0.02), gravidity(r= 0.5, p = 0.01), respiratory distress (r= -0.5, p=0.03), and lethargy (r= 0.2, p=0.05) in septic neonates. Conclusion: Serum neopterin may be used as an early diagnostic tool with high sensitivity (78.09%), specificity (85%), positive predictive value (93.8%), negative predictive value (82.6%) in neonates with suspicion of sepsis especially when combined with routine hematological sepsis score and C-reactive protein.

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Key word: Neonatal sepsis – neopterin level – hematological sepsis

1. Introduction:

Each year, an estimated four million neonatal deaths occur globally. Infections account for about 36% of these deaths. Forty percent of these four million neonatal deaths occur in developing countries¹. Neonatal sepsis has been used to describe the systemic response to infection in the newborn infant younger than one month of age and is categorized as early or late neonatal sepsis². Early signs of sepsis in the newborn are often non-specific leading to the initiation of treatment before the presence of sepsis has been proven. Blood culture is currently the gold standard for the diagnosis of sepsis, however, in addition to the fact that cultures reports are available only after 48-72 hours, they frequently give false negative results due to the small amount of blood that can be drawn from neonates³.

So the unnecessary exposure to antibiotics, with emergence of bacterial resistance will lead to potential poor outcomes in this vulnerable population of neonates. To identify accurately neonates with sepsis, attempts have been made to use physiologic parameters, hematologic indices, and cytokine profiles, at the time of onset of the suspected sepsis episode⁴. C-reactive protein (CRP) has been extensively investigated but there has been more interest in chemokines, cytokines, and other markers to diagnose the neonatal sepsis as procalcitonin, fibronectin, haptoglobin, lactoferrin, and neopterin⁵

Neopterin a pyrazino – pyrmidine derivative is formed from guanosione triphosphate within the biosynthetic pathway of biopterin. It is produced by the human macrophages when stimulated by interferon gama released from activated

T lymphocyte⁶. Elevated levels of neopterin have been shown to be an early specific and sensitive marker responsible for activation of the cellular immune system in several clinical settings including allograft rejection, acute bacterial infection, inflammatory and malignant diseases⁷. Therefore, neopterin production appears to be closely associated with activation of the cellular immune system⁸ and increased concentrations are related to endothelial damage and risk for septic complications⁹. In this study, we aimed to evaluate the value of serum neopterin as an early diagnostic marker for early onset sepsis during the first 48 hours and to compare the three variables, serum neopterin level, Rodwell's hematological sepsis score and C-reactive protein for predicting infection and outcome in neonates with sepsis.

2. Patients and Methods

The study was conducted on 60 neonates of different gestational age, who were admitted to the NICU in El Kasr El-Aini and Abou El-Reish Pediatric Hospitals, Cairo, Egypt between June 2007 and August 2008 after collecting signed approval consents from their parents. According to their clinical picture they were divided into 3 groups. Group (1) had a proven clinical picture of sepsis and group (2) with a suspected clinical picture of sepsis. 20 neonates of matched gestational age with no evidence of sepsis served as control group (3), they were admitted to NICU for causes other than sepsis. Careful prenatal, natal and postnatal history was taken also full clinical examination was done.

Diagnosis of sepsis was based on the presence of one or more of the following clinical signs: tachypnea, respiratory distress, apnea, cyanosis, lethargy, tachycardia, bradycardia, hypotonia, seizures and irritability. Laboratory criteria of sepsis were; positive blood culture, elevated C-reactive protein level >6 mg/dl and Rodwell's hematological sepsis score above 3¹⁰.

Clinically suspected infection was defined when there were (1)high risk maternal factors of sepsis such as intrapartum fever >37.5C, chorioamnionitis, premature rupture of membrane, meconium stained amniotic fluid, antepartum hemorrhage, pregnancy induced hypertension(PIH), and diabetes mellitus or (2)high risk fetal factors of sepsis such as low birth weight and meconium aspiration syndrome ,(3) non specific laboratory markers such as white blood cells count below 5000 or above 30.000cell/m3, immature/total leucocytes count >0.2 and C-reactive protein >6mg/dl are indicative.

Blood sample collection and storage:

Two ml of blood were withdrawn from a peripheral vein after taking an informed consent from parents of patients and controls. The sera were separated by centrifugation at 3500 rpm for 10 minutes. Sera were stored at -20°C till the time of assay. A follow up sample of blood of suspected neonates was collected for estimation of the serum neopterin level after 48 hours to confirm sepsis.

Laboratory investigations included complete blood count (CBC) with differential measured by automated cell counter system Coulter T680. The differential leucocytic counts were performed manually on leishman stained blood films. Neutrophils were classified as immature (band) forms when width of the nucleus at any constriction was not less than one third of its widest portion. 11

Blood cultures:

Aerobic and anaerobic cultures were done on blood agar plates at 10%Co2 and on MacConkey agar plates. Isolated colonies were further identified by examination of their colony morphology, gram stained smears and biochemical and enzymatic reactions. True bacteremia was considered when the blood culture was positive within 72 hours. If no growth was detected, the bottles were incubated up to 10 days with further subcultures every other day on solid media. If no growth appeared after 10 days of incubation, blood culture was considered negative. Antibiotic sensitivity test was done by Kirby Baur Technique¹².

$\label{lem:eq:hematological Sepsis Scoring system} \textbf{(HSS):}$

The previously validated hematologic criteria were used as indicators for hematological sepsis scoring system : (1)Abnormal total leucocyte (TLC)count <5000 or >30.000, (2)Abnormal total neutrophil count, (3)Elevated immature neutrophil count, (4)Elevated immature to total neutrophil ratio >0.2 (I/T), (5)Immature to mature neutrophil (I/M) ratio >0.3 , (6)Platelet count less than or equal to 150.000/mm3 (7)Pronounced degenerative changes in total neutrophil count. The higher the score the greater was the likelihood of sepsis. With score ≤ 2 the likelihood that sepsis was absent was $99\%^{10}$.

CRP assay:

C-reactive protein serum level was assessed by slide latex agglutination test (Rapitex CRP kit). It was considered positive when the titer was>6 mg/L.

Serum Neopterin assay:

Neopterin serum level was determined using Human Neopterin ELISA kit. These tests are species-specific >32.2nmol/l during the first 48 hours.

Statistical analysis:

Statistical Package for Social Science (SPSS) program version 9.0 was used for analysis of data. Values were summarized as mean \pm SD, range or as number of subjects and proportions. Non parametric test (Mann Whitney U) was used for analysis of two qualitative data. One way ANOVA was done for analysis of more than two variables followed by post Hocc test for detection of significance. Simple linear correlation (Pearson's correlation for quantitative data and Spearman correlation for qualitative data) were done to detect any relationship between the variables. P-value is considered significant if < 0.05*.

The sensitivity and specificity for the measured variables were calculated according to construct the receiver operator characteristic curves.

3. Results:

The demographic characteristics of the study and control groups are summarized in table (1). There were no significant differences in gestational age means (35.3 versus 35.6 $\,v$ 35.7 weeks), birth weight means (2.2 $\,v$ 2.6 $\,v$ 2.7 kg), Apgar scores at one and five minutes, and male to female ratio between the infected, suspected, and control groups respectively.

Neonatal sepsis was predisposed by maternal and neonatal risk factors. Premature rupture of membrane (PROM) occurred in 8 neonates (40%) of the infected group while in the suspected group it occurred in 9 neonates (45%). 12 neonates (60%) of the infected group were delivered preterm and in the suspected group 11 neonates (55%) were delivered preterm. Maternal temperature more than 38C° was detected in mothers of 2 neonates (10%) of the infected group and in 4 mothers (20%) of the suspected group. There were no significant changes between the 3 groups, table (2).

The most frequent clinical presentations of septic and suspected cases were poor moro (100% and 80% respectively), poor suckling reflexes (80% and 60% respectively), fever (35% and 35% respectively), respiratory distress (100% and 65% respectively), tachycardia (55% and 25% respectively), lethargy (60% and 45% respectively) and hypotonia (65% and 50% respectively), (Fig.1).

Pathogenic organisms were isolated from blood cultures of all neonates of the infected group (group I), gram negative organisms were the most common pathogens identified (80%). The most common species identified were Klebsiella (7cases, 35%),

Pseudomonas (4cases, 20%), Enterobacter Coagulase (3cases, 15%), Staph Negative (2cases, 10%), followed by gram positive organisms which were predominant (20%) of the neonates, they were Staphylococcus aureus (2 neonates, 10%), and Streptococcus (2 cases, 10%). In group II, gram negative organisms were also predominant, they were isolated from 4 (70%) neonates, they were Klebsiella (6 cases, 30%), Pseudomonas (3 cases, 15%), Enterobacter (2 cases, 10%), Staph Coagulase Negative (3cases, 15%), followed by gram positive organisms in 6 cases (30%) of the neonates, they were Staphylococcus Aureus (3 neonates, 15%), and Streptococcus (3 cases, 15%). The causative bacterial agents are listed in table (3).

Different laboratory parameters of the three studied groups are shown in table (4). The I/T ratio and I/M ratios were significantly higher in the infected and the suspected groups compared to the control group, while platelet and RBC counts were significantly lower (p=0.001) in both the infected and the suspected groups compared to the control group.

Serum levels of neopterin of newborns in the sepsis group had a mean of 51.6 ± 22.2 nmol/l ranging between 28.0 - 124.0 nmol/l, while in the suspected group, it ranged between 26.0- 91.0 nmol/l with a mean of 41.4 ± 17.6 nmol/l in the first day of life and ranged between 40.0-147.0 nmol/l with a mean of 66.5 ± 24.0 nmol/l in the third day of life. In the controls, it ranged between 2.4-38.0 nmol/l with mean of 12.8 ± 9.7 nmol/l. The level of serum neopterin was significantly higher in cases than controls (P = 0.0001) being higher in infected group, as shown in table (4).

Mean serum CRP levels, in the neonates with proven sepsis were found to be significantly higher than in the suspected and control groups. (P=0.0001). These levels are shown in table (4).

In the group with confirmed sepsis, a highly significant positive correlation was found between serum neopterin level and the serum CRP level (r=0.8, p=0.0001) it correlated as well significantly with the sepsis score (r=0.5, p=0.04). A significant positive correlation was also detected between sepsis score and serum CRP level(r=0.5, p=0.01), Table (5).

In the septic neonates, serum neopterin level correlated positively with the maternal age (r = 0.5, p=0.02) and gravidity (r = 0.5, p=0.01). On the other hand it correlated negatively with the gestational age with (r=-0.4, p=0.07). No significant correlations between serum neopterin concentration, sepsis score and serum CRP with the other demographic data of the infected neonates were detected. As regards the clinical manifestations, serum neopterin and CRP concentrations correlated significantly positive with respiratory distress (r=0.5, p=0.03) while lethargy

correlated significantly positive with serum neopterin level only(r=0.2,p=0.05) table (5).

In this study 7 cases (35%) of the infected group and 9 cases (45%) of the suspected group died, their serum neopterin level was significantly higher than that of the living neonates (p value =0.001). This was also the case regarding the serum CRP level, which was significantly higher in dead septic neonates compared with those who survived with a significant p value of 0.002 table (6).

The sensitivity, specificity, positive and negative predictive values of neopterin, CRP and

HSS for determining neonatal sepsis are summarized in table (7). In case of neopterin, it was found to be 78.9%; sensitive in identifying sepsis, the specificity was 95%; the predictive value of a positive test was 93.8%, while that of a negative test was 82.6%. The sensitivity of CRP was found to be 65.1%, specificity 95.5%, positive predictive value 97%, negative predictive value 60.5%, while the HSS sensitivity was 63.4%, specificity 100%, positive predictive value 100% and negative predictive value 57.1%.

Table (1): Demographic and clinical characteristics of the studied neonates

Variables	Infected (n=20)	Suspected (n=20)	Controls (n=20)	P-value
Maternal age (yrs)				
mean±SD	27.2± 6.7	27.5 ± 5.8	26.7 ± 6.1	0.7
range	18-40	18-39	17-40	
Gestational age (wks)				
mean±SD	35.3 ± 3.1	35.6 ± 3.6	35.7 ± 4.1	0.5
range	29-39	29-40	28-40	
Birth weight(kg)				
mean±SD	2.2 ± 0.8	2.6 ± 1.1	2.7 ± 1.1	0.2
range	1-3.5	1.1-4.1	1.1-4.2	
Apgar1min				
mean±SD	4.4 ± 0.6	4.5 ± 1.5	6.3 ± 1.8	0.09
range	3-5	2-7	5-8	
Apgar 5 min				
mean±SD	8.9 ± 0.4	9.0 ± 0.6	9.2 ± 0.5	0.09
range	8-9	8-10	8-10	

Table (2): Risk factors for neonatal sepsis in the different studied groups

Variables	Infected No. (%)	Suspected No. (%)	Controls No. (%)
Sex			
Males	12 (60)	13(65)	12(60)
Females	8 (40)	7 (35)	8(40)
Maternal risk factors			
PROM>18h	8 (40)	9 (45)	0
Fever>37.8	2 (10)	4 (20)	0
Diabetes	2 (10)	1 (5)	0
Pregnancy ind. hypertension	1 (5)	1 (5)	1 (25)
Polyhydramonos	2 (10)	1 (5)	1 (25)
Meconeal amniotic fluid	5 (25)	2 (10)	0
Neonatal age			
Preterm	12(60)	11(55)	9 (45)
Full term	8(40)	9(45)	11 (55)
Low birth weight			
< 2499 g	9(45)	8(40)	6(30)
Mode of Delivery			
Vaginal delivery	11(55)	12(60)	11 (55)
Cesarean section	9(45)	8(40)	9 (45)
Sepsis score			
< 3	2(10)	1 (5)	20 (100)
> 3	18(90)	19 (95)	0
Outcome			
Died	7(35)	9 (45)	2(10)
Survived	13(65)	11(55)	18(90)

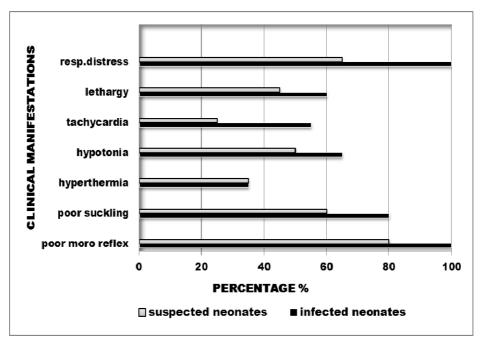


Fig. (1) Clinical manifestations of infected and suspected neonates

Table (3) Organisms isolated from blood culture of infected and suspected neonates

Organisms isolated	Infected No (%)	Suspected No (%)	P value
Gram negative bacteria	16(80%)	12(60%)	NS
Klebsiella	7 (35)	6 (30)	
Enterobacter	3 (15)	2 (10)	
Pseudomonas	4 (20)	2 (10)	
Staph coagulase –ve	2 (10)	2 (10)	
Gram positive bacteria	4(20%)	8(40%)	NS
Staph aureus	2 (10)	4 (20)	
Streptococcus	2 (10)	4 (20)	

Table (4): Laboratory data of the studied neonates

Varia	bles	Infected	Suspected	Control	P-value
TLC (10 ³ /ul)	Range Mean+SD	2.9-53 13.4± 12.6	2.8-40.6 17.8± 14.9	5.4-18.2 11.5± 43.6	0.8
Total. Neutrophil (10³/ul)	Range Mean+SD	1.2-22.9 7.74± 6.88	11.3-27.0 9.21± 9.81	2.1-7.0 5.02±1.99	0.9
Immature Neutrophil (10³/ul)	Range Mean+SD	1.7-52 16.89± 17.28	2.5-72.9 21.96± 23.97	0.2-1.1 6.59± 2.97	0.3
I/T ratio	Range Mean+SD	0.2 - 0.3 0.2 ± 0.04^{a}	0.2 - 0.3 0.2 ± 0.03^{a}	$0.1-0.2$ $0.1\pm 0.02^{\mathbf{b}}$	0.0001*
I/M ratio	Range Mean+SD	$0.2 - 0.4$ 0.2 ± 0.04^{a}	0.2 - 0.4 0.3 ± 0.05^{a}	0.1 - 0.2 0.1± 0.04 ^b	0.0001*
Hb (g/dl)	Range Mean+SD	$7.6-16.6$ 10.4 ± 2.7^{a}	$6.5-13.4 9.3 \pm 2.0^{a}$	9.7 -17.3 14.1± 2.0 ^b	0.0001*
RBCs (10 ¹⁰ /ul)	Range Mean+SD	$2.2 - 5.5$ 3.9 ± 0.8^{ab}	$2.1-6.2 \\ 3.6 \pm 1.0^{\mathbf{a}}$	3.4-6.2 4.5 ± 0.7 ^b	0.0001*
Platelet (10³/ul)	Range Mean+SD	56.7-382.0 88.50± 99.07 ^a	43.0-253.0 130.5± 55.3 ^b	$101.0-370.0$ 247.3 ± 82.5^{c}	0.0001*
CRP (mg/l)	Range Mean+SD	12-48 28.8±16.7	0-6 2.9 <u>+</u> 1.1	0-3 1.3 <u>+</u> 0.7	0.0001*
Neopterin (nmol/l)	Range Mean+SD	28-124 51.6± 22.2 ^a	(Day 1) 26-91 41.4± 17.6a (Day 3) 40-147 66.5±24a	2.4 - 38 12.8± 9.7 ^b	0.0001*
HSS	Range Mean+SD	3-7 5.6±1.3	3-7 5.1±0.9	0-1 0.2±0.4	0.0001*

P value is significant if < 0.05* Different symbols indicate significance

Table(5): Correlation between serum neopterin, CRP levels and sepsis score with clinical data of the septic neonates.

demographic and

P-

	clinical data of the septic neonates.										
Inflam.	MA	GA	BW	Gravi-	AS (1)	AS(5)	Resp.	Lethar	Neopt-	CRP	HSS
markers				dity			Distress	-gy	erin		
Neopterin											
r	0.5	-0.4	-0.3	0.5	0.3	-0.01	0.5	0.2		0.8	0.5
p	0.02*	0.07	0.2	0.01	0.2	0.9	0.03*	0.05*		0.0001	0.04*
										*	
CRP											
r	0.5	-0.3	-0.3	0.5	0.3	-0.2	0.5	0.1	0.8		0.5
p	0.02*	0.2	0.36	0.02*	0.2	0.4	0.03*	0.6	0.0001		0.01*
									*		
HSS											
r	0.2	-0.1	-0.01	0.2	-0.1	-0.1	0.3	-0.2	0.5	0.5	
p	0.5	0.7	0.9	0.5	0.7	0.6	0.2	0.3	0.04*	0.01*	

Maternal age (MA) Gestational age (GA), Agar score (AS), C reactive protein (CRP) P-value is significant if < 0.05*

Table (6): The relation of serum neopterin level, serum CRP level and sepsis score with the outcome of the infected group.

Variables	Survival	Death	p-value
	$Mean \pm SD$	Mean ± SD	
	N= 13	N= 7	
Neopterin (nmol/L)	41.3 ± 11.4	70.8 ± 25.4	0.001*
CRP (mg/L)	20.3 ± 13.3	44.6 ± 9.1	0.002*
Sepsis score (HSS)	5.2 ± 1.4	6.3 ± 0.8	0.1

value is significant if < 0.05

Table (7): Sensitivity, Specificity and Predictive values of neopterin, CRP serum levels and HSS as a marker in early onset neonatal sepsis

Variable	Sensitivity	Specificity	Positive predictive	Negative
(Cut-off)			value	predictive value
Neopterin	78.9%	95 %	93.8 %	82.6 %
32.2(nmol/L)				
CRP	65.1%	95.5%	97.5%	60.5%
6 (mg/dl)				
HSS	63.4%	100%	100%	57.1%

The multiple regression analysis of neopterin was done and revealed that the most important factor affecting neopterin level was serum CRP (r^2 =0.63, p value= 0.0001).

4. Discussion

Sepsis and septic shock in newborn infants have a high risk of morbidity and mortality. Despite advances in medicine, diagnosis of neonatal sepsis

remains as a major challenge. Early clinical signs are nonspecific and the laboratory criteria are also not fully reliable. Warning signs and symptoms are often subtle and can easily be confused with non infective causes such as apnea, hypothermia, and acute exacerbation of chronic lung disease. So that haematological and biochemical markers such as immature/total neutrophil ratio, platelet count, C-reactive protein (CRP), various cytokines have been proposed as being useful indicators for early identification of septic infants¹³.

Incidence of sepsis increases with low birth weight and preterm infants, due to the relatively immunodeficiency condition and the possibility of undergoing some invasive monitoring procedures¹⁴. .In our study, 60% and 55% of the infected and suspected group respectively were born preterm while 40 % and 45% respectively had low birth weight. This goes concomitantly with other previous reports where prematurity and low birth weight were found to have higher incidence of sepsis and high case fatality rates 15,16. Prolonged leaking and premature rupture of membranes is considered as a major risk factor for sepsis because of the danger of ascending infection. In the present study, 40% of the neonates with sepsis and 45% of suspected had PROM. Veskari et al., $(2000)^{17}$ reported that premature rupture of membranes occurred in 19% of his cases and reached up to 75% of cases in the study done by Khalada et al. (2010)¹⁸.

Most previous studies have shown a predominance of males among neonates with neonatal sepsis¹⁹, this is confirmed in our study, were males formed around 60% of the patients. A gene located on x-chromosome has been postulated to be involved in the function of thymus or with synthesis of immunoglobulins²⁰.

Klebseilla dominated the organisms isolated from the blood culture (35%), followed by Coagulase Pseudomonas (20%),Negative Staphylococci (10%), Group B Streptococci (10%), Staph. Aureus (10%) and Enterobacter (15%). These pathogens are commonly responsible for early onset disease as in other studies done in Egypt^{21,22,23,24}. In most of the developing countries, gram-negative bacteria form the majority of the isolates in neonatal sepsis where Klebsiella was the commonest isolate recovered in Tanzania²⁵ and in Nigeria it was Eisherishia Coli followed by Staphylococcus aureus²⁶. The predominance of an organism causing septicemia in the unit can be due to selective pressure of antibiotics, this has been found to be true with neonatal septicemia due to Klebsiella pneumonia²⁷.

Rodwell et al. 1988¹⁰ evaluated the role of hematologic findings as a screening test for neonatal sepsis, one must keep in mind, however, the wide variability in the diagnostic accuracy of leukocyte indices in neonatal sepsis, especially the band count and its derived immature/total neutrophil ratio⁴. The HSS has practical advantages; it is applicable to all

infants, including those who have received antibiotic therapy prior to evaluation and simplifies the interpretation of hematologic profile¹⁸. In the present study, total leucocytic count (TLC) was not much informative for the diagnosis of neonatal sepsis, this may be because septic infants, in contrast to adults in whom haematopoiesis is developmentally mature, may deplete their neutrophil reserve and develop neutropenia during overwhelming infection² Thurlbeck and Meintoch (1987)²⁹ also stated that the TLC is often unhelpful in the diagnosis of sepsis because the normal range is wide and varies with gestational age and postnatal age. The ratio of immature to total neutrophil (I/T) and immature to mature neutrophil (I/M) were much informative, as they were significantly higher in the septic and suspected neonates in comparison with the controls ,these results are concordant with the results of Varsha et al, $(2003)^{30}$ and Abou El-Ela et al., $(2005)^{31}$.

Most of our studied patients in the infected group were thrombocytopenic which is similar to previous studies^{32,33}. This could be due to direct toxic injury of platelets, megakaryocytic suppression, increased peripheral consumption as in DIC or presence of immune component due to increased level of platelet associated immunoglobulins³⁴.

Although, in recent years, several new markers of infection have been investigated, some studies suggested that CRP remains to be the best sensitive and specific acute phase reactant for diagnosis of neonatal sepsis with a higher likelihood ratio for the prediction of sepsis¹³. CRP level in the septic group of our patients was found to be elevated when compared with both suspected and control groups. A highly significant positive correlation between CRP and HSS was found (P=0.01), this is in concordance with Black et al, 2004³⁵.

Neopterin has been proposed to aid in the diagnosis of bacterial infection³⁶. Human monocytes/ macrophages produce neopterin when stimulated by interferon-y released from activated T cells. Therefore, neopterin production appears to be closely associated with activation of the cellular immune Increased concentrations are related to endothelial damage and risk for complications³⁷. The current study revealed highly significant increase in serum neopterin concentrations in the infected and suspected groups compared with the control group

(P =0.0001), indicating that the serum neopterin level is a good marker for diagnosis of early onset neonatal sepsis, this is in agreement with Czyzewska et al, 2005³⁸. The optimal cutoff points have not been established yet; this may be due to the wide variation between the studies in the methods or the relative small numbers of patients studied. In this study,

serum neopterin level correlated positively with both CRP (p =0.0001) levels and the Hematological Sepsis Score (p=0.04) which are laboratory markers of neonatal sepsis pointing to their usefulness as additional markers of sepsis, this is in agreement with the study of Czyewska et al, 2005³⁸. The combination of serum neopterin level and CRP is a reliable test for the diagnosis of early onset bacterial infection and may be helpful in establishing antibiotic therapy in newborn³⁹. In our study, 35% of the infected group and 55% of the suspected group, died, a highly positive significant correlation was detected between the outcome of the infected neonates and serum neopterin level. This positive significant predictor of mortality in the studied patients (p= 0.02), is similar to the results of Murr et al, 2001³⁹ and Ruokonen et al,200240, who reported an increase of serum neopterin level with the severity of infection and a higher level in non-survivors.

In conclusion, neopterin may be used as a diagnostic marker for early onset neonatal sepsis. Combined use of one or more laboratory marker as HSS and CRP with neopterin will enhance the diagnostic accuracy, early detection and consequently prevention of complications of infected cases.

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Contourlet Features Extraction and AdaBoost Classification for Palmprint Verification

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Abstract: Biometrics-based personal verification is a powerful security features in technology era. Palmprint is an important complement and reliable biometric that can be used for identity verification because it is stable and unique for every individual. This paper presents a new palmprint verification method by using the contourlet features and AdaBoost classification. The contourlet transform is a new two dimensional extension of the wavelet transform using multi-scale and directional filter banks. It can effectively capture smooth contours that are the dominant features in palmprint images. AdaBoost is used as a classifier in the experiments. Experimental results shows that the contourlet features when classify by using AdaBoost (α -Type) classifier are very suitable for invariant palmprint verification. The experimental results illustrate the effectiveness of the method proposed.

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Keywords: Palmprint, verification, Contourlet, AdaBoost, Biometrics.

1. Introduction

Biometric systems that recognize individuals based on their physiological and behavioral characteristics such as the fingerprint, face, iris, palmprint, retina or signature are much more secure [1, 12, 13]. Biometric identification is an emerging technology that can solve security problems in our networked society [4, 5, 16]. In the networked society there are a great number of systems that need biometric identification, so it has become an important issue in our days. This identification can be based on palmprint features [10].

Biometrics have gained much attention in the security world recently, and the use of biological features as the personal identification number has replaced the use of digits gradually due to their obvious advantages. However biometrics can provide a perfect solution to these problems [2].

Biometrics is taking its place as one of the most secure, flexible and reliable of the available approaches [6]. As a result, many biometric systems for commercial applications have been successfully developed [2, 3].

Biometrics-based personal identification is a powerful security features in the technology era [12]. Recently, the researches on biometrics-based verification have been receiving more and more attention because of its stabilization, uniqueness and arduous duplicate characteristics [7].

As the important implementation of biometric technology, palmprint verification is one of the most reliable personal identification methods [5, 8, 9].

Palmprint is one of the relatively new physiological biometrics due to its stable and unique characteristics. The rich texture information of palmprint offers one of the powerful means in the field of personal recognition [2]. There are many unique features in a palmprint image that can be used for personal identification. Principal lines, wrinkles, ridges, minutiae points, singular points, and texture are regarded as useful features for palmprint representation (see Figure 1) [3, 11, 12, 13, 14, 16].

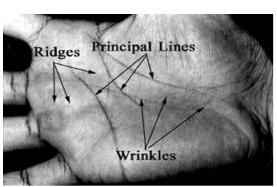


Figure 1. Three types of basic features in a palmprint

Compared with the other physical characteristics, palmprint authentication has several advantages: (1) low-resolution imaging, (2) low intrusiveness, (3) stable line features, (4) high user acceptance, (5) user friendly, and (6) low cost requirements [3, 5, 11, 13, 15].

Palmprint verification is an approach for verifying a palmprint input by matching the input to the claimed identity template stored in a database.

If the dissimilarity measure between the input and the claimed template is below the predefined threshold value, the palmprint input is verified possessing same identity as the claimed identity template [11].

Our palmprint verification system contains three modules, preprocessing, feature extraction and classification. Figure 2 gives a block diagram to describe the relationship between the three modules.

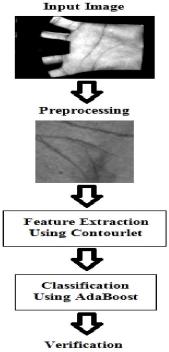


Figure 2. The flow chart of proposed palmprint verification system

The main steps of palmprint verification system are described below:

- (1) Input Palmprint Image: We obtain a good quality palmprint image in a short time interval, that is captured by palmprint scanner and then the AC signal is converted into a digital signal, which is transmitted to a computer for further processing. Palmprint images in this case are from the Hong Kong Polytechnic University Palmprint Database [17].
- (2) Preprocessing: Determine the two key points between fingers to establish a coordinate system for aligning different palmprint images. A coordinate system is set up on basis of the boundaries of fingers so as to extract a central part of a palmprint for feature extraction.
- (3) Feature Extraction: We apply a contourlet transform to extract feature information from the central part.

(4) Classification: The AdaBoost classifier is used to classify palmprint features; hence the selected features are input to the related AdaBoost (α -Type) for classification.

In the palmprint verification mode, the user is asked to provide his/her user ID and his/her palmprint sample. Then the palmprint sample passes through preprocessing and feature extraction.

The extracted features are compared with templates in the database belonging to the same user ID. The rest of this paper is organized as the follows: Palmprint image preprocessing steps are mentioned in Section 2. Palmprint feature extraction using Contourlet transform is explained in Section 3. Classification using AdaBoost classifier described in Section 4. Section 5 is dedicated to Palmprint Verification Using the Contourlet Transform and AdaBoost Algorithm. Experimental results are given in Section 6. Finally, we present our conclusions in Section 7.

2. Palmprint image preprocessing

Preprocessing is important for the segmentation of region of interest (ROI) and feature extraction, it is necessary to obtain a sub-image from the captured palmprint image and to eliminate the variations caused by rotation and translation.

Hence palmprint images should be orientated and normalized before feature extraction and matching [6]. In this project work we have not taken any palmprint scanner for acquisition of palmprint images. Rather we have used the online database of Hong Kong Polytechnic University Palmprint Database [17].

The six main steps of palmprint image preprocessing are as follows (see Figure 3):

Step1. Apply a low-pass filter, such as Gaussian to the original image (see Figure 3 (a)) and use a threshold to convert it to a binary image (see Figure 3 (b)).

Step2. Extract the palm's boundary (see Figure 3(c)).

Step3. Use straight lines (L^1 and L^2 , L^3 and L^4) to fit the segments of the boundary of the first finger, middle finger, third finger and little finger (see Figure 3 (d)):

$$L^i: y = k_i x + b_i \tag{1}$$

Where k_i and b_i are the slope and intercept of L^i (i=1, 2, 3, 4), which can be computed by the following equations:

$$k_{i} = \frac{\sum_{k=1}^{M_{i}} x_{i}^{k} \times \sum_{k=1}^{M_{i}} y_{i}^{k} - M_{i} \times \sum_{k=1}^{M_{i}} (x_{i}^{k} \times y_{i}^{k})}{\left(\sum_{k=1}^{M_{i}} x_{i}^{k}\right)^{2} - M_{i} \times \sum_{k=1}^{M_{i}} (x_{i}^{k})^{2}}$$
(2)

$$b_{i} = \frac{\sum_{k=1}^{M_{i}} y_{i}^{k} - k_{i} \times \sum_{k=1}^{M_{i}} x_{i}^{k}}{M_{i}}$$
(3)

where $\{\!\!\{x_i^k,y_i^k\}\!\!\}_{k=1}^{M_i}$, (i=1, 2, 3, 4) are the coordinates of the points on the segments of the boundary of the first finger, middle finger, third finger and little finger, respectively; M_i is the total number of the points on the corresponding segment.

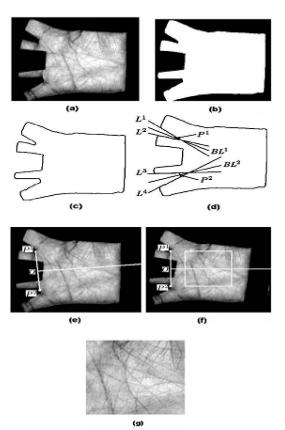


Figure 3. Main steps of preprocessing (a) Original image (b) Binary image (c) Boundary tracking (d) Line fitting, bisectors (e) Palmprint coordinate system (f) Central part extraction (g) Preprocessed result

Step4. Computing the bisectors (BL^1 and BL^2) of the angles formed by $\rm L^1$ and $\rm L^2, \, L^3$ and $\rm L^4$:

$$BL^i: y = K_i x + B_i \tag{4}$$

Where K_i and B_i are the slope and intercept of BL^i

(i=1, 2), which can be computed by the following equations:

$$K_{i} = \frac{k_{2\times i-1} \times \sqrt{1 + k_{2\times i}^{2}} + k_{2\times i} \times \sqrt{1 + k_{2\times i-1}^{2}}}{\sqrt{1 + k_{2\times i-1}^{2}} + \sqrt{1 + k_{2\times i}^{2}}}$$
(5)

$$B_{i} = \frac{b_{2\times i-1} \times \sqrt{1 + k_{2\times i}^{2}} + b_{2\times i} \times \sqrt{1 + k_{2\times i-1}^{2}}}{\sqrt{1 + k_{2\times i-1}^{2}} + \sqrt{1 + k_{2\times i}^{2}}} + \sqrt{1 + k_{2\times i}^{2}}$$
(6)

Where i=1, 2; $k_1 \sim k_4$, $b_1 \sim b_4$ are computed by (2) and (3). The intersection of BL^1 and the boundary, BL^2 and the boundary are P^1 and P^2 , respectively (see Figure 3 (d)).

Step5. Line up point P^1 and P^2 , and make a palmprint coordinate system in which y-axis is line P^1P^2 and the original point is the midpoint of line segment P^1P^2 (see Figure 3(e) and 3(f)).

Step6.Extracting a sub-image with fixed size from the center of the image (see Figure 3 (g)).

3. Palmprint feature extraction using Contourlet transform

The limitations of commonly used separable extensions of one-dimensional transforms, such as the Fourier and wavelet transforms, in capturing the geometry of image edges are well known [18].

The contourlet transform is a new extension to the wavelet transform in two dimensions using nonseparable and directional filter banks [20, 23, 29]. The contourlet transform uses contour segments and fine details in images to realize the local, multiresolutional and directional image expansion [19, 21, 22, 26]. Contourlet is implemented by the Pyramidal Directional Filter Banks (PDFB) that is a cascade of a Laplacian Pyramid (LP) and Directional Filter Banks (DFB) [22, 23, 24]. With this rich set of basis functions, the contourlet transform effectively capture smooth contours that are the dominant feature in natural images. In contourlet transform, the Laplacian pyramid does the decomposition of images into sub-bands and then the directional filter banks analyze each detail image as illustrated in Figure 4.

Figure 4 shows a flow graph of the contourlet transform [19, 21, 28]. It consists of two major stages: the sub-band decomposition and the directional transform. At the first stage, we used Laplacian pyramid (LP), and for the second stage, we used directional filter banks (DFB) [28].

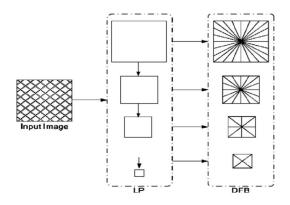


Figure 4. A flow graph of the Contourlet Transform

The pyramidal directional filter bank (PDFB), was proposed by Minh Do and Vetterli, which overcomes the block-based approach of curvelet transform by a directional filter bank, applied on the whole scale also known as contourlet transform (CT) [18, 20, 25].

The grouping of wavelet coefficients suggests that one can obtain a sparse image expansion by first applying a multi-scale transform and then applying a local directional transform to gather the nearby basis functions at the same scale into linear structures. In essence, first a wavelet-like transform is used for edge (points) detection, and then a local directional transform for contour segments detection. With this insight, one can construct a double filter bank structure (Figure 5 (a)) in which at first the Laplacian pyramid (LP) is used to capture the point discontinuities, and followed by a directional filter bank (DFB) to link point discontinuities into linear structures [18, 19, 26, 29].

The overall result is an image expansion with basis images as contour segments, and thus it is named the contourlet transform. The combination of this double filter bank is named pyramidal directional filter bank (PDFB).

Figure 5 (a) shows the block diagram of a PDFB. First a standard multi-scale decomposition into octave bands is computed, where the low pass channel is sub-sampled while the high pass is not.

Then a directional decomposition with a DFB is applied to each high pass channel. Figure 5 (b) shows the support shapes for contourlets implemented by a PDFB that satisfies the anisotropy scaling relation [18, 19, 27].

From the upper line to the lower line, four reduces the scale while the number of directions is doubled. PDFB allows for different number of directions at each scale/resolution to nearly achieve critical sampling. As DFB is designed to capture high frequency components (representing directionality), the LP part of the PDFB permits sub-band

decomposition to avoid "leaking" of low frequencies into several directional sub-bands, thus directional information can be captured efficiently.

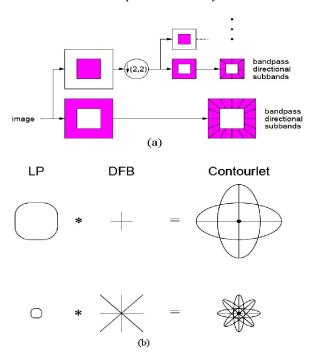


Figure 5. (a) Block diagram of a PDFB, (b) Supports for Contourlets

For the contourlet transform to satisfy the anisotropy scaling relation, one simply needs to impose that in the PDFB, the number of directions is doubled at every other finer scale of the pyramid. Figure 5 (b) graphically depicts the supports of the basis functions generated by such a PDFB. As can be seen from the two shown pyramidal levels, the support size of the LP is reduced by four times while the number of directions of the DFB is doubled. Combine these two steps, the support size of the PDFB basis functions are changed from one level to next in accordance with the curve scaling relation. In this contourlet scheme, each generation doubles the spatial resolution as well as the angular resolution. The PDFB provides a frame expansion for images with frame elements like contour segments, and thus is also called the contourlet transform.

3.1 Laplacian Pyramid

One way of achieving a multi-scale decomposition is to use a Laplacian pyramid (LP), introduced by Burt and Adelson. The LP decomposition at each level generates a down sampled low pass version of the original and the difference between the original and the prediction,

resulting in a band-pass image as shown in Figure 6 (a). In this figure [18, 19, 30], 'H' and 'G' are called analysis and synthesis filters and 'M' is the sampling matrix. The process can be iterated on the coarse version.

In Figure 6 (a) the outputs are a coarse approximation 'a' and a difference 'b' between the original signal and the prediction. The process can be iterated by decomposing the coarse version repeatedly. The original image is convolved with a Gaussian kernel [18, 19].

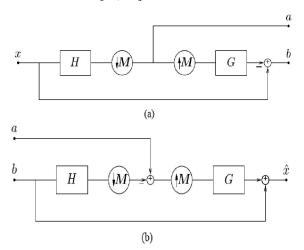


Figure 6. Laplacian pyramid scheme (a) analysis, (b) reconstruction

The resulting image is a low pass filtered version of the original image. The Laplacian is then computed as the difference between the original image and the low pass filtered image. This process is continued to obtain a set of band-pass filtered images (since each one is the difference between two levels of the Gaussian pyramid).

In this case, we proposed the use of the optimal linear reconstruction using the dual frame operator (or pseudo-inverse) as shown in Figure 6 (b).

The new reconstruction differs from the usual method, where the signal is obtained by simply adding back the difference to the prediction from the coarse signal, and was shown to achieve significant improvement over the usual reconstruction in the presence of noise [18].

Thus the Laplacian pyramid is a set of band pass filters. By repeating these steps several times a sequence of images, are obtained. If these images are stacked one above another, the result is a tapering pyramid data structure, as shown in Figure 7 and hence the name [19].

The Laplacian pyramid can thus be used to represent images as a series of band-pass filtered images, each sampled at successively sparser

densities. It is frequently used in image processing and pattern recognition tasks because of its ease of computation. A drawback of the LP is the implicit oversampling. However, in contrast to the critically sampled wavelet scheme, the LP has the distinguishing feature that each pyramid level generates only one band- pass image (even for multi-dimensional cases), which does not have "scrambled" frequencies.

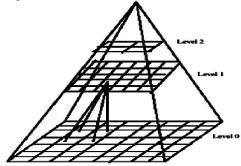


Figure 7. Laplacian pyramid structure

This frequency scrambling happens in the wavelet filter bank when a high pass channel, after down sampling, is folded back into the low frequency band, and thus its spectrum is reflected. In the LP, this effect is avoided by down sampling the low pass channel only.

3.2 Directional Filter Bank

In 1992, Bamberger and Smith introduced a 2-D directional filter bank (DFB) that can be maximally decimated while achieving perfect reconstruction [18, 19]. The directional filter bank is a critically sampled filter bank that can decompose images into any power of two's number of directions.

The DFB is efficiently implemented via a 1-level tree-structured decomposition that leads to '21' subbands with wedge-shaped frequency partition as shown in Figure 8 [18, 19, 25, 30].

The original construction of the DFB involves modulating the input signal and using diamond-shaped filters. Furthermore, to obtain the desired frequency partition, an involved tree expanding rule has to be followed. As a result, the frequency regions for the resulting sub-bands do not follow a simple ordering as shown in Figure 7 based on the channel indices. The DFB is designed to capture the high frequency components (representing directionality) of images. Therefore, low frequency components are handled poorly by the DFB. In fact, with the frequency partition shown in Figure 8, low frequencies would leak into several directional sub-bands, hence DFB does not provide a sparse representation for images.

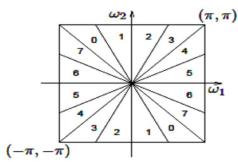


Figure 8. DFB frequency partitioning

To improve the situation, low frequencies should be removed before the DFB. This provides another reason to combine the DFB with a multi-resolution scheme. Therefore, the LP permits further sub-band decomposition to be applied on its bandpass images.

Those band-pass images can be fed into a DFB so that directional information can be captured efficiently. The scheme can be iterated repeatedly on the coarse image. The end result is a double iterated filter bank structure, named pyramidal directional filter bank (PDFB), which decomposes images into directional sub-bands at multiple scales. The scheme is flexible since it allows for a different number of directions at each scale. Figure 9 shows the contourlet transformation coefficients of palmprint image without preprocessing step. Each image is decomposed into a low pass sub-band and several band-pass directional sub-bands. It can be seen that only contourlets that match with both location and direction of image contours produce significant coefficients. Thus, the contourlet transform effectively explores the fact, that the edges in images are localized in both location and direction.

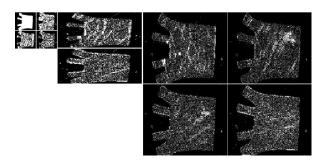


Figure 9. Contourlet transform of palmprint image without preprocessing step

One can decompose each scale into any arbitrary power of two's number of directions, and different scales can be decomposed into different numbers of directions. This feature makes contourlets a unique transform that can achieve a high level of

flexibility in decomposition while being close to critically sampled. Other multi-scale directional transforms either have a fixed number of directions or are significantly over complete.

4. Classification using AdaBoost classifier

"Boosting" is a general method for improving the performance of any weak learning algorithm that consistently generates classifiers which need to perform only slightly better than random guessing.

A recently proposed and very promising boosting algorithm is AdaBoost.

It has been applied with great success to several benchmark machine learning problems using rather simple learning algorithms, in particular decision trees. AdaBoost is a boosting algorithm, running a given weak learner several times on slightly altered training data, and combining the hypotheses to one final hypothesis, in order to achieve higher accuracy than the weak learner's hypothesis would have.

The main idea of AdaBoost is to assign each example of the given training set a weight. At the beginning all weights are equal, but in every round the weak learner returns a hypothesis, and the weights of all examples classified wrong by that hypothesis are increased.

That way, the weak learner is forced to focus on the difficult examples of the training set. The final hypothesis is a combination of the hypotheses of all rounds, namely a weighted majority vote, where hypotheses with lower classification error have higher weight. In this section the two versions of AdaBoost are described although the more theoretical properties are explained.

The two versions are identical for binary classification problems and differ only in their handling of problems with more than two classes. We use the original notation used by Schapire rather than the more convenient notation of the recent generalization of AdaBoost by Schapire and Singer [31, 32].

Basic α -Type AdaBoost algorithm can be presented as follow:

- Initialize distribution over the training set $D_i = \frac{1}{m}$
- For t = 1...T:
- Train Weak Learner using distribution D,
- Choose a weight (or confidence value) $\alpha_t \in R$.
- Update the distribution over the training set:

$$D_{t+1} = \frac{D_t(i)e^{-\alpha_t y_i h_t(x_i)}}{Z_t} \tag{7}$$

We should choose α_t to minimize Z_t (normalization factor). It has been shown that α can be found analytically as follows:

$$\alpha = \frac{1}{2} \ln \left(\frac{1+r}{1-r} \right) \tag{8}$$

Where

$$r = \sum_{i} D_{i} u_{i}$$
 , $r \in [-1,1]$ (9)

$$u_i = y_i . h(x_i) \tag{10}$$

$$Z = Z_t$$
, $D = D_t$, $h = h_t$, $\alpha = \alpha_t$ (11)

And y_i is the target output, u_i is positive if hypothesis $h(x_i)$ is correct, and negative if it is incorrect. In this section, we present pseudo-code for the two versions of β -type AdaBoost algorithm (Basic β -Type AdaBoost algorithm and multi-class extension using confidence scores) in Table 1.

Table 1. Basic β-Type AdaBoost algorithm (left), Multi-class extension using confidence scores (right)

Willit-Class extension	Withiti-class extension using confidence scores (fight)				
Input: sequence of N examples $(x_1, y_1), \dots, (x_N, y_N)$ with labels $y_i \in Y = \{1, \dots, k\}$					
Init: $D_1(i) = 1/N$ for all i	Init: let $B = \{(i, y) : i \in \{1,, N\}, y \neq y_i\}$ $D_1(i, y) = 1/ B $ for all $(i, y) \in B$				
Repeat: 1. Train neural network with respect to distribution D_{ϵ} and obtain hypothesis $h_{\epsilon}: X \to Y$ 2. calculate the weighted error of h_{ϵ} : $\epsilon_{\epsilon} = \sum_{i:h_{\epsilon}(x_{\epsilon}) \neq y_{\epsilon}} D_{t}(i)$ $\lim_{i:h_{\epsilon}(x_{\epsilon}) \neq y_{\epsilon}} abort loop if \epsilon_{\epsilon} > \frac{1}{2}$	Repeat: 1. Train neural network with respect to distribution D_t and obtain hypothesis $h_t: X \times Y \to [0,1]$ 2. calculate the pseudo-loss of h_t : $\epsilon_t = \frac{1}{2} \sum_{(i,y) \in B} D_t(i,y) (1 - h_t(x_i, y_i) + h_t(x_i, y))$				
3. set $\beta_t = \epsilon_t/(1 - \epsilon_t)$ 4. update distribution D_t $D_{t+1}(i) = \frac{D_t(i)}{Z_t} \beta_t^{\epsilon_t}$ with $\delta_i = (h_t(x_i) = y_i)$ and Z_t a normalization constant	3. set $\beta_t = \epsilon_t/(1 - \epsilon_t)$ 4. update distribution D_t $D_{t+1}(i) = \frac{D_t(i)}{Z_t} \beta_t^{\frac{1}{2}((1+h_t(z_t,y_t)-h_t(z_t,y))}$ where Z_t is a normalization constant				
Output: final hypothesis: $f(x) = \arg \max_{y \in Y} \sum_{t: h_t(x) = y} \log \frac{1}{\beta_t}$	Output: final hypothesis: $f(x) = \arg\max_{y \in Y} \sum_{t} \left(\log\frac{1}{\beta_{t}}\right) h_{t}(x, y)$				

5. Palmprint Verification Using the Contourlet Transform and AdaBoost Algorithm

The wavelet transform is well adapted to point singularities, so it has a problem with orientation selectivity. This is an important drawback for wavelet-based feature extraction in invariant palmprint classification. The contourlet transform was recently developed by Do and Vetterli [18] to overcome the limitations of wavelets. It is based on an efficient two dimensional multi-scale and

directional filter bank that can deal effectively with images having smooth contours.

It uses a combination of a Laplacian Pyramid (LP) that decomposes an image into a number of radial sub-bands, and a Directional Filter Bank (DFB), where each LP detail sub-band is fed to this stage to be decomposed into a number of directional sub-bands. Contourlets have elongated supports at various scales, directions, and aspect ratios. Therefore, they are good at capturing directional features in the palm-prints in a multiresolutional way.

Since the contourlet transform has very desirable properties for invariant palmprint recognition, we will use it to extract features to recognize the unknown palmprint images. The original palm samples contain the fingers and the background. This is undesirable. We extract the central portion of the palm sample and save it to a matrix of size 128×128 for later processing. We apply the contourlet transform to the extracted palmprint image for a number of decomposition levels. After that, we use these extracted features for classification by AdaBoost (α -Type).

The steps of our proposed method for palmprint verification can be summarized as follows:

- 1) Extract the central portion of the palm sample image by preprocessing module.
- 2) Perform the contourlet transform on the extracted palmprint image and extract features.
- 3) Classify the extracted features using AdaBoost (α -Type) classifier.

AdaBoost is a very popular boosting algorithm. It assigns each sample of the given training set a weight. All weights are initially set equal, but in every round the weak learner returns a hypothesis, and the weights of all examples classified wrong by that hypothesis are increased. Therefore, the weak learner will focus on the difficult samples in the training set. The final hypothesis is a combination of the hypotheses of all rounds and hypotheses with lower classification error have higher weight. In our experiments we find that our proposed algorithm achieves state-of-the-art palmprint classification rate, and it is very competitive.

The advantages of the proposed algorithm can be summarized as follows: The Contourlet transform has elongated supports at various scales, directions, and aspect ratios, and it is good at capturing directional features in the palm-prints in a multiresolutional way. The AdaBoost algorithm is a very effective method to classify unknown palmprint images. All these good properties combine in our new method, making it a very promising method for invariant palmprint verification. Experimental results confirm the feasibility of our proposed method for palmprint verification.

6. Experimental results

In order to test our proposed method for palmprint verification, we conduct experiments on the PolyU Palmprint Database [17].

Our experiments are programmed and tested by using Matlab software on a data set formed from 240 samples, i.e. The database contains 40 different palms, and each has six samples palmprint image. For each palm, we use five of the six palmprint samples for training and the one palmprint sample for testing. The size of the original palms without preprocessing is of 284×384 pixels. We extract the central portion of the palm image for palmprint verification.

The extracted palmprint image by preprocessing module has a size of 128 × 128 pixels. Five decomposition levels of the contourlet transform are applied to the extracted palmprint image. 16 feature vectors extracted are final features that used for AdaBoost for feature classification. We used leave-one-out technique to obtain statistically validated results from neural networks and AdaBoost, during training and test phases.

We measured the global performance of the systems using the three following indices:

False Acceptance Rate (FAR), False Rejection Rate (FRR) and total percent of miss classifications (Error).

For all of the inputs weak learner case, we have tested a system implemented using α -Type AdaBoost with different number of iterations (T).

In our system, neural networks have been used as weak learners in AdaBoost. In order to meet the requirement of a weak learner, we selected the simplest structure of a typical neural network, i.e. a simple neuron.

Consequently, each weak learner had one output whose the value determined the weak learner's vote concerning the identity of an individual.

Since the hyperbolic tangent was used as the neurons activation function, a positive output indicated a positive verification result and a negative output indicated a negative verification result. Nguyen-Widrow weights initialization, Levenberg-Marquardt back-propagation learning algorithm and Mean Square Error (MSE) criteria were used in neural networks training phases.

We mention again that each of the curve points in Figure 10 were obtained by averaging the results of several leave-one-outs experiments.

Figure 10 shows that the error rates converge, after only ten iterations, to the following values:

- FAR= % 0.2137,
- FRR= % 5.8333 and
- ERROR= % 0.3021

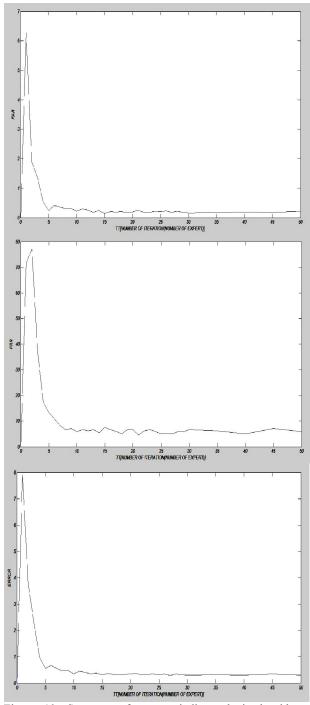


Figure 10. System performance indices obtained with different number of iterations. FAR (above), FRR (middle) and Error (below) converges after about ten iterations for α -Type AdaBoost

7. Conclusions

In this paper, we propose a new method for palmprint verification by using the contourlet features and AdaBoost. The contourlet transform has the multi-scale and time-frequency localization properties of wavelets, but also offers a high degree of directionality and anisotropy. These properties are very important in palmprint verification.

The AdaBoost (α -Type) is also used as a classifier for palmprint verification. Obviously, the main goal was to optimize the system design with respect to the verification error and computational cost.

In order to minimize the computational cost, according to the AdaBoost condition for weak learners, we selected a very simple expert as weak learner, i.e. a single neuron. Also, based on our experiments, we showed that using an AdaBoost (α -type) structure with full input weak learner's connections (16 inputs or feature vectors), we obtained a FAR as low as % 0.2137 and FRR as low as % 5.8333 with only ten iterations.

Focusing our attention on FAR, which plays a very important role in secure environments; we showed that even the average FAR and the average FRR are acceptable.

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Spectrophotometric Studies on Antioxidants-Doped Liposomes

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Abstract: Antioxidants are the effective modulators of physical properties of model and natural membranes as a scavenger of what called free radical. To demonstrate the relationship between the structure of antioxidants and their effect on the molecular dynamics of membranes, UV spectroscopy is applied to investigate the influence of three structurally different antioxidants: Ascorbic acid (vitamin C), vitamin E and Zinc, on the behavior of dipalmitoylphosphatidylcholine (DPPC) multilamellar vesicles. The results obtained indicate that positively charged liposomes doped with each of vitamin C and vitamin E or negatively charged liposomes doped with zinc contribute to membrane fluidity changes as they have been shown to decrease membrane fluidity. The results suggest that the hydrophobic core of the membrane is poorly affected by these three structurally different antioxidants molecules and, consequently, they cannot insert deeply into the bilayer and the interaction is mainly localized at the polar head level which strongly influences membrane stability and lipid dynamics.

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1. Introduction:

Cellular membranes, which contain abundant phospholipids, such as phosphatidylcholine, are major targets subjected to the damage caused by free radicals. Cellular damage due to lipid oxidation is strongly associated with ageing, carcinogenesis and other diseases (Kujoth et al, 2005). Antioxidants are reducing agents, and limit oxidative damage to biological structures by passivating free radicals. Oxidative damage caused by oxidative stress which may be defined as an imbalance between pro-oxidant and antioxidant agents, in favour of the former, this imbalance may be due to an excess of pro-oxidant agents, a deficiency of antioxidant agents or both factors simultaneously. Oxidative stress is free radical which has been characterized by an elevation in the steady state concentration of reactive oxygen species including super oxide anion, hydrogen peroxide, and hydroxyl radical. The oxidative stress state results in an excess of free radicals (which are molecules or atoms with unpaired electrons) which can react with cellular lipids, proteins, and nucleic acids leading to local injury and eventual organ dysfunction. Lipids are probably the most susceptible bio-molecule to free radical attack. There is increasing evidence connecting oxidative stress with a variety of pathological conditions including cancer, cardiovascular diseases, chronic inflammatory disease, post-ischaemic organ injury, diabetes mellitus, xenobiotic/drug toxicity, and rheumatoid arthritis.

Fortunately, our bodies have developed a number of defense protective mechanisms known as the "antioxidant defense system". The protective

mechanisms are enzymes and non enzymatic antioxidants like vitamins (classified to water soluble and lipid soluble vitamins) and minerals.

Liposomes have been used extensively as biological models for in vitro lipid oxidation studies. The resemblance between the liposomal and membrane bilayer core makes liposomes a very useful tool to investigate the significance of the antioxidant-membrane interactions for antioxidant activity. The antioxidant activity of a compound is strongly influenced by numerous factors including the nature of the lipid substrate, the hydrophiliclipophilic balance of the antioxidant, the physical and chemical environments of the lipids, and various other interfacial interactions. In a large number of studies, liposomes have been used for the evaluation of the antioxidant properties of several lipophilic and hydrophilic antioxidants against oxidant insults. In addition, but to a lesser extent, studies have also examined the use of liposomes for the delivery of water-soluble and lipid-soluble antioxidants as well as antioxidant enzymes to different organs and tissues for the treatment of oxidative stress-induced damage. (Suntres, 2002).

The main aim of this work is to stress the influence of three structurally different antioxidants: vitamin C, vitamin E and Zinc on membrane fluidity and to establish a relationship between the interactions of the antioxidants with the membrane and their consequent antioxidant activity. The structures of vitamin C and vitamin E are presented (figure 1). The evidence from several studies have shown that administration of antioxidants did not seriously modify the injurious actions of oxidants, an

observation attributed mostly to their inability to cross cell membrane barriers and/or to their rapid clearance from cells. So, the liposomes (which are phospholipid bilayer vesicles) are used as a model membrane (due to their structural similarity to cell membranes) to study and understand the molecular basis of the pharmacological behavior of antioxidant and their effect on membrane fluidity and as the result the possible implications in their antioxidant activity (Suntres and Omri, 2006).

In this study, we use UV spectroscopy experiments to show antioxidants induce changes in the fluidity of the lipid bilayer and to estimate the subtle perturbation of the lipid bilayer structure.

Fig. 1: Chemical structures of the antioxidants involved in the study: Ascorbic acid (vitamin C) and vitamin E.

2. Materials and Methods

High purity L-α-Dipalmitoyl phosphatidylcholine (DPPC), with a molecular weight of 734 (99% pure), Trizma buffer, with a molecular weight of 121.1, Dicetyl phosphate (DCP), with a molecular weight of 546.9 (99% pure) and, Stearyl amine (SA), with a molecular weight of 269.5 (99% pure) were purchased from Sigma (ST. Louis, Mo. USA) and were used without further purification. Vitamin C (VC), with a molecular weight of 176.13, vitamin E (VE), with a molecular weight of 430.72 and, Zinc, with a molecular weight of 65.409 were purchased from EIPICO (Egyptian International Pharmaceutical Industries Co, Egypt). All other chemicals used in this work were of research grade. Solutions were prepared in de-ionized ultra pure water.

Preparation of control liposomes

Aliquots of 10 mg of DPPC were dissolved in 10 ml ethanol (EtOH), and evaporated in a Rotavapor (Vacuum System). The film was dried under vacuum (Vacutherm, Heraeus Instrument, Hannover,

Germany) overnight at 42 °C. Ten ml of buffer (10 mM Trizma adjusted to pH 7) was then added to the flask which was flashed through with nitrogen stream and immediately stoppered. The flask was mechanically shaken for 1 hr at 42 °C. The hydration step is done at a temperature above the liquid crystalline transition temperature T_c of the lipid. The suspension was then centrifuged at 8000 rpm for 20 min and the supernatant was discarded. The liposomes were prepared following classical methods (Deamer and Uster, 1983.)

Preparation of antioxidants - doped liposomes

Two alternative incorporation strategies were performed:

Preparation I for VC and VE

prepared Antioxidant liposomes were following the same classical methods as described above using 10 mg of DPPC were mixed with each of 0.68 mg of vitamin C (molar ratio of 7:2) or 1.37 mg of vitamin C (molar ratio of 7:4), 1.6766 mg of vitamin E (molar ratio of 7:2) or 3.35 mg of vitamin E (molar ratio of 7:4) in round bottom flasks. 10 ml of EtOH were added to each mixture, and then a vigorous vortex took place to assure a complete solvation for each mixture. The mixture was evaporated and dried as before. The previous preparation was for neutral preparations. A net positive or negative charge was introduced by the addition of either SA (0.506 mg) or DCP (1.027 mg) to the lipid composition.

Preparation II for Zinc

0.509 mg of zinc in a molar ratio of 7:2 or 0.76 mg molar ratio of 7:4 was added to 10 ml of buffer (10 mM Trizma adjusted to pH 7) which previously contained 0.5 ml of conc HCL and each mixture added to 10 mg of DPPC which previously dissolved in 10 ml of EtOH. The mixture was evaporated under the same conditions of control as before and the film was similarly dried.

The above preparation was suited to be the neutral preparations. A net positive or negative charge was introduced by the addition of either SA $(0.506\ \text{mg})$ or DCP $(1.027\ \text{mg})$ to the lipid composition.

UV spectroscopy measurements

To characterize the antioxidants stability before and after incorporation, UV spectra of the liposomal suspension were taken on a PC Scanning Spectrophotometer (Uvikon 930, Italy). From UV spectra [200-360 nm], the resonance absorption peaks of antioxidants were recorded. All measurements were performed at room temperature.

3. Results and discussion UV spectroscopy measurements

Figure 2 shows the typical UV-absorption spectra for pure DPPC [A], vitamin C [B], vitamin E

[C] and Zinc [D] respectively. The characteristic bands was found at 221 nm for pure DPPC, 214 and 268 nm for vitamin C, 240, 280 and 287 nm for vitamin E and 227 nm for Zinc.

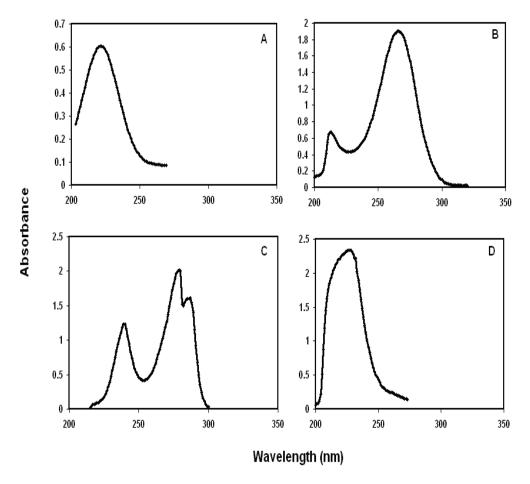
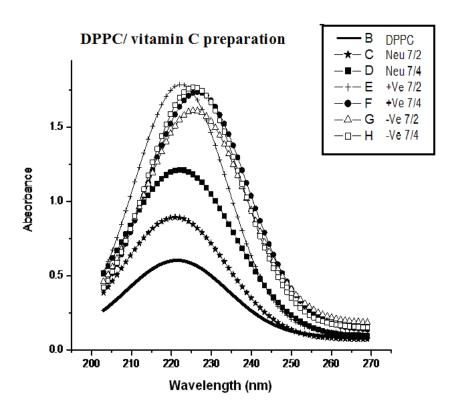


Fig. 2: Typical UV- spectra for [A] DPPC, [B] vitamin C, [C] vitamin E and [D] Zinc

The UV-absorption spectra of various formulations of vitamin C in DPPC liposomes (Figure 3), shows that positively charged liposomes doped with vitamin C at molar ratio 7:4 and both negatively charged liposomes at molar ratio 7:2 and 7:4 exhibited an average 5-6 nm bathochromic shift (which assigned for less energy) with respect to the absorption spectrum in tris buffer solution, indicating that these formulations are embedded in the lipid vesicle. Moreover, the characteristic bands of vitamin C as integral molecule at 214 and 268 nm are not any more visible. The strong electrostatic reaction between phospholipids and vitamin C should not be ignored, as they might play a vital part in the interactions of vitamin C with phospholipids. The existence of N(CH₃)₃⁺ group in the polar head of DPPC may attract ascorbate negative ions of vitamin

C which may be expected to disappear the characteristic band of vitamin C. In polar solvents aggregates would be formed between vitamin C and water molecules, and these would shift the absorption maximum to higher wavelengths. The data suggest that the hydrophobic core is poorly affected by vitamin C molecules and, consequently, they cannot insert deeply into the bilayer and the interaction is mainly localized at the polar head level.

These findings from UV spectroscopy experiments showed that vitamin C was unable to interact with the hydrophobic zone of the bilayer. (Table 1) summarizes the spectral changes monitored upon incorporation of vitamin C into different formulations of DPPC liposomes.



(Fig. 3): Typical UV-spectra of vitamin C incorporated into different formulations of DPPC liposomes.

Table 1: Spectral changes upon incorporation of Vitamin C into DPPC liposomes

VC / liposomes	Wavelength	Bandwidth	Absorbance
Samples			
DPPC	221±0.7	25± 2.1	0.7
Neutral (7:2)	221±0.8	26 ± 2.3	1
Neutral (7:4)	*223±0.6	27 ± 2	1.3
+Ve (7:2)	220±0.5	*19 ±1.2	1.7
+Ve (7:4)	*227±0.5	*18 ±1.1	1.77
-Ve (7:2)	*227±0.4	*16 ±1.3	1.8
-Ve (7:4)	*226± 0.5	*19 ± 1.2	1.9

*Statistically significant

Figure 4 represents the absorbance spectrum of various formulations of vitamin E in DPPC liposomes. The results indicate that the positively charged liposomes doped with Vitamin E at molar ratio 7:2 and neutral liposomes at molar ratio 7:2 exhibited an average 4-5 nm bathochromic shift with respect to the absorption spectrum in tris buffer solution, indicating that this formulation is significantly interacted with lipid bilayers. The bathochromic shift would occur not only in polar solvents (by the formation of aggregates with solvent molecules) but also in non-polar solvents (by the formation of intra-molecular hydrogen bonds). Moreover, the characteristic bands of vitamin E as integral molecule at 240, 280 and 287 nm are

disappeared by incorporation into liposomes. The results indicate that the incorporated vitamin E can not insert deeply into the bilayer and the interaction is mainly localized at the polar head level.

It has been concluded that vitamin E induces a disordering effect in the gel phase in the phospholipids membranes (Severcan, 1997). The effect of α-tocopherol on a phospholipid model membrane has been investigated by Electron Spin Resonance and Saturation Transfer ESR by using stearic acid and perdeutero- di-t-butyl nitroxide spin probes. It is observed that in the gel phase it induces a decrease of order and increase in fluidity; while in the liquid crystalline phase an indication of a slight increase in ordering and a clear decrease in fluidity

are registered (Severcan and Cannistraro, 1990). (Table 2) summarizes the spectral changes upon

incorporation of vitamin E into different formulations of DPPC liposomes.

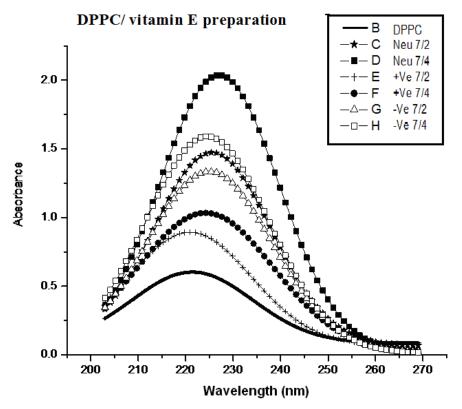


Fig. 4: Typical UV-spectra for vitamin E incorporated with different formulations of DPPC liposomes.

Table 2: Spectral changes upon incorporation of vitamin E into DPPC liposomes

VE / liposomes	Wavelength	Bandwidth	Absorbance
Samples			
DPPC	221± 0.7	25± 2.1	0.7
Neutral (7:2)	*223 ±0.4	22 ± 1.2	1.5
Neutral (7:4)	*225±0.3	24 ± 0.7	2
+Ve (7:2)	*226±0.6	27 ± 1.3	0.5
+Ve (7:4)	*223 ±0.5	26 ± 1.1	1.1
-Ve (7:2)	$*222 \pm 0.5$	23 ± 0.9	1.4
-Ve (7:4)	$*223 \pm 0.4$	23 ± 0.8	1.6

^{*}Statistically significant

It is well known that the antioxidant action of vitamin E significantly depends upon its location in the membrane bilayer (Fukuzawa et al., 1981; Burton and Ingold, 1986; Niki, 1989). On one hand the phenolic hydroxyl group of vitamin E acts as a capture of peroxyl radicals. Recently, on the basis of numerical kinetic investigation, it was shown that the pro-oxidant activities of vitamin E mostly due to the reduction of hydroperoxides by vitamin E (Tavadyan et al., 2007). On the other hand the existence of a long hydrophobic phytyl side chain allows one to monitor

the location of vitamin E in the membrane bilayer and hence to vary its antioxidant action.

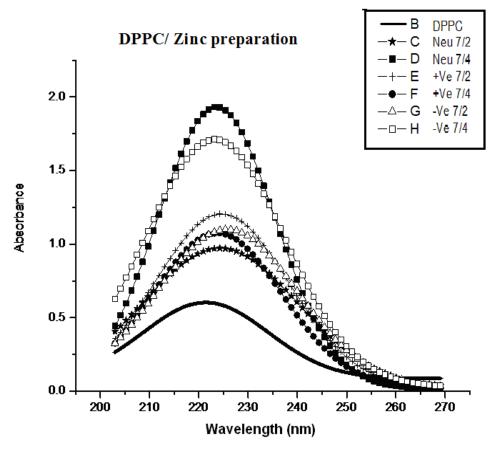
It has been considered (Avellone et al., 2002) that UV absorption spectroscopy is a suitable technique to provide direct information on the location of vitamin E in the DPPC. UV absorption band of vitamin E (-tocopherol; Fig. 1) as an aromatic group-containing compound exhibits fine vibrational structure in non-polar solvents, such as heptane or cyclohexane. On the other hand, in relatively polar solvent chloroform and in ethanol the

fine structure is vanished and just broad absorption is observed. These observations provided to develop an elegant approach for studying the local microenvironments of vitamin E in liposomes and hence membranes.

The absorption spectra of Zinc into different formulations of DPPC liposomes are shown in figure 5. The results indicate interestingly that the both negatively charged liposomes at molar ratio 7:2 and 7:4 are displayed contrary effect. While the negatively charged liposomes at molar ratio 7:2 exhibits a siginifant bathochromic shift (6nm), the negatively charged liposomes at molar ratio 7:4 exhibits hypsochromic shift (3nm). Zinc was known as from metal ion with positive charge and when these metal ions react with liposomes, it make destruction of the liposomes. It has been investigated that the efficiency of encapsulation of several divalent metal ions, mainly Zn (II) ion, into liposomes with particular attention to the stability of liposomal membrane against the transition metal (II)

ions. The stronger interaction of metal ions to liposomes led to the less formation of liposomes. (Sunamoto et al, 1980).

Like all metal cations, zinc interacts electrostatically with anionic groups. In contrast to other divalent metal cations with similar ionic radius such as Mg⁺₂, zinc ions possess a higher affinity to electronegative groups (Gresh and Šponer 1999). Zn⁺₂ obviously bind more tightly. It forms a stable complex with the zwitterionic phospholipid headgroup. The changes in its conformation, hydration and the effect on gel – liquid-crystal phase temperature of 1-palmitoyl-2-oleoyl-snglycero- 3phosphocholine (POPC) were studied by (Binder et al. 2001). Dehydration of phospholipid headgroups due to complexation with zinc cations was suggested to increase fusogenic potency of lipid membranes. (Table 3) summarizes the spectral changes monitored upon incorporation of Zinc into different formulations of DPPC liposomes.



(Fig. 5): Typical UV-spectra for Zinc incorporated with different formulations of DPPC liposomes.

Zn / liposomes	Wavelength	Bandwidth	Absorbance
Samples	_		
DPPC	221± 0.7	25± 2.1	0.6
Neutral(7:2)	$*225 \pm 0.6$	*32± 1.4	1
Neutral(7:4)	*219± 0.4	22 ± 0.8	2
+Ve (7:2)	$*225 \pm 0.5$	*23± 1.1	1.3
+Ve (7:4)	221 ± 0.5	22 ± 1.1	1.1
-Ve (7:2)	$*227 \pm 0.5$	22 ± 1.0	1.2
-Ve (7:4)	$*218 \pm 0.3$	$*21\pm0.8$	1.8

Table 3: Spectral changes upon incorporation of Zinc into DPPC liposomes

*Statistically significant

Conclusion

On the basis of the above results, antioxidants are the effective modulators of physical properties of model and natural membranes as a scavenger of what called free radical. The results revealed complex interactions between antioxidants and polar head group, which strongly influence membrane stability and lipid dynamics.

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Eastern nations in Ferdowsi thoughts

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Abstract: The western culture has always kept a close eye on eastern civilization throughout the history. Toward making a survey and getting an understanding of the eastern knowledge, customs, and conventions, a new field of study was created called orientalistic. The dawn of eastern civilization was much sooner than the western one. The oldest city of the ancient world in Mesopotamia in Iraq, Jiroft in Iran, and Mohenjo-Daro in India were of incredible civilization. Formation of great empires in Iran, China and India were concomitant to stating of city dwelling in other parts of the world, so it puts us to shame to look into ourselves from western outlook.

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Keywords: Eastern nations; Ferdowsi; history; Iran

1. Introduction

East in general means Asia and non-European world, as opposed to western world whose people believe in Christianity. Asia is the world's vastest and oldest continent which roughly measures 43.4 million km2. Its population is estimated to be 3.3 billion live in 54 countries; some of them are the world's biggest and most populated countries. Northern Sea is in north of Asia, Indian Ocean in south, Pacific Ocean in east, and Mediterranean Sea and central part of Russia in west.

At the beginning of Shahnameh, Fereydoon divides its territory among his three sons: Selm, Toor, and Iraj; Fereydoon revealed his decision to divide the world into three parts, i.e. first Rome and West, second Turkey and China, and third Iran, the gracious land. He granted Rome and West to Selm who really deserved it. Father ordered him to collect his troops and dispatch them to his territory. There he took the throne and was called the king. Fereydoon also granted China and Touran to Toor. Tour dispatched a great number of soldiers; he took the throne there and the nobles granted him various gifts and declared him as the king. As it was Irajs' turn, the father selected him as the king of Iran. He was granted both Iran and Neizeh Varan plain as well as the throne and the crown

He was granted the position and ivory throne as he deserved it. All three took the throne like great kings (Shahnameh Ferdosi, 2002). Three brothers lived peacefully together for a while but the two elder brothers, Selm and Toor, were jealous of Iraj. They decided to take revenge as the father granted him the cream of the crops, Iran. Here we can see how Selm tries to persuade Toor and give him a look of hatred against Iraj. He says that "we have right to be angry as father was cruel to us both since he granted Iran and Yemen to Iraj and Rome and West to me. He

granted you Turks and China, which is not as good as being the governor of Iran".

Yemen was also a part of Iraj's territory. In Avesta (Iranian holy book) it is mentioned that "if I had not created each territory so as to give relaxation and peace of mind to the dwellers, all people of the world would have selected Iran for living. Iran Veij was the first nice land that I, Ahoora Mazda (God), created on the bank of Ditia River" (Avesta the oldest Iranian Songs, 2003).

Iranian Empire was the vastest one the world ever experienced till that era.

Sámi, Hitia, Greece and Egypt were a part of territory of Iranian Empire, and Iranian princes and noblemen ruled over these areas. Babylon was also a part of Iranian kingdom; this has been referred to in Shahnameh (History of civilization, 2003).

The two brothers defeated Mesopotamia and captured everywhere. Nothing remained intact in Iran and Babylon and everywhere went up in smoke (Shahnameh Ferdosi, 2002). It is clear that Iran is considered as Aryans. Dr. Rezaie concerns Aryans as an important Indo- European race that gradually entered Iran since 1st century B.C. and mingled with indigenous dwellers of Iran (Ten thousands year of Iran history, 2003).

Dr. Joneidi describes Aryans as follows: they are hopeful, calm and nature-friendly. Defeating their enemies as well as natural problems and enjoying calm nature and high adaptability, they made a peaceful life and paved the way for rapid development in all aspects of living (Life and immigration of Aryans based on Iranian sayings, 1987). Mr. Henry Locus in history of civilization asserted that Medes and Parthian –Aryan tribescould establish an empire of international importance for the first time (History of civilization, 2003). Mr. Child Virgordone asserted -with a biased view and

ignoring valid historical and archeological documents – that Aryans were a group of uncivilized bandits and due to exploring some roads they could take the throne (Aryans, 2007).

The archeological excavations revealed that local dwellers of Iran at the time of Aryan arrivals and simultaneous to Iron era did believe in resurrection day and buried some food with their dead bodies to provide them with their needs for their new lives (Archeology and Iranian art in 1st millennium B.C, 1995).

Zoroastrian was one the world's ancient religions. It combined Iranian prominent characteristics and conventions toward defending honesty and determination (History of civilization, 2003).

Iranian old books are full of fairy tales about evils and angles constantly fighting all through the story. Loofer Dalashoo believed it is impossible to fantasize communal or tribal dreams disregarding the immaterial creatures, demons and fairies. Disregarding supernatural creatures it is so hard to absorb and seize the attention of people (The Mysterious Language of Fictions, 2007).

The word mythology is of the same origin with "Historia" which means story and history. The world myth in book of "Iranian and Indian mythology" is defined as a symbolic manifest of the goddess, angle, and supernatural creatures. In fact this was the way they could interpret the existence. It is an imaginative farfetched story of how the world came into existence, evolved, and would destroy one day (An introduction to Iranian and Indian symbols in ancient era, 2006).

Ancient Iranians imagined the globe as around, flat plate. Originally everything was stable and untouched; there was no valley or mount. Stars stood still right above the earth. Everything was so calm and harmonious. Devil appeared and everything was unstable. Alborz protrude from the earth in 800 years. There exists a bridge from its tallest peak to guide the spirit of the dead to heaven and hell. The Lord, Tishtar, made the rain drops, blew wind, and created an endless sea, Varoukesheh, on other side of Alborz peak. The first rainfall divided the earth into seven parts so that the man cannot travel through the earth. unless riding on the back of the divine cow, Serishok, which were a half man and a half cow creature. They were some of Iranian myth we get to know about through old sources, although it is possible to reconstruct some of them.

It is worth to remember that current Iran was a small part of the ancient one. This fact has not been mentioned in Soviet Union or Afghanistan history due to political reasons. Historians were pressed to mention Central Asia and Afghanistan as independent countries through the history (they lived

by tyranny of Russian empire) (Tajik, Aryan and Iran Plateau, 2004).

Here I am to refer to Mavara-o-Nahr, a small part of Great Iran. Called so by Arabs, it includes current Turkmenistan, a part of Afghanistan, Uzbekistan, and Tajikistan. It was the main part of Iranian Empire ruled by Cyrus and Darius.

Being conquered by Alexander the Great, it was included in Greek territory but of course for a while, in Bacteria era in 2nd millennium B.C. This Greek government could not resist Parthian and Nomads of Central Asia.

Some believe that Greek empire could extend its eastern borders to Kharazm and Farghaneh, but based on historical documents Greek empire in its flourishing day could get to China borders. Anyway, political supremacy of Greek in central Asia lasted until 30 B.C.

Parthian could survive till 3rd century A.D. and dominated south-west and Middle Asia till then. 200 years of Greek dominance over Middle Asia (since Alexandria's invasion in 329 B.C. till 130 B.C.) has been of great concern to western historians (Khorasan and Mavara o Nahr, 1985).

Herodotus was the first to mention central Asia in his book and his information on the area is of great value. Avesta, Zoroastrian's holy book, is also concerned as a main source of value. Bisotoon inscription, Keztiaks the Greek physician, and book of memories wrote on Ardeshir king of Sassanid are other valuable sources.

It is possible to find some information on different races and geographical locations in all above-mentioned sources like "Morghian", Part which is a part of Turkmenistan and a part of Khorasan in north east of Iran, Kharaz in lower bank of Amou Darya river, as well as Saghd and Saghdian in subsequent centuries.

Blentiski asserted that prosperous civilization and great historical monuments in Pamir plateau, Kharazm, and eastern shores of Caspian Sea all stand for the fact that initially Aryans resided there.

Tajiks who lived in east of Iran originally dwelled in Great Khorasan including Middle Asia, a great part of Afghanistan and North East of Iran (Tajik, Aryan and Iran Plateau, 2004).

According to this survey, most of Iranian tribes settled in current Afghanistan in 2nd millennium B.C. There is no evidence about previous inhabitants of the area. As Iranian tribes abandoned their mother land in central and east of Europe in 3rd millennium B.C. going through Caucasus, they settled in Middle Asia, Afghanistan and Iran.

There exists undeniable evidence on Iranian residence in the area; not to forget that Iran was a

general name of the area in Middle Age and this name is rooted in Aryan.

In Shahnameh, Mavara-o-Nahr and its cities have been mentioned some times, like the following verse: A senior from Mavara-o-Nahr located in head of the world (Shahnameh Ferdosi, 2002).

Through the history business was considered as a great means of communication between East and West and as its result a kind of recognition and mixture happened. Except through Silk Road which was extended from Syria and Mesopotamia to Iran, then India and China, a great part of business transactions were fulfilled through land and sea: from Syria to Mesopotamia and then to India through the sea and finally they continued eastward through the land (Ancient Iran from 550 B.C to 650 A.D, 1999).

Moving eastward, passing Iran we get to India. There exist ancient civilizations in this area since ancient time like Hindus River; its dwellers could build modern cities and irrigate their fields utilizing innovative techniques. They did business with their neighboring villages (World civilizations, 2005).

Bangladesh in east, China in north and Pakistan in west and north-west are neighbors of India (New Atlas of the countries, 2005). Indian peninsula is connected to Asia from its northern part. It has three different geographical zones. In north, Himalaya Mountain Range stretched like a wall and is concerned as traditional position of Gods, fertile lands in north west- Gang and sand rivers valleysrain forests, rivers and glaciers. There it is possible to find heaviest rains next to deserts (Art through the time, 2007).

Indians and India are mentioned in Shahnameh so often. Stories like "clown and Ball" and "Chess" are originally from India, like:

There was a great man of honor in India armored with troops

As he was so determined that he could defeat every where

He could dominate Hindus as he was wise, gifted and enlightened

He was the king of Kashmir and China, God was pleased by his deeds (Shahnameh Ferdosi, 2002).

A great number of Indian cities were mentioned in Shahnameh like Shegni, Moultan, Denber, Kashmir and Qonoui, for instance look at this verse:

From Kashmir to China Sea in all cities they cheer us or:

Near Shangal the Indian Guard from Qonouj to Sand borders.

Indian athletes were considered as nice men in Shahnameh as in following verse:

There exists a nobleman named Sourg; he was a great athlete from India.

There are a great number of races and religions in India. The most common language is Indian language in north of India.

It is derived from Sanskrit. Urdu language is also derived from Sanskrit and is of concern among Moslems. In southern part of India, Dravidi language is so popular. It is not of the same origin with Sanskrit (Art through the time, 2007).

Himalaya Mountain Range in north protects the main land against Mongols' invasion. Immigrants should go through Balkh in north east and Iran (History of civilization, 2003). Indo-European languages and religious beliefs got to India through the same channel and so possessed a lot of common points with those of Iranians. Conquering the India, Invaders and Daviders which were a black-skinned race fought over the land and finally Invaders could overcome and dominated the north.

Southern dwellers could keep safe from Aryan invaders. The origin of Draviders or Tamils who live in south is not so clear but it dates back to New Stone Age. Veronica Evans believes that the ancestors of Draviders immigrated to India in 4000 to 2500 B.C. They constructed a brilliant civilization in Indus Valley in cities like Harapa River Mohenjoudarou. There is no written document on this civilization but the ruins of these two cities reveal some valuable documents on the origin of Indian Gods and religions. In other words, philosophical and cultural heritage of India was affected by two origins on the one hand Aryan linked to Indo-European culture and on the other hand Indus River Valley and Mesopotamia. Hindu religion is also derived from this origin (Indian Myths Ivan's Veronica, 2002).

Researchers and scholars did believe in similarities and close connections between Iranian and Indian myths; this is because of old thoughts and beliefs of Aryans.

Mithra, the Goddess of brightness, both in Rig-Veda and ancient Iran and Mithraism is one of important Gods.

Except in one case, the name Mithra is always considered as Varona alliance and their names have always been mentioned together except for one case. It is mentioned in Rig-Veda that: Mithra and Varona rule over the skies and watch the brightness (An Introduction to mythologies and symbols of Iran and India in ancient era, 2005). In Veda as Indian's old holy book, Mithras' name has been mentioned very often and it means the promise. In Avesta which is Iranian's holy book, Mitra has also been mentioned and there is a song in its praise called Mehrish (Mithraism religion, 1994). But it is worth to mention that the roles of Gods and Goddesses in Indian and Iranian holy books are opposite. For instance, Iriman

or Satan is concerned as devil and could cause 9999 types of diseases but in Rig-Veda it is concerned as a good willing goddess praised so often with Mitra and Varona (Avesta the oldest Iranian Songs, 2003).

There are some other common well-known names in Indian and Iranian mythology. For instance, Yam or as Indian named it Yamais the same as Jamshidin in Farsi, Traitanan or Tertonen in Indian and Fereydoon in Farsi, and so many other names in two languages substantiate great historical ties between two nations. In this section, it is better to deal with Mazandaran which was frequently repeated in Shahnameh. According to Mr. Kariman, Mazandaran in Shahnameh does not refer to current Mazandaran. It was previously called "Bisheh Marva" or "Bisheh Tamisheh" or Tabarestan (A survey in Shahnameh, 1995).

As it gets near to Tamisheh, again his grandfather wished to see him (Shahnameh Ferdosi, 2002). Two different locations have been referred as Mazandaran in Shahnameh. One in Saudi Arabia about Yemen, Egypt, Damascus and so on and the second in Lahore, Multan, Kashmir, Badakhshan and Pamir plateau (A survey in Shahnameh, 1995).

Mazandaran name is mentioned in two different stories: one in Manoochehr and Nozar era, the latter was one of the kings from Pishdadian dynasty in east of Mazandaran:

All Gorgosaran and Mazandaran were conquered in a combat (Shahnameh Ferdosi, 2002).

The second is at Keykavous reign in west of Mazandaran:

You did attack Mazandaran with Kiany mace and arrow.

Mazandaran invaded by Keykavous could not be the same as the place wherein Saam fought demons. When Keykavous voiced his decision to capture Mazandaran, he was dissuaded by Zal and other athletes as none of Iranian kings ever tried to fight Mazandaran demons, while Zal should know of the invasion by his father Saam.

In Keykavous invasion there is no name of Gorgosaran and Sagsar, but it was quoted that on their way the troops went passed ra oasting desert and a dark land, fought with lion, monster and witch (A survey in Shahnameh, 1995).

Touranian who were a tribe lived in north and northeast of Iran at that time invaded Iran frequently. Their name has been mentioned so often in Shahnameh. Veiseh was assigned as the commander of Touran troops and deployed his soldiers to take revenge (Shahnameh Ferdosi, 2002).

Dividing the territory among Fereydoon's sons resulted in Iraj to be killed by his brothers and this was the beginning of hostility between Iran and

Touran in long term. It lasted 300 years in reign of five kings.

Killing of Sivash and taking his revenge fueled the fight. Finally after killing Afrasiab when he ran away to hide at a corner and returning the son of Siavash to Iran by Keykhosro who was the Iranian King, this long-lasting combat came to an end (National Iranian Epic, 2004).

The name Turks was mentioned in historical documents in 5th century A.D. for the first time. Named Tuchueh by Chinese, origin of Turks can be traced back to Hoons who are descendent from Assena and from Huinguu tribe. Pressed by emperor Tobie 3rd, 700 Turk families decided to immigrate Jun-Jun tribe borders in 433 A.D.

Divided into two groups, eastern one captured Mongolia and Oral Mountain. Western group took the control of Altai and Seyhoon (Ten thousands year of Iran history, 2003). All through Shahnameh it is possible to find a great number of the stories about Iranian and Touranian combats.

Thousands of Chinese and Turk fighters were dispatched for the fight

It is time to summon the troops from all Iran.

Sometimes Chinese emperor is considered as Touran king:

All nobles from all nations went before Chinese empire and said what your order the commander is? It is also documented in history that Turks finally accepted the dominance of Chinese empire in 7th century A.D. They were made of some tribes partially united and dominated by Khan, which means ruler. They were scattered from Mongolia to Amodarya. Turks' empire was extended from China to Pars (World elaborated history from the beginning to 20th century, 2007).

Sassanids were in fight with three different groups from three different sides vigorously. They were Romans in west, Koushnian and Heptalian in east, and wild tribes in north. Hayatella, a Chinese tribe, made a government in 30 B.C. They started dealing with Romans. Through the time they were dethroned by Tia or Aftalit who were white Hoons and Iranian called them Hitaleh. They invaded Iran so many times and were defeated all through. Their name was mentioned in Shahnameh so often, particularly in the story of their fight with Chinese emperor like the following lines (Ten thousands year of Iran history, 2003):

Hitalian attacked Chinese and Turks for a week constantly

Finally they were all defeated and killed (Shahnameh Ferdosi, 2002).

Except Arabic civilizations, Chinese were the first civilization European came to know about. China is so vast and enjoys a great variety of climatic

conditions. Their mother land is as big as U.S.A and throughout the history they could rule over so many countries like Mongolia, Tibet, Cinkiang, Manchuria, and a vast part of Korea.

The country includes some sand deserts, roaring rivers, high mountains and fertile lands. North of China around Beijing enjoys a mild and dry climate but south of China is of tropical weather (Art through the time, 2007).

Chinese embarks their deals with Indus River, south east of Asia as well as Middle East through the roads and the sea. Chinese clergymen presented Indian with Buddhism. Their cultural development continued till collapsing of Han Empire (New Atlas of the countries, 2005).

While Mongols dominated China, they announced Chinese, Mongolian and Farsi as official languages there. In Sassanid reign a group of Tajiks immigrated to China through Sagad. They dwelled in Cinkiang, an autonomous area in south-west of china and next to Pamir. Cinkiang was under the reign of Moslems and its official language was Farsi: it was preferred to Arabic (Iranian essays, www.topiranian.com). Ms. Khatibi believes that Iranian miniature was affected by Chinese art. Traveling to Iran, Chinese businessmen and artists brought along miniature and it mingled with Iranian painting style (The color of ten thousand years of Civilization Iran Culture and Art before Islam, 2002).

Enjoying a great variety of languages, it was not possible for Chinese to communicate all their compatriots across the country, but their common handwriting was understandable to everybody across the country. This made the way for Chinese to create and maintain common literature, philosophy and religion all through the time (Art through the time, 2007).

In Dehkhoda Dictionary, Machin was mentioned to be a city in south of China and in east of India. It means huge and in Sanskrit it was concerned as China main land. In Farsi literature, Machin is considered as China main land and China was meant as a place in east of Turkistan.

Machin was repeated so often in Shahnameh:

A troop will support him from China and Machin that will make the conditions difficult for us (Shahnameh Ferdosi, 2002).

China was considered with glamour and great power: The head of Chinese commanders whose throne was carried by some was as powerful as 100 roaring lions and could decapitate a very huge elephant.

From time to time Touran and China got together and invaded Iran:

A group of Chinese wrestlers gave a hand to Piran.

Sometimes there were close ties between two nations as Khosro, the Iranian king, stayed in China for three months, as mentioned in following line:

Accompanied by some of his commanders, Khosro stayed in China for three months.

Khaqan gifted them thousands of valuable presents.

As China is concerned as an isolated land, their close relationship with their neighbors poses a question on their origin. Concerning its vast territory and importance, there is no clear evidence on their real origin.

Discovered bones in a cave near Beijing called Joukoutain made the researchers think of them as real ancestors of Chinese, but further experiments proved they were of American Indian origin not Mongols or Asian. First real Mongolian bones were discovered in south of China in Govang Shee Province. Their origins as well as the broken skull of Sichuan which belonged to 5535B.C. are not quite clear.

Some believe that Mongols are real ancestors of Chinese and there exist a great number of tribes, but getting to know about the Chinese ancestors asks for more archeological excavations.

The bones were excavated in cemeteries of north of China and assumed to belong to some villagers when their Mongolian origin was proved (Chinese Mythology Birrel Ann, 2005).

In Vandadid of Avesta (Zoroastrian holy book) it is declared that 16th country was created by the lord besides Colorful River, where headless men lived.

Mr. Doostkhah describes headless men as follows: the ones who have no rulers and are assumed to live in an eastern island near China (Avesta the oldest Iranian Songs, 2003).

In Chinese mythology in contrast to those of ancient India and Iran, there is no association of Gods. In official documents a group of 10 Gods and myths like God of fire or farmer do not make well-structured associations.

Another point worth to mention is that Chinese Gods are not fighting each other as with switching of the power Indian Gods start a competition (by ascending of Brahma, Vishnu and Shiva to the throne, Verona, Agne and Souria disagree and start a combat) (Indian Myths Ivan's Veronica, 2002).

Here it is time to refer lands are concerned as eastern countries in Shahnameh geographical divisions as Iran was considered as the center of the world.

Barbarestan was geographically located in an area where sea was in its middle, Egypt on the left, Barbar on the right, and Hamavaran in front. Barbarestan and Hamavaran were attacked by Keykavous. He went to Egypt and Damascus to put down the riots:

He went among three cities to a place where

The Egypt was on the left, Barbar on the right; he chose the milled way to get to Hamavaran with a

great number of troops (A survey in Shahnameh Kariman, 1995).

According to Ferdowsi, Barbar is the same as Shemr desert in north of Saudi Arabia and south of Iraq.

It is interesting to know that Egypt is in Shahnam; it is considered in the same geographical point as Barbarestan and Hamavaran.

At the end of Shahnameh, Arab names have also been mentioned.

He said I am Qeis-ibn-e Hareth one of Arab nobles (Shahnameh Ferdosi, 2002).

Names of Baghdad, Hejaz, Syria, Damascus, etc. have been also mentioned in Shahnameh. In this book, Minor Asia is also under the control of Romans who are symbol of the west.

Armenia was also concerned a place in the middle of east and west. All Arabs, Indians and Iranians decided to be at his service. He went toward Caspian Sea from Armenia to the east.

Russia, in north-west of Asia and east of Europe, is concerned in Shahnameh as a western country. The Roman emperor was named Filqous; the Russian king agreed with him.

He first provides the treasure of bride, Dowry, from China, Rome, and Russia.

Names of a lot of other cities have also been mentioned in Shahnameh, but it is not possible to name them all here. It is possible to conclude that the eastern nations from Shahnameh's point of view are different from the current eastern countries. In geography, east means Asian countries whereas in Shahnameh Iran is in the middle of the world and all countries in its east are called eastern and countries in its west are considered as western countries.

Eastern nations enjoy a great history and civilization as archeological findings have revealed.

It is possible to get to some valuable findings. For instance, Touranian are considered as Iranian enemies and they do not accept the peace. India is so vast, green and great and China is of great civilization.

These nations were in peace or fight, but these differences did not bar their communication. After so many years of close connection they naturally mixed together. They had business as well as fight as it is mentioned in Shahnameh.

As the mix of Iranians, Turks and Arabs, a new race came into existence. It was not further Turk or Arab; it was a new creature. Among all nations, some of them were of more popularity and their names have been repeated in Shahnameh frequently. This signifies their close relationships with Iran. This

close connection can be grasped through their common mythological symbols. Even in China enjoying a great variety and number of Gods and Goddesses you can find a lot of common points with other eastern national symbols.

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Detection of red ripe tomatoes on stem using Image Processing Techniques

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Abstract: Image Processing Techniques are being used increasingly in the field of agricultural and food products for quality assurance purpose. The system offers the generation of precise descriptive data and reduction of tedious human involvement. Image segmentation based on color difference between mature fruits and backgrounds under natural illumination condition is a difficult task. By processing images in three color space of RGB, HSI and YC_bC_r from CCD camera, tomato fruit, stems, leaves and a stem-supporting pole were recognized. Then the processed images were compared in three color spaces in order to identify ripe tomatoes with more than 50% redness. The average of error between actual number of red tomatoes and estimated number in 3 images of each 28 tomato trees was 3.85%.

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Keywords: Image processing; ripe tomato; natural illumination.

1. Introduction

Recently, there are a lot of researches work have been carried out by depending on the computer; in order to reduce the processing time and to provide accurate results. Digital image processing, as a computer based technique, has been extremely used by scientists to solve problems in agriculture (Chen, et al., 2002). Computer vision system has proven successful for the objective, online measurement of several agricultural and food products with application ranging from routine inspection to the computer vision system guided robotic control (Sun and Brosnan, 2003). Slamet, et al. (2007) classified papayas according to combinations of the three features to study the uniqueness of the extracted features. The proposed technique showed the ability to perform papaya size classification with more than 94% accuracy. Eggplant was graded by a mobile robot that was equipped with machine vision system (Chong et al. 2006). Ebrahimi, et al. (2011) used machine vision to analyze the greening area of potatoes based on RGB (Red-Green-Blue) and HIS (Hue-Saturation-Intensity) spaces. The difference between red and green components of RGB space for green parts of potatoes was lower than that of other parts. Mummert (2004) developed and investigated a machine vision system to measure the shape of sweet potato root. The results showed that the system could accurately measure the length and width for each sweet potato within several millimeters. Unay et al. (2011) introduced a fully automatic grading system for bi-colored apples by multispectral machine

vision. They first segmented defective skin in a pixelwise manner, then extracted several image features from the resulting segments, and assigned the fruits to the corresponding quality categories using statistical and syntactical classifiers. In the case of tomato product, Nielsen, et al. (1998) developed a technique to correlate the attributes of size, color, shape and abnormalities, obtained from tomato images, with the inner quality of the tomato samples. They applied fuzzy sets into their study. Recently, chaos theory was introduced into this area (Morimoto, et al., 2000). In their study tomato fruit shape was quantitatively evaluated using an attractor, fractal dimension and neural networks. The results showed that a combination of these three elements offers more reliable and more sophisticated classification.

Tomato fruit is one of major agricultural product in Iran. Currently around 18.5 million tons are harvested annually (Agricultural Ministry of Iran, 2010).

2. Materials and Methods

Greenhouse experiment was conducted in the greenhouse at Hashtgerd Greenhouse Center in Alborz province (Iran) during July 2010. To do experiments 28 tomato trees were selected in which there are at least 5 tomatoes with more than 50 percent redness.

2.1 Image Acquisition and Preprocessing

To carry out this work, a personal computer based on the microprocessor was used. At one expansion slot of the computer, an image digitizer board was placed

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with a random access memory of 1024 x 1024 x 8 bits, which allowed work with three images of 512 ×512 pixels. The acquisition of images in the greenhouse was made with a color CCD (Charged Coupled Device) camera with 1536 × 2048 pixels (CNB, 560 TV line, model GA4162PF, Korea), and automatic iris control. With the aim of creating uniform illumination conditions, all recording were done about 10 to 11 am. The images were taken from a distance of approximately 135 cm and three images were obtained from the same tomato tree. From each of them, all tomato fruits on the tree placed within the vision field of the camera were counted. Visible fruits were considered to be those which a human eye can distinguish on the monitor, using the red and green images, regardless of the size of the visible portion. A typical laboratory set for image processing is as shown in figure 1.

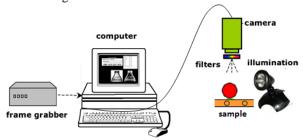


Figure 1. Components of a computer vision system

2.2 Color Spaces

The algorithm starts by converting a set of image from RGB to HSI and YC_bC_r (Luma and Chroma signals) color spaces, where we limited the color segmentation step primarily to the hue plane. By setting the threshold values to include only the color shades that could represent regions of interest (ROI); we make a first approximation step towards the end result. RGB color image is converted to grey scale and HSI images, in two separate stages. Use of grey scale is for removing unvalued data of images, increasing speed and efficiency of sorting algorithms. The equations of converting colors from RGB to HSI are (Abbasgholipour, et al, 2011):

$$H = \begin{cases} \theta & B \le G \\ 360 - \theta & B \ge G \end{cases}$$

$$S = 1 - \frac{3}{(R + G + B)} [min(R, G, B)]$$

$$(2)$$

$$I = \frac{1}{3} \left(R + G + B \right) \tag{3}$$

where $\theta = \cos - 1 \left\{ \frac{\frac{1}{2} [(R-Q) + (R-B)]}{[(R-Q)^2 + (R-B)(Q-B)]^{\frac{1}{2}}} \right\}.$

 YC_bC_r are also a practical approximation to color processing and perceptual uniformity, where the primary colors corresponding roughly to red, green and blue are processed into perceptually meaningful information. The YC_bC_r color space is used for both digital television and image compression. The chroma components $(C_b$ and $C_r)$ are difference values between the luminance and the blue and red components, respectively. The equations of converting colors from RGB to YC_bC_r are:

$$\begin{pmatrix}
Y \\
C_b \\
C_c
\end{pmatrix} = \begin{pmatrix}
0.299 & 0.587 & 0.114 \\
0.169 & 0.381 & 0.500 \\
0.500 & -0.419 & -0.081
\end{pmatrix}
\begin{pmatrix}
R \\
G \\
B
\end{pmatrix} (4)$$

2.3 Performance of proposed algorithm

In order to evaluate the performance of the proposed image segmentation methods, the red area of tomato images was computed using an own script in MATLAB. Performance of the algorithm was evaluated using two following formulas: accuracy of positives prediction (F_n) ;

$$F_{p} = 100 \frac{n_{p}}{N} \tag{5}$$

accuracy of negatives prediction (F_{∞}) ;

$$F_n = 100 \frac{n_n}{N} \tag{6}$$

where N is the total number of tomatoes on each tree, n_p is total number of correct predictions and n_n is total number of false predictions (tomato with less than 50% redness that was recognized as red ripe fruit with more than 50% redness).

3. Result and Discussion

Figure 2 shows the result of the number red tomatoes of 28 tomato trees estimated by algorithm compared to the actual the number red tomatoes. The results showed that the average error is 3.85%. This shows this method has enough accuracy to be used in harvesting robots. Results of tomato fruit image segmentation methods such as RGB, HSI and YC_bC_r, are respectively given in (a) to (d) of figure 3. It is clear that RGB and HSI (when S> 0.50) color spaces can be more successful in identifying tomato fruits from background with at least noisy signal. The total visible tomato fruits express the percentage of the fruits that are visible by a static human observer with respect to all those actually existing on the tree. It appears that only about 60% of production could be seen by a person standing at the same place as the camera. The use of camera increased significantly the percentage of fruits detected, from 60% to 84%. With these data the efficiency of the algorithms to discriminate fruits from other objects is evaluated.

The fruits detected refer to number of tomatoes detected with respect to the visible tomato fruits in the scene (Figure 3).

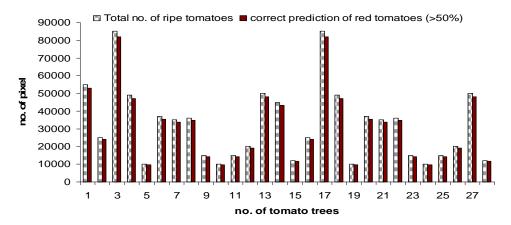


Figure 2. Comparison between estimated (by algorithm) and actual area of green parts

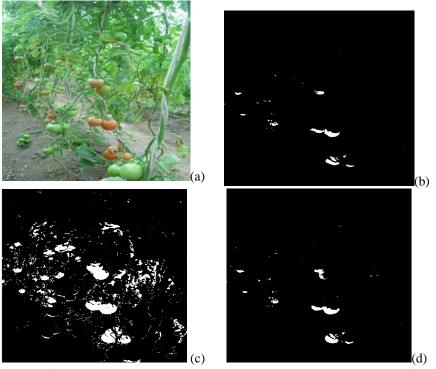


Figure 3. Detected tomato fruit: (a) raw image, (b) RGB gray level image, (c) YC_bC_r thresholding and (d) HSI gray level image (S >50%).

4. Conclusion

In terms of color characteristic analysis of tomato images and test of image segmentation, RGB and

HSI spaces may be implemented to realize dynamic threshold segmentation of color of fruit images in which color of objects and background show noticeable difference. It makes fruit image

segmentation easy and change original 3D color image into 1D gray-level image segmentation. Future works in this direction will make vision systems accurate, robust, low cost and feasible for picking robot in greenhouse horticulture.

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Study of the relationship between parenting style, and children's emotional intelligence and self-efficacy

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Abstract: This project is performed with the aim of studying the relationships between the parenting style on the one hand, and children's emotional intelligence and self-efficacy on the other hand. Regarding the importance of parenting style and its influence on children the question that arises that; what is the effect of the type of parenting style on children's emotional intelligence and self-efficacy? This study aims to find the answer. The statistical samples of the study were 110 students of middle school (62 boys and 48 girls) and their parents in Gonbad-Kavoos city, Golestan Province, Iran. They were chosen by cluster sampling method. To evaluate the parenting style, children's emotional intelligence, and children's self-efficacy, Baumrind parenting styles questionnaire, the 32-item Shrink's questionnaire, and the 10-item Schwarzer & Jerusalem Generalized Self-Efficacy scale questionnaire were used, respectively. The results obtained indicated that there is a significant statistical relationship between parenting style and emotional intelligence. However, there was not any significant statistical relationship between parenting style and children's self-efficacy.

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Keywords: Parenting style; emotional intelligence; self-efficacy

1. Introduction

Family is considered as the smallest social unit and the main element of each society. Family's environment is the first and most important factor that influences the individual's growth (Bahrami, 2008). Two important aspects of parenting style are: 1- the amount of affection and kindness that children experience, 2- the amount of acceptance and control that is applied by parents (Bamrind, 1991). Bamrind presented four behavior patterns for parents: 1-authoritative, 2- despot, 3- permissive, and 4-uninvolved parenting (Nijhof & Engels, 2007).

Children of decisive parents show high selfconfidence and higher self-reliance. They have higher inclination toward personal independence and they can make decisions personally (Steinberg, 2001). Parents of this group of children believe that wrong behaviors of children are necessary for their mental maturity and confronting with the difficulties of adulthood period (Bahrami, 2009). Children of despot parents seem worried, isolated, and dissatisfied, and have problems in coping with peers. Also, in these children, pervasive hostility, anger and much disobedience in boys and abstaining of duties in girls is observed (Bamrind 1991). These children are so much expecting and their training pattern is based on reproach, severity, and lack of affection and kindness, since their parents expect the children obey their commands indisputably. Thus, dialogue takes place less often between these children and their parents. If children of despot parents do not obey their parents, they will experience punishment (Leung & Kwan, 1998). Children of permissive parents avoid taking responsibilities and because of their parents' excessive affectionate behavior, these children do not learn patience and tolerance against hardships and adversities (Aunola, Stattin, & Nurmi, 2000).

The investigations carried out indicate that parenting style affect coping skills in homesickness feeling (Nijhof, & Engels, 2007), children's adaptation to university environment, psychological health and academic success of children (Bahrami, 2008).

Another concept of this study is emotional intelligence. Aristotle is perhaps the first person who considered the importance of feelings in humanistic actions. According to him, getting angry is so easy, everybody is able to become angry, but becoming angry at the correct person and to the correct degree, in correct time, for correct reason, and in the correct way is not easy (Goleman, 1995).

In 1985, a PhD student in Arts in an American university accomplished a thesis on emotional intelligence (Hein, 2004). In 1990, Salloy and Meyer used the term "emotional intelligence" with their knowledge about the works carried out on the non-recognition part of the intelligence (Cherniss, 2000).

The investigations carried out on emotional intelligence addresses the abilities of this structure, involving emotional conception, emotional

adjustment, emotional recognition, and emotional facilitating relevant to psychological adaptation (Salovey, Mayer, 1990, Mayer & Salovey 1995), and have introduced emotional intelligence as a better predictor of success and social adaptation, compared with the traditional structure of intelligence quotient (Goleman, 1995). The investigations performed on the relationship between emotional intelligence and the components of psychological health indicated that emotional intelligence has positive correlation with psychological health (Besharat, Reza zadeh, Firoozy and Habibi 2004, Lane & Schwartz 1987), recognition of the emotion contents and capability of empathy with others (Mayer, DiPaolo, & Salovey, 1990, Meyer and Salloy 1993,1997), self-awareness (Ghorbani, Bing, Watson, Davison, and Mack 2002), social and emotional adaptation (Salovey, Mayer, & Caruso, 2003), emotional well-being (Mayer, & Geher, 1996), life satisfaction (Palmer, Donaldson, & Stough 2002). Moreover, there is a negative correlation between emptional intelligence and psychological helplessness (Slaski & Cartwright 2002, Besharat et.al. 1384), depression (Dawda & Hart, 2000, Schutte et.al. 1998), cigarette smoking and alcohol drinking (Trinidad, & Johnson 2002). emotional inadequacy (Ghorbani et.al. 2002), and psychological disorders (Lane & Schwartz 1987). Some researchers consider emotional intelligence as a kind of ability that consists of understanding capacity, and the tools of identifying the applications and managing the emotions in ourselves and others (Salovey., Mayer, 1990). Some other researchers define emotional intelligence as a kind of inherent tendency that consists of adaptation capacities and abilities to control impulsive behaviors and confronting with stresses. The four connected skills of emotional intelligence in Meyer and Salloy's theory are as follows: 1- recognizing the emotion. i.e., the ability of finding emotion in ourselves and others, 2- using emotions to facilitate thinking, ability of using emotion to attract others' attention, transferring the feelings, and entering the cognitive processes such as problem solving and decision making, 3- defining the concept of emotion, understanding emotional information, the underlying causes for emotional status and their combination, and advancement and changing of one form of emotion to other forms, 4- managing the emotions that are related to adapting the feelings and applying effective strategies to promoting and understanding personal advancement Ciarrochi. & Mayer 2006). Also, they noted the followings as definitions of emotional intelligence: consciousness and control of impulsive behavior, stability of motivation, and empathy and social skills (Goleman, 1995).

Concept of self-efficacy derived from the idea of social knowledge by Albert Bandura (1997) that points to the individual's beliefs and judgments and his abilities to perform responsibilities and duties; for a person with low self-efficacy, it is less probable to perform new behaviors or change the behaviors that became habit for him/ her. Human being is an active creature and influences his life's events. Bandura stated that an individual's idea about his self-efficacy constitutes the main part of his/her self-awareness. Four important sources have been distinguished for changing the beliefs of self-efficacy system. These sources are: positive experiments, substituting experiments, social reinforcements, and affectionate moods (Abdollahi, 2001). Persons with strong self-efficacy feeling look at the troublemaking matters as the problems they must overcome: persons who show deeper interests in difficult activities have more commitment to their interests and activities and overcome the disappointment and hopelessness (Bandura, 1994). On the other hand, people with low self-efficacy feeling avoid troublemaking tasks; they believe that conditions and responsibilities of such problems are beyond their ability and strength. They concentrate on their personal failures and negative results, and lose their confidence in their personal abilities and strength. (Bandura 1994).

From Bandura's point of view, people with high self-efficacy have five characteristics: 1- they assign high goals for themselves and undertake duties to reach their goals, 2- they welcome troubles and try hard to face them, 3- their personal motivation is very high, 4- they do not refrain from doing any attempts to access their goals, 5- they are consistent when encountering the obstacles (Bandura 1997). Five points about self-efficacy are: 1- self-efficacy in each field is specific for the same domain of activities and cannot simply be generalized to other fields of individual's life, 2- obtaining self-efficacy in each activity is based on exercise and proficency in that field, 3- in each activity, although the person has selfefficacy, it is always possible to elevate self-efficacy, 4- self-efficacy is under the influence of others' beliefs about one's abilities (Luthans, Youssef, & Avolio 2007), 5- self-efficacy is under the influence of some elements such as: individual knowledge and skills, bodily and mental health, and also external conditions surrounding the person (Luthans, Youssef & Avolio 2007).

In the current study, our aim was to test to what extent parenting styles are related to children's emotional intelligence and children's self-efficacy. The study was carried out on 110 students of middle school (62 boys and 48 girls) and their parents in Gonbad-Kavoos city, Golestan Province, Iran, who

were selected for the study by cluster sampling method. We attempted to find the answer of the following research questions: 1) is there a statistically significant relationship between the parenting style and emotional intelligence? 2) Is there a statistically significant relationship between the parenting style and the children's self-efficacy?

2. Method

Study population was the employees of Golstan Province hospitals and their children. The participants were the employees of private hospitals of Gonbad-Kavoos town and their children, which were selected by cluster sampling. Frequency distribution of the participants is presented in Table 1

Table 1: Gender and sample

	N	PCF
M	62	56036
F	48	43064
T	110	100

After describing the aims of this research and attracting the participants' cooperation, the 30-item Bamrind's, the 32-item Shouter's, and the 10-item Shrink's questionnaires were used to evaluate the parenting style, the children's emotional intelligence, and the children's self-efficiency, respectively. The current research was a field research and some statistical criterions and methods including frequency, percentage, average, standard deviation, correlation coefficient, regression analysis, and factor analysis were used to analyze the data.

Shrink's emotional intelligence questionnaire: This questionnaire is adjusted on the basis of Goalman's emotional intelligence theory (1995). In Iran, the normalization was done by Mansouri in 2001. To address the value rate of this examination, Cronbach's statistical method was used and the h amount of inner equality of the test was reported to be about 85%.

Baumrind's parenting styles questionnaire: This tool is based upon the parenting style proposed by Baumrind (1991) and measures permissive, authoritarian and decisive (trusty) behavior patterns. This questionnaire consists of 30 items, of which 10 items are related to the permissive pattern, 10 items are related to the despot pattern, and the remaining 10 items are related to the authoritative pattern. In this questionnaire, the parents' opinions are measured on a 5 degree Likert's scale. Validity of the questionnaire was previously considered and these considerations report acceptable validity for the questionnaire.

Generalized Self-Efficacy scale: The Self-Efficacy scale was justified in 1995 and has 10 items. The

scale was normalized on 802 Iranian men and women and its Cronbach's alpha is obtained to be 83% (Schwarzer & Jerusalem, 1995).

3. Results

There was a statistically significant relationship between the parenting style and the emotional intelligence. This is consistent with the findings of other researchers, i.e., choosing a particular parenting style can influence the function of emotional intelligence.

Also, it was confirmed that there is not a statistically significant relationship between the parenting style and children's self-efficacy. It means that development and formation of self-efficacy in children depends on internal, individual, and personality variables; rather than external and environmental variables. This is in agreement with the viewpoint of Bandura that considers human being as an active creature, which influences his life's events, and the people's belief in their self-efficacy constitutes the main part of self-awareness.

4. Discussion and conclusions

Several researches have indicated that selfefficacy has many associates. The ecological, sociological, and economical conditions and also the residential area and neighbors, which can affect the parents' behavior and parenting style, influence the children's self-efficacy (Ardelt & Eccles 2001). Even the children's bodily situation and his involvement with physical and psychological diseases have some effects on his case (Coleman and Karraker 1998). The potential roles of parental self-efficacy (PSE) in parents' and children's adjustment and the role of parental cognitions in understanding the behaviors and emotions within families is an important issue. PSE is a potentially important cognitive construct, related to children and family functioning and can be broadly defined as the expectation caregivers have about their ability to be successful parents. PSE is presumed to be a specific case of a more general class of constructs associated with personal efficacy (Bandura 1977, 1982; Cervone 2000; Pajares 1997).

Bandura (1997) linked personal efficacy to human agency, which he defined as acts done intentionally and reflect an individual's perception about exercising influence over what they do. Cognitions of personal efficacy, considered the main facets of human agency, are the beliefs that what an individual performs will produce the intended outcomes. Extrapolating from these general definitions, PSE involves a parent's beliefs in their ability to influence their child and the environment such that it would foster the child's development and success (Ardelt & Eccles, 2001). The findings of the

current research indicate that if as a presupposition it is accepted that continuous variables in the regression modeling must be normal (this work is done by the Kolmogorov–Smirnov test) and according to the significance (0.930) the supposition of being normal is confirmed. Now, according to this method R= 251.0. It means that the amount of correlation coefficient and the rate of dependence of these two variables are 0.251.0.

Now, if it was a statistically significant relationship, we can present a mathematical model for it and then by the variance analyze table existence or nonexistence of the model will be investigated and the level of significance of 0.018 is obtained; and because P<0.05 (ANOVA) the existence of this model is confirmed.

Now, we provide the coefficients of this confirmed model and examine existence and nonexistence of these coefficients. For these coefficients, the level of significance of the constant number for the model is obtained to be 0.943 and the variable coefficient of parenting style is obtained to be 0.018. This demonstrates that the constant number of the model is deleted but the variable coefficient is confirmed. So the model is in the form of (parenting style) Y=0.018, but with standardization of coefficients in the model, it is indicated that by increasing one unit number in parenting style, the number of emotional intelligence will increase by 0.251 unit.

As a presupposition, the dependent variable in regression modeling method must be normal and the task is done by the Kolmogorov–Smirnov test. According to the significance level of 0.539, the supposition of their being normal is confirmed. Now, according to this method R is obtained to 134.0, i.e., the amount of correlation coefficient and the rate of dependence of these two variables is 0.134.

Now, if the relationship is statistically significant, we can present a mathematical model for it. Then, existence or nonexistence of the model will be investigated by the variance analyze table and the level of significance was obtained to be 0.221. Since P>0.05 (ANOVA), the existence of the model is not confirmed. So, the relationship between the parenting style and children's self-efficacy is not statistically significant.

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The new approach to study of relationship between Tughrul and Caliph Alqayem (in in the second half of the forth Hijri century)

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Abstract: In the second half of the forth Hijra century, the Seljuks government was recognized. It was historically the most important and valid Turkmen tribes. With the emergence of Seljuk dynasty, a new era began in the history of Islam. For the first time, the Turkish tribes dominated southwest of Asia and possessed the political power of Caliphate system. At the same time, it was the source of happiness for Abbasids that Saljuks were devout Sunnis and remained Sunni. Thus, they were the pioneers of a proactive cooperation with Caliphs and forcefully prevented the Ismaili conspirators. The military expedition of Tughrul to Iraq not only saved the Caliph from his enemies, but also caused a new division of power and brought a definitive shape of influence in the central territories of Darulislam. In the present study, we have tried to depict the relations of Tughrul, as the first king of Seljuks, and Caliph Alqayem. We also addressed the ups and downs of Caliph and Sultan relations and the formation of these relationships. [Abolhasan Shahvari; The new approach to study of relationship between Tughrul and Caliph Alqayem (in in the second half of the forth Hijri century); Journal of American Science 2011;7(7):385-391]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Call; Alqayem; Basasyry; Shahneh; Naan pareh; Marriage; Minister

1. Introduction

Seljuks established the largest Empire in West Asia; it was the largest one after Islam. They were able to form a strong central state from East Turkestan to the east coasts of the Mediterranean Sea. The power peak of this dynasty should be found under the rule of Tughrul, Alp Arsalan, Malek Shah, Berkiaraq, Mohammad and Sultan Sanjar, whose capital cities were Rey, Isfahan, Hamadan, and Marv, respectively. For 123 years, the dynasty ruled in Transoxiana (beyond the Oxus River), 128 years in Khorasan, 161 years in Iraq, 150 years in Kerman, and 230 years in the Minor Asia.

Like other Turk tribes of central Asia, this immigrant tribe moved from Turkestan toward the border and near the Transoxiana (beyond the Oxus River) about Bukhara embraced the faith of Islam. Then, they gradually entered Khorasan and thereafter dominated Iraq, Syria and Minor Asia. Tughrul came officially to power in 429 AH in Nishabur. Then, he occupied Gorgan, Tabarestan, Khaarazm, Rey and Hamadan. He occupied Isfahan in 443 AH and Azerbaijan in 446 AH and overthrow the rule of Buwayhid in 447 AH. Algayem Bamrellah was the twenty sixth Abbasid Caliph. He confronted the revolt of Basassiry- the commander of his Turk troops- and called Turghrul for help. Tughrul entered Baghdad in support of the Caliph, and defeated and killed Basassiry. He also offered his niece- the sister of Alp Arsalan- to the Caliph and Caliph married her. Caliph called his savior the Sultan of East and West; thus the center of Islamic Caliphate was under the influence of Seljuks.

In that period, not only the twelve-Imam and Zevdy Shiites get the Caliphate in trouble, but also Ismailis were so dangerous. Ismailis had a base in Egypt in 358 AH/969 AD and from that base, which led by Fatimid Caliphs of Egypt, they run their propaganda. The base placed all the Fertile Crescent and above all Iran- under the coverage of a network of fortifications. The agents of their governments were accepted, wherever they were. If Seljuks were not present there and forthrightly did not impose the religious of Sunnis, it was a possibility that Ismailis could come to power. However, Seljuks did not stop in Iran and moved to Syria and occupied Jerusalem in 463 AH/1071 AD and Damascus in 468 AH/1076 AD. At this time, they declared war to promote the faith of Islam.

In this study, the situation of Abbasid Caliphate system, reasons for invitation of Tughrul to Baghdad, quality of his entrance to Baghdad, measures of Tughrul in Baghdad, conditions of his marriage with the daughter of Caliph, and the official and political relationships between Sultan and Caliph are analyzed and explained.

2. Relationship of Tughrul and Alqayem

Political relationships between Tughrul and Caliph of Baghdad began after Dandanghan event in 431 AH/1040 AD. After the victory of Seljuks in Dandanghan, they wrote a formal proclamation of victory and sent it to Baghdad by Abu Is'haq Alfaqani. In the letter, the Seljuk leaders introduced themselves to be obedient and adhering to the Abbasid government. They wrote that we do ever

Jihad against infidels and we always visit the Kaaba, they also complained that Mahmoud Ghaznavi arrested their uncle -Israel Ben Seljuk- who did not commit any crime and sent him to Kaalanjar Castle in India, they said that their uncle spent seven years -the rest of his life- in prison. In that letter, they added: Masoud, the son of Mahmoud disregards the interests of Khorasan and spent his time in binge. Invitation of the Greats of Khorasan is the reason of our presence here and God helped us to overcome Masoud Ghaznavi. At the end of the letter, they piously stated that they will manage the conquered territories according to the religious law of Islam and the order of Caliph. "Thanks for this gift and for this victory. we will expand justice and equity and will avoid oppression and injustice and we will act according to the religious law and the order of Caliph" (Rahat Alsodur 1363 pp. 102-104; Seljuknameh 1342 p.17). Coincidently, the situation of Baghdad was chaotic. The court of Caliphate was the arena of political competitions; especially conflict between Moslemeh, the minister of Algayem and Abulhares Arsalan Bsasyry, the Shahneh (commander) of Baghdad. So, the city was experiencing sedition. Ibn Moslemeh thought that Bsasvry was the agent of Mostazar, who was the Fatimid Caliph in Egypt in 427-487 AH /1035-1094 AD. In fact, at the same time, the great Ismailis' missionary, Almuayyed Feddin Abunasr Ben Omran, was in Iran and he entered the Abu Kaalijar dynasty in 415-440 AH/1024-1048 AD. He invited the Emir of Bouveh and many people around him to the Ismaili faith. He also started to correspond with Basasyry and contacted with Syrian and Iraqi Arab Emirs (Farsnameh 1363, p. 119; Sirat Almoayyedadin Daee Aldoa 1945 pp. 96-109-113-141; Alkamel fi Tarikh 1966 AD p. 608).

Under the circumstances, Ibn Moslemeh competed with Basasyry and tried to vanquish him, so he decided to unite with Tughrul and invited him to Baghdad.

Arrival of Tughrul in Baghdad: Prevalence of Caliph When Tughrul was invited by Ibn Muslemeh, he did not directly move to Baghdad. At this time, he was involved in Rey. After conquest of Rey in 447 AH, he went to Hamadan and announced that he will go to Hajj and is intended to correct the way of Mecca and after that, he is going to go to Damascus and Egypt to overthrow the government of Almostansar Alavi, which was the rival of Caliph. Then, he wrote letters to his friends in Dinoor, Qarmisin, and Halvan to prepare food and fodder, but rumor of Tughrul's arrival to Baghdad led to the chaos in city and Turks decided to conquer Caliphate governing office (History of Ibn Khaldun 1368 V4 p. 12).

Malek Rahim, a ruler of Bowahid dynasty, who was informed of Tughrul's arrival in Baghdad, moved from Vaaset to Baghdad and declared his obedience to Caliph. He considered that he will obey every command of Caliph. But Tughrul sent a messenger to Caliph and exaggerated his obedience. Moreover, Tughrul sent messages to Turks of Baghdad gave him their favor and benevolence. But Turks of Baghdad were unhappy to hear that he will come to Baghdad and requested Caliph to keep this enemy away from them. However, the court did not answer them explicitly, because the Caliph preferred Tughrul to come hereby to end the rule of Deylam.

Advisors of Caliph deemed it advisable that the existing troops go to their tents and send a certain person to Tughrul to welcome his arrival in Baghdad. The Caliph sent a message to Tughrul that he can enter Baghdad. In Nahravan, the prime minister went to welcome him with a great retinue of judges, chiefs, aristocrats, witnesses, servants, and nobles. Tughrul sent Abunasr Kandari, his minister, to welcome them, too. The prime minister met Tughrul and gave the message of Caliph to him to swear allegiance to the Caliph, Malek Rahim, and army officers (the same; Rahat Alsodur and Avat Alsorur 1363 P105).

After Tughrul's arrival in Baghdad, his troops found a fault and came to blow the people of Baghdad and many people were killed. Tughrul put the blame on Malek Rahim, who irritated the people, but Caliph asked to give protection to Malek Rahim. Caliph also sent a group to testify that he was innocence. In that case, it is not clear that if Tughrul and Caliph were conspired or not, but Tughrul ordered to arrest Malek Rahim and his followers and sent them to the Sirvan castle (Alkamel fi Tarikh V9 pp. 613-627; Zobdat Alnasrah and Nokhbat Alosrah 2536 p. 52). At that time, the Caliph was more powerful than Tughrul and blamed Tughrul for the actions he committed. The Caliph told Tughrul that they came to you by my order and security and if you do not free them, I will leave Baghdad; I thought if you come there, the conditions will become better and the honor of Caliphate will increase. Tughrul lived in Baghdad for thirteen months without being accepted by the Caliph. Their negotiations were conducted by their ministers (Rahat Alsodur and Ayat Alsorur p.105; Seljuknameh p.19).

Importantly, despite of predominance of Tughrul to Malek Rahim and overthrowing of the hegemony of Bowahid, the Caliph did not accept to meet Tughrul. So, this issue shows dominance and power of the Caliph and emphasizes that Seljuks still needed the support of Caliph to legitimize their monarchy.

Departure from Baghdad and disturbance in the court of Caliphate

In the case of Tughrul's departure from Baghdad, most resources remained silent, but Ibn Khaldoon wrote: "Tughrul stayed in Baghdad for a long time and people of Baghdad suffered from his troops because they reside in the home of people, apart from the fact that they allocated provisions of city. The Caliph ordered the prime minister to write a letter to Amidulmolk Kandari and call him in presence. As he came, the prime minister told him on behalf of the Caliph: Say to Sultan that people are suffering from your oppression and if you do not keep away this oppression; for avoiding the sins the Caliph is going to leave Baghdad. This message and the Tughrul's dream that Prophet Muhammad (PBUH) blames him for his troops caused him leave Baghdad with all equipments in the tenth of Zelgaade (Eleventh Arabic Lunar month) (Ibn Khaldoon V4 P14). Thus, the Caliph himself was the reason of Tughruls departure from Baghdad, because as even before being said, after thirteen months of Tughrul's residence in Baghdad, the Caliph did not accept to meet him in person.

But in the absence of Tughrul, who was the advocator of Caliph and imprisoning of Malek Rahim, new events occurred in Baghdad, and the Caliph was dethroned and exiled from Baghdad. In the absence of Tughrul, Basasyry with Qureish Bin Badran entered Baghdad in 450 AH/1058AD. Both Sunni and Shiite people of the city welcomed them enthusiastically. Ibn Moslem, the minister, who invited Tughrul, and several servants of Caliph were executed and the Caliph was exiled to Hadise Aane. For one year, from Zelqaade (Eleventh Arabic Lunar month) of 450 AH/1058AD, the sermon was read by the name of Fatimid Mostansar in Baghdad. But Basasyry did not come to good, because as it will be mentioned, when Tughrul returned to Baghdad, Basasyry left the city. The Fatimid Caliph and his allies -Dabis Mazidi and Oureish Aghili- did not support him and he was arrested and killed by Gamashtakin, servant of Amidulmulk Kandari, in 451 AH/1059AD. They cut his head and sent it to Baghdad, thus the activities of Fatimid Caliph and their advocators to overthrow the Abbasid Caliphate were useless (Alkamel fi Tarikh V9 PP640-645-693; The great history of Islam and Iran V16 pp. 343-344-349). The question is that what really happened in Baghdad that people of Baghdad, both Sunnis and Shiites, welcomed Basasyry after his arrival in Baghdad? Were they unhappy with Ibn Moslemeh who Invited Seljuki Tughrul to Baghdad? Did the activities of the Caliph offend people? Did unsupportiveness of Caliph toward Malek Rahim offend people? Did clashes of Tughrul's Turk troops with people and their massacre cause people's dissatisfaction? Whatever the answer was, there was

a sign of crisis in Baghdad since Monarchy and Caliphate were so interconnected, and if they did not support each other, the other one encountered challenge. This was the case when Tughrul left Baghdad, the Caliph exiled, and the Caliphate court encountered disturbance.

Return of Sultan, tranquility in the court of Caliphate According to the historians, when Tughrul left Baghdad, he proceeded to Diarbakr and occupied surrounding areas and entrusted them to his brother-Ibrahim Yanal. Disturbance in the Caliphate system and the dreams Tughrul developed in his mind for the future of Caliphate and Monarchy caused him return Baghdad. He tried to enthrone Algayem Beamrellah again, so he sent a messenger to Basasyry and Qureish Bin Badran and requested to return the Caliph to Baghdad and to mention the name of Tughrul in the sermon and on the coin. Furthermore, he agreed not to enter Baghdad. But Basasyry and Qureish rejected this proposal and Tughrul moved toward Baghdad. As this news rumored in Baghdad, Basasyry left Baghdad with all his relatives and followers. Tughrul Beyk sent Amidulmulk Kandari to the deserts of Iraq to seek the Caliph and sent him gifts, water, tent, and pavilion. Amidulmulk with these equipments went to see the Caliph and they moved toward Baghdad. The Caliph arrived Nahravan in the twenty-forth of Zelqaadeh (Eleventh Arabic Lunar month) of 450 AH. Tughrul met the Caliph there and as he saw him afar, he dismounted. Algayem told him that: O! Roknollah be mounted... (Rozatossafa V4 1373 p. 666).

Thus, the Caliph who was not willing to meet Tughrul after thirteen months of his presence in Baghdad, was proudly accepted by Tughrul; considering their meeting, it is written that: five days before Zelqaadeh (Eleventh Arabic Lunar month), the Caliph and government leaders gathered. Sultan with all glory was passing the Tigris River. As the Caliph arrived, he set his foot on Caliph's horse and came toward him.

He sat on a palanquin, which was seven meters higher than the ground. The servants carried the Caliph on their shoulders and a bamboo stick in his hand. Sultan kissed the ground and the Caliph's hand. The Caliph sat him on a seat and told to prime minister that he admires Sultan's actions and he is pleased to meet him and makes him the ruler of the territories God granted him. And wanted him to give the people some consideration and fears of God...expands justice... As Tughrul heard these words, he kissed the ground. The Caliph ordered to give him the robe of honor. Tughrul was carried to a place in which the robe of honor being worn, he came back with robe of honor and kissed the hand of Caliph again and kept the robe on his eyes. Caliph

named him as the King of East and West and contracts were made. Also, Tughrul gave Caliph more gifts, such as five thousand Dinars and fifty best Turk slaves with their weapons and tools and many other garments and other precious things. Sultan Roknaddin Tughrul Yamin Amiralmumenin was the other title of Tughrul (Selected History 1362 pp.454; Ibn Khaldoon P15). Also, in that meeting Caliph granted Tughrul seven black robes- the color of Abbasids-, which was the sign of Kingdom of seven territories, a golden turban, the sign of Arab and non-Arab ruling, and a gemmed sword, the sign of ruling from East to West. Thus, the ruler of Turks became the first secular ruler in all Iran after the fall of Sassanid dynasty in 30 AH/560 AD (Zobdtat Alnasrah and Nokhbat Alosrah pp.14-15; The Great history of Islam and Iran V16 pp.328-337).

In fact, by this meeting the situation quieted down. The Caliph granted Tughrul ruling of Iran and Iraq and all the territories God granted him. But the issue of managing Baghdad- the capital of Abbasids- was not clear.

When Kandary went to bring the Caliph to Hadise Aaneh, he presented the Caliph a golden inkpot and a gemmed sword and said that, hereby, he adds pen services to sword services. In this way, he implicitly wanted to annex Baghdad to the territory of Sultan (Zobdtat Alnasrah and Nokhbat Alosrah p.20). But Tughrul himself had not any intention or plan to occupy Baghdad. He told his minister, Amidolmulk, to request a place in the outskirts of Baghdad for him and his troops reside, when he comes to the seat of the Caliph to do the country affairs. At the same time, Algayem sent his minister to Tughrul to request Sultan ration and a piece of land for the cost of office. A few days later, by the order of Tughrul, Aqta Algaym (territories of Caliph) was registered in the government office and ruling of Baghdad handed over to Sultan (Rahat Alsodur and Avat Alsorur pp.110-111; Seljuknameh p. 20-21).

But the settlement of Seljuk Sultans in Baghdad did not keet the hands of Abbasid Caliphs open to intervene in the worldly affairs of Baghdad, Iraq. In fact, Amidolmulk weakened the position of Sultan against the Caliph's by occupying Baghdad, particularly as used his influence in Baghdad by his representative, the Shahneh.

Who was Shahneh? In Baghdad when Tughrul take the government offices under his power, up to the Caliphate of Almustansar in 512-529 AH/1118-1135 AD, administrative power was dominated by Sultan and his agents. Shahneh was the most important of them, who was the ambassador of Sultan in sight of Caliph and supervised Caliph and his agents. He usually was selected from among the Turk commanders (Emirs) and had some military duties. In

Baghdad, to some extent, there was a conflict for legal authorities, and citizens preferred Caliph because they could access him; however, Shahneh could have access to Sultan. Totally, there seem to be that the order and national security responsibilities were divided between the agents of Caliph and Shahneh. In Baghdad, the minister of Caliph exercised legal authority in some extent and sometimes established the court of injustice (A satiety on Iran's history after Islam 1363 p. 19). Such measures, which were accomplished in the meeting of Tughrul and Caliph, determined a private income (Naan Pareh) for the Caliph in exchange of monitoring the official organizations of Baghdad. After that, the Caliph was not exposed in arbitrary dispossess, like the case of Ale Bowahid era. He was allowed to use the income of his private property without fear of any account or confiscation of his property. The dignity of his position was improved to some extent, but the respect which Seljuks professed him, although significant, but was limited. And the place which was his residence at the time of Bowahid dynasty, for all those feared Bouwahis. But such a situation did not exist at the time of the Seljuks dynasty. Additionally, Seliuks dominated the Caliph by appointing his minister (A satiety on Iran's history after Islam p. 18).

The most important issue that should be considered about giving the political power by the Caliph is that the monarchy has been separated and became an independent institution from the Caliphate. In the beginning of Seljuk's arrival in Khorasan, they did not know anything about the absolute power of the King and they imagined the empire as the property of Seljuks dynasty; therefore, after the Dandangan victory, it was seen that in some cities of Khorasan the sermon was read by the name of Tughrul and others by the name of Cheqri Beik.... (Seljuks p.170) Undoubtedly, one way to legitimize the rule of Seljuks in Iran was the familial ties with Abbasid Caliphate of Baghdad and apparently the consultants of Tughrul recommended him to do so. In fact, when Tughrul was moving toward Iraq, he intended to bring the two dynasties closer by marriage. Arsalan Khatoon, the daughter of Cheqri Beik Davood, and the Caliph married together in 448 AH/ 1956 AD (Zobdat Alnasrah and Nokhbat Alaosrah p.113, Alkamil fi Tarikh V9 p. 63, The great history of Iran and Islam V16 p. 320). In this marriage, a girl from a royal family gets married the Caliph of Baghdad. However, course of events showed that the daughter of Sultan usually could not live in harem, as it was the case of the daughter of Malek Shah and Torkan Khatoon marriage to the Caliph. But in this context, a mutual link is provided. After failure of Basasyry and managing of Iraq's affair by Tughrul, he decided to

marry one of the Caliph's daughters. The Sultan dispatched Abumosaed, the Judge of Rey, to pose his request. Ibn Jozi mentioned that the former spouse of Tughrul Beyk, who passed away in 452 AH/1060 AD, recommended him to do so (Almontazem 1357-9 V3 p. 218). The marriage of a bride from the Abbasid dynasty with a rough and wild Turk was another case, and Algayem responded that such a marriage was not common among the former Caliphs (History of Iran Cambridge V5 p. 54). It seems that the Caliph still did not understad his position against Sultan. That was the Sultan, who vanguished the sedition of Basasyry and other enemies of Caliph and had returned the Caliph from exile to Baghdad. And more importantly, that the Caliph earned living by the income which the Sultan provided him (Naan Pareh) and expenses of the Caliph and the court were funded by the incomes Tughrul provided. So Tughrul dispatched Amidolmulk Kandari to the court to explain the situation for him. It has been written that when Kadary visited the Caliph, he kissed the ground on Tughrul's part and said that Sultan send his respect and thanks Emiralmomenin government for his proceeding gifts. I have achieved all my wishes and I do not have any wish except joining Your Excellency and joining this blessed dynasty (Tajareb Alself 1357 p. 262). At first, against the persistence of Kandary, which was backed by Arsalan Khatoon, the spouse of the Caliph, he haughtily replied that: we, the Abbasid dynasty, are the best of people and there is a leader among us, until the day of resurrection; everyone who accompanies us will be saved and guided and who opposes us will be misled and perplexed (The same; Zobdat Alnasrah and Nokhat Alosrah pp. 22-26-31-32; Alkamel fi Tarikh V9 pp. 20-22-25-26; Rahat Alsodur and Ayat Alsorur p. 111).

The issue of Caliph's daughter's marriage with Tughrul was an order, which even Abolwahid did not force the Caliph to so. Thus, Caliph tried to put an end to this problem and said to his messenger that if Tughrul insisted on marriage, receive him 300000 Dinars. However, against the spiritual power of Caliph, Tughrul was able to impose a part of the power of Cairo on him. Pecuniary affairs of the Caliphate system in those days depended on gifts of foreign powers and political envoys, selling robes of honor and titles and revenues the secular rulers of Iraq offered him. In Baghdad, Amidolmulk told explicitly to the Caliph's envoy that it is not advisable to reject this request and he threatened that in the case of refusal, he will confiscate all the left (donated) properties and will only leave the Caliph the properties owned by his father, Alqayem Beamrellah. Therefore, there was not any other choice for Caliph except a favorable answer. And the

order for managing the contract was issued. The marriage contract was signed by the representatives of the parties outside Tabriz in 454 AH/1012 AD .Tughrul himself did not attend the ceremony and dispatched his troops to Armenia for the second time (Zobdat Alnosrah and Nokhbat Alosrah 30-31; Rahat Alsodur and Ayat Alsorur pp. 111-112; Alkamel fi Tarikh V10 pp. 25-26). Raees Aleraghin Abu Ahmad Nahavandi and Abu Oanavem Abi Mahleban were the deputies of Tughrul and the Caliph, respectively. Tughrul came to Baghdad in 445 AH. We know that when matchmaking, the Caliph was not pleased with this marriage and Amidolmulk signed that the Sultan had no intentions except that this marriage is a source of pride for him (History of Ibn Khaldoon V4 p. 15). So, when Tughrul entered Baghdad and sought for the Caliph's daughter, he was told that the issue of marriage was only to respect him and they told him that the signature and conditions he accepted is available and if he had any other intention, he should meet the Caliph's daughter in the residence of Caliphate (The same). Some sources have written that finally they brought the daughter of the Caliph to the Sultan's residence in the city and he did necessary measures with her (a satiety on Iran's history after Islam p. 18). But many sources have written that the Sultan met the daughter of Caliph in the residence of Caliphate. "In the middle of the new month, Sultan met the daughter of Caliph, who sat on a golden palanquin; he kissed the ground and served her. But the lady did not take her veil off and did not stand up. The Sultan offered her abundant gems and returned. Every day, he met her in this way and returned" (History of Ibn Khaldoon V4 p. 15). Whatever the result was, the Sultan left Baghdad and moved toward Rev. In Lambton's opinion, when Sultan left Baghdad, the Caliph unwillingly let his daughter to accompany him (A satiety on Iran's history after Islam p. 18). However, considering their contractwhen concluding a marriage contract and meeting the daughter of Caliph-as described above, this action seems impossible; but the certain point is that when Tughrul left Baghdad, Arsalan Khatoon -his nephew and the Caliph's wife - accompanied Tughrul, because she complained about unkindness of the Caliph in front of her paternal uncle and Tughrul accompanied her from Baghdad (History of Ibn Khaldoon V4 p. 16). On his route, Tughrul entered Ray and shortly after that he died in the eights of Ramadan (Ninth Arabic lunar month) in 455 AH/1063 AD (Zobdat Alnasarah and Nokhba Alosrah 3031; Rahat Alsodur and Ayat Alsorur pp.111-112; Alkamil fi Tarikh V10 pp. 25-26). Mentioning the story of Tughrul's death, the book Rozat Alsafa, mentioned a nice point that "the daughter of Caliph returned Baghdad without

consummation of marriage" (Rozat Alsafa V4 p. 666). Nevertheless, it was a political marriage to strengthen the monarchy and Caliphate that though it had not a happy ending in the bond of matrimony but undoubtedly strengthened the Monarchy and Caliphate. On the one side, the Sultan achieved his religious legitimacy and became the groom of the Muslim's Caliph, and on the other side, the Caliph benefitted the power of Sultan in Cairo to contend with competitors gaining properties.

3. Conclusion

The extent of Seljuks' conquests shows that Seljuk leaders -under the rule of Tughrul- were powerful commanders. They led all Agoozes and when they entered Khorasan, their troops were totally estimated to be about two thousands, which after the victory in Dandangan these troops were divided among some ethnic leaders. In the war with Sultan Masoud, it was observed that Seljuk leaders often fight with minimum troops against well-equipped and superior troops of enemy and overcome them. Chegri Beik Davood pointed out this issue in a letter to his brother and wrote: With accompanying of thirty men, we encountered with three hundreds enemies. We faced the enemies and overcome them (Alkamil fi Tarikh V10 p. 17). In addition to exceptional cases such as Tughrul's retaliatory slaughter in Sanjar, the behaviors of Seljuk leaders toward the rulers and the people of occupied areas were mostly conciliatory. They employed bureaucrats like Amidolmulk and continued Irani-Islamic statecraft (Journey of Nasser Khosrow 1370 p. 3; Zobdat Alnosrah and Nokhbat Alosrah p. 32; Akhbar Aldoolate Alseljookieh p. 32; Alkamil fi Tarikh V9 p. 459). From their arrival, they undertook the role of Sunnis' advocators against Fatimids and establishment of Sunni monarchy was a turning point for the Caliph. Overcoming the national governments through Iran and Iraq and occupying Syria and Minor Asia by Seljuks, the power was centralized in Baghdad. Most Imperial Western border rulers, which already had bowed to the Fatimids, turned to the Abbasids. Then, the name of Abbasid Caliph was read in the sermon through the Empire. Shaneh of Baghdad, who was appointed by Sultan and confirmed by the Caliph, was the liaison between Sultan and Caliph. The Caliph himself chose his successor and allegiance to the new Caliph meant that he was regarded and confirmed. With determination of the Crown Prince by Sultan, the credit of new Sultan to get the charter from Caliph and to read sermons to his name found consistency in Baghdad. Furthermore, the removal of the power of Abbasids from Caliphate increased the respect and sanctity of the person (The Caliph) and the credit of the sermon; as Malekshah at his peak of power was

not allowed to kiss the hand of Caliph Moqtadi and only kissed his ring (Zobdat Alnasrah and Nokhbat Alosrah pp. 57-59-91; The great history of Islam and Iran V17 pp. 45-46-67).

Tughrul certainly had a great personality, because during seventy years he could ascend from an unstable and precarious existence as the head of a desert-dweller tribe to the place of Kingdom of the territories extended from Kerman to Diarbakr. Besides ruling as a powerful Sultan, he was able to gain the religious legitimacy in the territories traditions played a decisive role. On the other hand, considering the social circumstances and political geometry vicariate may bring the reader to the conclusion that relations between the Sultan and the Caliph was inevitable. The Caliph of Baghdad, lost its political power in Baghdad years after dominance of Buwayhids and now with the emergence of Turkmen Seljuks which had the desire of Islam to support, the Caliphs could restore their power and improve the face of Caliph in Muslim's world. Also, overwhelming of Fatimids by Seljuks was an opportunity that the Caliph was able to take advantages in the best possible way. It is worth mentioning that, before the arrival of Seliuks, the income of Caliph was based on selling of robes and incomes of Iraq rulers, so the economic power of Caliphate field was limited. But when Tughrul arrived in Baghdad -by granting of Naan Pareh (Income) or wealthy territories - the Caliphate court became strong in the economic aspect. Considering the link between Caliph and Sultan we should mention the prominent role of the minister. During the three first Seljuk Sultans; namely, Tughrul, Alp Arsalan, and Malekshah, the minister played a prominent role in relationships between the Sultan and the Caliph; supervising the religious affairs, development of country, and organizing the relations. These were carried out by undertaking the negotiations related to the bond of matrimony with family members of Caliph. In the marriage of Cheqri Beik's daughter, Arsalan Khatoon, with Caliph Algayed in 448 AH/1056 AD, and the controversial matchmaking of Tughrul from the daughter of Caliph and their wedding in 454 AH, as mentioned before, Amidulmulk Kenderi was the representative of Tughrul (Zobdat Alnasrah and Nokhbat Alosrah pp. 13-26; Alkamil fi Tarikh V9 p. 617; Almuntazam fi Tarikh Almoluk va Alomam V8 pp. 70-169). In the procedure of granting the political power to Tughrul, Kenderi was the translator between the Sultan and Caliph Algayed and received the title of Seyved Alvozara from the Caliph (Zobdat Alnasrah and Nokhbat Alosrah p. 11; Almuntazam fi Tarikh Almoluk va Alomam V1 p. 235). Since Monarchy of Tughrul, the minister played a very important role in the relationship between Monarchy and Caliphate.

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Bower

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Abstract: Undoubtedly, the most basic needs of human being for survival or comfortable life are food, clothing and house. After providing good food, cloth, and house, he can have a higher quality of life. Nowadays the house matter is one of the most basic discussions of nations and governments. From some people's point of view, house is prior to other needs of human beings, because with the house one can dispense with eating good food and wearing good cloth and spending his day. In history different tribes have used various architectural methods and houses. Iranian Turkmen tribe, who constantly migrate to find better pastures, because of their tribal life style, use an especial kind of house that is unique; called Turkmen language "Bower". These Turkmen houses have attracted many people including anthropologists. So, in the current article it is tried to completely describe the bower. [Aghil Taghavi; Bower; Journal of American Science 2011;7(7):392-396]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Turkmen; Iran; Bower

1. Turkmen

Groups that are now named Turkmen previously were named "Ghouz" or "Oghouz", taken from the name of their ancestor "Oghouz Khan". There are different ideas for the reason of naming them as Turkmen. Some believe that they replied the Question of "Who are you" as "Turk men", which means I'm Turk. Also, some other believe that Turkmen is the same as Turk and gradually changed into Turkmen; another belief is that Turkmens were the first group of Turks who became Muslim and the word 'Turkmen' is the abbreviation of Muslim Turk.

However, Turkmens are a group of yellowskinned people who probably lived in Mongolia and then gradually came to Iran and Turkmenistan.

In "final proof," it is said that Turkmens "Oghouzes" lived in Mongolia at first. In the Chinese 8th century encyclopedia, it is mentioned that Turkmens lived in west and were named (To- Ko-Moong) there. In present time, Turkmens live mainly in Turkmenistan and Iran's Turkmen Sahara while some Turkmen groups live in Afghanistan, Turkey, and Irag.

Being Turkmen has three basic conditions: each Turkmen must be in the Turkmens'

Pedigree or be the Turkmen's second hand children's grandchild and can speak with Turkmen accent and at last be the Hanafite Sunni Muslim (Askary et al, 1995).

Bower was Turkmen's house from a long time ago because it can meet the needs of immigrants in the best manner, and also can be stood up and closed down in a short time and make the movement of the Tribe easier. Bower is the smallest unit of Turkmens; i.e., one Turkmen family who live in it. Each bower near other bowers of relatives formed

one village (Saeedian, 1996). The geometric form of placing the bowers is indicative of social relationships of the people who live in the bower. Usually bowers of each village are located in a straight line. The neighbor bowers (Oÿ) are relative and have common pastures. Their animals graze in one folk. However, Oÿ or bower forms the village. The distance of villages changed on the basis of the capacity of pastures. The Oÿs distance from each other and the place of these bowers can demonstrate the thing that belongs to each tribe (Yazdi, 1996).

Each bower is made by wood and covers of felt in a round form; the same method as it is common among the Mongolia's nomads. The felts are made by Turkmen's artful women (Morad Nejad, 2009). Turkmen women decorate inside the bowers with their handicrafts. Turkmens sit and sleep on the felt or rugs that are woven by the women and are placed on the ground.

They hang some sacks on the walls of bowers. The bigger ones are named gunny sacks and smaller ones are named feed bag. Turkmen women use them as the drawer, to store their home tools and materials (Diba, 1996). The primary house of Turkmens, Bower, has complete concordance with their social construction. However, nowadays it is used only by a few number of the immigrant Turkmens in the north of Atrak (Yazdi, 1996).

Turkmens also called the bowers "Aghachi Oÿ" that means the wooden house. They believe that bower is the symbol of health and generosity; being the door of the bower always open without any lock is known to indicate the hospitality of the tribe.

Turkmens are interested in horse, gun, and bower. Whenever their life became difficult, they

migrated from that place and went farther and out of the reach of other tribes (Ghourkhanjani, 1981).

Now, we consider different types of Turkmen's bowers:

Chatmeh:

When Turkmen tribes wanted to rest in an area during summer and winter resorts, they put two porches in front of each other, and tied them from the top. In this way, they create the temporary shelter, named "Chatmeh" (Kalteh, 1996).

Göt Tokmeh:

Some Turkmens used "Göt Tokmeh" as temporary settlement for some days or some months or because of poverty. This type of house consists of "Ogh and Toynok" (the bow-shaped woods and the circle-shaped wood) that is especially proper for poor people. Therefore, it is called "Gherib Oy" (the humbly house) and because of its small size, it is also called "Kechi Jik Oy" (the small house) (Azami et al, 2003).

Agh Oy and Ghare Oy:

Among the tribes, house is not only the place of rest for family members, but also it is the place of keeping their animals, the storage of foods, the place of keeping the dairy and food products, and the storage of wheat and barley. Also, it is the place of producing handicrafts such as felt making, carpet making, etc (Saeedian, 1996).

Agh Oy or white house is the bower that has a wooden frame "Tarim", "Ogh" and "Toynok". Preparation and construction of this type of house is refers to grandness, and nobles and wealthy people are capable to make and afford it. This type of bower is named white house because of its newness and novelty. Moreover, it has white woolen felts and has white and bright view. But as time passes, due to the fireplace inside the bower, the white felts became black by the smoke, it will be called "Ghare Oy", i.e., black house (Pour Karim, 1958).

However, a bower that is covered with new and white felts is also called "Agh Oÿ" (white bower), and as after some times the felts became black and dirty because of sun shine and smokes, it would be called "Ghare Oy" (black bower).

2. Components of the bower

- 1- The frame of the door
- 2- Tarim
- 3- Ogh
- 4- Tovnok
- 5- Ghamish
- 6- Keche (felt)
- 7- Dorlogh Yakha
- 8- Bil youp
- 9- Düzi
- 10- Bash Youp

- 11- Erghen
- 12- Chouchi
- 13- Tarp yapar
- 14- Toynok poup

The frame of door

The door consists of a two leaf frame that is usually made by skilled local carpenters with special designs and ornaments. The lower and upper parts are called "Isteg" and the two sides are Tarim, which are fastened by "Sooyeh". Usually the door of bower is placed opposite of the wind and rain direction, toward the south. This would also prevent direct shining of the sun in the $O\ddot{y}$, and meanwhile preserve the $O\ddot{y}$ from northern, western and eastern winds.

Tarin

Each bower has four *Tarims*, which their connection to each other creates the cylinder with 2- 2.5 meter angle. The height of *Tarims* is about 1.70 meters. *Tarims* are constructed in the form of a net with crossed woods. The length of each Tarim is about 2 meters; these woods are fastened and fixed to each other by dried and softened skin of the camel in the place of joint; of course nowadays this has become nearly impossible and they are fastened by ordinary string or ropes.

Ogh

Oghs are the bow-shaped woods that are used for connecting Toynoks and Tarims. Their approximate length is about 3.30 meters and depending on using large or small size Oghs, about 40- 60 Oghs are used in each ogh.

Toynok

Toynok is placed in the upper part of the frame dome of the $O\ddot{y}$, which is made from circle-shaped woods and a collection of bow-shaped woods comprised its centre.

Toynok Youp

It is a rope that is hanged from the *Toynok*. When the bower is attacked or became the target of storm, the Turkmen man using this to prevent the bower from being destructed and disintegrated. Sometimes this is done by tying and binding a heavy thing such as a sack of flour or etc to it.

Ghamish

Ghamish is the same as reed; Turkmen women cut these Ghamishes in suitable size, split and prepare them in a thin form. After being prepared, Ghamishes are connected and bound with a string. Now, it is possible to make them in the form of a pipe. Ghamish has three sections; one section is placed behind the Oÿ and is named "Got Ghamish" and the two other sections are placed at its sides. In summer, Turkmen remove the Göt Ghamish to allow the wind enters the Oÿ.

Keche (felt)

Keche is used for covering the frame and skeleton of the bower and is prepared by Turkmen women and girls from the wools of sheep during some days. To cover the bower three types of felt are used as follows:

- a) *Dorlegh:* It is constructed from four rectangle-shaped parts and used for covering the *Tarims*. It covers all rounds of the bower.
- **b)** *Ozuk:* They are two trapezoid-shaped felt that cover the *Oghs*.

Dorlegh and Ozuk are made from ropes, so when they are put on the bower, they are bound and fastened to the frame by the rope.

c) Serfek or Serpek: serpek has a circular shape and has a diameter of about 2 meters that cover the Toynok, also the brim of Serpek is rope-made but it is usually bound with some pieces of these ropes to the frame and skeleton of the bower and other ropes are left free. Thus, whenever they want, they can push half of the Serpek aside to send the fireplace smoke out of the bower or to let the sun light shines inside the bower. One of the advantages of covering a bower by felt is preventing the heat loss and entering the cold weather inside, as well as stopping the humidity and damp.

Dorlogh Yakha (Yagha)

When *Tarims* are put together and the circle shape of bower was complete and *Tarims* were connected together, a piece of colorful woolen ribbon that is woven by women with the width of about 30 centimeters and a length of equal to the size of bower, called *Dorlogh Yagha*, is bound all around the *Tarims* for their firmness.

Bil Youp

Another colorful woolen ribbon that is thinner than *Dorlogh Yakha*, called "bil Youp" is bound a few centimeters upper *Dorlogh Yagha* for more firmness of the *Tarims*.

Düzi

All around of *Ogh's* bowers are bound each other with the thin knitting ribbon, called "*Düzi*", to prevent its dislocation. *Düzi* is prepared from the wool of sheep and by skill of Turkmen women and girls.

Bash Youp

A thin cotton ribbon prepared by Turkmen women and girls is used to bind *Oghs* in the place of joint to the *Tarim*. In this way, the frame will be established.

Erghen

It is a thick rope used for keeping the bower stable and constant against winds and storms. To this end, the rope (*Erghen*) is hanged behind *oÿ* from both sides and its two ends are connected to the wooden pegs, "*Chouchi*", which are hammered to the ground. *Chouchi*

They are two wooden pegs, which are hammered at the sides of the bower and are connect each other with a rope, called *Oghen*. This would protect bower against winds and storms.

Tarp Yapar

It is a felt placed on the bower in winter or in the cold days, when the weather is temperate, the *Tarp Yapar* is rolled on the top of the door.

3. The inside view of a bower

The inside space of the $o\ddot{y}$ is in the form of a big circle that is like a building with some rooms. However, it does not have separated parts but each part of the interior space is used for a special task and has a particular application.

- a) The front section near the entrance door is the place of put the shoes off.
- b) In the centre of the Oÿ with a little inclination to the front part, there is a fireplace that is distinguished by the mud wall.
- c) In the left side of the entrance door, there is a place, called "Chali", to store the provisions, foodstuffs, and milk and producing cheese and butter. Logoshva, in the book of "Iran's Turkmen", called this place "Ash Bouri" that 'is the place of producing food (Logoshva et al, 1982).
- d) When one enters a tent or bower, there is a frame in the left side, called "Beverte Lar", where quilt and mattress are put on it and also the large leathern bottle of oils are put on it.
- e) The partition between "Beverte Lar" and fireplace is the place of women and girls' sitting.
- f) In the right side of the door is the place of keeping the newborn lambs and kids that is separated from other parts by a mat. Logoshva in his book "Iran's Turkmens" named this part as "Ashligh Bouri" and wrote this part is for men and at that place grains, flour and so on are kept there.
- g) The right part of the fireplace is called "Ojagh Bash" and is the place of receiving guests.
- h) The back part of the fireplace is the place of sitting men and guests.
- i) And finally, the end part of the tent or bower is named "Vib" and is the sleeping place of the family members. In big families "Vib" is separated to some parts by a curtain that is called "Tott".

4. The stages of establishing or standing up a bower

Standing up a bower is the duty of women but men help them. Sometimes the neighbor women help each other and do this work (Moeen, 1955). After determining a propitious and lucky day, they select a suitable ground that is a little higher than other parts for standing up the bower. When these things were done, some air shooting were done that means

informing happiness and starting the new life. After preparation of the ground, at first they put and installed the frame in the ground, and first put the lower parts of the frame in the ground. Then, the sides that are related to the frame are put in their place and its upper parts will be installed, and firmly are bound the frame of door by the rope. Then *Tarims* are placed in two sides of the door and are firmly bound to the frame of door. Also, four pieces of *Tarims* are bound together and create a cylinder with 2-2.5 meters angle. The height of *Tarim* is about 1.7 meters.

After formation this cylinder, they bind the surrounding by Dorlogh Yagha that is a woven woolen ribbon and its width is about 30 centimeters and bind another ribbon a little upper that is thinner and is called Bil Youp. Then, the Oghs are connected to the Tarims and Toynok. Oghs are some bowshaped woods that are jointed to the intersection of Tarims on the one end and connected to the holes of Toynok on the other end. Toynok is the upper part of the oÿ's frame dome and has a circular shape, with many holes around it. In this stage, men help women. One man hold the Toynok by a wooden beam in the centre of the bower and women connect the Oghs to the Toynok and bind this junction with a string. Also, they bind the Oghs by another thin ribbon that is called *Düzi* to prevent its motion.

At this time, the first step that is constructing the frame and skeleton of the bower that looks like a big cage is finished. Then, the frame is covered with some felts with different names.

The first felt is *Dorlogh* that is wound around the *Tarim*. The second one is *Ozuk* that consists of two trapezoid parts and cover the *Ogh* parts. The third one is *Serpek* with a circular shape that covers *Toynok*. Then, these felts are bound firmly to the frame of the bower with the ropes, which are placed in them. After putting these felts, Turkmen cover all around the bower by a piece of mat that is called "*Ghamish*".

In this way, standing up a bower will finish. Before covering inside of the bower with carpets, they cover the floor with a type of grass, *Gholder ghen*, that is frequent in the desert and prevents penetration of moisture.

Removing and closing down the bower is easier than its standing up, and is exactly reverse of the works done for its standing up.

Some mores of standing up a bower

Turkmens have special mores at the time of standing up a bower. Usually standing up a bower is the women's duty and its repairing and mending is of men's duty. When everything is ready for standing up a bower, some air shooting were done that means informing happiness for starting the new life.

After standing up the wooden frame "Oÿ", they connect a rope to the "Toynok" that hang from it, called "toynok Youp". They bind a handkerchief that contains some money to the upper part of the rope. Turkmen's youth try to take the money. That money is named "Baylegh" (Goli, 1986). After standing up an "Oÿ", its owner sacrifices a sheep and makes a delicious food with it that is named "Chekderme" and gives it to people.

Another mores of Turkmens is that if a person is died in the $O\ddot{y}$, the remaining members of his family change the place of $O\ddot{y}$.

The oldest woman of the family connects the felt of "serpek" to "toynok". The Oÿ

that a father gives to his son usually is stood up in the right side of the father's $O\ddot{y}$. This case is returned to this fact that the elder son is the right hand of his father in life matters (Taghavi, 2009).

Turkmens try to stand up an $O\ddot{y}$ in a good and lucky day. And in this case, they asked from their local and neighbor clergy man. Some Turkmens believe that the seventh day of each month is good and suitable for standing up an $O\ddot{y}$ (Kamali et al, 1995).

5. The main reasons of using bower

The climate specifications, finding a new Yourt for animals grazing, made Turkmens busy during several centuries. They had agricultural and animal husbandry life, each of which was done in a different place; agriculture was done at the side of rivers and in the following months they forced to migrate to other places for finding good pastures for their animals. In fact they always migrated to find good and suitable pastures. In such conditions, they had to make homes with light components and easy standing up and closing down. Since Turkmens were dependent on the animal husbandry economy, and because of their constant movement and migration, and also to meet social and economical needs and fitness to natural conditions or finding fertile pastures, it was necessary for them to use some houses called "bower" and sometimes by gathering some bowers, a village (Obeh) was formed (Nadimi, 2008).

Among the other reasons for using *Oÿs*, we can point to the following:

- a) It is resistant against wind, storm and earthquake such that even if a bower is overturned, no family member will be injured.
- b) Its standing up, closing down, and carrying is easy and will be done quickly.
- c) Facilities, conditions, and necessary things for its preparation and construction existed in the area abundantly and most of the required equipments are prepared from bestial products and ranchmen that are easily accessible at little costs.

d) Easy ventilation of the air inside the bower in hot or cold weather.

One of the basic needs of each human being to survive is house. The house has so many varieties among different tribes. Because of their tribal and nomadic life conditions to find new pastures, Turkmen tribes in Iran's Turkmen Sahara use a kind of house that is called "Bower". Choosing this type of house has particular benefits. Bower has different types that are used according to the duration of stay in one area; if the staying is for a short time, they use simple kinds of the bower and proportional to the duration of the stay, it will be complicated. For standing up a bower, different tools are used, most of which are constructed from Turkmens' bestial products and are hard, firm, light and inexpensive. One of the main benefits of bower is its apparent and external form that is made in a manner that prevents entering the wind and rain and is resistant against storms.

Turkmens have special mores and customs in standing up a bower; some of them include: shooting some air shoots, hanging a handkerchief that contains money, sacrificing a sheep, changing the place of bower after the death of a family member, standing up a bower in a good and lucky day, performing the dirk dance and so on.

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Turkmens' History

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Abstract: Getting acquaintance with background and history of different tribes is so attractive and can learn some lessons from it to achieve life aims. Turkmen tribe has one of the most attractive historical background that in this assay it is tried to investigate about this by reference to the books and works that describe Turkmen's history, generally Turkmens' history is divided to two parts. One is the mythical and fabulous period of Turkmens that considered the pedigree of this tribe from Adam to Oghuz Khan, who is the common ancestor of all Turkmens, and the second historical period is divided to three periods of nomadism, migration to Turkmenistan and Iran's Turkmen Sahara and the period after formal delimitation between Iran and Russia, Turkmens' condition in each of these periods is considered and turned into the today geographical condition. Generally Turkmens don't have a very unsuitable condition during the history and they were migrating constantly.

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1. Introduction

Turkmens are a group of yellow-skinned people of Middle Asia that for some natural and social reasons rushed toward the south, this group was reside in Turkmenistan and Iran's Turkmen Sahara and also some of them lived in Afghanistan, China, Iraq and Turkey (Irons, 1982).

Undoubtedly each tribe or family has a pedigree and one of the most important aims of anthropology, is recognition of origin and pedigree of different tribes.

Turkmen tribe as one of the most attractive tribes in the world has a historical background that in this essay it is tried to consider and study the history of this tribe by reference to the existed documents in the libraries.

Turkmens' background

About nine centuries before the birth of Christ Turks lived in Turkistan, west of China, south of Mongolia, north of Caspian Sea, and the old Iran, they established a big empire that was named "Goug Turks" and its place was in "Arkhoon", their first ruler was named "Bomin". Later Turks were divided to two groups, the western Turks and eastern Turks (552 A.D.) then they united each other and create the greatest empire in the Asia's history and in some of the Islam's histories named them as Yäjün. Mäjün. Khezrs, Sakaes and etc, the western Turks were named as Huns, and Bejnaks and the eastern Turks were named Tafghaes, Bashgirds and thousands other named. The eastern Turks were divided to some groups such as Oguzes, Ghare Ghalbaghs, Ouzes, Cossacks, Uzbeks, Kirghizia, and Tatars. The present Turkmens are from eastern Oquzes and Azerbaijan's Turks are from western Turks, in the first Islamic

centuries some of these Turks came down from the south of Mongolia and west of china toward the south this immigrant group of Turks were Oquzes or Quzes that later were named "Turkmen" and because of rough and abnormal nature of Sin city and ruination of Amu Darya river and Syr Darya, Ghare Ghom, Ghezel Ghom, and Dast Ghobchagh region, they stayed near the Turkmenistan and current Turkmen Sahara in Iran. Nowadays they live in the north of Khorasan in Iran, in the plain of Turkmen Sahara, a wide area of Turkmenistan's land, a large part of Afghanistan and China's land (Ahmadi, 1996).

In the year 630 A.D. eastern Turks and in the year 659 the western Turks were governed by Chinese but after a short period, in 630 A.D. "Ghotlogh Khan" from Bomin's generation established Turks' government again. At last Goug Turk's governorship was overturned in 754 A.D. by Oyguz Khan (Kalteh, 1995).

Some historians believe that Oguzes are ancestors of all these Turks: Oguz, Oiguz, Onagh, Gharlogh (Ghaznavids are from this tribe), Ghotlogh, Gheimagh, Kirghizia, Khataiee, Tatar, Turkmen, Uzbek, Seljuk, Ghare Ghoyenlou, Safari, Afshar, and Qajar (Lokashva, 1978).

Oguzes resided in Tola (Toghla) coasts in the part of the river that was directly toward the North, in petrographs Oguzes is introduced a tribe that lived in the north. Their eastern neighbor was Tatars. Since they consisted of 4 tribes they were named Toghuz Oghuz (9 Oghuz), from these 9 tribes only the name of two tribes, with names of Ghuni and Tongra tribes, is available.

Oguzes were a tribe of 9 Toghuz tribes of area, and they form a main part of eastern Turk's

union and in Urkhon's inscription they were named oguzes, it is written in Hodood-ol-Alam book that "kings of all the old Turkistan were from Toguz Guz, and Toguz Guzes had close relationships with Oighuzes. Of course some historians believed that Toguz Oguz and ün Oiguz is one tribe and it is surprising that Oguz Khan's tribe that lived in Tola coasts and consists 9 groups and accepted allegiance of Khaghan, was distinguished from Oiguzes who lived in Silenka coasts and consisted of ten groups and were ruled by governors with the title of Ill Teber. Undoubtedly they were two distinct tribes (Sarly, 1998).

In the second century A.H. the Oguzes union migrtated from the centre of eastern Turks, Urkhon area, to the west till the Aral and Syr Darya and in their way reach to Jeihoon, Ghare Ghom and Dehestan plains (in Caspian shores), in later half of 4th century A.D. the phrase of Turkmen was used in Islamic sources. Moghdas talked about two places in Transoxiana as the defensive matters against Turkmens. As it is written by Turkmen's history compiler; in one inscription of Yeni Seie that belongs to the seventh century A.D. we see the word "Quz" (Guz) for the first time. It is indicated from this inscription that Ouzes at first lived in the coast of "Balk River" and consisted of six tribes. Then in the second half of that century they migrated to the coast of Tola River, in that area they consisted of nine tribes or families. The leader of "Toguz Guz" was "Alp Tooran" that died when he was 23 years old, then Guzes were divided to two "Ouj ugh" and "Bozavegh" tribes and 24 family, and Oguz Khan was their leader. Oguz Khan has 24 son and they are all the today Turkmens. Each family has a special title and OguzKhan conquered the west areas. Turkestan, Damascus and Egypt and after adding these areas to his country came back to "Yourt", his main domain in "urtagh" and "Kertagh" and divided his bow and arrow between them, the sons of his generation who took bow from him titled "Bouzagh" that means tear and the right side of army entrusted to them and the children that were born from the generation who had taken arrow were named "uch ough" or (three arrows) and took the left side of the army. After the death of Oguz Khan one of his boys by the name of "Gun Khan" became ruler and he had a wise minister who was named "Ikit Erghil Khoje" and one day this minister said to Gun Khan, in order to avoid taking place hostility among your children for your properties, give each of them a "Tamgha" and appoint a "animal" for each of them that be their "Onghoun", that is derived from the word of "Inagh" or blessed and they must not persecute the "Onghun" (Iry, 2005).

Oguzes were very hospitable as Ebn e Fazlan said; "if a person come to a Turk man that doesn't know him and said to him I'm your guest and I want something like camel and beasts and your money, he gives it to him".

Each of these 24 Oguz families had one "Totam" that all of them were a kind of a bird of prey: Royal falcon, eagle, Tavshanjil (a kind of eagle), Senghur (a kind of hawk), each of these 24 family has a "Tamghay" (a particular sign and mark for themselves) and also families know an "Onghun" for themselves, that was respectable for all the families the meat of these Onghuns wasn't eaten and they were known as the sign of consecration and good luck (Barthold, 1996).

2. Tribal history of Turkmens

Renovation of Turkmens' history is very difficult, "Abolfazl Bahador Khan, 1097" the Khan of Khiveh in 11th century wrote a book about Turkmen's pedigree. According to the verbal and genealogical sources, Turkmens lived in the north of "Ishligh Gol" lake about six thousand years ago (Boogoliopf, 1979).

The sources show that Turkmens belonged to the north of Mongolia. Most of historians believed that Turkmens migrated from east. They lived near Syr Darya in six century A.D. and later migrated to the southern parts of Amu Darya and Marv. Generally Turkmens' history can be divided to two periods: 1-mythical or fabulous, 2- historical, that here is pointed to them briefly.

The mythical and fabulous period of Turkmens

According to the verbal and genealogical sources, it is possible to describe Turkmens' history from the beginning of their creation till now (Kamali, 1984): His holiness Adam was the first human being in the earth. After him "Sheith" his oldest son, was his successor. He lived about 912 years old. After him his child "Anoush" became ruler and prophet. Then "Ghinan" who lived about 840 years old and was Anoush's child undertook the leadership and prophethood. "Mahlaieel" the child of "Ghinan" became his father's successor. He lived about 920 vears old and at his time Adam's children were increased and were scattered in a wide area. He lived in "soor" in Babylon, at that time people lived in mountains and forests. "Mahlaieel" asked them to construct villages and cities and do agriculture. Then people started to plant wheat and barley. After him boy "Edris" undertook leadership and prophethood, and after him his boy "Akhnoush", who lived for 980 years old, became prophet. He knew the medical science and invite people to worship of God and theism. Then "Motoshlekh" his child become his successor. After him "Lamegh" his son and after him

his holiness "Nooh" the son of Lamegh undertook people's leadership. As it is mentioned in "Jame-ol-Tavarikh", his holiness Nooh became prophet when he was 250 years old but most of his people didn't believe him and the unique god. During 700 years only 80 peoples believed him. He asked the God to annihilate his people. The God agreed him and annihilate them through a violent storm and flood, Nooh and his followers and a couple of each animal were saved by a very big ship. His holiness Nooh had three boys by the names of "Yafeth", "Sam" and "Ham". Yafeth is the common ancestor of Turks and Yellow-skinned who lived in the north. "Sam" who lived in Middle East is the ancestor of Iranian a Arabs and "Ham" who lived in India, is the ancestor of Negroes. Therefore, these three brothers are the common ancestors of all of the today peoples. Probably "Yafeth" was prophet and lived in nomadic manner. He spent summers in "Ortagh" and "Kertagh" which are high mountains and also in "Inanj" city (in Mongolia) and winters went to "Orsough", "Ghaighan" and "Ghare Ghom" in Mongolia. He has seven boys that one of them was named "Turk" and he is the ancestor of all the Turks. "Turk" had four boys. "Totak" one of his boys had a child by the name of "Ilje Khan". Also "Dib Baghoy Khan", his son, was the father of "Goog Khan". He has a boy who was named "Alinje Khan" who had two boys with the names of "Mongol" and "Tatar" that are the ancestors of Mongols (yellowskinned) and Tatars respectively. "Mongol" had four boys with the names of "Ghara Khan", "Avor Khan", "Gor Khan" and "Guz Khan". "Ghara khan" owned a boy by the name of "Oguz Khan" who became the common ancestor of Turkmens. Turkmens' pedigree from the beginning of their creation till Oguz khan is in this order.

Oguz had six boys with the names of "Gun", "Aye", "Yilduz", "Gog", "Dagh" and "Dangar". He came back to his main land, "Ortagh" and "Kertagh", after conquering Iran, Turkestan, Damascus, Egypt, Rome and Europe. After death of Oguz, his old boy became his successor. The Gooklan families are from his, and "Aye Khan" and "Yilduz Khan", two other boys of Oguz generation.

It is necessary to mention that just pedigree of "Gun Khan" is available among Turkmens, which of course it is incomplete and defective. Turkmens believed that two groups of Turkmens who reach to kingdom and monarchy place, it means Seljukian and Ghaznavid, were from "Gun khan" generation.

Gun Khan started to renew the nickname and seal and sign of each of his and his brothers' children. Each of the Oguzed children had four boys that totally their number reached to twenty four persons. Turkmens believe that the basis of Turkmen tribes is from these 24 nephews. In any case, "Gun Khan" determined an animal for each of these 24 persons to be their Onghon. Also he determined that in the ceremonies the meat of which part is the share of which of these twenty four persons and their children in order to prevent their Quarrel at the time of eating pottage. Other tribes of Turkmen are from the other children of Oguz Khan. "Dagh Khan", one of the young boys of Oguz, is the common ancestor of the majority of Turkmen tribes such as: "Teke", "Sarigh", "Yamoot", "Salour", "Ersay" "Yemerli", "Imer" and "Ale Younli".

3. The historical period of Turkmens (Taghavi, 2009)

Turkmens' historical period is divided to three periods:

- a) Nomadic period
- b) The period of migration to Turkmenistan and Turkmen Sahara
- c) The period after formal delimitation between Iran and Russia

The nomadic period:

This period is started from the beginning of Turkmens' migration and lasted to their entering to Turkmenistan and Turkmen Sahara of Iran. There isn't exact information about this period. Also they were forced to migrate and change their living place like Mongos and other groups who were resident in Mongolia's Sahara and Middle East. The life of all these tribes in this period depended on herbivorous animals. In this type life two factors were very important. One is the weather and another is pastures, and each group that had the better posture exposed to the attacks of other groups. In this period Turkmens attack to other groups and possessed their postures. and took their wives and children to captivity and sent the men captives to the slave selling bazaars in Bokhara and Khiveh. The competition for postures caused Turkmens gradually went to the west and in the sixth century A.D. moved to the neighbor of Syr Darva and in tenth and eleventh centuries to the neighbor of Amu Darya and Marv.

The period of migration to Turkmenistan and Turkmen Sahara:

Barthold, 1962, says; the primary historical application of Turkmen phrase that existed in geography books is related to the second half of the tenth century A.D. It is written in this book that Turkmens lived in border of the lands that Islam had in Middle Asia, near a city by the title of "Isfijab" that probably is located near the Siram city in 125 kilometers distance to Tashkand.

Turkmens of besides the Caspian Sea, Khanat of Bokhara and Afghanistan have common ancestors. They consist about 70 percent of the people in this area. Turkmens are divided to some main groups that each group is consisted of several subgroups. According to Bahador Khan's opinion. Salors leaved their living place after a long time war with "Bejne" Turkmens. Later they went to Amu Darva and Marve regions with their leader "Enkhesh". Later the grandchildren's of "Enkhesh" established the tribal life of "Yamout" and "sarigh" Turkmens in eleventh century A.D. Turkmens never resided in one place but always fought with their neighbors and extended their lands. When Salors resided in the east north of Khorasan, "Oghurjik" was their leader. He was the common ancestor of Yamouts. Oghurjic was forced to go to the "Shamakhi" with 1000 tents and from there go to "Krime" and "Oral", meanwhile he transferred some of his tents to "Mengheshlagh" and "Abolkhan". The region that today Turkmens lived there belonged to the Iranian tribes before Islam and Abbassides and Arabs before the eleventh century A.D.

According to Logoshva (1959) Turkmen tribes were created with their particular specifications in fourteen and fifteenth centuries A.D., from the union of Turkmen Tribes that migrated in the north of Turkmenistan, "Uset yourt" and "Mengheshlagh". These tribes mixed each other in thirteenth and fourteenth centuries A.D. and caused disappearance of tribal disputes. They attracted some of the other immigrants to each other Seljukian who were Turkmen, resides in Marv in eleventh century A.D., at that time this city had so many progresses and attained a universal fame but Mongols conquered and destroyed it. This city conquered by Safavids later in sixteenth and eighteenth centuries A.D.

Turkmen tribes scattered in a wide area in sixteenth century A.D. Khorasan's Salors lived in Balkans. Most of Yamouts, Salors, Tekehs and Sarighs lived in the coastal regions of "Sari Ghemish" in the southern part of "Oset Yourth". coasts of "Ghare Boghaz" and "Caspian Sea" until "Mengheshlagh". Chodours, Ighdirs, and Ibdals lived in the northern parts in Uzbek's neighborhood. Also they lived in "Uzboy" coasts in the east north of Khorasan and "Kopet Dagh" slopes. Turkmens gradually scattered in Iran in sixteenth century. At this time "Tekes" lived in the north of Khorasan and Turkmen Sahara. Turkmens' migration to the north of Khorasan and "Kopet Dagh" slopes increased because of torments by Khans of Khive and Ghalmigh's feudalists.

Consequently, Yamouts of "Mengheshlagh" migrated to Kharazm and desert coasts of Caspian Sea and the coasts of Atrak river in IIran. Also Salors went to the "Bolton" in the south of Marv and some of the Turkmen tribes went to Afghanistan.

Turkmens' migration is continued in seventeenth and early eighteenth century, at this time Turkmens of Álghe Oily", "Imer", "Teke", and "Yamout" were resident in "Akhal" and "Niki Ghaleë" in Khorasan. Also some groups of Teke family lived in "Zaghchekend". "Bayat" Turkmens lived in Neyshabour and "Imagh" Turkmens lived in "Marv Chekend" and Sarakhs. "Yamout" Turkmens also migrated to the north of Khorasan and they were supported by Tatars (Rabeë, 1979).

Turkmens resided also in "Tajan", "Bateni" and the coasts of Atrak River. Nader Shah Afshar attacked to Khive and occupied it in Eighteenth century A.D., he banished "Tekeh" and "Yamout" Turkmens to Khorasan. Other Turkmens stayed in the north and scattered among "Mengheshkagh" and "Amu Darva". Also Nader Shah forced Yamout Turkmens to migrate to the coastal region of "Ester Abad" (Gorgan). He conquered the Khanan of Bokhara and Khiveh so a big group of Yamout Turkmens were forced to migrate to the coastal region of Caspian Sea and Gorgan Gulf and started to remonstration and revolt there, and was crushed again. Consequently a group of them were banished and another group ran away to the out of reach areas. At this time another groups of Yamout Turkmens who lived in Khiveh were forced to migrate to Gorgan.

After the death of Nader Shah, Khans of Bokhara conquered Marv, and ruined it and transferred its people to Bokhara. So the Marv City destructed completely and turned to a place for criminals in nineteenth century.

Therefore Turkmens searched for suitable land that has widespread and abundant postures and water, they fight other groups to find such a land and changed their living place for whole the nineteenth century. This condition is continued till Russia government suppressed and crushed them and finally in 1881 the Russia army, with leadership of General Eskoilof, crushed the resistance of Teke Turkmens and in 1885 all of the Turkmenistan region conquered with Russia and Turkmens were forced to live under their rule and control.

The period after formal delimitation between Iran and Russia:

Political progresses caused formal delimitation and border determining between two countries of Iran and Russia. In this way, the Turkmens' movement between Iran and Russia is prevented. Consequently, most of the Turkmens resided in Turkmenistan of Russia and the remaining resided in Turkmen Sahara of Iran and Afghanistan and some in Iraq and Turkey and China. The formal contract of delimitation between Iran and Russia was signed between two countries in December of 1881

and Turkmens' going back and forth and migration from Turkmenistan to Iran and vice versa was forbidden, and at last the Turkmens, from life condition and geographical viewpoint, resided in Turkmenistan, Turkmen Sahara of Iran and some of them in Afghanistan, Iraq and China, and this condition is also kept at this time.

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Biology of the Hairy Mangrove Crab, Sersema Huzardii (Decapoda: Graspidae) from a Tropical Estuarine Lagoon.

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Abstract:The size composition, growth pattern, food habits, reproductive biology and feedstuff preferences of the mangrove crab, *Sesarma huzardii* in a tropical estuarine lagoon were investigated. The carapace length ranged from 1.5cm to 4.7cm and weight from 4.5g to 27.8g. The crab exhibited negative allometric growth. The condition factor ranged between 3.6 and 13.5 and decreased with size. The crabs fed mainly on diatoms, algae, higher plants and insect parts. The sex ratio was 1: 0.6 (male/female) which was significantly different from the expected 1:1 ratio. The fecundity ranged between 1.2 and 3.5 million eggs. The average fecundity was 2.5million eggs. Egg diameter ranged from 0.21 to 0.33mm with a mean diameter of 0.24mm. The crab had the highest gain in weight when fed with white mangrove leaves and least with animal food.

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Keywords: Mangrove crab, growth, feeding habits, reproductive biology

Introduction

Crabs occur commonly in West Africa and are a major food items caught in the marine, coastal and lagoon fishery. Their distribution has been documented by FAO (1992). The biology and ecology of the economically important crabs have been documented by Kwei (1978), Okafor (1988), Anetekhai *et. al.* (1994), Chindah *et. al.* (2000), Lawal-Are and Kusemiju (2000), Akin-Oriola *et. al.* (2005), Lawal-Are (2009, 2010).

The mangrove crabs (Sesarmidae) are the dominant species of crabs in the mangrove swamps. They live beneath drift and high-tide mark in the estuaries and lagoons (Cannicci *et. al.*, 1995). They are amphibious in habit and can be found round intertidal areas with moist/wet muddier regions of the mangrove (Gillikin, 2004). Mangrove ecosystems fringe tropical and sub-tropical coastlines throughout the world and function as nurseries for a wide variety of vertebrate and invertebrate marine species (Olafasson *et. al.*, 2002).

The mangrove crab inhabited a large area of mangrove swamps in Lagos Lagoon, a tropical estuarine lagoon. Such areas have however been subjected to reclamation for housing and road construction and deforestation for domestic firewood leading to diminishing of available space for these crabs.

While the mangrove crab does not constitute a food item for the coastal communities, it has played ecological role in the mangrove ecosystem where it

has helped to clean up the mangrove areas by its feeding habits on the fallen leaves (Dahdouh-Guebas *et. al.*, 1999; Olafsson *et. al.*, 2002).

The aim of this study is to provide baseline data on the biology of the hairy mangrove crab (*Sersama huzardii*) in the Lagos Lagoon mangrove swamps with particular emphasis on the size composition, growth pattern, food habits, reproductive biology and feedstuff preferences.

Materials And Methods

The Lagos Lagoon is located between latitudes 6° 26'N and 6° 39'N and longitude 3° 29'E and 3° 50'E (Fig. 1). The study was carried out between February and July 2006 and covered both the dry and rainy seasons. Specimens of mangrove crabs were collected from University of Lagos (Yaba) lagoon front and two other stations where the mangrove swamps/forests are still preserved (Fig. 1.).

The crabs were collected with hand and hand net on weekly basis at each station between 1000 and 1200 hrs. The crabs were immediately preserved in an ice-chest with ice-blocks and later transferred into a deep freezer (-20°C) in the laboratory prior to analysis. A total of 600 crabs were studied.

Sex was determined using the method described by Kwei (1978).

The carapace length (CL) of the crab was measured from the edge of the frontal region to the tip of the carapace backwall using a 0.05cm precision

Venier caliper, while the carapace width (CW) was measured from the tip of the 4th dorsal spine from left to right. The total weight of the crab was taken to the nearest tenth of a gram on a Sartorius top loading balance (Model 1106).

The carapace-length/weight relationship was expressed by

Log W = Log a + b Log L (Parsons, 1988) where W = weight of crab in g, L = carapace length in cm, a = regression constant and b = regression coefficient.

The condition factor (K) of the crab was determined using the formula:

$$K = \frac{100W}{L^b}$$

(Bannister, 1976)

where W = weight of the crab in g, L = carapace length in cm, b = regression co-efficient.

For the food analysis, the cardiac stomach of each specimen was dissected out and the contents examined under a binocular microscope. The food analysis was by the numerical and the frequency of occurrence methods (Kwei, 1978, Hyslop, 1980).

Fecundity was estimated by the gravimetric method (Bagenal, 1978; Kwei, 1978). The egg diameter was measured using a calibrated eye piece micrometer.

For the feed experiment, the mangrove crabs were fed feedstuffs in aquarium tanks. The feedstuffs included Tilapia, fluted pumpkins (*Telferia sp*), mangrove grass (*Paspalum sp*), red mangrove leaves (*Rhizophora sp*), hermit crab (*Clibanarius sp*), white mangrove leaves (*Avicennia sp*), green amaranth (*Amaranthus sp*), water leaf (*Talinum sp*), while in the control tank the crabs were fed with mixture of the eight feedstuffs. The crabs were fed 5% of their body weight. The experiment lasted 12 weeks.

RESULTS

Size composition and growth pattern

A total of 600 crabs were obtained from the mangrove swamps. The carapace length ranged from 1.5cm to 4.7cm (carapace width 1.0 cm - 4.5 cm) and weight from 4.5g to 27.8g. The size frequency distribution is given in Fig.2. The crabs exhibited a unimodal size distribution and were of the same agegroup in the first year of life.

The length/weight relationship of *S. huzardii* showed no linear relationship between the length and the weight of the crabs (Fig.3.). The length/weight relationship values for the male, female and combined sexes were given as follows:

For Male:

Log W= Log
$$0.6327 + 1.0069$$
 Log L
 $(n = 384, r = 0.3063)$

For Female

$$Log W = Log 0.5826 + 1.0768 Log L$$

(n = 216, r = 0.3460)

For combined sexes

Log W = Log
$$0.6125 + 1.0430 \text{ Log L}$$

(n = 600, r = 0.3249)

The values of b, the regression coefficient were 1.0069, 1.0768 and 1.0431 for the males, females and combined sexes which showed that the mangrove crabs exhibited a very low negative allometric growth.

The correlation coefficient (r) was 0.3063 for the males, 0.3460 for females and 0.3460 for combined sexes which showed a very low correlation between the carapace length and weight in *S. huzardii*

The condition factor (K) which indicated the state or overall well-being of the crab is given in Table 1. The K- values ranged between 3.6 and 13.5 and decreased with increase in size of the crabs.

Food Habits

600 specimens of *S. huzardii* were examined for food and feeding habits. 56 (18.7%) of the crabs had empty stomachs. The summary of the stomach contents is given in Table 2. The stomach contents consisted mainly of plant materials, algae, diatoms, insect parts and unidentified mass. The plant materials formed the most important food item occurring in 96.3% of the mangrove crabs examined. Diatoms and algae occurred in 86.4% and 90.4% of the stomachs.

Reproductive Biology

Sex ratio of the 600 crabs obtained from the mangrove swamps, 382 were males and 218 were females giving a sex ratio of 1:0:6. A chi-square (χ^2) test indicated that this ratio was significantly (P<0.05) different from the expected 1:1 ratio.

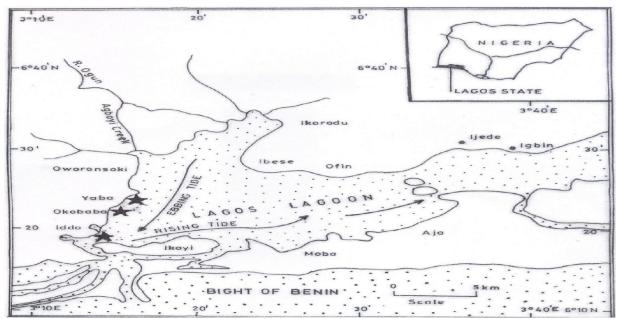


Figure 1: Lagos Lagoon showing sampling sites.

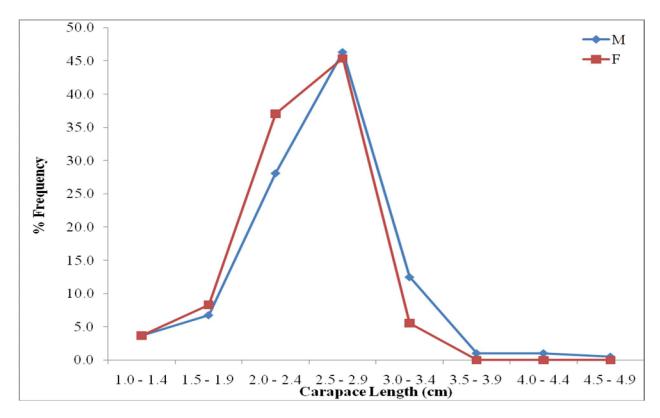


Figure 2. Carapace length frequency distribution of Sesarma huzardii from Lagos Lagoon mangrove swamps.

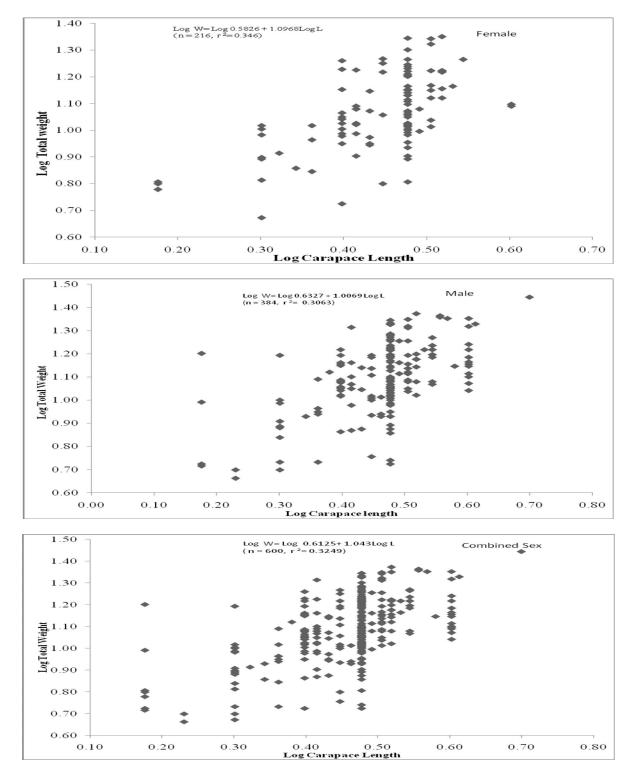


Fig.ure 3. Log length / Log weight relationship of Sesarma huzardii from mangrove swamps of Lagos Lagoon.

Table 1. Condition factor (K) by sex and size of Sesarma huzardii from mangrove swamps of Lagos Lagoon.

Carapace Length	Male				Femal	e			Combin	ned Se	X	
(cm)	N	CL	WT	K	N	CL	WT	K	N	CL	WT	K
1.0 - 1.4	14	1.1	1.8	13.5	8	1.1	1.7	12.8	22	1.1	1.8	13.1
1.5 - 1.9	26	1.7	5.4	11.0	18	1.6	5.1	12.5	44	1.7	5.3	11.7
2.0 - 2.4	108	2.2	10.9	10.2	80	2.1	10.6	11.4	188	2.2	10.8	10.8
2.5 - 2.9	178	2.6	16.4	9.3	98	2.6	15.1	8.6	276	2.6	15.8	9.0
3.0 - 3.4	48	3.0	18.9	7.0	12	3.0	17.3	6.4	60	3.0	18.1	6.7
3.5 - 3.9	4	3.5	24.6	5.7		-	-		4	3.5	24.6	5.7
4.0 - 4.4	4	4.0	28.5	4.5	-	-	-	-	4	4.0	28.5	4.5
4.5 - 4.9	2	4.5	32.8	3.6		-	-		2	4.5	32.8	3.6

Table 2. Summary of the stomach contents of Sesarma huzardii from the mangrove swamps of Lagos Lagoon.

	Numerical Method		Occurrence Method		
Stomach Contents	Number	%	Number	%	
Algae	9369	45.8	492	90.4	
Diatoms	10995	53.7	470	86.4	
Insect parts	104	0.5	90	16.5	
Plant materials	-	-	520	96.3	
Unidentified mass	-	-	484	89.0	

Table 3. Growth Performance of Sesarma huzardii fed on different feedstuffs.

				Red		White		
		Fluted	Mangrove	mangrove	Hermit	mangrove	Green	Water
	Tilapia	pumpkin	grass	leaves	crab	leaves	vegetable	leaf
No of crabs								
stocked	20	20	20	20	20	20	20	20
Mortality	6	2	0	0	2	0	2	3
Mean initial								
weight (g)	15.5	13.6	9.1	7	8	4.8	13.2	16.8
Mean final weight								
(g)	12.2	16.3	16.8	9.6	8.8	9.5	17	21
Mean increase in								
weight (g)	-3.3	2.7	7.7	2.6	0.8	4.7	3.8	4.2
% Weight gained	-21.3	19.9	84.6	37.1	10.0	97.9	28.8	25.0

Fecundity

Egg counts were made on the only ten mature female crabs (1.6 - 3.0cm carapace length, 17.2 32.2g weight) obtained during the study. The fecund females were obtained only during the month of February. The fecundity ranged from 1.2 to 3.5million eggs. The average fecundity was 2.5 million eggs.

The egg diameter ranged from 0.21 to 0.33mm. The average egg diameter was 0.24mm.

Feeding Experiment

A summary of the feedstuff experiment is given Table 3. The best growth in term of weight gained was obtained in the crabs fed with white mangrove leaves (97.9%) followed by mangrove grass (84.6%) and red mangrove leaves (37.1%). The least performance was obtained from tilapia (-21.3%) and hermit crab (10.0%).

In the control tank containing a mixture of all the feedstuffs, the crabs showed preference for the leaves compared to the animal food.

Discussion

The mangrove crab, *S. huzardii* examined in this study had carapace length of 1.5cm to 4.7cm and showed a unimodal size distribution. Unimodal size frequency was reported by Kwei (1978) for *C. latimanus* in two Ghanaian lagoons while Lawal-Are and Kusemiju (2000) documented it for *C. amnicola* in Badagry Lagoon. According to Kwei these results indicated that there was only one predominant generation of crabs sampled and the specimens belonged to the same year class in this case, in their first year of life.

S. huzardii from the mangrove swamps exhibited a highly negative allometric growth with b (correlation coefficient) values ranging between 1.0069 and 1.0768. Allometric growth in brachyuran crabs has been reported by Neville (1976), Hartnoll (1978), Oyenekan (1995), Lawal-Are and Kusemiju (2000).

The correlation coefficient (r) in the crabs (0.3063 for males, 0.3460 for females) was very low indicating that there was no linear relationship between length and weight in *S. huzardii*. This is contrary to very high correlation between length and weight reported by Kwei (1978) and Lawal-Are and Kusemiju (2000) for *Callinectes sp.*

The condition factor (K) for the mangrove crabs ranged from 3.1 to 18.8 and varied in relation to size of the crabs. Lawal-are and Kusemiju (2000) reported values of 5.67 to 9.97 for the blue crab, *Callinectes amnicola* in the adjacent Badagry Lagoon.

The crabs showed a carnivorous feeding habit as their stomach contents consisted of diatoms, algae, plant materials and insect parts. These were items commonly found in the mangrove swamps inhabited by the crab with the diatoms and algae coming in with the tidal water. Warner (1977) reported that crabs were opportunistic carnivore and this type of feeding was common in *Carcinus sp*, *Cancer pagurus* and *C. sapidus*. Lawal-Are (2009) reported that *C. amnicola* from the Lagos Lagoon was an opportunistic omnivore feeding mainly on fishes, crustaceans, molluscs, annelids and occasionally on plant materials.

The males were significantly more numerous than females. This differed from the nearly 1:1 ratio obtained for *C. amnicola* in the Lagos Lagoon by Lawal-Are (2010). Fecundity in *S. huzardii* was very high (1.2-3.5 million eggs). High fecundity has been reported in crab species. Kwei (1978) reported 1.9-2.8 million eggs in *C. latimanus* while Guillory *et. al.* (1996) documented mean fecundity of 3.2 million eggs for *C. sapidus*. According to Shields *et. al.* (1990), variations in fecundity may be caused by several ecological factors including habitat and biological constraints.

The egg diameter of *S. huzardii* ranged from 0.22 to 0.33mm with a mean of 0.24mm. This result is similar to Lawal-Are (2010) who obtained egg diameter of 0.25 to 0.35mm with a mean of 0,25mm for *C. amnicola* in the Lagos Lagoon.

In the feeding experiment, the crabs fed on white mangrove leaves and mangrove grass had the highest weight gain of 97.9% and 84.6% respectively. While these mangrove crabs may not be a food item for the coastal communities, they definitely help in keeping the mangrove ecosystem clean by feeding on the fallen and dead leaves. Olafsson *et. al.* (2002) reported that in Kenya East Africa mangrove decapod crab, *Neosarmatium meinerti* in the high intertidal *Avicennia marina* zone consumed on average 67% of the leaves placed on them within two hours while in the high zone, the crabs consumed appropriately twice the daily litter fall. The authors confirmed earlier studies indicating that *N. meinerti* may sweep mangrove forest floors clean of leaf litter.

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A qualitative study of effectiveness of clinical teaching

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Abstract: Clinical experience has been always an integral part of nursing education. It prepares student nurses to be able of "doing" as well as "knowing" the clinical principles in practice. Clinical experience is one of the most anxiety producing components of the nursing program which has been identified by nursing students. The educational process is unique in the practice professions because being able to perform the activities of the profession in live situations as opposed to simply being able to express understanding of principles is a requisite competency of graduation. Despite a wealth of research on clinical teaching, the criteria for determining what constitutes effective clinical teaching remain poorly defined. Therefore, the aim of this study is to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in critical care nursing courses. Material and Method; A descriptive qualitative research design was used. Setting: The study was conducted at the Critical Care & Emergency Nursing Department, Faculty of Nursing, Alexandria University, Subjects: consisted of two groups. The first group included nursing students and the second group consisted of critical care clinical instructors. Clinical Teaching opinionnaire tool was developed to elicit the nursing student's / clinical instructors' perception of clinical teaching effectiveness in critical care nursing courses. Results; Students had enough orientation. Students are under stress because of a lot of work and duties. The ratio of instructors to students (1:6) is adequate. The instructors' agreed with the students on the duration of clinical training is not enough. Students are well oriented with the intended learning outcomes (ILOs) of their clinical training. Students and instructors enjoyed OSCE. Students and instructors don't like portfolio and log book. Students like their clinical instructors they see them role models Conclusion; the findings of this study and the literature support the need to rethink about the clinical skills training in nursing education. Recommendation; Longitudinal studies to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in randomly selected multiple faculties are recommended.

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1. Introduction:

Nursing is a professional discipline. A professional is an individual who possesses expert knowledge and skills in a specific domain, acquired through formal education in institutions of higher learning and through experience, and who uses that knowledge and skills on behalf of society by serving specified clients. Professional disciplines are differentiated from academic disciplines by their practice component. Clinical practice requires critical thinking and problem-solving abilities, specialized psychomotor and technological skills, and a professional value system. Practice in clinical settings exposes students to realities of professional practice that cannot be conveyed by a textbook (1). Clinical experience has been always an integral part of nursing education. It prepares student nurses to be able of "doing" as well as "knowing" the clinical principles in practice (2). The educational process is unique in the practice professions because being able to perform the activities of the profession in live situations as opposed to simply being able to express understanding of principles is a requisite competency

of graduation⁽³⁾. Despite a wealth of research on clinical teaching, the criteria for determining what constitutes effective clinical teaching remain poorly defined ⁽⁴⁾

The complexity of patient care, the vulnerability of the patient and family, and the controversies surrounding best practices in education make teaching critical care content to students in nursing a challenge for faculty⁽⁵⁾. The American Association of Colleges of Nursing heralded the identification of essential content for both undergraduate and graduate education in nursing in the mid-1980s as major curricular reform and has continued to revise these widely used documents. In addition, the American Association of Critical-Care Nurses (AACN) published a document that encouraged selection of critical care content to meet competencies at the undergraduate and graduate level⁽⁵⁾

The critical care nursing undergraduate curriculum in Alexandria University is designed to ensure that the theoretical and clinical practice requirements are met at appropriate levels throughout

the 3 critical care nursing courses { Emergency Nursing, Critical Care Nursing I and Critical Care Nursing II]. Emphasis in the emergency nursing course is placed on the prioritization and decision making processes of nursing care and the nursing responsibilities associated with diagnostic studies, emergency nursing procedures, evaluation of outcomes, health promotion and support for individuals and families experiencing acute health problems. Collaboration with interdisciplinary health professionals in health restoration is fostered. Clinical experiences are offered in nursing skill lab and emergency units ⁽⁶⁾.

Critical care nursing I course is designed to assist students in developing expertise and in-depth knowledge in the field of critical care nursing. Students will be able to provide the foundation skills in caring for critically ill patients/family in collaboration with the other health team members. It enables them to function as educators, leaders and researchers in the field of critical care nursing. The critical care nursing II course which is the third course focuses on the application of nursing process and problem-solving approach in providing nursing care to critically ill patients. Knowledge and skills developed through the course should enable students to provide comprehensive nursing management to critically ill patients and their families during their critical illness. Clinical experiences in critical care nursing I and II courses are offered in the nursing skills lab and intensive care units (6).

Nursing students are required to complete 9 credit hours (theory and practical) throughout the critical care nursing program as they pass from the emergency nursing course to the critical care nursing I course and ending their studying with critical care nursing II course. During the clinical training, students are allocated to various clinical specialties in emergency & critical care settings to gain clinical experience. Their clinical knowledge, skills, problemsolving ability, and professional attitudes have to be assessed in each course. Nursing student's experiences of their clinical practice provide greater insight to develop an effective clinical teaching strategy in nursing education ⁽⁶⁾.

Clinical experience is one of the most anxiety producing components of the nursing program which has been identified by nursing students. In a descriptive correlational study by Beck and Srivastava ⁽⁷⁾, third and fourth year nursing students reported that clinical experience was the most stressful part of the nursing program. Lack of clinical experience, unfamiliar areas, difficult patients, fear of making mistakes and being evaluated by faculty members were expressed by the students as anxiety-producing situations in their initial clinical

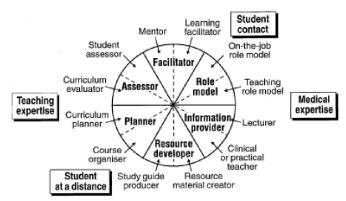
experience ⁽⁷⁾. Several studies in clinical education were directed towards determining problems frequently encountered in clinical practices and suggest that further studies are needed to identify the leading factors for effective clinical teaching ^(2,4,7).

It is known that nursing clinical instructors' attitudes, experience, and knowledge influence nursing students. Clinical instructors give students advice on nursing practice, are role models for students, defend them, and evaluate their performance, good clinical instructor help students apply their theoretical knowledge to practice, provide learning opportunities, and help students to do their best. In addition, clinical mentors should be able to make use of all educational strategies to facilitate learning ^(8, 9).

The six areas of activity of the teacher can be; the teacher as information provider, role model, facilitator, assessor, planner and resource developer. Each of the six roles described can be subdivided into two roles, making a total of twelve roles as illustrated in Figure 1. Roles to the right in the figure require more content expertise or knowledge, and roles to the left more educational expertise⁽¹⁰⁾.

Figure (1): The teacher twelve roles

Maintaining and/or improving the quality of nursing education is the most important concern of nurse educators and the subsequent performance of students as nurses in the work-force is often a



reflection of the quality of the nursing education programme and the quality of the clinical experience (11). Therefore, the aim of this study is to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in critical care nursing courses.

2. Materials and Methods: Material

Design:

A descriptive qualitative research design was used. A qualitative approach was chosen because

the richness and depth of the findings from this approach provide a unique appreciation of the reality of the experiences. This design was also chosen because the focus was on practices, beliefs and attitudes, which all are part of lived experiences of students.

Setting:

The study was conducted at the Critical Care & Emergency Nursing Department, Faculty of Nursing, Alexandria University.

Subjects:

The subjects consisted of two groups. The first group included a convenient sample of all nursing students (the first group) enrolled in critical care (II) course in the sixth semester during the academic year (2009-2010). The total numbers of students expected to participate in the study were (210), 160 were girls and 50 were boys. Students were divided into ten groups. The second group consisted of critical care clinical instructors (7 senior clinical instructors and 2 junior clinical instructors)

Tool:

Clinical Teaching opinionnaire, it was developed by the researchers after reviewing the related literatures (2-4, 8,12) and observing the current practice. This tool was used to elicit the nursing student's / clinical instructors' perception of clinical teaching effectiveness in critical care nursing courses. It includes open-ended questions related to the clinical experience. Focus group interviews were used for data collection. The following topics were used to stimulate discussion regarding clinical experience in the focus groups.

- How do you feel about nursing in general?
- How do you feel about being a student/clinical instructor in critical care nursing?
- Is there anything about the clinical field that might cause you to feel anxious about it?
- How do you feel about the clinical instruction?
- How do you feel about evaluation in your clinical experience?
- What are the best and worst things do you think can happen during the clinical experience?
- What do nursing students worry about regarding clinical experiences?
- How do you evaluate your clinical practice for your learning?
- What are the facilitating factors for your learning during clinical practices?
- How do you think clinical experiences can be improved?

The first two questions were general questions which were used as ice breakers to stimulate discussion and put participants at ease encouraging them to interact in a normal manner with the facilitator. During the interview, additional questions were asked for clarification, definition, or reaffirmation.

Methods

Official permission to conduct the study was obtained from the head of Critical Care & Emergency Nursing Department. All participants were informed about the purpose and design of the study and were told that they were free to withdraw from the study any time.

Data were collected from focus group interviews. The interviews were held at the end of the academic term after students' grades were announced.

Planning the focus group interviews; the location for conducting the focus group discussion was selected taking into consideration the freedom from outside distraction. The following materials were assembled for conducting the group discussion: a tape recorder, batteries, name tags and discussion guideline. Students were arranged in ten groups of 21 students. Prior to conducting each focus group discussion, the dates, time, place and duration of the group discussion were reported to each potential participant one week before the session. The planned duration for discussion was approximately 1:30 to 2 hours including the pre-session informal talks.

Conducting the focus group interviews; arrangement of the seats was made so that participants are seated in a circle. A period of brief sociable small talks coupled with refreshments was allowed for 15 minutes. The purpose of the study, the group discussion, the use of a tape recorder and the presence of assistant moderators were explained. The tape recorder was turned on after taking permission from the group. Rules for conducting the focus group discussion were explained to the group. The group interacted in a relaxed and friendly atmosphere.

Researchers facilitated the groups. The observer was a public health graduate who attended all focus groups and helped the researchers by taking notes and observing students'/ instructors' non-verbal behavior during the focus group sessions. Observer was not known to students or instructors.

Data analysis:

At the end of the data collection part of interviews, the records were documented. The following steps were undertaken in the focus group data analysis.

- 1. Immediate debriefing after each focus group with the observer and debriefing notes were made. Debriefing notes included comments about the focus group process and the significance of data.
- 2. Listening to the tape and transcribing the content of the tape.
- 3. Checking the content of the tape with the observer noting and considering any non-verbal behavior. The benefit of transcription and checking the contents with the observer was in picking up parts of words non-verbal communication, gestures and behavior.

The methods used to code and categorize focus group data were adapted from approaches to qualitative content analysis and focus group data analysis. Content analysis, as a research method, is a systematic and objective means of describing and quantifying phenomena. Content analysis allows the researcher to test theoretical issues to enhance understanding of the data. Through content analysis, it is possible to combine words into categories. Inductive content analysis process included open coding, creating themes of categories and abstraction. If there is not adequate knowledge about the phenomenon, or if this knowledge is fragmented, the inductive approach should be used^(2,4,12).

For coding the transcript it was necessary to go through the transcripts line by line and paragraph by paragraph, looking for significant statements and

codes according to the topics addressed. The researchers compared the various codes based on differences and similarities and sorted into categories and finally the categories were formulated into a 5 themes.

The researchers were guided to use and three levels of coding as the following:

Level 1 coding examined the data line by line and making codes which were taken from the language of the subjects who attended the focus groups.

Level 2 coding which is a comparing of coded data with other data and the creation of categories. Categories are simply coded data that seem to cluster together and may result from condensing of level 1 code.

Level 3 coding which describes the Basic Social Psychological Process which is the title given to the central themes that emerge from the categories.

The documents were submitted to two assessors for validation. This action provides an opportunity to determine the reliability of the coding. Following a review of the codes and categories there was agreement on the classification.

3. Results:

The findings obtained will be presented under the major themes Student, Clinical practice, Outcome, Roles/Responsibilities of instructors and Environment {SCORE}.

	Tabl	e (1):	Shows	the	five	themes	and	its	subcategory	V
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	Theme	Sub-theme
S	Student	 Orientation Student/ instructor ratio Paper work
С	Clinical practice	 Duration of clinical training Open lab system Procedure performance
O	Outcome	 ILOs OSCE Evaluation tools Log book Portfolio
R	Roles/Responsibilities of instructors	 Instructors 'roles Communication Relationship with students
Е	Environment	 Skill labs ICUs Relationship with hospital staff Equipments and supplies

S-Student;

From the Students' point of view; they stated that they had enough students' preparation;

orientation for all they have to do during their clinical experience and this made them under stress as perceived that they have a lot of work and duties. A

number of students said: "The orientation is enough""We felt that it is a hard thing to be in ICU, we had bad dreams about it. "The orientation day increased my anxiety and stress; we feel we have to do a lot of work, duties, and assignments" "Clinical orientation was affected by each clinical instructor." "Clinical orientation was simple, according to the clinical instructor and toward the objectives she wants to achieve." As for orientation in the clinical area; students need to be oriented more with patient's condition "We need detailed orientation on patients' files" and they also need to have knowledge regarding all what they see; they said "We don't have enough knowledge regarding some diagnoses and medications"

From the instructors' point of view; they know that the orientation is a major source of students' stress but it is essential. Some of instructors see that it contains a lot of details which can be postponed to the following days.

As for Student/ instructor ratio, students said that the ratio between number of students and clinical instructors is enough. "The ratio between students and clinical instructor is enough." From the instructors' point of view; they see that the ratio is good and wish the ratio to be fixed as one instructor to 5-6 students.

Students complain of paper work as it takes time, effort and put them under stress continuously, paper work needs to be decreased, they said that "We copy the data of the assessment sheet among us" and "The number of the assessment sheets should be limited to two assessment sheets only which is enough for each rotation", also they need the assessment sheet and the record to be changed "The assessment sheet should be modified it can be as a case study or notes in the record sheet" and "We prefer to use the patients' record" instructors' point of view; they said that they know that students copy the paper work from each other; so they suggest to make a rubric for the evaluation sheet. Also clinical instructors agreed with students on using records similar to patients' records.

C- Clinical practice;

Regarding the duration of clinical training, students stated that "The period of clinical training is not enough" and also they said "The training period in the hospital is not enough." They also suggest that the training period should be increased as they said "We need the duration to be increased from 3 hours/week [one day} to be 6 hours/week [on two days]". The instructors' agreed with the students on the duration of clinical training is not enough and suggest being a day weekly.

Some students also said "The clinical trauma rotation is not enough, it needs to be increased". Students also agreed that the clinical practice in the emergency nursing rotation should be modified "In clinical of emergency nursing course we spend a lot of time in performing CPR we need more training in the reception, in the emergency department in the hospital." Open lab system helps students to practice more and to overcome inadequate performance.

Students agreed that the organized schedule is helpful as they decrease their irritability and help them to perform better "The schedule in this term is well organized", also they agreed that practicing in labs before hospitals is essential. They see them skillful in performing critical care procedures "We are skillful in performance". Students also need to work as bedside nurses in the hospital as they said "We need to report patient's condition as nurses' staff in the ICU."

O-Outcome:

Students mentioned that, they are well oriented with the intended learning outcomes (ILOs) of their clinical training, but some of them didn't achieve all the required objectives. They said that "The clinical objectives were clear, but we didn't achieve all the objectives.""The objectives in the lab are clear and we achieve it more than in the hospital" "The clinical objectives are according to the clinical instructor". They explained that some groups achieve more than the required objectives and they want to be like them. To achieve the objectives, a number of students said that "the content should be fixed for all students". It is important to inform students and to achieve all the required ILOS this is the instructors' point of view; they also said that," sometimes, students need to learn more about everything in ICU".

They like the final clinical exam to be in the lab as they enjoyed OSCE, they said "OSCE is good". The evaluation tools are good from the students' point of view. "The checklist is a good method for evaluation." on the other side; instructors agreed with students on importance of OSCE in evaluation, but not in the final clinical exam for students on critical care I and critical care II courses.

Students stated that they don't like portfolio and log book, as they said "There is no need for portfolio, it takes a lot of effort and time", "We don't understand what self- reflection is" "We don't understand what is logbook and what the objectives of using it are?" Also some instructors see that there is no need for the logbook, as it is considered more workload for them. Instructors mentioned that students don't accept using a portfolio.

R-Roles/Responsibilities of instructors;

The learning community consists of both students and teachers. Helping students learn and practice is a challenge for teachers/ clinical instructors. Students stated that they like the clinical instructors as they said "We like the clinical instructors in the department." Also they said "We will not find like critical care clinical instructors we like them very much." and "Some instructors deal with us in a friendly way/manner, which is what we need from them."

According to focus group findings, among the most important feature of effective clinical teaching were communication capabilities. Students noted that the communication between themselves and their clinical instructors greatly influenced the efficiency of practice hours, as the students were worried about being criticized when they asked a question. In addition, students reported that clinical instructors' body language influences their performance. One student stated: "A clinical instructor should have communication capabilities. Body language is also important. In fact, some instructors had rough, fixed facial expression." another student said that "The bad reaction of some instructors and their comments in front of patients and staff, embarrass us and we feel discouraged" ."Some instructors were interested with evaluation and grades more than students." Students. noting that they needed their clinical instructors' attention and care, also thought that empathy was an important feature. They wanted the clinical instructors to appreciate them when they did well, and added that this appreciation would motivate them.

Students wish to be like their instructors, they said "Some instructors are role model for us". Noting that they wanted to work with instructors who were experienced in the field, students stated that their clinical instructors are knowledgeable and competent in their specialty. Students expected clinical instructors to be advisors and guides and to offer information or give explanations about clinical practices. Students also wanted to receive answers to their questions or to be provided with a list of needed sources. Students always need support, guidance and motivation; "We always need guidance and support from the clinical instructors" They also mentioned that they feel protected with their clinical instructors. Students see that it is good to practice with the same instructor throughout the clinical period "it is better that clinical instructors don't change along the rotation period."

In addition, students noted that feedback was important and that clinical instruction should be motivational, not critical, when providing feedback. Students mentioned that positive feedback

increased their motivation but negative feedback discouraged them from attending practice hours. One student said: "There is always feedback from instructors." and "We're not saying that there shouldn't be feedback, but it should be without judgment". Students also believed that feedback should not be given in front of patients or nurses, who made them, feel inferior. One student said that "negative feedback should be given one to one."

They also need to feel independent as they stated that "Instructors should trust us we need to be independent to care for patients" and "The instructors don't trust us to perform procedures on the patients without supervision". On the other hand; instructors don't trust students as they said that" We don't trust to leave patients with students alone". Some instructors added that, they can depend on students to care for patients according to patients' conditions.

All girl students agreed that instructors deal with boys better than girls. On the other side, all instructors disagreed with students and said they don't differentiate between girls and boys; they are the same for them; except the only male instructor who agreed with students on that, instructors deals with boys better than girls.

All instructors agreed that although they are under stress, they have a lot of paper work to check, they also have their post graduate studies, and they don't have enough time for all their duties; that they try to do their best with students.

E- Environment of clinical training;

Students are satisfied with training in labs as they stated that "The training in labs was excellent, but we prefer all of us to be in the lab before the clinical practice in the hospital." There is always a big chance for peer learning and evaluation in labs as students said. They also like to interact with critically ill patients. "We learn more in the hospital as we interact with patients." But they feel irritable "We found ourselves facing patients who have life threatening problems which made us irritable and sometimes we can't save patients' lives"." We found ourselves in a stressful, fearful environment for the first time in our lives." The instructors agreed with students that training in labs is essential before training in hospitals.

They see that some ICUs are suitable areas for training; they said that "Unit III is an Ideal ICU" and "We had the best training in Unit III and Unit I but the equipment are unavailable, the relationship with the staff is bad" also they stated that "The ICU of Gamal Abd El Naser hospital is an appropriate area for training as all equipment are available, the relationship with the staff is good as they leave us do what we want with patients" The instructors agreed

with students regarding Unit III and Unit I, but they assured that the ICU of Gamal Abd El Naser hospital is not suitable for training as the number of patients isn't enough. In general, the instructors find the relationship with the hospital staff is good.

Students dislike caring for patients in isolation rooms as they said "Caring for patients in the isolation room is bad we are afraid from infection we are students we should be protected from hazards" From the instructors' point of view; there is no problem that students provide care for patients in isolation rooms, they should follow the universal precautions and deal with any patients as he has infection, they should protect themselves as they said.

As for equipment and supplies, students mentioned that "All equipment are available in labs" and "In labs were very good, but in hospitals were not enough." Regarding hospital staff, students agreed that there is a bad relationship between the students and the hospital staff as they said that "In some units, staff deal with us badly" "Some nurses and doctors don't respect us" and therefore they need the faculty to have some control in the hospital. The instructors agreed that equipment are not enough in the hospital and need the faculty to help to solve this problem especially personal protective equipment needed for infection control measures.

4. Discussion:

Clinical practice is a vital component of the nursing curriculum and has been acknowledged as being central to nursing education. Based on this general premise, there is agreement that nursing curriculum should be directed improvement of clinical competencies of nursing students⁽¹²⁾. Therefore, the aim of this study is to investigate the nursing students'/instructors' perception of effectiveness of clinical teaching in critical care nursing courses.

The results of this study showed that students were satisfied with their clinical teaching. From their point of view, the *orientation* is necessary, but it is a source of stress for them. Clinical instructors agreed also on the importance of orientation. This is in line with Chesnutt *et al.* ⁽¹³⁾ who stated that; today's hospital environment with its high-acuity patients necessitates tailored orientation programs that account for the unique learning needs of nurses, giving the nurses a solid foundation in application of concepts and as much practice with clinical and time management skills as possible. It is important to schedule a day for orientation and rotate students through in groups and discuss all information about the clinical rotation ⁽¹⁴⁾.

It is important to meet the orientation needs of students and adequately prepare them to care for

critically ill patients. The orientation may be stressful for students because they find themselves loaded with a lot of duties and responsibilities. Orientation program is essential to be detailed as it can be considered as a contract with students. Also, students have the right to know everything about the clinical rotation period.

As for *Student/ instructor ratio*; students and clinical instructors agreed that the ratio is adequate. In some nursing faculties, student-faculty ratios range from 5:1 to 15:1 (Ulker *et al.*, ⁽¹⁵⁾). The average student-faculty ratio in clinical placements is approximately 7:1⁽⁸⁾. The student/ instructor ratio plays an important role in clinical teaching; especially in critical care nursing. The nature of units, the severity of patients' condition, presence of advanced technology and machines and the types of procedures, all these factors necessitate that the student/ instructor ratio not to exceed 5-7:1.

Before finalizing the protocol for evaluating clinical performance in a course, the teacher should review the purpose and number required of each assignment completed by students in clinical practice. What are the purposes of these assignments, and how many are needed to demonstrate competency? For example, in some clinical courses, students complete an excessive number of written assignments. How many assignments, regardless of whether they are for formative or summative purposes, are needed to meet the outcomes of the course? Students benefit from continuous feedback from the teacher, not from repetitive assignments that contribute little to their development of clinical knowledge and skills. Instead of daily or weekly care plans or other assignments, which may not even be consistent with current practice, once students develop the competencies, they can progress to other more relevant learning activities (20).

Paper work causes a lot of stress for both students and instructors. This is in line with Walton et al., (8) who stated that a heavy workload was identified as a major stressor for nursing students. Students have many academic demands such as work papers, examinations and other written assignments. Also, Frassrand *et al.*, (16) found in her study those priority stressors to include in descending order: academic, environmental, financial, interpersonal, and personal. For academic stressors; performance, written work and clinical practice topped the charts. In addition, the most reported environmental stressor was teacher/student relationships, with students perceiving teachers to be insensitive (16, 17). Another study mentioned that; nurse educators find teaching in the classroom and in the clinical area most satisfying however, excessive paperwork and endless meetings were given as reasons for perceived frustrations by nurse educators ⁽¹¹⁾. Students should learn how to document correctly, therefore, it is essential to review and modify the paperwork required from students to be clear, simple, concise and effective.

The instructor should consider the time needed to complete the evaluation, provide feedback, and grade the assignment. Instead of requiring a series of written assignments in a clinical course, the same outcomes might be met through discussions with students, cases analyzed by students in clinical conferences, group writing activities, and other methods requiring less teacher time and accomplishing the same purposes. Considering the demands on nursing faculty, it is important to consider one's own time when planning how to evaluate students' performance in clinical practice.

Students and instructors agreed on the duration on clinical training needs to be increased. This is in line with Eta *et al.*, (18) who found that clinical instructors were dissatisfied with duration of students' placement and the limited time for clinical teaching was a major challenge which faced them as clinical educators. Also, in Elçigil *et al.*, (17) study (2011) students reported that although the patients with severe illnesses increased their workload, they have learned a lot from them. They emphasized that nursing care for patients with severe illnesses help them to gain experience and prepare them for professional life.

Effective teaching requires careful planning. The course coordinator is responsible for planning and adapting the entire course, theory and practice components of the course should work together to develop students' knowledge, skills, and attitudes. Courses usually begin in classrooms with theoretical background and the introduction, demonstration, and practice of related concepts and skills. They continue in a simulated environment in the skill development lab (14), where students continue to develop knowledge, skills, and attitudes. Finally, students practice key skills and demonstrate key attitudes in ICUs (supervised clinical setting).

The amount of time that students should spend in the clinical practice has been the subject of much debate among nurse educators ⁽¹⁾. The length of time spent in clinical activities is no guarantee of the amount or quality of learning that results. Both the activity and the amount of time need to be individualized. Most nursing faculty members worry far too much about how many hours students spend in the clinical setting and too little about the quality of the learning that is taking place. A 2-hour activity that results in critical skill learning is far more valuable than an 8-hour activity that merely promotes repetition of skills and habit learning.

In critical care nursing courses, the duration of the clinical training is appropriate according to the planned objectives that are required to be achieved by students. Students want to do more and more for critically ill patients, may be they want to act as in ER movie; therefore they need the time and duration of the clinical training to be increased. In nursing education, clinical learning activities historically have been confused with caring for patients as the typical activities of nursing students center on patient care. Learning is assumed to take place while caring. However, the central focus in clinical education should be on learning, not doing, as the student role. Gaberson et al., (1) stated that the role of the student in nursing education should be primarily that of learner, not nurse. For this reason, the term nursing student rather than student nurse is preferred, because in the former term, the noun student describes the role better.

Provision of nursing care for patients with complicated conditions was a positive factor for clinical learning. Caring for critically-ill patients required that students put all their theoretical knowledge into practice and make use of their decision making skills. When a student realized that she could take care of such patients her self-confidence increased⁽¹²⁾. Conflicting with this study was the finding by Kloster *et al.*, ⁽¹⁹⁾ that students prefer to work with healthy individuals rather than look after elderly patients with patients with chronic diseases, or with those who had psychiatric problems.

Course schedule is developed to achieve the learning outcomes outlined in the course specification (syllabus), therefore, the sequence of activities in the schedule reflects the process of developing knowledge, skills, and attitudes. Schedule should be prepared correctly to achieve the required ILOs. Clear ILOs help determining the course content, how the course will be taught and how students' learning should be assessed. The development of clear, concise and measurable learning objectives is a critical step in planning the course (14).

Clinical evaluation is a process by which judgments are made about learners' competencies in practice. This practice may involve care of patients, families, and communities; other types of experiences in the clinical setting; simulated experiences; and performance of varied skills. There are many evaluation tools for use in nursing education as checklists, logbooks and portfolio (20).

Evaluation methods can be used for formative or summative evaluation. In the process of deciding how to evaluate students' clinical performance, the teacher should identify if the methods will be used to provide feedback to learners (formative) or for grading (summative). Some of the strategies designed for clinical evaluation provide feedback to students on areas for improvement and should not be graded. Other methods such as rating scales and written assignments can be used for summative purposes and therefore can be computed as part of the course or clinical grade^(1,20).

Clinical evaluation is not the same as grading. In evaluation the teacher makes observations of performance and collects other types of data, then compares this information to a set of standards to arrive at a judgment. From this assessment, a quantitative symbol or grade may be applied to reflect the evaluation data and judgments made about performance. The clinical grade, such as pass-fail or A through F is the symbol to represent the evaluation. Clinical performance may be evaluated and not graded, such as with formative evaluation or feedback to the learner, or it may be graded. Grades, however, should not be assigned without sufficient data about clinical performance (20).

An Objective Structured Clinical Examination (OSCE) provides a means of evaluating performance in a simulation laboratory rather than in the clinical setting (20). In an OSCE students rotate through a series of stations: at each station they complete an activity or perform a task, which is then evaluated. In this study students enjoyed performing activities in the OSCE; they also found it one of the most powerful learning sessions they ever passed in their clinical practice. This may be attributed to all students pass the same stations, are evaluated with the same tools and not experiencing stress as in ICUs. Nahas and Yam⁽²¹⁾ examining the effects of clinical experience on student learning and the problems students encounter during their clinical teaching. These studies also have shown stressors associated with fear of making mistakes, anxiety over possible criticisms from peers, being able to communicate with health personnel and patients, providing care for the seriously ill or terminal patients, having the necessary technical skills for procedures, attitudes towards and expectations of staff of students⁽⁹⁾.

Using of valid evaluation criteria for performance evaluation can play an important role in effectiveness of nursing practice ⁽⁸⁾. Ford *et al.*, ⁽²¹⁾ stated that evaluation should provide the student with knowledge regarding how well they performed the skill as well as knowledge of results and should be timely, specific (skill and developmental level), and positive. Lee *et al.*, ⁽²²⁾ found that students give more importance to evaluation than do instructors.

Portfolios are valuable for clinical evaluation because students provide evidence in their portfolios to confirm their clinical competencies and document

new learning and skills acquired in a course ⁽²⁰⁾. They can also be used for students' self-assessment of their progress in meeting personal and professional goals. Students in this study don't accept using the portfolio, the reason for this may be; they are asked to do a portfolio for each course they are studying which considers a load which they hate.

A Logbook contains a list of skills or tasks that students should be able to perform. Yaghobian *et al.*, ⁽²³⁾ found that using logbook in clinical training can prevent students' errors and confusion in clinical field by sharing standards in clinical education. Students stated they don't know the importance of logbooks; this may be because of using the traditional methods on documenting the frequency of performed or observed procedures as notebooks. Log books help students to manage time and plan to have more effective clinical field.

Helping students learn and practice is a challenge for teachers/ clinical instructors. Students in this study need instructors to give them support, guidance and motivation, have a good relationship with them and give them constructive feedback. They also noted that effective clinical instructor should be able to communicate without prejudice, give positive feedback, have empathy, and offer students information. A good teacher can be defined as a teacher who helps the student to learn. He or she contributes to this in a number of ways. The teacher's role goes well beyond information giving, with the teacher/instructor having a range of key roles to play in the education process (8, 10).

Some important characteristics related to the instructors' personality also may influence effectiveness of their teaching, including enthusiasm for nursing and teaching, the ability to admit mistakes honestly, cooperation and patience, approachability, self-confidence and flexibility in the clinical area, and the ability to provide opportunities for students to vent their feelings. Communication between clinical instructors and students affects student success in clinical practice. Good communication requires all parties to trust each other, to be honest and tolerant, and to have empathy for each other. A strong instructor-student relationship based on good communication enables students to learn more and allows both students and mentors to enjoy learning⁽⁸⁾.

Students emphasized that positive feedback was motivating. Students also dislike performance evaluations made in front of staff and patients as they want to be appreciated for their performance. This is in line with Elçigil *et al.*, (17) who found that instructors' attitude and communication skills played a role in learning and recommended that feedback should be given in a constructive manner avoiding

giving negative messages. Feedback helps students recognize their weaknesses and improve themselves; therefore, feedback should be constructive, not destructive. Positive feedbacks increase students' self-confidence. They need to have a good relationship with others and giving feedbacks without hurting feelings.

How a nursing clinical instructor evaluates and gives feedback to students is an important part of clinical education; in fact, it has been noted that evaluation can also affect students' self-respect and self-confidence therefore, fairness and constructive criticism contributed to learning. Lee *et al.*, (22) emphasized the importance of evaluation in both teaching/learning interaction and motivation. Girl students agreed that instructors deal with boys better than girls. This may be due to the culture as they deal with males better than women, also boys' reaction (more aggressive) differ than girls.

Effective education offers a balance of theoretical and practical experiences to help learners develop competencies that are essential for their entering a healthcare profession and continuing to develop professionally throughout their careers. Effective clinical education is linked to social context. Broad social, cultural, historical, and political forces interrelate to form and shape teaching and learning, and thus the essential competencies that learners must develop (14). The necessary facilities, resources, and equipment should be available for teaching; the teaching should be consistent with what is being taught in other, related courses, there is a clear link between the classroom and the practical or skills development components of the course, and staff members at the clinical practice facility follow the same procedures as those taught in the course.

Because nursing is a professional practice discipline, what nurses and nursing students do in clinical practice is more important than what they can demonstrate in a classroom. Clinical learning activities provide real-life experiences and opportunities for transfer of knowledge to practical situations ⁽¹⁴⁾. Some learners who perform well in the classroom cannot apply their knowledge successfully in the clinical area. Students learn prerequisite knowledge in the classroom and through independent learning activities that they later apply and test, first in skills development lab and then in clinical practice.

The skills development lab is used as a simulated environment especially in critical care nursing students for demonstration and opportunities for small group activities and practice with feedback before them facing the real situations in ICUs (14,24,25). Therefore, the labs should be well equipped, well lighted and ventilated, safe for practicing, have enough supplies and teaching materials and adequate

space for students. ICUs should be selected and prepared by ensuring adequate supplies for the related skills, adequate and appropriate patient caseload and flow, and informed clinical instructors. Nursing students who get along well with nurses' staff feel more self-confident and become more creative while performing nursing care. Students feel more satisfied when they are considered as members of the team ⁽¹²⁾. Most hospital staff members are receptive to students coming to their work place to practice applying new skills as they have been in that situation themselves and may be again. Sometimes, certain staff members don't want to host students; they must be treated carefully as their unwelcoming attitudes can create a negative leaning environment.

Limitations of the study; This study aimed to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in critical care nursing courses. This study was limited to critical care nursing students / instructors. Therefore, findings cannot be generalized to include other students / instructors in other courses and nursing faculties.

Conclusion

The findings of this study and the literature support the need to rethink about the clinical skills training in nursing education. It is clear that all themes mentioned by the students play an important role in student learning and nursing education in general. Nursing students/instructors expressed their views and mentioned their concerns about student, clinical practice, outcome, roles/responsibilities of instructors and environment.

- S- Students; Students had enough orientation. Students are under stress because of a lot of work and duties. The ratio of instructors to students (1: 6) is adequate.
- C- Clinical Practice; the instructors' agreed with the students on the duration of clinical training is not enough. Open lab system help students to practice more and to overcome their deficiencies in performance. The organized schedule decrease students' irritability and help them to perform better. Students see them skillful in performing critical care procedures.
- O- Outcome; Students are well oriented with the intended learning outcomes (ILOs) of their clinical training. Students and instructors enjoyed OSCE. The evaluation tools are good from the students' point of view. Students and instructors don't like portfolio and log book.
- R-Roles/Responsibilities of instructors, students like their clinical instructors they see them role models, they worry about being criticized. The positive feedback act as students' motivation.

- Girl students agreed that instructors deal with boys better than girls.
- E- Environment of clinical training; Students and instructors are satisfied with training in labs. They dislike caring for patients in isolation rooms. In labs equipment and supplies were adequate, but in hospitals were not.

Recommendations

The result of this study would help us as educators to design strategies for more effective clinical teaching. The results of this study should be considered by nursing education and nursing practice professionals. Faculties of nursing need to be concerned about solving student problems in education and clinical practice. The findings support the need for Faculty of Nursing to plan and implement nursing curriculum in a way that nursing students be involved actively in their education. The information gained from this study can assist with the improvement of clinical education. This study also suggests that a positive experience in clinical learning seems to have strong effect on students' professional socialization.

- S- Students; clinical orientation is essential. It should be concise clear and formal. A contract with students should be formulated. Orientation in the clinical area; should be directed toward patients' condition. Paper work should be decreased and modified, other methods as discussions with students, cases analyzed by students in clinical conferences, group writing activities, and other methods requiring less time and accomplishing the same purposes. Documentation using assessment sheet and records similar to patients' records is important for students to work in the real area. It is useful to make a rubric for evaluating all required paper work.
- C- Clinical Practice; Duration of the clinical training should be appropriate according to the planned objectives that are required to be achieved by students. The role of the student should be primarily that of learner, not nurse.
- O-Outcome; portfolio and logbook should be simplified. Students and instructors should be oriented with the importance of using them. Instructors' portfolio should be enhance
- R-Roles/Responsibilities of instructors; engagement of students in the clinical teaching, can be affected by several factors that should be considered, which are; motivation, students' feeling of safety, belonging, being respected, selfesteem, students need to feel valued by praise, words of appreciation and constructivist rather than destructive criticism. Students' perception of

- the relevance of what are being taught is a vital motivator for learning. Effective time management and stress reduction strategies should be taught to instructors.
- E- Environment of clinical training; effective communication channels should be done between the faculty and hospitals. Staff nurses can be prepared to aid in the clinical teaching. Students should be well prepared to care for patients in the isolation rooms. Equipment and supplies should be available for training especially the personal protective equipment (PPE).

Recommendations for further research; Longitudinal studies to investigate the nursing students' and instructors' perception of clinical teaching effectiveness in randomly selected multiple faculties are recommend

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The Effect of Consuming a Cake Containing Propolis on Gut Micro flora and Toxicity.

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Abstract: This work was done to study the effect of crude propolis and its extracts (water and ethanol) on modulation of micro flora in the gut and protection against toxicity with aflatoxin. Experiment was done on Sprague Dawley white Albino rats that were divided into 9 groups. Group 1 was fed on basal diet, group 2 was fed on a cake, groups 3, 4 & 5 each was fed on either cake fortified with crude, water or ethanol extract of propolis. Group 6 was fed on the cake but contaminated with aflatoxins, then, groups 7, 8 &9 each was fed on cake contaminated with aflatoxins and either crude, water or ethanol extract of propolis. All groups continued for eight weeks. Feces were collected during the experiment and the secum was isolated at the end of the feeding period for assaying the pattern of micro flora either the beneficial bacteria or the harmful ones. The Results showed that the microbial count of the Bifidobacterum increased by addition of propolis to the cake. The value obtained in case of control rats was 50 x 10^4 , this value was 77 x 10^4 , in case of rats fed on the cake. Addition of propolis crude, the water or ethanol extract raised the count of bifidobacterium. The value obtained for ethanol extract was 30 x 10⁶. Addition of aflatoxin to the cake markedly increased the count of coilform in feces. Adding propolis to aflatoxins contaminated cake caused a reduction in enumerated colony of coliform. The values obtained were 25 X 10⁴, 48 x 10⁴ and 33 x 10⁴ for crude, water, and ethanol extract of propolis respectively. The activities of the liver enzymes, namely AST and ALT were markedly increased in rats fed on the aflatoxin contaminated cake. Adding propolis to the cake caused a return to normal values of the activities of these enzymes. Conclusion is that supplementation of food with propolis can promote growth of the beneficial bifidobacterium and inhibit that of the harmful coliorm type present in the gastrointestinal tract. In addition, it can protect against toxicity.

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Keywords: Propolis, Aflatoxins, Bifidobacteria, Coilform, Toxicity.

1. Introduction

Propolis is a multifunctional material used by bees in the construction and maintenance of their hives. Propolis has been used in folk medicine and proved to have numerous biological activities including antioxidant, anti-microbial, anti-carcinogenic, anti-fungal, anti-viral, anti-ulcer, immunostimulatory and antiinflammatory properties. (Barros et al., 2007; Atungulu et al., 2007). Use of propolis by humans has a long history, predated only by the discovery of honey. In addition, propolis was extensively used to improve health and prevent diseases such as diabetes, atherosclerosis, heart diseases and cancer. (Sforcin, 2007). Propolis contain over 300 constituents, some of which are nutrients as proteins, amino acids, vitamins, minerals and other natural compounds such as polyphenols, terpenoids, and steroids. (Buratti et al., 2007). Egyptian propolis became a subject of research by biologists and chemists (Hegazi et al., 2002). Some varieties may contain enzymes such as glucose oxidase, catalase and peroxidase. These presented compounds are in part responsible for the health benefits of propolis. Propolis is considered as a source of natural antioxidant and has a strong antioxidant activity. It contains large amounts of anti-oxidative compounds; the ethanol extract exerts an anti-lipid peroxidative action. (Ahn et al., 2007) Dietary propolis suppressed the lipoxygenase pathway of arachidonic acid, thus inhibit prostaglandin and leucotriene generation and in turn inflammation. (Borrelli et al., 2002).

The micro flora in the human gut exists in a dynamic state and ecologically diverse environment. This micro flora is made up of hundreds of microorganisms (Moore and Holdeman, 1974). Several types of these microorganisms present in the gut exert activities that have a direct impart on host health (Mitsuoka, 1992). It is thus clear that selective enumeration of bifidobacteria is of great interest because of the assumed health and nutritional benefits ascribed to these bacteria. There are several disorders that affect the different sectors of the population in Egypt and need to be avoided. Children usually suffer from diarrhea due to infection with pathogenic bacteria. Adults suffer from environmental pollution which causes several health disorders such as oxidative stress, atherosclerosis and liver toxicity. Exposure to

aflatoxin contamination in the diet is considered an important factor for the development of primary hepatocellular carcinoma (Bennett and Klich, 2003; Antonio et al.2008) showed that the liver is the main site of aflatoxin biotransformation with the mitochondrial cytochrome P450 oxidative system converting the AFB1 into AFM1, thus considered a detoxification process.

Based on these multiple health benefits of propolis, the aim of this study is to add it to some food items such as cake that is usually consumed by children, adolescent or adults in the breakfast. This will supply them with the adequate amount of propolis that realize all the fore mentioned health benefits. It is hopeful that such cake with propolis will participate or help to avoid these health complications and promote the growth of the beneficial bacteria in the gut.

2. Materials and Methods

Material:

Propolis: Propolis used in this study was obtained from the Ministry of Agricultural farms in El-fayome. *Aspergillus parasiticus* (NRRL 3145) was kindly provided from the Central laboratory of Mycotoxins, National Research Center.

Animals: Albino rats of Sprague-Dawley strain, body weight $(70 \pm 20 \text{ gm})$ were obtained from the animal house of the National Research Center.

Diet ingredients: The ingredients used for the preparation of the cake such as, wheat flour, fat, sugar, eggs, chickpea, whey protein concentrate and others were purchased from the local market.

Standard diet: The ingredients used for the preparation of the standard diet such as casein (85% protein), Cellulose, mineral or vitamin mixtures, Choline bitartrate and L-Cystine were obtained from National Research Center stores.

Media: Dehydrated Agar Medium (ready to use) was obtained From Fluka, sigma Switzerland. (Oxiod manual .1998).

Methods:

Aflatoxin Production and Assay: Potato dextrose agar medium was used to produce aflatoxins with *Aspergillus parasiticus* NRRL 3145 (highly and multi-toxin-producing strain). The medium was prepared according to Harrigan and Margaret (1966).

Extraction of Propolis: In this study we used propolis in three forms, Crude propolis, water extract and ethanol extract. Water extract of propolis was prepared according to Nagai *et al.* (2003). Ethanol extract of propolis according to Choi *et al.* (2006). Preparation of cake: The Cake was prepared with some modification in the method given for cake preparation in AOAC (2000).

Animal experiment:

The experiment was done on 54 male Sprague Dawly rats, body weight (70+ 20g), housed individually in stainless steel cages. Rats were classified into 9 groups each of 6 .Each group was put on certain diet as shown in table(1). Food and water were allowed adlibitum. The consumed food was calculated and the body weight gain was recorded. Experiment lasted 8 weeks. The fresh feces were collected once a week from all groups in sterile plastic bags and transferred to the laboratory to be assayed for microbial load within 1 hour. At the end of the experiment, rats were fasted overnight and in the morning were again weighed, anesthetized with diethyl ether then blood was withdrawn by open heart puncture, part over heparin and the other without for separation of serum by centrifugation at 3500 rpm for 15 minutes. The liver kidney and spleen were separated, washed with saline, plotted between 2 sheets of filter paper and kept in plastic bags till needed. The secum was tied and isolated, washed with saline and put in a sterile plastic bag for microbiological assay. The endogenous populations of colonic pathogenic and prebiotic bacteria such as bifido and coliform had been counted according to Wehr and Frank (2004): Haddadin et al. (2004). Ten grams feces were homogenized diluted with buffered peptone water pH 7.0 supplemented with 0.5% Lcysteine for growth of bifidobacteria and Violet Read Bile Agar (VRBA) for growth of coilform. Total coliforms were determined by using a three-tube dilution series. Growth of bifidobacteria was determined by using a five-tube dilution series, MRS and VRBA Plates were incubated at 37oC for 24-48 h. The above procedure was repeated twice for each sample.

Statistical analysis:

Statistical analysis was carried out by using SPSS, PC Statistical Software the results were expressed as mean \pm SD. Data were analyzed by one way analysis variance (ANOVA). The difference between means were tested for significance using least significant difference (LSD) test at (p <0.05).

3. Results Microbiology

The microbial count of samples obtained from secum of rats at the end of the experiment is shown in table (2). Rats fed on the cake showed an increase in number of *bifidobacterum* and a decrease in coliform, compared to those fed on the basal control diet. The value obtained for *bifidobacterum* in case of control was 50×10^4 , this value was 77×10^4 , in case of rats fed on the cake. Addition of crude propolis raised the value to 10×10^6 and to the same value for rats fed on cake + water extract. The value obtained for ethanol extract was 30×10^6 . When

aflatoxin was added to the cake, few *bifidobacteria* was detected in feces. However, addition of propolis to the aflatoxin contaminated cake caused reappearance of this type of bacteria. The values reported for the enumerated colony were $20x10^6$, $10x10^6$ and $30 x10^6$ for crude propolis, water or ethanol extract respectively. Addition of aflatoxin to the cake markedly increased the count of coilform in feces. The value obtained was $62x10^4$. Adding propolis to aflatoxins contaminated cake caused a reduction in enumerated colony of coliform. The values obtained were 40×10^4 , 48×10^4 , 33×10^4 for crude, water and ethanol extract respectively.

Table (3) show the values reported for microbial count in samples of feces collected from animals during the experiment. As shown in the table, the number of *bifidobacterium* in feces of control rats was 24×10^5 that for rats fed on the cake was 30×10^6 . Addition of crude propolis to the cake caused an appreciable increase in bifidobacterium 30×10^6 . When water extract of propolis was added to the cake, the value obtained was 27×10^6 , in case of ethanol extract the value was 33×10^7 .

The pattern obtained for coliform bacteria is different. Coliform was detected in feces of rats fed on the control diet 14×10^5 , also found in feces of rats fed on the cake, however, it was more or less absent in rats fed on the cake to which propolis was added, (10×10^2) , in case of crude propolis, 14×10^3 , in case of water extract, and 10×10^3 in case of ethanol extract). Addition of aflatoxin to the cake caused an elevation in the enumeration colonies of coliform bacteria. The value reported was 62×10^5 . This value became much lower when propolis was added to the contaminated cake. The values reported were 25 $\times 10^4$, 84×10^3 and 33×10^4 .

Nutritional evaluation:

Body Weight gain and Food Efficiency Ratio:

The values for gain in body weight gain and the food efficiency ratio (FER) are given in Table (4), As shown in the table, rats fed on the standard diet consumed 668.2 ± 6.42 g during the experimental period. The food intake of the other groups was more or less lower than that of group B which was fed on the basal diet. The food intake ranged between 540.0 \pm 18.24 to 592.7 \pm 2331 g.

As shown in the table, the highest gain in body weight was that of rats fed on the cake that contain water extract of propolis. The gain in body weight reached 276.2 ± 18.54 g. The lowest gain of body weight was reported for the group given the cake contaminated with aflatoxins.

The food efficiency ratio which is the relation between the gain in body weight and food intake was also highest for the group fed on the cake

with water extract of propolis and lowest for the group given the cake with aflatoxin.

Weight of organs:

The mean values \pm SE and significance of difference of weight of liver, kidney and spleen are shown in Tables (5), the ratio of liver to body weight is also given. As shown in the table, addition of propolis, crude or extracts to the cake caused a slight decrease in liver weight that was most marked in case of water extract. The weight of liver of rats fed on the AFT contaminated cake was lower than that of rats fed on that containing propolis or those fed on the control diet.

Addition of crude or extracts of propolis to the contaminated cake caused slight increase in liver weight (Table 6). The liver to body weight ratio also showed slight decrease in case of rats given propolis with either the contaminated or the non-contaminated cake, (Table 9).

Activities of transaminases

The activities of the two enzymes ALT and AST which are representative to liver function are shown in Table (6) the highest value reported for these two enzymes was found for group fed on the cake contaminated with aflatoxin. The values reported were 33.86 \pm 4.2U/L for ALT and 141.46 \pm 4.12 U/L for AST. These values for rats given different extracts of propolis with the contaminated cake were lower.

Gamma Glutamyl transferase (GT):

The activity of GT was remarkably high in case of rats belonging to the group which were fed on the AFT contaminated diet. Addition of either crude propolis of its extracts to the contaminated diet caused the activity of the GT to return back to near normal value, see Table (6).

4. Discussion

Propolis, the glue material collected by honey bee from plant buds and exudates (Marcucci, 1995), has several health benefits that encourage its use in food to give it an added health value. Propolis was proved to posses antioxidant properties (Guney et al. 2007; Ahn et al. 2007), anti-inflammatory (Ramos and Miranda, 2007), anti-bacterial (Alexandra et al., 2004), anti-fungal (silic et al., 2005), antiviral (Ramos and Miranda, 2007), in addition to its character as a prebiotic (Macfarlane et al., 2008). In the present study, propolis was added to cake, prepared in a traditional manner and contains whey to improve its nutritional and health value. Propolis was added in three forms; crude, water or alcohol extracts. The reason for this is that propolis contains variable biological compounds, some of which may be soluble in water, alcohol, others may not be soluble in any and thus propolis has to be taken as it is.

The advantage of the cake is that most people at different age stages are used to eat. Children, elder and young are used to eat cakes. Besides, this is a type of food that can be prepared at home and in turn, most family members can benefit from its nutritional and health value.

Modulation of the human gut microflora towards improved health status using prebiotic, probiotic and synbiotics or other power will directly contribute towards human health (Tuohy et al., 2005).

In this study, the effect of adding propolis to the diet of rats either the normal or those challenged with myctoxin caused high enumeration of bifiedobacterium and a decrease in coliform. It was not possible to find any study about the effect of propolis ingestion on the gut microflora pattern in vivo, perhaps this is the 1st study in this area. However, Abd El-hady and Hegazi. (2002) showed that propolis possesses antibacterial activity against staphyloccus aurus, Escherichia coli, and Candida albicans. The antibacterial activity of the propolis was attributed to the presence in propolis of compound such as aliphatic and aromatic acids, caffeate esters. triterpenes and Flavonoids. The finding in this study is in agreement with that of those authors; however, the present study was done in vivo. The study also agrees with that of Mertzner (1979). The antibacterial activity of propolis against Pseudomonas aeruginasl, Salmonella typhi, Esherichia coli, Staphylococcus aureuss and Bacillus subtilus was also proved by Mulie and Maingi (2007). It is worth mentioning that the alcohol extract was found to be most active with regard to inhibition of coliform group of bacteria. This is also in agreement with Mulie and Maingi, (2007) who stated that the extraction procedures determine the antibacterial activity. Probably different extraction procedures lead to extraction of different compounds which alternately contribute to difference in the antibacterial activity. On the other hand, addition of propolis to the cake or that with aflatoxin caused an appreciable increase in the enumeration of bifidobacteria. In this case, it is assumed that propolis act as a prebiotic to the beneficial bacteria or it may synergize the action of the prebiotics present in the gut, such as oligosaccharides and other dietary fibers (Tuohy et al., 2005). Also, microbial populations present in the gut provide an efficient barrier to invading gastro intestinal pathogens (Hentges, 1992). Although little is known about the effect of a bacterial species on the other, yet it is thought that, these species compete for nutrients, attachment sites on intestinal mucosa, production of bacteria, and stimulation of immune

system (Khalil, 2007). Most probably all these factors work together towards favoring beneficial bacteria.

Rats fed on the cake formula consumed less food than those fed on the standard diet; however, the gain in body weight and the food efficiency ratio were higher. This is an indication that the composition of the formulated cake is balanced and most nutrient content are bioavailable. Addition of propolis or its extract to the formula did not change food consumption of the animals. However, the gain in body weight of rats fed on the cake that contain propolis was higher particularly in case of water extract of propolis. This indicates that water is able to extract active compounds in propolis that can promote growth. Results obtained by Tatlı Seven et. al (2007) suggested that propolis supplements improved the growth and carcass yield in broilers under heat stress. This was attributed to the flavonoid content and palatable properties of propolis. Flavanoids can act as antioxidants by chelating with free radicals (Wang, 2004; Prytzyk et al., 2003). It was reported that they protect unsaturated fatty acids against the oxidants in the cell membrane (Havsteen, 2002). This is again in support to our finding that the loss in body weight of rats fed on the cake that contain aflatoxin was corrected by addition of propolis to the formula. This means that the stress condition or toxicity of aflatoxin can be tolerated by propolis.

Transaminases:

The activities of the enzymes ALT& AST are indicative to the state of liver. It is a measure of liver function. Addition of propolis in any form to the cake caused a slight decrease in the activity of each of these enzymes. When aflatoxin was added to the diet, the activity of these enzymes became very high. Elevated activities of these enzymes in serum point to cellular leakage and damage of liver cell membranes. Wang et. al (2009) reported that repeated butenolide exposure induced a significant liver injury, and oxidative damage. Bhadauria et al. (2007), found that alcohol extract of propolis is effective against the injurious action of carbon tetra chloride on hepatocytes in vitro. When propolis was added to the contaminated diet, the activities of these enzymes became relatively lower or started to be normalized. This means that propolis therapy could protect against hazardous effect of mycotoxin on the liver.

Stabilization of AST or ALT activates by propolis ingestion indicate improvement in the functional status of liver cells, which may be attributed to the free radical scavenging action of propolis. The present result insure that propolis either crude or extracts can protect the liver from injurious factors including mycotoxins. The protection may extend to normal state without direct exposure to the

harmful agents. It is noted that rats given the cake with propolis have enzymes activities lower than those fed on the control standard diet. This means that propolis is effective against any inflammatory condition that can affect the liver. The anti-inflammatory effect of propolis was reported before by Teixeira *et al.* (2008).

Gamma Glutamyl transferase:

There was no significant difference between the activity of serum $\gamma\text{-glutamyl}$ transferase of rats given the cake and those given the standard diet table (12). Even when propolis was added no change was observed. When the cake was contaminated with aflatoxins, serum $\gamma\text{-glutamyl}$ transferase was markedly elevated, (13.43 \pm 1.047 U/L) relative to a value of (8.63 \pm 0.842 μ /L) for the non-contaminated cake.

High level of this enzyme in blood is indicative to liver injury, (Ruppin et al. 1982). Gamma glutamyl transferase is elevated in diseases of the bile duct, however, increased level may indicate in general that the liver is being damaged (Gonsales, 2006). This means that the injurious effect of aflatoxins on the liver is marked. However, when propolis was added to the aflatoxin contaminated cake, the activity of the enzyme returned to near normal. This again proves the protective action of propolis against aflatoxins toxicity and support the probability that Propolis have the ability to promote liver metabolic processes that lead to detoxification. This funding agree with similar study (Bhadauria et al. 2008), who confirmed the hepato-protective efficacy of propolis.

It is thus proved in this study, that addition of propolis to cake brought about a very good health value, through improvement of beneficial bacteria and diminishing the harmful ones. The toxic hazards of mycotoxin contamination were ameliorated as evidenced by liver and kidney functions.

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Table 1: List of different groups of rats used in animal experiment.

Group	Diet
1	(Control a) the rats fed on basel diet.
2	(Control b) the rats fed on cake alone.
3	The rats fed on cake + crude propolis.
4	The rats fed on cake + water extract of propolis.
5	The rats fed on cake + ethanol extract of propolis.
6	The rats fed on cake + aflatoxins.
7	The rats fed on cake + aflatoxins + crude propolis.
8	The rats fed on cake + aflatoxins + water extract of propolis.
9	The rats fed on cake + aflatoxins + ethanol extract of propolis.

Table2. Coliform and Bifidocount (CFU/g faecal homogenate) in samples obtained from Secum.

Groups	Bifidobacterium	Coliform group
1	50 x 10 ⁴	39×10^3
2	77×10^4	10×10^3
3	10×10^6	10×10^3
4	10×10^6	39 x 10 ⁴
5	30×10^6	10×10^2
6	10×10^2	62 x 10 ⁴
7	20×10^6	40×10^4
8	10×10^6	48×10^4
9	30×10^6	33×10^4

Table 3. Coliform and Bifidocount (CFU/g faecal homogenate) in feces.

Group	Bifidobactereum	Coliform group
1	24×10^5	14×10^5
2	30×10^6	88×10^3
3	30 x 10 ⁶	10×10^2
4	27×10^6	14×10^3
5	33×10^7	10×10^3
6	60×10^2	62 x 10 ⁵
7	18×10^6	25 x 10 ⁴
8	50×10^5	84×10^3
9	32×10^5	33×10^4

Table 4. Gain in body weight (g) and Food Efficiency Ratio of control rats and those fed on diets contaminated with aflatoxins and supplemented with propolis.

Rat	Group	Group	Group	Group	Group	Group	Group	Group	Group	
No.	1	2	3	4	5	6	7	8	9	
Gain in	Gain in body weight									
Mean	170.5	194.8	177.5	214.0	169.2	122.7	159.2	183.3	163.5	
SE	8.45	8.80	6.24	14.87	7.77	6.64	9.93	16.43	7.00	
Pa<		0.098	0.234	0.189	0.081	0.000	0.209	0.038	0.695	
Pb<							0.015	0.000	0.007	
Food Ef	ficiency R	atio								
Mean	0.25	0.33	0.31	0.36	0.30	0.22	0.28	0.31	0.28	
SE	1.32	1.51	1.43	2.93	1.42	1.50	1.65	2.87	1.46	
Pa<		0.006	0.50	0.241	0.489	0.000	0.244	0.103	0.437	
Pb<							0.045	0.001	0.048	

Table 5. Liver, Kidney and spleen weights (g) of control rats and those fed on diets contaminated with aflatoxins and supplemented with propolis.

Rat	Group	Group	Group	Group	Group	Group	Group	Group	Group
No.	1	2	3	4	5	6	7	8	9
Liver									
Mean	7.75	7.70	6.40	5.68	5.90	5.57	6.10	5.88	6.00
SE	0.321	0.511	0.256	0.865	0.167	0.548	0.192	0.227	0.337
Pa<		0.936	0.040	0.002	0.005	0.001	0.628	0.747	0.872
Pb<							0.391	0.610	0.485
Kidney	1								
Mean	1.617	1.617	1.467	1.883	1.483	1.283	1.350	1.317	1.483
SE	0.075	0.098	0.067	0.471	0.024	0.060	0.034	0.031	0.154
Pa<		1.000	0.545	0.284	0.590	0182	0.638	0.026	1.000
Pb<							0.788	0.893	0.420
Spleen									
Mean	0.917	0.633	0.633	0.450	0.533	0.500	0.400	0.517	0.483
SE	0.120	0.076	0.076	0.096	0.033	0.089	0.037	0.060	0.098
Pa<		0.017	1.000	0.115	0.386	0.249	0.047	0.562	0.664
Pb<							0.386	0.885	0.885
Liver /	body weig	ht Ratio							
Mean	3.34	3.99	3.19	3.23	3.20	3.44	3.34	3.20	3.18
SE	0.194	0.136	0.264	0.609	0.070	0.211	0.143	0.131	0.103
Pa<		0.079	0.032	0.042	0.035	0.135	0.678	0.938	0.949
Pb<							0.788	0.518	0.478

Table 6. Serum AST,ALT and GT Activities (U/ml) of control rats and those fed on diets contaminated with aflatoxins and supplemented with propolis.

Rat	Group	Group	Group	Group	Group	Group	Group	Group	Group
No.	1	2	3	4	5	6	7	8	9
AST									
Mean	92.95	87.34	80.38	77.73	76.49	141.46	97.13	91.25	85.51
SE	5.26	6.61	12.18	12.47	4.97	4.16	5.19	6.86	9.28
Pa<		0.622	0.543	0.401	0.373	0.000	0.146	0.293	0.430
Pb<							0.000	0.000	0.000
ALT									
Mean	21.17	15.72	13.83	15.68	13.35	33.86	18.66	18.30	14.89
SE	2.68	2.04	0.46	2.14	0.55	4.02	2.37	2.36	0.42
Pa<		0.088	0.549	0.990	0.452	0.000	0.130	0.406	0.624
Pb<							0.000	0.000	0.000
GT									
Mean	8.89	8.63	8.484	8.03	8.21	13.43	8.85	8.228	8.48
SE	1.069	0.842	1.171	0.695	0.685	1.047	0.769	0.867	0.700
Pa<		0.837	0.909	0.636	0.739	0.001	0.769	0.876	0.827
Pb<							0.001	0.000	0.000

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A nucleotide sequencing of foot-and-mouth disease virus Egyptian strains

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Abstract: Foot and mouth disease virus (FMDV) has been annually isolated during the recent years in Egypt. There is no sufficient local data about the genetic changes occurred in the virus, which makes tracing its origin difficult. In this work, FMDV serotype O and A were isolated from bovine clinical samples, collected from Ismailia, Dakhlia, Monoufia and Sharkia during 2010. RNA extracted from either clinical or cell culture grown virus was subjected to RT-PCR. Nucleotide sequencing of FMDV 1D gene was determined using standard automated sequencing technique. Phylogenetic analysis revealed that the isolated serotype O viruses were closely related to O1/Sharquia/EGY/72 and had same lineage with the O Turkish Manisa strains. Deduced amino acids of 2009 and 2010 Egyptian A isolates in relation to the Egyptian A 2006 strains showed several replacements (I42V, N43S, S44N, L45Q, P141S and A156P). From the obtained result, it was clear that FMDV serotypes O and A isolated in 2010 were closely related to the Egyptian FMDV vaccinal strains and they emerged from the same ancestor. [Laila EL-Shehawy, Abu-Elnaga H, Talat A, El-Garf E, Zakria A and Azab A. A nucleotide sequencing of foot-and-mouth disease virus Egyptian strains. Journal of American Science 2011;7(7):430-435].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: nucleotide sequence, foot-and-mouth disease virus, Egyptian strains

1. Introduction

Foot-and-mouth disease (FMD) is an animal viral disease worldwide affecting ungulates animals and is caused by Foot-and-mouth disease virus (FMDV). It can cause vesicles in the mouth, on the nose and on the coronary bands of the hoofs. It has severe economic impacts. Milk production drops dramatically and animals become lame. Mortality can be high in young animals in unvaccinated herds. Trade of livestock and animal products must be blocked and the export of agricultural products must be banned from areas where the disease occurs [1]. The virus is a picornavirus (genus Aphthovirus, family Picornaviridae) which exists as seven immunologically distinct serotypes (A, O, C SAT1, SAT2, SAT3 and Asia) and multiple subtypes reflecting significant genetic variability [2]. The high potential for genetic and antigenic variation is one of the most important FMDV features, which derives from the quasispecies structure of its viral populations [3]. This structure poses important implications on its biology and control; among them, the high antigenic diversity of viral population that is reflected in seven serotypes and a multitude of variants [4]. The virus has a linear single-stranded RNA genome of about 8.5 kb that consists of 12 proteincoding genes encoding a leader peptide, structural proteins (1A, 1B, 1C, 1D), and non-structural proteins. 1D encodes VP1, which is the most surface exposed capsid protein and contains three important immunogenic sites at amino acid positions 40-60, 140-160 and residues 200–213 [4-6]. Variation at specific amino acid sites within those immunogenic regions contributes to the antigenic variability of the virus. Nucleotide sequence data have been used to understand the transboundary nature of FMDV, recreating temporal

movement patterns of virus spread within countries and across international borders. At the broadest scale, phylogenetic analyses of VP1 (1D) sequences have been shown to be a useful tool to categorize field strains into discrete topotypes which frequently show geographical clustering based on the historical distribution of the virus [7].

In Egypt, FMDV has been endemic since 1952 and evoked outbreaks every few years [8-11]. Recently, the disease were annually recorded either sporadic or epizootic without sufficient national database of the origin of the causative agent and the genetic changes occurred in the main immunogenic sites of the virus that have a negative reflection on the control strategy of the disease in Egypt. In this paper, molecular detection, nucleotide sequencing and phylogenetic analysis of FMDV suspected clinical samples in different Egyptian province were performed to study molecular epidemiology of virus.

2. Materials and methods2.1. Samples

Clinical samples were received from different Egyptian governorates (**Table 1**). These samples were 18 tongue epithelium and 20 oeso-pharyngeal fluid (OP) collected from cattle. The clinical samples were investigated by ELISA and RT-PCR coupled to nucleotide sequencing for detection and identification of FMDV.

Table 1	Suspected	FMDV sam	ples from	different	governorates.
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Clinical		Total			
samples	Ismailia	Dakhlia	Sharkia		
Tongue Epithelium	6	4	2	6	18
OP	6	5	2	5	20

2.2. Preparation of samples

All virus samples were prepared for FMDV detection. In brief, tongue epithelium were minced, suspended in veronal buffer and centrifuged. Also, OP samples were undergone several centrifugation until clear transparent supernatant was obtained. Afterward, all the prepared supernatants were inspected by sandwich ELISA kit purchased from Institute for Animal Health, Pirbright, UK. Virus supernatants were filtered and isolated on low passage monolayer BHK cells.

2.3. Nucleic acid recognition of virus samples

RT-PCR was used to amplify genome fragment from the prepared samples followed by nucleotide sequencing using FMDV serotype specific primers. These oligos were synthesized by BioBasic, Canada. Primers PH1 (5'- AGC TTG TAC CAG GGT TTG GC -3') and PH2 (5'- GCT GCC TAC CTC CTT CAA -3') were designed to bracket a 402-bp region in the 1D/2B genome sequence for serotype O [12]. For serotype A, primers PH9 (5'- TAC CAA ATT ACA CAC GGG AA -3') and PH10 (5'- GAC ATG TCC TCC TGC ATC TG -3'), designated to whole 1D gene, were used to amplify the expected sequence fragment of 863-866 bp in the 1C/2B regions [13]. RNA Extraction was done using QIAamp® Viral RNA kit (Qiagen, Germany) according to the manufacturer's protocol. RT-PCR was carried out using One-Step RT-PCR Kit (Qiagen, Germany). The cycling parameters were 50 °C for 30 min and 95 °C for 15 min; then 30 cycles consisting of 94 °C for 45 s, 55 °C for 45 s and 72 °C for 60 s, and then a final incubation at 72 °C for 10 min. Amplified products were analyzed on agarose gel. Negative control specimen and DNA ladder were involved in agarose gel electrophoresis.

2.4. Nucleotide sequence and Phylogenetic analysis

Amplified viral products were sent to Macrogen (Korea) for DNA sequencing. The sequenced samples represented different FMDV isolates from different governorates. These samples O/EGY/2010 iso1031 - O/EGY/2010 designated iso1038 for serotype O and A/EGY/2010 iso1031-A/EGY/2010 iso1032 for serotype A. All the received sequence results were aligned with nucleotide sequences database at the National Centre for Biotechnology Information site (NCBI) using Basic Local Alignment Search Tool programs to assert the new sequences FMD virus/serotype specificity. Analysis of the sequences identity, divergence and phylogenetic relationship was performed using the clustal W method with weighted residue table provided in the MegAlign program (DNASTAR, Inc. Madison, WI, USA). For multiple alignment and analysis of the deduced amino acid of the received sequence, the sequences of some related viruses and reference virus strains were involved in the analysis.

3. Results

Epithelia and OP samples were collected in this study during 2010. All epithelial samples were positive for FMDV by isolation on low passage monolayer BHK cells and ELISA. Three of these isolates were of serotype A from Ismailia and Dakhlia governorates, while 16 isolates were serotype O. All OP samples were negative except one sample that was serotype A from Ismailia (Table 2). All ELISA positive samples were amplified by RT-PCR with the production of the expected amplicons of either 402 bp for serotype O or 863-866 bp for type A (Fig 1).

Table 2 Positive FMDV epithelium and OP samples using isolation on tissues culture and identification by ELISA

Governorates	No of Tongue	No of OP	Tissue culture	EL	ISA
	Epithelium samples	samples		FMDV serotype	FMDV serotype
				0	A
Ismailia	6	6	7 (6+1*)	5	2
Dakhlia	4	5	4	3	1
Monoufia	2	4	2	2	-
Sharkia	6	5	6	6	•
Total	18	20	19	16	3

^{*}One OP sample was positive for serotype A from Ismailia governorate

Partial nucleotides sequences of type O 1D gene was obtained and gave the easiness to select from FMD viruses partial and complete sequences found on genebank in order to align deduced amino acid residues (Fig. 2) and to construct the phylogentic tree. For serotype A, complete deduced amino acid of VP1 region (Fig. 3) was investigated to study genetic relationship between the different strains. Phylogenetic analysis of serotype O revealed 97% identity among the compared 2010 Egyptian strains (Fig. 4). While there was 0.8 % divergence between the studied serotype A Egyptian viruses isolated in 2009 and that were isolated in 2010 (Fig. 5).

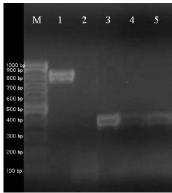


Fig. 1 RT-PCR for detection of FMDV serotype A and O. M: 100 bp ladder, lane 1: serotype A (863 bp), lane 2: negative control, lanes 3-5: serotype O (402 bp)

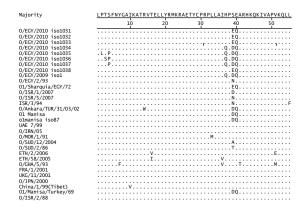


Fig. 2 Alignment of partial deduced amino acid sequences of VP1 gene of FMDV serotype O isolated from Egyptian governorates

	_					QTHQHGLVGAL					
	10	20	30	40	50	60	70	80	90	100	110
01031		R.		VSNQ				KS	T .	A	
.032 Cai		R .		V S NQ						A	
		R .		V S NQ				KS	T .	A	
	A	R .		<u>P</u>		V		K	<u>T</u> .	. Ş A	
		R .						K	<u>T</u> .	. S A	
		K .		<u>P</u>				K		. S A	
		R .						K	<u>T</u> .	. S A	
	A	K .						K		. § Å	
		K .		D . P							
			. H S . G .	. L V . NP		M					
		D		LV.NP	M	ii				. 5 L	
		R.				.				S A	
		D R						v k		S A	
		D R .						V K D		S A	
		D R .	D .					V K		. S A	
		R .		D	G. I	1		K		. S A	
		D R .						V K		. Š A	
		A	G	SPV		A		D		/EA	Q
		AR.		PV		A				S	
		A	.HG.	I	N			DD.		S . AG	N
G										. V N . AG	
			.HG.	NT							N
T				QN .				D		S G	L
		A	G	S PV		<u>A</u>		D		/E <u>A</u>	Q
			.нн		<u>T</u>	<u>5</u>		VD		5	R.E
		R .		PV		<u>.</u> <u>A</u>				5	E
		A				P.NT				S	
		A	. HN	PV						/EA	Q
		A	G			A				VEA VEA	
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			. H G							N . AG	
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			. H G .			HKI				S	N
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V		т.	. H G .							S	N
			. H								
			. H G .							S	N

Fig. 3 Alignment of complete deduced amino acid sequences of 1D gene of FMDV serotype A isolated from Ismailia and Dakhlia

Majority	PFTRLALPYTAPHRV	LATVYNGTSI	KYSVTGSPRR	DLGSLAARVA	AQLPASFNYG	AIRATTIHE	LVRMKRAELY	CPRPLLAVE	VSSQDRHKQK1	IIAPAKQLL
	120	130	140	150	160	170	180	190	200	210
A/EGY/2010 iso1031 A/EGY/2010 iso1032 A/EGY/2009 iso-Cai A/EGY/2006 iso-Fay	. P		T.S T.S T.S		P			A		
A/Egy/2006/iso-Ism A/EGY/1/2006 A/EGY/2/2006 A/EGY/3/2006								A	T	
A/EGY/4/2006 A/EGY/5/2006 A/EGY/1/72 SUD/1/82			T T ATES.G	p		. Ĺ Ŕ		A	T	k
ETH/4/2007 A/ETH/4/2005 A/ETH/1/94 A/ETH/7/92			T A.T.S		Ť			A		
A/KEN/29/2005 A/KEN/15/98 A/SAU/15/2005 A/SAU/41/91			T TDGG.	P P				A	P	T
A/SAU/23/86 A/SYR/5/2002 A/IRQ/2/2002			AGHV RTGRT GRT.	QIL AS	F .	N.S			AEG .TET.	
IRQ/24/64 A/IRN/1/2005 A/IRN/22/99 A/IRN/2/87		N	TNG T	P	SF.		R	ST.	.L	R
A/IND/7/82 A/TAI/2/97 A/TUR/2/2008 A/TUR/859/2007			TP.T TNG	F	TSF.	G.Q				R
A/TUR/1/2006 A/TUR/2/2003 A7/GRE/50 a20ussr iso10	S	N	RTGRA TG.P TG.P-G	M	KF. K	V		I.	.AN	R
A10/H0L/42 a10holland iso82 A5/Allier/FRA/60 A12/UK/119/32			AS TD.P	T M A . S P	T K R	V K.E		I.		R
a2spain iso7 A24/Cruzeiro/Brazi1/55			AS.L-G						R .	

Fig. 4 Phylogenetic tree showing relationship among FMDV O depending on the virus partial 1D gene sequence

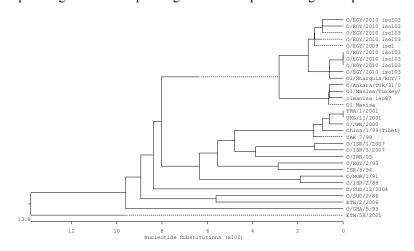
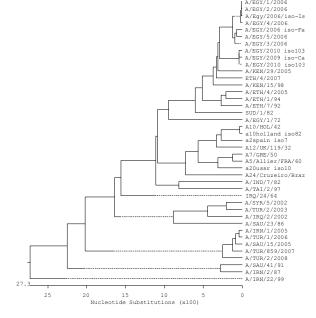


Fig. 5 Phylogenetic tree showing relationship among FMDV A depending on the virus complete 1D gene sequence



4. Discussion

FMDV represents an annual challenge in Egypt to the authorities, veterinarians and farmers. The virus causes the disease in sporadic cases in different areas. Monitoring the strains of FMDV is important to enable appropriate vaccine to be selected and control measures to be implemented as rapidly as possible. In this paper, virus samples from clinically infected cattle were tested by ELISA and RT-PCR. They were found to be either FMDV serotype O or A.

FMDV serotype A was detected in two epithelial samples from Ismailia and Dakhlia and one OP samples from Ismailia while serotype O was detected in 16 samples (Table 2). Recent articles [11, 14] recorded that serotype O and A still persist and circulating in Egypt. RT-PCR is an important diagnostic tool for laboratory detection. RT-PCR was performed by using specific primers for FMDV serotype O and A to amplify the VP1 coding region fragment of FMDV. The amplified fragments confirmed all ELISA positive samples for FMDV. FMDV was detected in 50 % of the collected samples. where 7.89% were serotype A from Ismailia and Dakhalia governorates while 42.1% were serotype O from Ismailia, Dahklia, Monofia and Sharkia. Phylogenetic analysis of isolates were performed to provide further characterization data and to support epidemiological investigation of the source of outbreak in the country. FMDV type A outbreak in Egypt in 2006 was due to indigenous African virus [15]. The molecular epidemiology of circulating viruses was monitored by sequencing the VP1 region of FMDV genome and comparing the recovered sequences to sequence data held in gene bank [16].

In this study, FMDV strains O/EGY/2010 iso1031- O/EGY/2010 iso1038 were homologous with the vaccinal strain O/EGY/2009 iso1 and had conserved amino acid residue at positions 198, where Glutamine replace the consensus residue Glutamic acid (Fig. 4). In addition, the Egyptian strains, constructed the phylogenetic tree, suffered variable residue between them at positions 161, 195, 197, nevertheless, these changes had no impact on the immunogenicity of these strains. Phylogenetic analysis revealed that the former strains were closely related to O1/Sharquia/EGY/72 and had the same lineage with the O Turkish Manisa strains with nucleotide sequence identity less than 5%. This analysis oppose the suggested concept of a constant evolutionary rate, where studies of FMDV types O, A and C in the Philippines and type A in Turkey have shown that the VP1 gene changes by approximately 1% per year [17]. The partial nucleotide sequence of

type O VP1 gene gave some informative content; however, it is worthiness in future to execute complete nucleotide sequence of 1D gene to have more data.

The sequenced samples of FMDV serotype A revealed that they were closely related to the vaccinal strain namely, A/EGY/2009 iso-Cai with homology 99.2% and they had no significant changes in amino acid residues between them (Fig. 5). However, at antigenic sites 40-60 and 140-160, deduced amino acids of serotype A 2009 and 2010 Egyptian strains in relation with the 2006 isolates showed several replacements (I 42 \rightarrow V, N 43 \rightarrow S, S 44 \rightarrow N, L 45 \rightarrow Q, P 141 \rightarrow S and A 156 \rightarrow P). Analysis of phylogenetic tree demonstrated that A/EGY/2010 strains have the same lineage with serotype A 2006 and 2009 strains and compose with the other compared African strains, the Africa topotype with more than 85% resemblance. It has been reported that serotype A could be grouped according to genetic and geographic distinct evolutionary lineage into three topotypes. (i) Euro-/SA; (ii) Asia and (iii) Africa, although occasional spread between these continents may take place [18].

From this study, it was found that FMDV serotypes O and A isolates collected in 2010 were closely related to the Egyptian FMD bivalent vaccinal strains, which were able to challenge the sporadic circulating variants. However, more clinical samples are required from all over the country to have a wide view on the molecular epidemiology of FMDV in Egypt.

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Effect of fringing filed on the internal stress field of nano cantilever beams in the presence of van der waals attractions

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Abstract: In this paper, effect of fringing filed on the internal stress field of nano cantilever beams is studied using homotopy perturbation method. The nano cantilever beam is considered as a distributed parameter model including intermolecular forces, electrostatic forces and fringing filed effects. In the modeling of intermolecular forces the van der Waals attraction and in the modeling of electrostatic forces, the fringing field effect is taken into account. By using the obtained polynomial solution, bending moment and shear force are calculated, for narrow and wide nano beams. Results shows that stress resultants enhances as the fringing field increases.

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Keywords: Nano-cantilever, Fringing field, Homotopy Perturbation, Stress, van der Waals.

1. Introduction

Micro and nanofabrication processes are planar technologies. Therefore, many micro and nano devices consist of beams and plates suspended horizontally over a substrate. On the microscale, suspended beams or plates serve as the active component of accelerometers, rate gyroscopes, pressure sensors, chemical sensors, electrical switches, optical switches, adaptive optical devices, resonators, electrostatic actuators, valves, and pumps (Mastrangelo, 1993). Conductive cantilever nanoactuators are one of the common components in developing nano-electromechanical system (NEMS) switches of nano technology (Ke, 2006). A typical form of NEMS actuator is a nano-beam which is suspended above a conductive flat ground (substrate). Applying voltage difference between the nano-beam and the ground plane causes the nano-beam to deflect downward and be attracted toward to the substrate. The inter-molecular forces significantly influence the deflection and internal stresses of nano-beam, at nano-scale separations (Soroush, 2010).

The van der Waals force results from the interaction between instantaneous dipole moments of atoms. It is significant when separation is less than the retardation length (typically below 20 nm) which corresponds to the transition between the ground and the excited states of the atom (Mastrangelo, 1993). The van der Waals force attraction is proportional to the inverse cube of the separation and is affected by material properties (Israelachvili, 1992) and (Koochi, 2011). Effect of van der Waals attraction on the instability of cantilever NEMS has been investigated by previous researchers (Mastrangelo, 1993), (Soroush, 2010) and (Koochi, 2011).

Design of reliable NEMS requires crucial knowledge about the mechanical stress field in the structure (Jonnalagaddaa, 2008) and (Pugno, 2005). If a nano-beam is not strong enough to bear internal stresses, it might deform or break under influence of electrostatic forces. All lamped models assumed the electrostatic and intermolecular forces uniform along the beam and therefore could not evaluate the internal stress resultants i.e. internal shear force and bending moment along the beam (Israelachvili, 1992).

The fringing field can highly affect electromechnical performance of NEMS (Soroush, 2010). The present paper considers the effect of fringing filed on the internal stress distribution of nano-beams in the presence of van der Waals attractions. The solutions obtained by homotopy perturbation method are compared with numerical results.

2. Mathematical model

Figure 1 shows a nano-cantilever beam, of length L with uniform rectangular cross section of thickness h and width w. the initial gap between the movable beam and the ground plane is g. The constitutive material of the nano-cantilever is

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assumed linear elastic and only the static deflection of the nano-beam is considered.

In our previous work we obtained the governing equation of nano cantilever beams subject to electrostatic and intermolecular forces in non dimensional form as follow (Soroush, 2010)

$$\frac{d^4u}{dx^4} = \frac{a}{(1-u(x))^3} + \frac{b}{(1-u(x))^2} + \frac{gb}{(1-u(x))}$$
(1-a)

subject to the following conditions

$$u(0) = u'(0) = 0,$$
 at $x = 0,$
 $u''(1) = u'''(1) = 0,$ at $x = 1,$ (1-b)

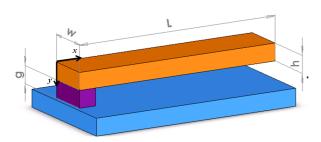


Fig.1. Schematic representation of a cantilever nano-beam

where x is nondimensional position along the beam measured from the clamped end, prime denotes differentiation with respect to x and u is non dimensional deflection. in equation (1) α , β and γ correspond to the values of Casimir force, applied voltage and fringing field respectively. The nondimensional constants are (Soroush, 2010)

$$a = \frac{AwL^{4}}{6pg^{4}E_{eff}I}, b = \frac{e_{0}wV^{2}L^{4}}{2g^{3}EI},$$

$$g = 0.65\frac{g}{w}, x = \frac{X}{L}, u = \frac{y}{g}$$
(2)

where $e_0 = 8.854 \times 10^{-12} c^2 N^{-1} m^{-2}$ is the permittivity of vacuum, V is the applied external voltage, y is the deflection of the beam and X is position along the beam. E_{eff} is the effective Young's modulus which is equal to $wh^3/12$, and I is the moment of inertia of the beam cross section (Soroush, 2010).

3. Stress resultants

Design of reliable NEMS requires crucial knowledge about the distribution of internal stress

over the length of the beam. The maximum value of shear stress and bending stress at the onset of instability are very important as the most critical state of stress in the engineering applications. Based on Euler beam theory, these parameters can be directly computed from stress resultants (Timoshenko, 1987). In order to determine critical values of stress resultants, we define F and M as the dimensionless maximum value of the shear force and bending moment at the onset of instability, respectively as follows

$$F = \frac{F_0 L^3}{E_{\text{eff}} Ig} \tag{3}$$

$$M = \frac{M_0 L^2}{E_{eff} Ig} \tag{4}$$

where F_0 and M_0 are shear force and bending moment at the cross-section of the beam fixed end (x=0). By these definitions, M and F equal to u'' (x=0) and -u''' (x=0), respectively (Timoshenko, 1987).

4. Analytical Solution

To convey the idea of the homotopy perturbation method, we consider a general equation of the type

$$O(u) = 0 \tag{5}$$

where O is an integral operator. We construct a convex homotopy structure H(u,p) as follows:

$$H(u,p) = (1-p)L(u) + pO(u)$$
 (6)

where L(u) is a functional operator with easily determined solutions v_0 . It is clear that H(u,0)=L(u) and H(u,1)=O(u). This shows that H(u,p) continuously traces an implicitly defined curve from a starting point $H(v_0,0)$ to a solution H(f,1). The embedding parameter increases monotonically from 0 to 1 as L(u)=0 continuously deforms into the O(u)=0. The homotopy perturbation method employs the embedding homotopy parameter p as an expanding parameter to obtain

$$u = \sum_{i=0}^{\infty} p^{i} u_{i} = u_{0} + p u_{1} + p^{2} u_{2} + \dots$$
 (7)

The best approximation for solution is

$$f = \lim_{p \to 1} u = \sum_{i=0}^{\infty} u_i$$
 (8)

Series (8) is convergent for most of the cases. A comparison of like powers of p gives appropriate solutions at various orders.

Integrating the Eq. 9(a-d), we get the following system of integral equations:

$$y(x) = 1 + \int_0^x y'(t)dt$$
, (9-a)

$$y'(x) = 0 + \int_0^x M(t)dt$$
, (9-b)

$$M(x) = A + \int_0^x F(t)dt, \qquad (9-c)$$

$$F(x) = B - \int_0^x \left(a \ y(x)^{-3} + b \ y(x)^{-2} + gb \ y(x)^{-1} \right) dt$$
(9-d)

Using relations (7) in Eq. 9(a-d), we have

$$\sum_{k=0}^{\infty} p^{k} y_{k} = 1 + p \int_{0}^{x} \left(\sum_{k=0}^{\infty} p^{k} y_{k}' \right) dt$$
 (10-a)
$$\sum_{k=0}^{\infty} p^{k} y_{k}' = 0 + p \int_{0}^{x} \left(\sum_{k=0}^{\infty} p^{k} M_{k} \right) dt ,$$
 (10-b)
$$\sum_{k=0}^{\infty} p^{k} M_{k} = A + p \int_{0}^{x} \left(\sum_{k=0}^{\infty} p^{k} F_{k} \right) dt ,$$
 (10-c)
$$\sum_{k=0}^{\infty} p^{k} F_{k} = B - p \int_{0}^{x} \left(a \sum_{k=0}^{\infty} p^{k} f_{k,3} + b \sum_{k=0}^{\infty} p^{k} f_{k,2} + g b \sum_{k=0}^{\infty} p^{k} f_{k,1} \right) dt$$
 (10-d)

The function $f_{k,n}$, which approximates the nonlinear term y_k^{-n} , is determined by Taylor series using Eq. (11) (Koochi, 2011).

$$f_{k,n} = \frac{1}{k!} \frac{d^k}{dp^k} \left[\left(\sum_{i=0}^{\infty} p^i y_i \right)^{-n} \right]_{p=0}, \quad (11)$$

Therefore, the polynomial solutions for F and M are obtained which can be summarized to

$$M(x) = A_{1} - A_{2}x + (a+b+bg)\frac{x^{2}}{2!}$$

$$-(3a+2b+gb)\frac{A_{1}x^{4}}{4!} - (3a+2b+gb)\frac{A_{2}x^{5}}{5!}$$

$$+\left(A_{1}^{2}(6a+3b+gb) + \frac{(3a+2b+gb)(a+b+gb)}{6}\right)\frac{x^{6}}{5!}$$

$$+ ...$$

$$F(x) = A_{2} - (a+b+bg)x$$

$$+(3a+2b+gb)\frac{A_{1}x^{3}}{3!} + (3a+2b+gb)\frac{A_{2}x^{4}}{4!}$$

$$-\left(6A_{1}^{2}(6a+3b+gb) + (3a+2b+gb)(a+b+gb)\right)\frac{x^{5}}{5!}$$

In the following text all results are calculated from eight terms of obtained Adomian polynomials.

5. Results

In order to verify the convergence of obtained series, the deflection of a typical nanoactuator is computed analytically and the solutions are compared with the numerical results those from (Soroush, 2010) in table 1. Figure 2, figure 3 and figure 4 are show the effects of fringing field for β =0.2 on F, M and cantilever tip deflection respectively. As seen, fringing field increases F and M of the cantilever.

6. Conclusion

Internal stress field of nano-cantilevers were computed using homotopy perturbation method. It is found that the intermolecular forces increase maximum shear force and bending moment at constant voltages. Intermolecular forces also, increase tip deflection of cantilever beams. Results shows that stress resultants enhances as the fringing field increases.

Table 1.The variation of the tip deflection of a typical beam obtained using different selected terms of homotopy perturbation series for α =0.3, β =0.2, and g/w = 1

Terms	Tip Deflection
6 Terms	0.0986
7 Terms	0.0870
8 Terms	0.0940
9 Terms	0.0886
10 Terms	0.0922
11 Terms	0.0898
12 Terms	0.0915
Numerical	0.0908 in (Soroush, 2010)

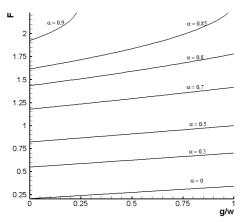


Fig.2. Effect of fringing filed and intermolecular force on the shear force at the fixed end of cantilever nano-beam when β =0.2

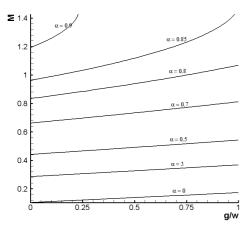


Fig.3. Effect of fringing filed and intermolecular force on the bending moment at the fixed end of cantilever nanobeam when β =0.2

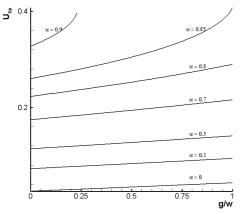


Fig.4. Effect of fringing filed and intermolecular force on the tip deflection of cantilever nano-beam when β =0.2

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Optimising Client Side Data Entry Process

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Abstract: Loss of data during data entry either by crashing or freezing is a common problem encountered in database data insert especially when there are many rows and columns of data to deal with and also when it is not appropriate to bind the data directly to the database. Techniques used in inserting data to the database include bulk load, row by row looping and the use of dataset together with data adapter. The dataset and looping techniques have been studied by comparing the time for data insertion. From the results it is concluded that the dataset technique should be used when the number of rows and columns grow beyond a threshold and below this threshold the row by row data insertion method marginally performs better. Journal of American Science 2011;7(7):440-444]. (ISSN: 1545-1003). http://www.americanscience.org.

Key Words: Dataset, Data adapter, AJAX, OPENXML, Bulk load, Constraint, Data integrity, Primary key.

1. Introduction

Many data entry personnel may have encountered data loss after clicking to save the entry. These encounters occur most often in an environment such as creating duty roster and other places where, as a result of data validation, the best practice dictates that all entries must be made before saving to the database. As the data rows grow in number, clicking the save button may frustratingly result in the application crashing by "hanging" instead of saving to the database. Whenever a situation like this arises, the data entry personnel may resort to "killing" the session by resetting thus losing the work done so far or wait for the system to resolve the problem at its own choosing. The latter option is extremely a time consuming exercise. Resetting and losing all the data may be acceptable where only few records are involved but not where the lines run in hundreds. This situation is relevant in applications where the data at entry is not directly bound to the database. There are situations where it may not be advisable to directly bind the data to the database and these include where data validation is top of the priority list and roster systems. Depending on the circumstance, the integrity of data may be compromised if the data is directly bound to the database and so open the database to corruption. In roster systems, before saving to the database, the roster manager needs to have full visibility of all data relating to the duty date so as to enable him juggle and reconcile staff qualifications, skills and experience to match the tasks available for the day.

The majority of work on database performance is on the server side, hardly can one find any work on http://www.americanscience.org

the client side where it is possible to lose hours of work if the system failed to save when required. Some of the approaches to optimisation of the server side include normalisation with the aim of keeping table indexing to a minimum, use of cursor and to a lesser extent, set theory. Even with the arrival of inexpensive storage devices, organisations would still have to guard that data does not grow in an exponential manner and also ensure that there is no loss in database performance. Others commission optimisation studies in order to have that extra edge over competitors.

Literature on client side performance is sparse. The few studies (Shah, 2007) on client performance focus their measurements on such issues as reducing the number of web pages by combining HTML pages with CSS files. Another technique found in the literature is the use of asynchronous processing to reduce full page reload and round trips to the database. In an asynchronous application response time is enhanced by the use of partial page reload which is essentially what happens with AJAX web application. Also found in the literature on client side performance is measurement studies where the focus is on memory usage reduction. (Koechley, 2007) discusses ways of improving web page retrieval including the removal of duplicate scripts and keeping AJAX cacheable. (Theurer, 2007 and 2011) investigated in experiments to find that it takes more than double the time to load all the cookie components on first visit to the server from the client side compared with subsequent visits. In another experiment Theurer showed that the time for cookie retrieval from the server to a page on the client side

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depends on the size of the page. The study found that retrieval time doubled when the page size changed from empty to 3kb. In his own study for pages with many small objects, (Hopkins, 2011) investigated how HTTP client site implementation affects page load time. But for (Achara, 2009) where results varied widely and there was no much effort to handle the resulting spikes, there is virtually no studies found on ways to handle data insertion to the database as the size of data grows.

2. Data Entry Methods:

There are various techniques of inserting data to the database but it is useful to know which method is most appropriate for use in each given situation. With the right method chosen, the database data entry process will benefit and the data insertion time optimised. Some of the methods used to insert data into a database include: batch insert, bulk load, traditional row-by-row looping and the use of the in memory dataset together with the data adapter.

2.1 XML Bulk Load:

XML Bulk Load is a stand-alone COM object that allows the user to load semi-structured XML data into database tables. XML data can be inserted into a database by using the INSERT statement and the OPENXML function. The Bulk Load Utility provides better performance when inserting large amount of data. Because the XML source document can be large, the entire document is not read into memory for bulk load processing. Instead, XML Bulk Load interprets the XML data as a stream. As the utility reads the data, it identifies the database table(s), generates the appropriate record(s) from the XML data source, and then sends the records, in the case of MS database, to the SQL Server for insertion (MS Library, 2010). XML Bulk Load can operate in either a transacted or a non-transacted mode. Performance is usually optimal when bulk loading in a non-transacted mode by setting the transaction property to false and either the tables to be bulk loaded are empty or have unique indexes. Once in the database, it is memory intensive if the requirement, as in this study, is to convert the XML dump data to appropriate data type.

Oracle has also implemented bulk load utilities as a UNIX-level command which is issued directly from the UNIX shell (Oracle, 2010).

2.2 Dataset:

The dataset is an in-memory cache of data retrieved from a data source for example database (MS Library, 2011). The dataset is an important http://www.americanscience.org

component of the ADO.NET architecture. The dataset may also be considered as a collection of data-table objects that use the data-relation objects to interact with one another. Data integrity can be enforced on the dataset using the unique constraint, primary and foreign key objects. Navigation between the data-tables in the dataset is achieved through data-relation objects. The dataset can read and write data schema as XML documents. The data and schema can then be transported across

HTTP and used by applications on any platform that is XML enabled.

The dataset has the ability to differentiate between Insert, Delete and Update queries. It uses the row-state property to decide what action to take. The row-state can be "Deleted", "Modified", "New" and "Unchanged". The data adapter is the bridge between the dataset and relevant table in the database. For each query to work, there must be a primary key defined. Each data-table in the dataset should come from one database table. If there is the need to return or save data from or to different database tables, then a data-table collection with each data-table object created from each of the relevant database tables may be used. The dataset can be manipulated using the data-column, the data-row, constraint and data-relation.

2.3 Looping Method:

In the looping process each row of the record is dealt with one after the other and it is the most common and traditional method of inserting and saving data originating from tabular controls to the database. This technique is known to lead to performance drop as the number of rows on the table grows. Some application developers resort to batch operation by looping through a smaller number of rows in each insertion round. Under this walk around, the application may not crash but could lead to more-complex coding for the developer and overall, longer processing time since the cumulative time will be the sum of all the time for each server trip, the time taken to reposition the cursor after each batch operation and the associated time overhead. Some application developers favour the row by row looping method arguing that it gives the developer more scope to control the data insertion process.

The purpose of this study is to compare the data insertion time to the database between the looping method and the in memory dataset particularly as the number of rows and columns in the database table grow and recommend which method to adopt in any given situation.

3. Resource Requirement and Method

The laptop used in this study has the following features:

- a. CPU: Intel (R) Core(TM)2 Duo P8600 @ 2.4GHz
- b. RAM: 4GB
- c. Hard drive: 283GB with 184GB free space.
- d. OS: Windows Vista 32-Bit

Test database: SQL Server 2005 Express relational database.

A test database was designed and built using MS SQLServer 2005 Express running on a standalone development laptop

For a given number of rows and columns the times for data insertion in the database using the looping and dataset techniques were measured and recorded. The influence of rows was studied by fixing the number of database fields (columns) and varying the row number. Similarly, the effect of columns was studied by keeping the row constant and putting the variation on the number of fields.

The application is web based and runs on Microsoft .NET2 framework and the code is written in VB/C##. In each run, the application records and displays on the screen the times just immediately before and after the data insert as well as the time difference. Even though in real life the user will enter the data on the key board, for the purpose of this study, to save time on typing, the data was code generated. This does not however in any way affect the results.

4. Result and Discussion

In the course of running the test, it was observed that there was a tendency for results obtained from runs conducted using the same number of rows and columns to produce spikes and thus vary widely. It was therefore decided, for a given number of rows and columns, to run the application for at least eight times and average the values. Consequently, the time plotted for each row in figures 1 to 4 below is such averaged values.

Figure.1 is the result of data insertion to the database using the looping technique plotted on time against number of rows for given number of columns (fields) in the database table.

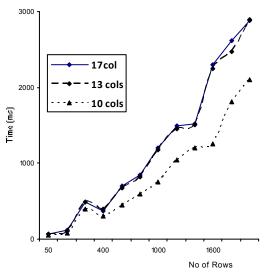


Figure.1 Time for Data Insert by Looping

Figure.2 is the result of data insertion to the database using the dataset technique plotted on time against number of rows for given number of columns (fields) in the database table.

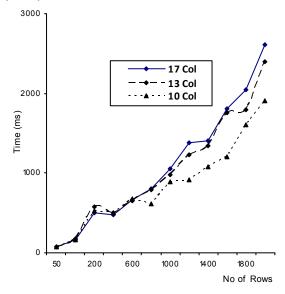


Figure.2 Time for Data Insert by Dataset

Figure.3 is the result of data insertion time comparison between the looping and the dataset methods for a database table having 10 columns.

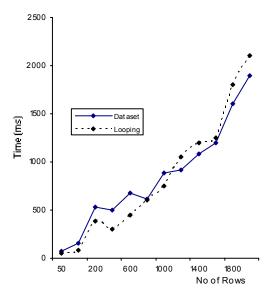


Figure.3 Dataset and Looping Comparison, 10 Columns

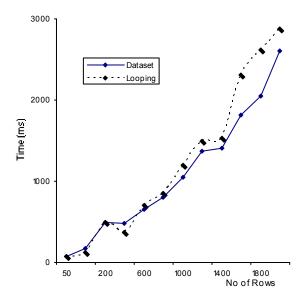


Figure .4 Dataset and Looping Comparison,
17 Columns

Figure. 4 is the result of data insertion time comparison between the looping and the dataset methods for a database table having 17 columns.

In figure.1 and figure.2, the time for insertion for any number of rows increases with increasing number of columns in the database table. Similarly for a given column in these two figures, the time for insertion increases with increasing number of rows.

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In figure 1 specifically, the time for data insertion between the plots for database table of 13 columns and a table of 17 columns can hardly be distinguished but the 13 columns plot is still marginally below the 17 columns plot. The time to insert data to the database in the 10 columns plot is however well below the other columns. In figure.2, below 400 rows the time for insertion for the database table of 17 columns plot falls below those of the table with 13 columns and 10 columns plots. This is not the trend that would be expected but it is thought that this is caused by the fixed overhead in using the dataset technique. This fixed overhead, it would appear, determines the time taken in saving the data when the row number is low. The result also appears to suggest that the time is independent of column number within this region.

In figure.3 and fig.4 the looping data insertion method to the database is compared with the dataset technique for given number of columns. On the whole, in each of the two figures, the time for insertion increases with increasing number of rows. In figure.3 which is plotted for a database table with 10 columns, below 1100 rows the dataset method performance is worse than the looping method. This may be attributed to the fixed overhead which is independent of any of the variables involved. Still on figure.3, above 1100 rows, the dataset data insertion method out performs the looping technique. figure.4 which is plotted for a database table with 17 columns, below 500 rows, the looping method performs better than the dataset data insertion method. The fixed overhead may also offer an explanation for this behaviour. Above 500 rows in figure.4, the dataset database data insertion method once more performs better than its looping counterpart.

5. Conclusion:

- 1. Two database data insertion methods, the looping and the dataset have been compared.
- 2. For a given number of database table columns, below a threshold of rows, the looping method marginally performs better than the dataset technique.
- 3. For a given number of table columns, above a threshold of rows, the dataset database data insertion method out performs its looping counterpart. This is the region in the data entry system where data entry personnel encounter data loss due to crashing.
- 4. The experiments have shown that the dataset method performs better as the number of rows as well as columns grows and therefore under conditions

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similar to this study, the dataset method should be employed when dealing with high number of rows and table columns.

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Physico- chemical properties of natural pigments (anthocyanin) extracted from Roselle calyces (*Hibiscus subdariffa*)

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Abstract: Physico-chemical properties of Roselle calvees (*Hibiscus subdariffa*) indicated that moisture content, protein, fat, fiber and ash were 12.81 %, 7.51%, 0.46 %, 11.17 % and 11.24 %, respectively. Mineral contents of K, P, Na Ca, Mg, Fe, Zn, Cu and Mn were detected at different levels. The results showed that the Roselle calyces powder more the red color. Besides, contained ascorbic acid (140.13 mg/100g), total anthocyanins (622.91 mg/100g) and total phenolics (37.42 mg/g dry weight). The DPPH scavenging capacity obtained from raw dried Roselle was 36.53 µ/ml. The extraction of natural pigments (anthocyanins) from Roselle calyces by different solvents (ethanol acidified with 1.5N/L HCl (85:15, v/v), ethanol acidified with 1% citric acid, citric acid, solution of 2% concentration and distilled water) were applied and pigments were analyzed for color, pH, total acidity, total soluble solids (T.S.S), total anthocyanins, total phenolic and antioxidants activity. The obtained results indicated that the highest yield of pigment recovered is considered the main goal in the extraction process. In addition to economic considerations, safety should be considered. Accordingly, water acidified with citric acid 2 % indicating anthocyanins yield of 1063 mg/100 g might be the best choice and the more preferable solvent compared with ethanol acidified with HCl which showed the highest yield i.e. 1386 mg/100 g dry weight. The results from this study showed that the greater the Roselle extracted by 2 % citric acid solution the more the red color intensity observed (a* 5.25). Results of these studies can be used to determine application of Roselle anthocyanins in a variety of food products as food colourants such as confectionery products, gelatin desserts, snacks, cake, pudding, ice cream and beverages.

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Keywords: Roselle calyces, extraction, anthocyanins, Physical properties, chemical properties.

1. Introduction:

Food colourants are either natural or synthetic depending on source. Natural colourants are extracted from renewable sources such as plant materials, insects, algae, etc, while the synthetic colourants are manufactured chemically and are the used dyes in the commonly pharmaceutical and cosmetic industries. Due to this limitation and worldwide tendency towards the consumption of natural products, the interest in natural colourants has increased significantly (Huck and Wilkes, 1996). Of special interest to the food industry is the limited availability of red pigments (Lauro and Francis, 2000), therefore research into natural sources of red pigments have increased recently.

Due to perceived safety and physiological advantage of the natural colourants over synthetic ones, interest are being geared into search of new natural colourants and the verification of the safety of existing ones. *Hibiscus sabdariffia* (also known as Roselle) is a tropical plant of considerable economic potential. Its calyces have been suggested as food colourants for food industries; emulsifier for

carbonated drinks, jam manufacture, juices and natural food colourants (**Duangmal** *et al.*, **2004**). The calyces are rich in anthocyanin, ascorbic acid and hibiscus acid. It is water soluble with brilliant and attractive red colour and with sour and agreeable acidic taste which aid digestion. The other health benefits of this plant include diuretic and choloratic properties, intestinal antiseptic and mild laxative actions. It also used in treating heart and nerve disorder, high blood pressure and calcified arteries (**Asolkar** *et al.*, **1992**).

Color is one of the most important quality attributes affecting the consumer's acceptance of food since it gives the first impression of food quality. Many convenience foods such as confectionery products, gelatin desserts, snacks, cake, pudding, ice cream and beverages would be colorless, and would thus appear undesirable without the inclusion of colorants (Hirunpanish et al., 2006). In this respect, Roselle calyces appear to be good and promising sources of water soluble red colorants that could be utilized as natural food colorants.

Roselle (*Hibiscus subdariffa* L.) is a tropical plant which belongs to the family *Malvaceae* and is

known in Egypt as *Karkadah*. It is probably a native of West Africa and is now widely cultivated throughout the tropics and subtropics e. g. Sudan, China, Thailand, Egypt, Mexico, and the West India (El-Saidy *et al.*, 1992).

In addition, Roselle juice, which is conventionally made from water extraction of fresh or dried Roselle calyxes, has been reported as being a popular soft drink with daily consumption in many countries including Egypt, Sudan, Mexico, Nigeria and Thailand (Aurelio et al., 2007).

The chemical components contained in the flowers of Hibiscus sabdariffa include anthocyanins, flavonoids and polyphenols (Tzu-Li Lin et al., 2007). The petals are potentially a good source of antioxidant agents as anthocyanins and ascorbic acid (Prenesti et al., 2007). Roselle calvx contains a rich source of dietary fiber, vitamins, minerals and bioactive compounds such as organic acids, phytosterols, and polyphenols, some of them with antioxidant properties. The phenolic content in the plant consists mainly of anthocyanins like delphinidin-3-glucoside, sambubioside, and cyanidin-3- sambubioside mainly contributing to their antioxidant properties (Aurelio et al., 2007). Recently, the biological activities of anthocyanins, such as antioxidant activity and anticarcinogenic activity have been investigated (Tsai et al., 2002).

The flowers of *Hibiscus sabdariffa* are rich in anthocyanins (Cisse *et al.*, 2009). The anthocyanins (Figure 1) are responsible for the red color, while the acid taste is due to the presence of some organic acids. Sepals' acidity may also contribute to their color variation.

Colour stability of anthocyanins depends on a combination of various factors including: structure of anthocyanins, pH, temperature, oxygen, light and water activity. Enzymatic degradation and interactions with food components such as ascorbic acid, sugars, metal ions, sulfur dioxide and copigments are no less important (Jackman and Simith, 1996).

It is used effectively in folk medicines for treatment of hypertension, inflammatory diseases and cancer (Tzu-Li Lin et al., 2007). The calyces are used to decrease blood viscosity and reduce hypertension (Christian et al., 2006). Hibiscus pigments reduce the incidence of liver lesions including inflammation, leucocyte infiltration and necrosis (Kong et al., 2003).

The antioxidant activity of Roselle extract is pH dependent (pH 2 to 7), the activity decreases as pH increases. However, at a constant pH, only a relatively small decrease in antioxidant activity and total phenolic content is observed (Sukhapat *et al.*, 2004).

R1 = O-Sugare (glucose, arabinose, galactose) R2, R4, R6 = OH R3 = H and R5, R7 = H, OH, OCH3 Figure 1. Structure of anthocyanins

The objectives of the present study were: extraction of natural pigments (anthocyanins) from natural plant sources such as Roselle calyces (Hibiscus subdariffa) by different solvents and determination of the efficiency of the solvents in the extraction of Roselle pigments. The main purpose of this study was to focus on determining the physicochemical properties of the major anthocyanins present in Roselle calyx. Results of these studies can be used to determine application of Roselle anthocyanins in a variety of food products as food colourants.

2. Materials and Methods

Materials:

Raw materials

-Calyces of Roselle (*Hibiscus subdariffa* L.) were used as source of the natural pigments investigated in the present study. The dried calyces of Roselle were purchased from a local market in Cairo, Egypt.

-The dried Roselle calyces were ground for 3 second using a blender (Braun KMM 30 mill), type 3045, CombiMax (Germany). The dried calyces were immediately packed in polyethylene bags and kept at low temperature (4°C) till used.

Chemicals

All chemicals used were at least analytical grade. 2, 2-diphenyl-1-picrylhydrazyl (DPPH), gallic acid, and citric acid were obtained from Sigma Chemicals Co. (St. Louis, USA). Anhydrous sodium carbonate (Na2CO3), Folin–Ciocalteu phenol reagent, hydrochloric acid (HCl), methanol, ethanol, ascorbic acid, sodium hydroxide and indophenols were obtained from Merck (Darmstadt, Germany).

Mineral standards

Standard solution (1000 ppm) of macro elements; potassium (K),calcium (Ca), sodium (Na), and magnesium (Mg) as well as micro-elements; copper (Cu), manganese (Mn), iron (Fe) and zinc (Zn) were provided by Merck (Darmstadt, Germany). The standards were prepared from the individual

1000 mg/L (Merck). Working standards were prepared from the previous stock solutions.

Extraction of anthocyanins:

Four solvents were compared in the extraction of pigments from Roselle calyces. The solvents evaluated were:

- 1. Ethanol acidified with 1.5N/L HCl (85:15, v/v).
- 2. Ethanol acidified with 1% citric acid.
- 3. Citric acid solution of 2% concentration.
- 4. Distilled water.

Extraction pigments were carried out according to the procedures described by **Du and Francis (1973) and Pouget** *et al.* **(1990).** Roselle calyces were removed from the refrigerator and ground into powders in order to increase the surface area for pigment extraction.

A suitable quantity (4.0 g) of Roselle calyces powder were immersed in 100 ml of the tested solvent and kept and 4 °C overnight. The mixture was filtered through a filter paper (Whatman No. 1) and the residue on the filter paper was reextracted for four times with suitable quantity of the solvent and water till the filtrate became almost colorless. The filtrates were collected and combined in a 500 ml volumetric flask and made up to volume with the extracting solvent.

Extraction of pigment:

Roselle pigments were extracted with solvent according to **Mattuk** (1998). One hundred gram of ground dried calyces were thoroughly mixed with a suitable amount of solvent in 500 ml flask and incubated overnight in the refrigerator at 4 °C. The soluble extract was filtered using Whatman No. 1 filter paper to obtain Roselle pigment extract. The properties of dried Roselle extract were determined:

Analytical methods:

Physical analysis:

Determination of color:

The color characteristics including (i) lightness (L), (ii) redness/greenness (\pm a), and (iii) blueness/yellowness (\pm b) of the calyces were measured by using a Hunter Lab. Model D25 color and color difference Meter according to **Hunter method** (1958). The machine was calibrated using black and white tiles and the samples were analyzed in triplicate.

Determination of pH:

The pH of Roselle calyx were measured using pH meter (model Cyber Scan 500) standardized with buffer solutions of 4.0 and 7.0 according to the method of **AOAC** (2000).

Total titratable acidity (TTA):

Total titratable acidity was expressed as % citric acid was determined by standard AOAC (2000) using 0.1 N NaOH and phenolphthalein as an indicator.

The total soluble solids (T.S.S):

The total soluble solids (T.S.S) ($^{\circ}$ Brix) of samples was determined according to **A.O.A.C** (2000) at room temperature (25 $^{\circ}$ C \pm 1) expressed as $^{\circ}$ Brix (0 - 90), was determined with a land Refractometer (ATAGO, Japan).

Chemical analysis:

Moisture, protein, fat, ash and fiber were determined according to the methods described in the **AOAC (2000).** Total carbohydrates calculated by differences.

Mineral contents, that is, copper (Cu), magnesium (Mg), manganese (Mn), iron (Fe) and zinc (Zn) were determined on aliquots of the solutions of the ash were established according to the method of AOAC (2000) using Atomic Absorption Spectrophotometer, Perkin-Elmer Model 2380 manufacture (USA). The flame photometer was applied for calcium (Ca), potassium (K) and sodium (Na) determination according to the method described by Pearson (1976).

Determination of ascorbic acid:

Ascorbic acid (vitamin C) was determined according to the indophenols method according to the indophenols method (AOAC, 2000).

Determination of Anthocyanins:

Total anthocyanins content of Roselle extract was determined colorimetrically according to the procedure described by **Du and Francis (1973)** where a known volume of the filtered extract was diluted to 100 ml with the extracting solvent. The colour intensity was measured at wave length of 520 nm for water and citric acid solution extracts and 535 nm for acidified ethanol using Spectrophotometer (model T80 x UVNIS Spectrometer PG Instruments Ltd) . The total anthocyanins content referred to cyanidin-3-glucoside was calculated using the following equation:

Total anthocyanins (mg/100g) =

Absorbance X dilution factor X 100 Sample weight X 55.9

Determination of total phenol:

Total phenolic (TPC) content was determined using the Folin-Ciocalteu (Kahkonen et al., 1999). Samples (300 µl; triplicate) were introduced into test tubes followed by 1.5 ml of Folin-Ciocalteu's reagent (10 times dilution) and 1.2 ml of sodium carbonate (7.5% w/v). The tubes were allowed to stand for 30 min before absorbance at 765 nm was measured. TPC was expressed as gallic acid equivalent (GAE) in mg per 100g of dry material. The calibration equation for gallic acid was y = 0.0111x - 0.0148 ($r^2 = 0.9998$), where y is absorbance and x is concentration of gallic acid in mg/l.

Total antioxidant activities:

Antioxidant activities of extracts measured included radical-scavenging activity. The methods were based on procedures described by **Chan et al.** (2007). Radical-scavenging activity was determined using the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay. Different dilutions of extracts (1 ml) were added to 2 ml of DPPH (5.9 mg/100 ml methanol). Absorbance was measured at 517 nm after 30 min. Radical-scavenging was calculated as EC_{50} and expressed as ascorbic acid equivalent antioxidant capacity (AEAC) in mg ascorbic acid /100 g.

AEAC (mg AA/100 g) = IC_{50} (ascorbate)/ IC_{50} (sample) × 10^5

The EC_{50} of ascorbic acid used for calculation of AEAC was 0.00387 mg/ml

Statistical analysis:

The data obtained from study was statistically subjected to analysis of variance (ANOVA) and means separation was by **Snedecor and Cochran (1980).** The least significant difference (L.S.D) value was used to determine significant differences between means and to separate means at p< 0.05 using SPSS package version 15.0.

3. Results and Discussion Chemical analysis of raw materials:

The results shown in Table (1) indicated that moisture content of naturally dried Roselle calyces was 12.81 %. Chemical analysis also showed that Roselle calyces contained 7.51, 0.46 and 11.17 % of protein, fat and fiber, respectively. Results given in the same table indicated that Roselle calyces had high

ash content which reached 11.24 %. The composition of the Roselle calyces was similar to referenced data, with some differences that may be due to genetic variety and type of soil (**Babalola** *et al.*, 2001).

Table 1. Chemical analysis of Roselle calyces (Hibiscus subdariffa) (% dry weight basis)

Constituent	% dry weight basis
Moisture	12.81±0.02
Protein	7.51±0.02
Fat	0.46±0.03
Crude fiber	11.17±0.02
Ash	11.24±0.02
Total carbohydrates*	69.62±2.0

^{*}Total carbohydrates: calculated by difference

The results are in agreement with those reported by (**Adenipeku**, **1998**) who showed that the calyces contain 11.33 % moisture and 6.90 % protein. The results indicate the nutritional content of calyces compared well literature value. Typical literature values are; carbohydrates (68.75 %), protein (6.71 %) and fat 1.01 %). This may be attributable to the source of calyces (**Ameh** *et al.*, **2009**).

Mineral composition of raw materials:

Table 2 shows the mineral composition of the Roselle calyces. In the minerals considered in this study K, Ca, and Mg had the highest value, Fe and P had the medium value, Na, Zn, Cu and Mn had the least value, while Ni and Co were not detected.

Table 2. Mineral composition of raw Roselle calyces (% dry weight basis)

Element	Macro-elements (mg/100g) ±SD
Potassium (K)	20.60±0.02
Phosphorus (P)	36.22±1.0
Sodium (Na)	6.62±0.02
Calcium (Ca)	912.15±2.0
Magnesium (Mg)	315.21±1.0
	Micro-elements (mg/100g)
Copper (Cu)	4.32±0.02
Manganese (Mn)	2.39±0.03
Zinc (Zn)	6.51±0.03
Iron (Fe)	37.80±1.0
Nickel (Ni)	ND
Cobalt (Co)	ND (CP)

-All values are means of triplicate determinations \pm standard deviation (SD).

ND: Not detection

⁻All values are means of triplicate determinations ± standard deviation (SD).

The trend indicates that the consumption of the Roselle calyces will took and active role in good bone and teeth formation and could be useful in blood formation.

Apart from giving the desirable color to the food, the colourants added reasonable quantity of K (2060 mg/100g) and Na (6.62 mg/100g) that is required to maintain osmotic balance of the body fluid and the pH of the body, muscle regulation and nerve irritability, glucose absorption control and enhancement of normal retention of protein during growth (Food and Nutrition Board, 2000). Similar quantities of these minerals had earlier been reported in vegetable minerals (Aremu et al., 2005, 2006).

Though the concentration of Fe and Zn were 37.80 and 6.51 mg/100g, the quantities are available for biochemical function. The daily recommended Fe requirements for humans are 10-15 mg for children, 18 mg for women and 12 mg for men (**Oluwaniyi** *et al.*, 2009).

Zinc plays an important role in human nutrition. Zinc deficiency results in retarded growth and delayed sexual maturation because of its role in nucleic acid metabolism and protein synthesis (Underwood, 1971). Therefore, sufficient intake of minerals and trace elements such as iron, zinc and calcium are important for ensuring optimal health, growth, and development of infants and young children

(Untoro et al., 2005)

The cupper was (4.32 mg/100g), the daily requirement is only 2 mg. Fe and Cu are present in cytochrome oxidase (enzyme) which is involved in

energy metabolism (NAS, 1976). Calcium is a coordinator among inorganic elements, for example excess amount of K, Mg or Na in the body can be corrected by Ca and also adequate quantity of Ca in the diet assist in Fe utilization (Fleck, 1976). The Mg and Ca value in the Roselle calyces are high which has 315.21 and 912.15 mg/100g, respectively. Mg is an activator of many enzymes systems maintains the electrical potential in nerves (Shills and Young, 1992). The mineral content of plants can be significantly influenced by variety, location, and environmental conditions (Rao, 1996).

Chemical and antioxidant properties of dried Roselle:

Chemical and antioxidant properties of Roselle calyces powder are shown in Table 3. From the results, CIE LAB color was measured with the following color coordinate lightness (L*), redness (a*, red-green) and yellowness (b*, yellow-blue). L*, a* and b* values. L*, a* and b* values of Roselle were 28.3, 71.0 and 45.9, respectively. The results from this study showed that the Roselle calyces powder the more the red color a* (71.0).

It was found that the dried Roselle contained the ascorbic acid, total anthocyanins as cyanidin 3-glucoside and total phenolics content which recorded 140.13 mg/100g, 622.91 mg/100g and 37.42 mg/g dry weight sample, respectively. The pH value was 2.73, % total acidity as citric acid was 18.85 and 13.5 °Brix total soluble solids (T.S.S). The DPPH scavenging capacity obtained from raw dried Roselle was 36.53 μ /ml (Table 3).

Table 3. C	Chemical and	l antioxidant	pro	perties o	f dried	Roselle	calyces	(on dr	y weight ba	sis)
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Properties of dried Roselle	(on dry weight basis) ±SD
Color	
L*	28.3±1.0
a*	71.0±2.0
b*	45.9±2.0
рН	2.73±0.02
Titratable acidity (% as citric acid)	18.85±2.0
Total soluble solids (°Brix)	13.5 ±1.0
Ascorbic acid (mg/100g)	140.13±3.0
Total anthocyanin content (as cyaniding-3-	622.91±2.0
glucoside (mg/100g)	
Total phenolic content as gallic acid (mg/g)	37.42±2.0
DPPH, IC ₅₀ (μ/ml)	36.53±2.0

⁻All values are means of triplicate determinations \pm standard deviation (SD).

It is well known that Roselle extract is characterized by its sour taste. This is confirmed by the total acidity of Roselle calyces which was as high as 18.85 %. In the same ways, pH value was a low as 2.73.

The results in (Table 3) are consistent with the fact that calyces are rich in vitamin C (141 mg/100g). This may be attributable to the source of calyces (**Wong** *et al.*, **2002**). This indicated that Roselle has a higher content of ascorbic acid than

guava, orange and mango. (**Tee** *et al.*, **1997**). Vitamin C content of Roselle calyces is related to the state of freshness or dryness.

Wills et al. (1998) reported that the pH value of Arab Roselle was 2.62. The pH depends on the concentration of free H ions or mirrored the changes in total organic acids. The free state of H ions is due to dissociation of H ions from the carboxylic group (- COOH) of organic acid. This increase in pH throughout maturation was due to a metabolic process in the fruits that resulted in the decrease of organic acids. This is because organic acids are an important source of respiratory energy in plant cell.

The amount of phenolic compounds in the raw Roselle was 37.42 mg/g dry weight (Table 3) is similar to that found by Mazza, et al. (1999) in various fruits such as strawberries and currants. Ascorbic acid and other phenolic compounds are good for health maintenance and prevention of disease (Ames et al., 1993).

Extraction efficiency of anthocyanins from Roselle calyces as affecting by the type of solvents:

Several solvents were compared in order to use the most effective one for extracting the pigments for Roselle calyces.

Ethanol acidified with 1.5 N/L HCl (85:15), ethanol acidified with 1% citric acid, 2 % citric acid solution and distilled water were used in extracting the pigments from Roselle calyces. The yields of pigments recovered with the different solvents are

shown in Table (4). Addition of acids to water or ethanol increased the efficiency of anthocyanins extraction compared with distilled water alone. In general HCl was more effective than citric acid. Ethanol acidified with HCl, showed the strongest influence on the amount of anthocyanins extracted, followed by 2 % citric acid solution and ethanol acidified with 1 % citric acid.

The same results showed that the yields of anthocyanins, using ethanol acidified with HCl, ethanol acidified with1 % citric acid and 2 % citric acid solution, were 1386, 1063, and 693 mg anthocyanins per 100 g Roselle calyces, respectively. While distilled water extracted only 545.39 mg/100 g dry weight. Similar data were reported by **Mattuk** (1998).

It could be concluded that adding acid to the extraction medium had a great effect in stabilizing anthocyanins, thus the extraction efficiency increased. The highest yield or content of natural anthocyanins pigment was obtained when extraction was performed using acidified ethanol while the extraction by water only gave the minimum yield. Acidification with HCl serves to maintain a low pH, thereby providing a favorable medium for the formation of flavylim chloride salts from simple anthocyanins and improving the efficiency of anthocyanins extractions. However, the use of mineral acids such as HCl may alter the native form of complex pigments by breaking associations with metals or copigments (Mattuk 1998).

Table 4. Extraction efficiency of anthocyanins from Roselle calvees as affected by the type of solvent

Extracting solvents	Yield of anthocyanins*			
Ethanol acidified with 1.5 N/L HCl (85: 15)	(mg/100 g) 1386			
Ethanol acidified with 1 % citric acid	693			
2 % citric acid solution	1063			
Distilled water	545.39			

^{*}Based on dry weight

These observations reveal that the pH value is a very important factor affecting the extraction of anthocyanins indicating that at lower pH values anthocyanins yield was the highest. **Bronnum-Hansen and Flink (1985)** reported similar results where they noted that the efficiency of extracting solvent increased with increasing the concentration of citric acid and concluded that pH of extracting medium was the determining factor for anthocyanins extractability.

Extraction of anthocyanins is commonly carried out under cold conditions with methanol or ethanol containing a small amount of acid with the objective of obtaining the flavylium cation form, which is red and stable in a highly acid medium.

However, acid may cause partial hydrolysis of the acyl moieties in acylated anthocyanins, especially in anthocyanins acylated with dicarboxylic acids such as malonic acid (Bronnum-Hansen and Flink 1985).

Ethanol is another good solvent for polyphenol extraction and is safe for human consumption (Shi1 et al., 2005). In preparing anthocyanin-rich phenolic extracts from plant materials, an acidified organic solvent, most commonly methanol or ethanol is used. This solvent system denatures the cell membranes, simultaneously dissolves the anthocyanins, and stabilizes them. However, care should be taken to avoid addition of excess acid which can hydrolyze labile, acyl, and sugar residues during concentration steps. To obtain

the best yield of anthocyanin extraction, weak organic acids, such as formic acid, acetic acid, citric acid, tartaric acid and phosphoric acid, and low concentrations of strong acids, such as 0.5-3.0% of trifluoroacetic acid and < 1.0% of hydrochloric acid are recommended (Nicoue et al., 2007). In addition, sulfured water has also been used as extraction solvent in seeking a reduction of the use of organic solvents as well as the cost of extraction (Cacace and Mazza, 2002).

The polar character of anthocyanins makes them soluble in several types of polar solvents such as methanol, ethanol, acetone, and water. Solvent extraction of anthocyanins is the initial step in the determination of total and individual anthocyanins prior to quantification, purification, separation, and characterization (Rivas-Gonzalo, 2003) generally involves the use of acidified methanol or ethanol. Even though ethanol is less efficient and more difficult to eliminate later, it would be preferred for food use, because methanol is toxic. The use of acid stabilizes anthocyanins in the flavylium cation form, which is red at low pH (Rivas-Gonzalo, 2003). However, solvent acidified with hydrochloric acid may hydrolyze acylated anthocyanins, which explains why it has been overlooked in the past that many anthocyanins are acylated with aliphatic acids (Strack, and Wrav. 1989). To avoid or at least minimize the breakdown of acylated anthocyanins, organic acids such as acetic, citric, or tartaric acids, which are easier to eliminate during anthocyanin concentration, have been preferred (Strack, and Wray, 1989)

The extraction of anthocyanins using ethanol acidified with citric acid (0.01%) instead of hydrochloric acid was reported by Ethanol would be preferred for food use to avoid the toxicity of methanolic solutions. Citric acid is less corrosive than hydrochloric acid, chelates metals, maintains a low pH, and may have a protective effect during processing (**Timberlake and Bridle, 1980**).

The extracting solution should be slightly acidic to maintain the flavylium cation form, which is red and stable in highly acidic medium, but not too acidic to cause partial hydrolysis of the acyl moieties in acylated anthocyanins (Andersen and Markham, 2006).

The main objective of the present experiment was to close the solvent that is more suitable in pigment extraction from Roselle calyces on commercial applications. In fact, the highest yield of pigment recovered is considered the main goal in the extraction process. However, in addition to economic considerations, safety should be considered. Accordingly, water acidified with citric acid 2 % indicating anthocyanins yield of 1063

mg/100 g might be the best choice and the more preferable solvent compared with ethanol acidified with HCl which showed the highest yield i.e. 1386 mg/100 g dry weight.

Physico- chemical properties of Roselle plant extracted by different solvents: Color:

Table 5 shows physical and chemical properties of Roselle plant extracted by different solvents. From the results, CIE LAB color was measured with the following color coordinate lightness (L*), redness (a*, red-green) and yellowness (b*, yellow-blue). L*, a* and b* values of Roselle extracted by ethanol acidified with 1.5 N HCl (85:15) were 2.72, 4.79, 1.81, respectively; L*, a* and b* values of Roselle extracted by ethanol acidified with 1 % citric acid were 2.00, 3.36 and 1.33, respectively; L*, a* and b* values of Roselle extracted by 2 % citric acid solution were 3.43, 5.25 and 1.74, respectively and L*, a* and b* values of Roselle extracted by distilled water were 2.08, 3.23 and 1.39, respectively. The results from this study showed that the greater the Roselle extracted by 2 % citric acid solution the more the red color intensity observed (a* 5.25) followed by ethanol acidified with 1.5 N HCl were (a* 4.79). It was found that the distilled water extraction to less brilliant red in color (a* 3.23) and also less the amount of total anthocyanin contents.

It could be concluded that the Roselle extracted by 2 % citric acid solution showed that the more the red color intensity. The results showed that the Roselle calyces contained natural constituents of organic acid such as malic, citric and 3-indlyl acetic acids (AL- Khtani and Hassan, 1990) which played an important role in giving brilliant red color of sample extract

pH value and titratable acidity (as citric acid %):

The results in Table (5) showed that the pH was in the range of 2.70 to 2.82.

It is well known that Roselle extract is characterized by its sour taste. The extraction by 2 % citric acid solution exhibited high acidity were 19.82 %, followed by ethanol acidified with 1 % citric acid (18.93 %). This increase in acidity may be due to the extraction of anthocyanin by citric acid Table (5).

Total soluble solids (TSS):

As seen in Table (5), the Roselle plant extracted by different solvents exhibited varying degree of total soluble solids. The ethanol acidified with 1.5 N HCl (58:15) extracts from the Roselle plant exhibited higher total soluble solids (T.S.S) than did the other solvents. Total soluble solids content were (20 °Brix), followed by ethanol acidified with 1 % citric acid (16 °Brix) and 2 %

citric acid solution were (12 °Brix) .While the distilled water extraction to less in T.S.S (5 °Brix).

Anthocyanins:

The anthocyanin pigments content recovered with the different solvents are shown in Table (5). In general HCl, was more effective than citric acid. Ethanol acidified with 1.5 N HCl, showed the strongest influence on the amount of anthocyanins extracted (1386 mg/100g dried Roselle), followed by 2 % citric acid solution (1063 mg/100g dried Roselle) and ethanol acidified with 1% citric acid (693 mg/100g dried Roselle). While distilled water extracted only 545.39 mg/100g dried Roselle).

The results are in agreement with those reported by Mattuk (1998) reported that the highest yield or content of natural anthocyanin pigment was obtained when extraction was performed using acidified ethanol followed by acidified water then ethanol while the extraction by water only gave the minimum yield.

It has been demonstrated that in acidic media, four anthocyanthin structures, including the flavylium cation, the quinonoidol base, the carbinol pseudbase and chalcone, exist in quilibrium. And at pHs below 2, the anthocyanthin exists primarily in the form of the red flavylium cation. As the pH is raised (≥ 4.5), a rapid portion loss occurred to yield blue quinonoidal forms (Mazza and Miniati, 1993). Total phenols:

As plant polyphenolic constitute one of the major groups of compounds acting as primary antioxidants or free radical terminators, the total amount of phenolic compounds in the Roselle extracts was determined using the Folin- Ciocalteu method. to obtain a crude estimate of the amount of phenolic compounds present in an extract, phenolic compounds respond differently to the Folin-Ciocalteu reagent, depending on the number of phenolic goups they have (Singlton et al., 1999). As shown in Table (5), all extracts contain high amount of content, to which their antioxidant activity may be ascribed. As seen in Table (5), the Roselle plant extracted by different solvents exhibited varying degrees of total phenolic content. The ethanol acidified with 1% citric acid extracts from the Roselle plant exhibited higher total phenolic than did the other solvents.

Total phenolic content were (45.06 mg/g as gallic acid), followed by ethanol acidified with 1.5 N HCl, (85:15) were (42.00 mg/g as gallic acid) than did the other solvents the difference is probably due to the characteristics of the solvent: this could affect which compounds are extracted from the plant mature. As the polarity of the solvent increases, higher extraction yields of total extractable phenolic

compounds were obtained were obtained (Esa et al., 2010).

The results are in agreement with those reported by (Shil et al., 2005) reported that the ethanol is good solvent for polyphenol extraction and is safe for human. In preparing anthocyanin rich phenolic extracts from plant materials, an acidified organic solvent, most commonly ethanol or methanol is used.

Previous studies have shown that the developmental stage of the plant may affect biosynthetic pathways of phenolic compounds this could then affect the total contents (**Krizman** *et al.*, **2007**).

Antioxidants:

DPPH free radical scavenging activity

The stable DPPH radical has been used widely for the determination of primary antioxidant activity that is the free radical scavenging activities of pure antioxidant compounds, plant and fruit extracts and food materials. The assay is based on the reduction of DPPH radicals in methanol which causes an absorbance drop at 517 nm. In this study, the antioxidant activity was expressed as ascorbic acid equivalent antioxidant capacity (AEAC) in mg ascorbic acid /100 g. of plant material on a dry basis.

As seen in Table (5), the Roselle plant extracted by different solvents exhibited varying degrees of antioxidant activity. The ethanol acidified with 1% citric acid extracts from the Roselle plant exhibited higher value in total antioxidant activity expressed as the lowest of the amount of sample (μ/ml) needed for 50 % decrease of the initial DPPH concentration (EC₅₀) were 42.77 (μ /ml), which was significantly greater antioxidative effect than those other solvents followed by ethanol acidified with 1.5 N HCl. (85:15) were (43.18 µ/ml). The difference is probably due to the characteristics of the solvent: this could affect which compounds are extracted from the plant mature. This phenomenon can be explained by a change in polarity of the antioxidant compounds due to particular solvent used for extraction. As the polarity of the solvent increases, higher extraction yields antioxidant compounds (Esa et al., 2010). Christian and Jackson (2009) reported that the high antioxidant activity observed in the Roselle could be due to the high ascorbic acid content of this Roselle.

Preferably formed under acidic conditions, these weak chemical associations can augment anthocyanin stability and increase antioxidant properties (Molien-Aubert et al., 2001). The antioxidant activity of Roselle extract is also pH dependent (pH 2 to 7), the activity decreased as pH increases. However, at a constant pH, only a relatively small decrease in antioxidant activity content is observed (Sukhapat et al., 2004). Tee et

al. (2002) assessed the antioxidant properties of Hibiscus by comparing its activity with those of BHA and β -carotene. The results showed that the Hibiscus extract had stronger antioxidant activity than BHA or tocopherol in a linoleic acid model system.

Duh and Yen (1997) reported that the calvces of Roselle possessed high contents of phenolic compounds. The water extract of calyces also showed good hydrogen donating abilities, indicating that they had effective activities as radical scavengers. It is known that Roselle calvees samples are very rich in vitamin C, anthocyanins, polphenols and other water-soluble antioxidants (Duke and Atchley, 1984). The antioxidant properties of herbs may be attributed to the plant pigments that are the main components of each herbal extract. The red pigment presented in the flowers of Hibiscus species (cyanidin-3-glucoside anthocyanins delphinidin-3- glucoside) which may act as an antioxidant (Ho, 1992).

Hibiscus sabdariffa L. which contained high phenolic compounds exhibited high antioxidant activity when determined by DPPH assays. It, thus, confirms that phenolic compounds have an important

role in antioxidant activities (Harborne, 1998). A good correspond between antioxidant activity and phenolic compounds were found in Bulgarian medicinal plants (Ivanova et al., 2005).

4. Conclusion

The obtained results indicated that the highest yield of pigment recovered is considered the main goal in the extraction process. In addition to economic considerations, safety should considered. Accordingly, water acidified with citric acid 2 % indicating anthocyanins yield of 1063 mg/100 g might be the best choice and the more preferable solvent compared with ethanol acidified with HCl which showed the highest yield i.e. 1386 mg/100 g dry weight. The results from this study showed that the greater the Roselle extracted by 2 % citric acid solution the more the red color intensity observed (a* 5.25). Results of these studies can be used to determine application of Roselle anthocyanins in a variety of food products as food colourants such as confectionery products, gelatin desserts, snacks, cake, pudding, ice cream and beverages.

Table 5. Physico- chemical properties of Roselle plant extracted by different solvents (±SD)

Properties of dried Roselle	Ethanol	Ethanol	2 % citric acid	Distilled water	LSD at 5 %
extract	acidified with	acidified with	solution		
	1.5 N HCl	1 % citric acid			
	(85:15)				
<u>Color</u>					
L*	2.79 ± 0.03^{b}	2.00 ± 0.02^{c}	3.43 ± 0.03^{a}	2.08 ± 0.02^{c}	0.02
a*	4.79 ± 0.02^{b}	3.36±0.03°	5.25 ± 0.02^{a}	3.23 ± 0.03^{d}	0.02
b*	1.81 ± 0.02^{a}	1.33±0.03 ^d	1.74 ± 0.03^{b}	1.39±0.03°	0.02
рН	2.82±0.03 ^a	2.70±0.03°	2.71 ± 0.02^{bc}	2.73 ± 0.02^{b}	0.02
Titratable acidity (as citric acid	11.58±0.02 ^b	18.93±1.01 ^a	19.02±1.0 ^a	18.85±1.0 ^a	1.64
%)					
Total soluble solids (°Brix)	20.00±2.0a	16.00±1.0 ^b	12.00±1.0°	5.00±0.03 ^d	1.88
Total anthocyanin content (as	1386±4.0°	693±3.0°	1063±3.0 ^b	545.39±2.0 ^d	17.88
cyanin-3- glucoside mg/100g					
dried Roselle calyces)					
Total phenolic contents, as	42.00±2.0°	43.06±1.0 ^a	41.72±2.0 ^a	38.39±2.0 ^b	2.49
gallic acid (mg/g)					
DPPH, EC ₅₀ (μ/ml)	43.18±2.0 ^b	42.77±2.0 ^b	44.53±2.0 ^{ab}	45.64±2.0 ^a	<u>1.88</u>

⁻All values are means of triplicate determinations \pm standard deviation (SD).

⁻ Means within rows with different letters are significantly different (P < 0.05).

EC₅₀: The amount of sample (μ/ml) needed for 50 % decrease of the initial DPPH, concentration

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Can the freshwater crayfish eradicate schistosomiasis in Egypt and Africa?

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Abstract: Schistosomiasis is a chronic, parasitic disease, infecting more than 207 million people, mostly from Africa, with an estimated 700 million people at risk in 74 endemic countries. One of strategies to eradicate this disease is biocontrol of its vector snail. Lab experiments and field survey have been carried out to investigate the impact and the relationship between the exotic crayfish; *Procambarus clarkii* and *Schistosoma* vector snails in Egypt. In the Lab, several species of freshwater snails, fish and aquatic plants were reported to serve as food for the freshwater crayfish. In the field, a survey for the crayfish and freshwater snails has been conducted at several irrigation channels in Qalyobiya, Ismailia and Behera governorates, which had been previously surveyed during 1990s. The results of the experimental Lab indicated that the vector snails; *Biomphalaria alexandrina*, *Bulinus truncatus* and *Limnaea natalensis* were the preys of first choice for the crayfish. The fields surveys showed high reduction and sometimes complete disappearance of vector snails in irrigation channels, which have been invaded by *Procambarus clarkii*, while in water courses which do not harbor the crayfish, such as El Manayef drain and Fayed canal (West of Suez Canal), high densities of these vector snails were recorded. The present study is providing encouraging indication of the possible overcoming schistosomiasis and fascioliasis in Egypt and whole Africa by the freshwater crayfish *Procombarus clarkii*. New estimates of the Egyptian Ministry of Health indicated that the percent of infected people decreased significantly to only 4% comparing to 45% during 1960s.

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Keywords: Procambarus clarkii, Biomphalaria alexandrina, Bulinus truncatus, Limnaea natalensis, crayfish, schistosomiasis, fascioliasis, Egypt, Africa.

1. Introduction

Schistosomiasis is a chronic, parasitic disease caused by blood flukes of the genus Schistosoma. More than 207 million people are infected worldwide, with more than 90% of the cases occurring in Africa, at poor communities without access to safe drinking water and adequate sanitation (Hotez, 2008, 2009; WHO, 2011). An estimated 700 million people worldwide may be at risk of infection in 74 endemic countries as their agricultural, domestic and recreational activities expose them to infested water (Hotez and Kamath, 2009). One of strategies to eradicate this disease is biocontrol of their vector snails.

On the other hand, a field survey for the exotic freshwater crayfish was carried out along the River Nile, for the first time since its accidental introduction to Egypt during early 1980's, by **Ibrahim** *et al.* (1996). They found that the crayfish has established viable populations in the aquatic ecosystems of Giza, Cairo and some Nile Delta Governorates. The coefficients of condition values have indicated the suitability of the new environment for the exotic crayfishes with regard to feeding condition.

In the Lab, **Ibrahim** *et al.* (1995) studied the feeding behavior of the exotic crayfish *Procambaraus clarkii* and its prospect in the

biocontrol of local vector snails and they found that smaller snails were easier preys to be attacked by the crayfish. Moreover, **Huner and Barr (1983)** and **Mc Clain et al. (1993)** studied the selectivity of this species for combating certain freshwater snails, which are vectors of parasitic diseases. Moreover, *P. clarkii* has been also known for its outstanding feeding capacity on some aquatic pest weeds (**Groves, 1985**).

On the other hand, distribution, density and population seasonal fluctuation of *Biomphalaria alexandrina* and *Bulinus truncatus* snails, the intermediate hosts of *Schistosoma mansoni* and *Schistosoma haematobium*, respectively were studied by **Yousif et al.** (1993a, b, 1998 and 1999) in several irrigation canals in Qalyobiya, Giza and Ismailia Governorates. The results of these studies showed considerable high densities and distribution of both snail species in most water courses of the study areas. The crayfish has been introduced into many of these channels, and some observations have showed that this animal has adversely affected the densities of the freshwater snails.

So, the objective of the present study was to evaluate the impact of the freshwater crayfish on the above vector snails at certain water courses in Ismailia, Qalyobiya and Behera Governorates. Moreover, the feeding capacity and behavior of this

crayfish - in the Lab - to different plant and animal species living in the River Nile were also examined.

2. Materials and Methods

A. Laboratory experiments:

Large numbers of adult crayfish *P. clarkii* of different sizes were collected from several Nile water courses at Giza Governorate. They were transferred to the laboratory and maintained in glass aquaria (50 x30 x20 cm) filled with continuously aerated dechlorinated tap water.

Eight species of freshwater snails including Biomphalaria alexandrina, Bulinus truncatus, Limnaea natalensis, Physa acuta, Bellamya unicolor, Cleopatra bulimoides, Melanoides tuberculata and Lanistes carinatus; in addition to a fish species Oreochromis niloticus and three aquatic plants namely, Lemna perpusilla, Ceratophyllum demersum and Elodea canadensis were introduced to the crayfish aquaria in combination. These organisms were collected from the same water courses from where the crayfish was obtained.

Four fully mature crayfish (4.5 - 6.5 cm) in carapace length) with only one small specimen (3.0-3.5 cm) carapace length) were placed in groups in the aquaria. Four replicates were set up; each aquarium was filled to 1/6 of its capacity with dechlorinated water and was used for the eight snail species (10 individuals) for each species) and one individual of the fish species and 3 different plant species.

Water of the aquaria was changed every other day. The feeding activity and the reaction of the crayfish towards each of the examined species were watched for seven weeks and the devoured specimens were reported daily and photographed.

B. Field survey:

Ten irrigation water courses (tertiary channels) reaching 5.5 Km long, 4 of them, namely El-Wehda, El-Galaa (East of El-Morra Lake in Sinai; 15 Km from Ismailia City), El-Manayef drain, Fayed canal (West of Suez canal, 6 Km to the South of Ismailia City) in Ismailia Governorate, 2 canals, namely Sanafeer and Sendebis in Qalyobiya Governorate, 4 canals, namely 7-El Hamamee, 7-7-El Hamamee (Abou Homoss District), El-Hadad El-Baharee canal and Drain No. 22 (Housh Esa District) in Behera Governorate were surveyed during this study, using the standard dip net (33 x 33 Cm), which was described by **Yousif** *et al.* (1992). The distance between each two following sampling sites was 25 meters (4 sites / 100 m.). At each sampling site 3

adjacent dip nets were taken, covering a length of about one meter.

At each channel, the collected snail samples were put in plastic containers, preserved in 5% neutral formalin and transferred to the laboratory for identification and counting.

C. Statistical Analysis:

The obtained results were subjected to analysis of variance (ANOVA) using Microsoft Office Excel, Program 2003 Ver. 7.

3. Results and Discussion

The data obtained from laboratory experiments and field observations indicated that *P. clarkii* is a polytrophic animal that can serve as an effective agent for controlling schistosomiasis and other snail borne parasitic diseases. It has a large feeding capacity to any freshwater biota, even dead organisms.

The results shown in Table (1) indicate that the crayfish consumes large numbers of snail species, hydrophytes and the offered fish that are commonly found in freshwater canals in Egypt. Regarding the snails, the crayfish tends to be selective according to shell hardness and the size of the snail. Therefore, the snails, B. alexandrina, P. acuta, L. natalensis and B. truncatus were preferred preys to be attacked by P. clarkii (Fig. 1). This is primarily because the shell is thin and easy to break, before getting to the soft parts. They usually crush the shell between their large claws and eat the soft body of the snail; though Ibrahim et al. (1995) reported that P. clarkii has been observed to devour the whole animal with its shell. It was also noticed from the present study that the crayfish could devour ten large-sized snails from each of the first four snail species (Table 1) during the first day only. The operculated snails *Cleopatra* bulimoides, Bellamva unicolor and Melanoides tuberculata came next to the former group in food preference of the crayfish, but after fullness the crayfish never attacks the latter snail group. Lanistes carinatus was more resistant to the crayfish attack due to its shell hardness and the bigger size. However, after a period of starvation for 6 weeks, the crayfish through the help of its chelipeds could orientate the snail in a suitable position so as to gain access to its retracted soft parts, leaving the empty shell and operculum.

Regarding the fish as a source of food to the crayfish, it was noticed that it can devour only the dead fish (Table 1) after consuming the non operculate snail species.

Food types Quantity Food consumption / day Total food consumption 7 5 6 (during one week) 1-Biomphalaria alexandrina 10 10 10 10 10 10 2- Bulinus truncatus 10 10 10 3- Limnaea natalensis 4- Physa acuta 10 10 10 2 5-Cleopatra bulimoides 10 5 3 10 6- Bellamya unicolor 10 3 3 2 10 2 7- Melanoides tuberculata 10 4 3 1 10 10 8- Lanistes carinatus 9- Oreochromis niloticus 1 1 1 10- Lemna perpusilla High density all ---all 2 1 3 11- Ceratophyllum demersum 3 branches 12- Elodea canadensis 3 branches 1 3

Table (1): Food consumption of *Procambarus clarkii* to different aquatic species in the laboratory

On the other hand, the crayfish is known to consume most species of aquatic plants that can be considered an essential part of its diet (Groves, 1985; Bishop, 1992). During the present study, *P. clarkii* consumed all species of aquatic plants that were added in their aquaria. Moreover, Ibrahim et al. (1995) reported that *P. clarkii* fed actively on *Elodea canadensis*.

Cannibalism phenomenon is very common among crayfish individuals (**Groves**, 1985). Results of the Lab experiment showed that when 5 crayfish (4 large-sized and one small-sized) were left without supply of favorite food (easy preys) for about 10 days, the smaller one were devoured by the others (Fig.2). **Ibrahim** *et al.* (1995) reported that cannibalization happens primarily during molting and aggressiveness of parent against the offspring when they are hungry.

The analyses of variance (ANOVA) for the experimental results showed a high significant reversible correlation between the presence of the

crayfish and disappearance of vector snails in all replicates at p < 0.05.

On the other hand, field surveys during the present study showed that the crayfish populations were successfully established in many water courses along the River Nile, and in some of the newly habitats in Sinai through the irrigation system.

The results in Table (2) indicate that P. clarkii appeared in 6 canals, with densities of 10, 4, 20, 2, 8 and 2 in El-Wehda, El-Galaa, Sanafeer, Sendebis, El-Hadad and Drain N° .22, respectively in three governorates. In El-Wehda canal, in the east of El Morra Lakes in Sinai, there were no B. truncatus or L. natalensis snails, while two B. alexandrina were found with 10 crayfish. In El-Galaa canal there were 3 B. truncatus only against 4 crayfish. In El-Manayef drain, the crayfish was missing completely, while there were 10, 4 and 5 of B. alexandrina, B. truncatus and L. natalensis, respectively. Also, there were no crayfish in Fayed canal in presence of 5, 3 and 4 of B. alexandrina, B. truncatus and L. natalensis, respectively.

Table (2): Density of vector snails and crayfish in the study areas

Governorate	Location	Village	Canal /	No. of	No. of	No. of	No. of
			Drain	В.	В.	L.	Crayfish
			(surveyed length)	alexandrina	truncatus	natalensis	
	East of	El-Wehda	El-Wehda	2	0	0	10
	El-	Zi ((tiruu	canal	_		Ü	10
	Morra		(300				
	Lakes		meter)				
	in Sinai	El-Galaa	El-Galaa	0	3	0	4
			canal				
			(300				
			meter)				
Ismailia		El-	El-	10	4	5	0
ı	West of	Manayef	Manayef				
			drain				
			(300				
	_	~	meter)	_			
	Suez	Sarapyoum	Fayed	5	3	4	0
	Canal		canal				
			(300				
	0-11-	C C	meter)	0	0	0	20
	Qalyoub District	Sanafeer	Sanafeer canal	0	0	U	20
	District		(500				
			meter)				
Qalyobiya	El-	Sendebis	Sendebis	0	0	> 1000	2
Qaryoorya	Kanater	Schacois	canal	O	O O	> 1000	2
	District		(500				
	District		meter)				
	Abou-		7-El	48	6	60	0
	Homoss	Abou El -	Hamamee			- *	
		Khazr	canal				
			(1Km)				
	District		7-7-El	650	30	48	0
Behera			Hamamee				
			canal				
			(1 Km)				
			El-Hadad	0	0	0	8
	Housh	El-Hadad	canal				
	Esa	El	(1 Km)	20		17	
	District	Baharee	Drain	20	0	16	2
			No. 22				
			(300				
			meter)				

On the other hand, in Sanafeer canal, the vector snails disappeared completely, in presence of a high density of crayfish; 20 individuals. In Sendebis canal, there were two crayfish only with a high number of *L. natalensis*. In 7-El Hamamee canal, there were 48, 6 and 60 of *B. alexandrina, B. truncatus and L. natalensis* snails, respectively in the absence of the crayfish. Also, the same in 7-7-El Hamamee canal, there were no crayfish, in presence

of high densities of the snails; (650, 30 and 48 of *B. alexandrina*, *B. truncatus* and *L. natalensis*, respectively). In El Hadad canal there was no snails found against 8 crayfish. In Drain N° 22, there were 20 and 16 of *B. alexandrina* and *L. natalensis*, respectively, but no *B. alexandrina* in presence of 2 crayfish.



Fig. (1): Biomphalaria alexandrina shells after devouring by the crayfish



Fig. (2). Cannibalism phenomenon in the crayfish

The analyses of variance (ANOVA) for field survey results showed a highly significant correlation between the abundance of the crayfish and disappearance of snails at both of Ismailia and Qalyobiya Governorates (r = -0.64, -0.93 and -0.84 at p < 0.05 for *B. alexandrina*, *B. truncatus* and *L. natalensis*, respectively). In Behera Governorate, it showed also a highly significant correlation. (r = -0.49, -0.55 and -0.88 at p < 0.05

for *B. alexandrina*, *B. truncatus* and *L. natalensis*, respectively).

The reduction or complete absence of freshwater snails in water courses of the present study is attributed mainly to the presence of the crayfish, which acts as a predator for snails, especially *Schistosoma* and *Fasciola* vector snails due to their slow movement and thin shells. This agrees with **Ibrahim** *et al.* (1995), where they claimed that the snails *B. alexandrina*, *B. truncatus*,

L. cailiaudi and Physa acuta were easier preys to be attacked by the crayfish.

In conclusion, the present study indicates that the crayfish became of a wide range of distribution along the irrigation system of Egypt, reaching to Ismailia, Qalyobiya and Behera Governorates and even to Sinai. Moreover, it has a wide range of acceptable foods, such as non operculate freshwater snails, small fish and aquatic plants. So the crayfish can act as a biological control agent for these vector snails, providing promising indication of its possible use for the control of schistosomiasis and fascioliasis in Egypt.

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Designing Customer Loyalty Model in Insurance Industry (A study of insurance sector in Iran)

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Abstract: This study explores customer loyalty model at the level of specific dimensions drawing from insurance of Iran. The purpose of this article is to explain the customer loyalty model at the level of constructs, drawing from the insurance industry of Iran. A SERVQUAL type service-quality instruments is developed for insurance of Iran. Path analysis is utilized to examine a model linking service quality, customer satisfaction and loyalty at the level of individual insurance. It is found that the quality of services and customer's satisfaction, are highly correlated. Furthermore the relationship between quality of tangible or intangible services with the customer's satisfaction is approved. Insurance managers must improve both tangible and intangible elements of services to have loyal customers. The proposed model can be used to provide comparable findings across sectors, countries and similar service industries. This study suffers the limitation that it tests the fit of the model within the limits of a single service industry. Another limitation is availability sampling, however the appropriated fit of the estimated model allows for the study to be a reliable comparison basis for further research.

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1. Introduction

The theory of marketing was first related to tangible and physical products. However, one of the main and basic trends in this issue is the growth of services. Industrial services are of high importance and variety. Customers are the most important factor of the production and service unit's maintenance (Roberts, 2005; Zeithaml, 2000). And being responsive to the needs of customers according to their interest and desire is of high importance in organization's programs. In today's world, the relationship between customer and his satisfaction attraction is a frontispiece in organization's functions especially, marketers in service section have made clear the potential value relevant to expansion of customers development of insurance as an indicator of modernity of societies is severely under the influence of customer's satisfaction and survival and maintenance of insurance companies is totally relevant to the insured (kavoosi and saghaee, 2004). The quality of services and gaining customer's satisfaction and being loyal for the survival of insurer are completely compulsory, specially the after-sale- services which can have positive results about customer's loyalty and further purchase. The structure relation relevant to cause and effect approach and recognition of customer's place is of high importance. Apprehension of insurance companies whether private or state ones, are to find a lasting place in minds of customers. So they can extend their stock and follow their goals (Saurina and Coenders, 2002). This way they can create a mental and psychological security for the insurable once. Examining the quality of services plays an important role in marketing. On the other hand, assigning the place of customer in course of quality and satisfaction and loyalty permit companies to utilize their marketing programs in order to quire the best economical functions and be trained in order to learn how to keep their customer in a competitive environment managers of insurance companies can make use of the data of this research to find how customer think and react. The model that is used in this study tries to find customer's needs and expectations of insurance services and identifies them and makes them clear. Furthermore, this research tries to design a system so that we can recognize the influential factors to customer's loyalty (Dick and Basu, 1994; Diamantopoulos and Siguaw, 2000).

2. Materials and Methods The Quality of Services

Before, it was believed that by adaptation of customer's criterion can reach their allegiance, but later with emergence of new companies which were more conforming to the needs of customers, they were attracted to these newly-established companies (Zeithaml, 2000; Tahir and Ismail, 2005). So exhibiting distinguished products can definitely lead to customer's loyalty, but the same problem came into existence with establishment of new competitors until the idea of maintaining customers through lasting relationship was proposed (Tsoukatos, 2003). Our thoughts about a

product or services today must be different of what we thought vesterday. Makes no difference what is vital and important and considerable in our opinion, what important is that we present our products in a way that they receive the general consent of the customers, whether a product is microwave or a portable TV. In case of not fulfilling this issue, soon or later, they're going to face a complete failure. The received quality is a competitive need and nowadays, lots of companies have altered their direction toward quality on the basis of customers. And consider this as a strategic weapon. They have created satisfaction and customer's value by the harmonious relationship between customer's needs and advantages and services (Tsoukatos and Graham, 2006; Peppers and Rogers, 2004; Ranaweera and Prabhu, 2003).One of the chief means of distinguishing a company among others is that the company must constantly give services with superior quality. The key success is that the customer's expectations must be fulfilled over quality of services or even exceeds that .if the mentality toward services is lower than what's expected, and then companies lose their customers. And if the mentality overlaps the customer's expectation, there is a chance of future purchase. On the whole, the qualities of services have decreased in most of the grounds all over the world. Customers experience various levels of satisfaction or dissatisfaction in every service (lovelock and Wright, 2004).

Satisfaction

Customer's satisfaction brings numerous advantages to the companies and in higher levels this factor leads to more loyalty (Mittal and Kamakura, 2001). At last, preserving good customers is much more beneficial substituting a customer for a new one. Customer's satisfaction is a psychological-emotional process that is made in comparison of products information with the needs and desires of customers (kavoosi, and saghaee, 2004). What interesting is that the definition of satisfaction does not depend on the type of business or to its situation but to the abilities and potentials of the company in fulfilling the customer's expected quality (kavoosi and saghaee, 2004). Increasingly, companies consider satisfaction as a competitive instrument since the basis of traditional segregations such as product characteristics, price and distribution are of no use anymore. Customers can easily compare the price and characteristics with the help of internet. This means that classification of on the basis of product or service is very difficult because these factors can easily be copied. Also prices can be leveled and make the process of distribution better. Instead, copying the factors that please the customers such as superiority in giving services for two reasons are difficult for the competitors. First, these factors are built inside the culture of organization and can't be imitated. Second, a lot of time should be allocated to identify what factors inspire the customer's satisfaction.

Loyalty

A regulator variable between the quality of services and customer's satisfaction and economical operations is loyalty (Mitchel, 2005). It's a limit that customers want to preserve their relation with a supplier and usually it's a consequence of how much customers believe that their received quality is more than other suppliers. Loyalty occurs when customers strongly feel that the organization can best fulfill their demands in best ways. And specifically customers try to purchase of the organization (Shoemakers and Hewis, 1999; Saurina and Coenders, 2002). The increase in customer's loyalty can reduce marketing costs and increase more customer demands (Aaker and Jacobson, 1994). In addition' loyal customers do more mouth-to-mouth advertisement and confront strategies (Dick and Basu, 1994; Diamantopoulos and Siguaw, 2000). And they benefit of high interest in stock market (Fornell and wernelfelt, 1987). The customer has an outlook and a sense of emotional dependability on an organization, its staff and products and services. For example when a customer is asked about his favorite drink or beverage, he only talks about his favorite drink emotionally and not necessarily purchase and use that specific drink. This is called as an emotional loyalty and also further motive purchase. On the other hand, a customer may not have the concern and dependence as it was mentioned and just as usual remain a loyal customer. For example, every time a customer drinks a specific beverage, he does not have a reasonable and justified reason and drinks that as a routine. Behavioral loyalty is repetitive deals and can be easily measured by observational techniques. Emotional loyalty is usually defined as the positive effect on continuous relationships and a desire to keep on bound relations (Morgan and Hunt, 1994). And it's measured by questionnaire approach. Behavioral loyalty is numerously valuable since it means selling. Emotional loyalty is important because these two totally depend on each other (Oliver, 1999). A strong emotional loyalty empowers the customers against other marketers' endeavors (Gundlach et. al., 1995). And preserve them against persuasion and research (Dick and Basu, 1994). It can be claimed that choosing customers and being loyalty to them can cover all the effects that are done in marketing domain. Whatever it is, the main goal of economical agencies in point of effort and competition is to attract customers and balance the long life interest (Tsoukatos and Graham, 2006).

Relationship Between Quality of Service, Satisfaction and Loyalty

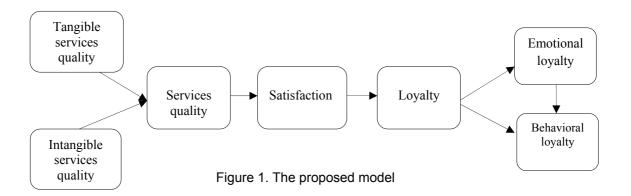
Ouality of services and satisfaction specifically from marketing point of view are attitudes that have several analogous indexes and of course they have specific factors (Simon, 1974). In satisfaction, customers must have the experience of a service and correspondingly the quality of services is not necessarily on the basis of experience. The empirical researches done by Cronin and Taylor have shown that the quality of services is as a key to satisfaction and explicitly influence on purchase reaction (Wang et. al., 2004). In addition, the quality of services and satisfactory attitude are the most significant factors in case of customer's maintenance. Tidies have shown that guaranteeing the customer's satisfaction gradually creates a sense of trust and loyalty. Simon, the oration in management science says: when an organization succeeds in attracting a new customer, the customer's satisfaction is a turning point in maintain a lasting relationship (Tsoukatos and Graham, 2006). Keep in mind that the only way to preserve customers is to fulfill needs, demands and their expectations or better to say give them what they want. The amount of relation between customer's satisfaction and loyalty is of high influence regarding the competitive status of market. In insurance, behavioral loyalty is defined as the customer tendency to maintain or renovation of an insured (Daskalopoulou and Petrou, 2005; Santos, 2002). In insurance industry, there are for sure hindrances that alter the situation and this is usually set forth in life insurances and long-term contracts. Purchasing a new insurance or revising the current insurance requires insurance condition. In other insurances, the altering obstacles have less limitation since the treaties are usually short and the rights of customer can be transformed to another customer. Researchers have shown that the quality of services and customer's satisfaction and loyalty are necessary for the survival of the insurer. Especially after-sale services needs to many positive results in case of loyalty, emotional loyalty and repetitive selling. However, many insurers have no tendency toward improvement of their image. And this issue brings them problems with the intensification of competition in market and as a result these problems augment (Tsoukatos and Graham, 2006).

Karafarin Insurance Company

KIC is one of the first private insurance companies which is established according to the codes of establishments of non-for profit insurances, with participation of stockholders consisting of prominent experts, economical agencies and legal individuals and Karafarin bank. Its capital was 140 million dollar and starts its operation with the permission of Iran central insurance on 2004. In the first six months of year 2009, the total numbers of insurers were 7000 people that as a whole they paid 80 million dollar. The cost of detriment in the first six months was 250 million dollar.

Proposed Model

With the studying of models in relation to the quality of services, satisfaction and loyalty and influential factors on them and adapting them to the cultural situation of society, the path between the variables of the research by researcher was proposed as follows:



The Hypothesis

The main and subordinate hypotheses of the research are as follows:

H1: There's a meaningful relationship between the quality of services and the rate of customer's satisfaction.

H1-1: There is a meaningful relationship between the quality of intangible services and the rate of customer's satisfaction.

H1-2: There is a meaningful relationship between the quality of tangible services and the rate of customer's satisfaction.

H2: There is a meaningful relationship between customer's satisfaction and their loyalty.

H2-1: There is a meaningful relationship between customer's satisfaction and their behavioral loyalty.

H2-2: There is a meaningful relationship between customer's satisfaction and their emotional lovalty.

H2-3: There is a meaningful relationship between customer's emotional and behavioral loyalty.

The Research Methodology

KIC was our case of study and the insured people who were a member in the first six months of the year 1388 were taken into consideration. The total numbers of this case were 464. Regarding the various insurances of insured, they were classified into 3 main parts as property, personal, liability the help insurances with of sampling techniques,188 people were chosen and according to random-sampling ,samples were allocated to each level (a sample of 30 had a standard deviation of 30%).

$$n = \left(\frac{z_{\alpha/2} \times s}{\varepsilon}\right)^{2}$$

$$n = (1.96 * 0.35)^{2}.0.05^{2} \approx 188$$

$$n_{i} = n \binom{N_{i}}{N} \qquad i = 1, \dots, h$$

n₁ = property insured n₂= personal insured n₃= liability insured

$$n_1 = 188 * (301/464)_{\approx} 122$$

 $n_2 = 188 * (12/464)_{\approx} 5$
 $n_3 = 188 * (151/464)_{\sim} 61$

For gathering data there are two specific ways; field and desk study research. The first category, books, article, magazines, thesis and internet were used. For identifying the publications and analysis of relationship between them, a questionnaire was planned. The used scale in this research is Likert. The person marks his agreement with every phrase and they are numbered from one to seven. Number one has the least value and number seven has the most value. This research considered 27 questions

of this questionnaire in five different sections. These 5 sections are as follows: the quality of tangible services, the quality of intangible services, the rate of satisfaction, behavioral loyalty and emotional loyalty. Questionnaire reliability is shown in Tables 1 and 2.

Table 1. Cronbach-alpha and Composite Reliability

	Cronbach- alpha	Composite reliability
Behavioral loyalty	0.804772	0.871238
Intangible services	0.952297	0.957351
quality		
satisfaction	0.933855	0.949786
Emotional loyalty	1.000000	1.000000
Tangible services quality	0.862302	0.907085

The questionnaire was prepared by researcher and according to similar questionnaires done by SERVQUAL and cultural criteria of the country. And statistics were confirmed and reviewed by professors and consultants (Faghihi and Soofi, 2008).

The Data Analysis

This research is a descriptive-applied research. For the test of model of this research, analysis method was used. That is a generalization of regression that can show not only straight effects but also indirect effects and the total effect of every independent variable on dependent variables and can interpret the logical relationship between them. This method or the combination mathematical methodology and complex statistical methodology are a multi-variable regression that has been gathered in a complex system in order to analyze the phenomenon. In order to analyze the data, the structural equation variable was used. So that by the use of these techniques researchers can confirm the theoretical structures (models) or even reject them (Azar, 2002; Golob, 2003; Diamantopoulos and Siguaw, 2000). The software that is used is smart-pls. The software uses the partial least squares in order to present structural equations and has the merit of testing two kinds of variables (formative and reflective).

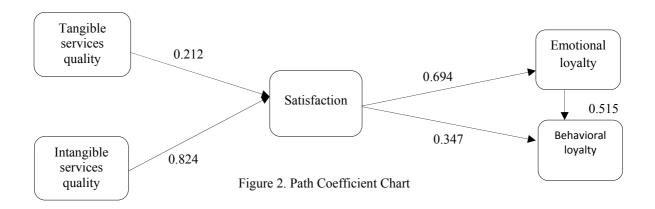
3. Results

The Outcomes of the Research

The following figure represents the relationship between defined factors. The conceptual model shows the relationship between variables that tests the truth or inaccuracy of the empirical data. Variables include the quality of tangible services, the quality of intangible services, and the rate of satisfaction, behavioral and emotional loyalty.

The amount of assigned coefficient shows that to what extent dependent variables influence the independent variables and shows the rate of ratio designed by author. But take into consideration that as a whole they show the tests of Cronbach-alpha and composite reliability and coefficients of the model to test the hypothesis. Considering the table's data, we can infer that 63% of behavioral loyalty alterations are due to the arrival of variables. 99% of unstable satisfactory variables

are defined by the quality of tangible or intangible services. Respectively, 48% of unstable emotional loyalty variables are defined by the satisfaction that is a variable itself. By taking into consideration, besides these confidents, there are other influential factors which are still unknown.



According to the confidents obtained, for each of the path model, there is a structural equation.

Tangible services quality= $0.24+0.87 V_1 + 0.85 V_2 + 0.89 V_3 + 0.75 V_4$

Intangible services quality = $0.02 + 0.77 \text{ V}_5 + 0.80 \text{ V}_6 + 0.76 \text{ V}_7 + 0.81 \text{ V}_8 + 0.61 \text{ V}_9 + 0.76 \text{ V}_{10} + 0.79 \text{ V}_{11} + 0.81 \text{ V}_{12}$

 $+0.76V_{13}+0.81V_{14}+0.73V_{15}+0.72V_{16}+0.75V_{17}+0.82V_{18}+0.62V_{19}+0.71V_{20}+0.53V+0.78V_{22}$

Satisfaction= 1.01+ 0.86 a + 0.89 b + 0.91 c + 0.89 d + 0.89 e

Emotional loyalty= 0.02+ 1.00 V₂₇

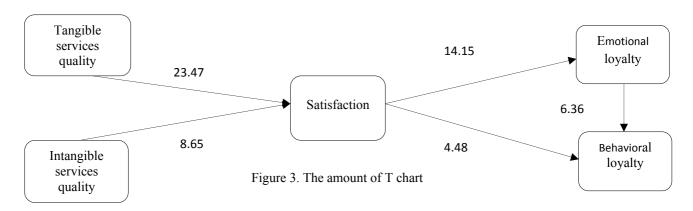
Behavioral loyalty= $0.011+0.79 V_{23}+0.64 V_{24}+0.87 V_{25}+0.85 V_{26}$

Satisfaction =0.21*tangible services quality+ 0.82* intangible services quality

Emotional loyalty =1.02+ 0.69* Satisfaction

Behavioral loyalty =0.011+0.35* Satisfaction + 0.51* emotional loyalty

The amount of t for every path was used and existence or absence of path was tested by the software.



According to the information obtained, all the hypothesis of the study was confirmed. General conclusions in statistical analysis are shown in Table 2 and 3. According to the confirmed hypothesis, the model fitness is proved.

Table 2. The Result of T Software Test

	Original	Sample Mean	Standard Deviation	Standard Error	T Statistics
	Sample (O)	(M)	(STDEV)	(STERR)	(O/STERR)
satisfaction → behavioral loyalty	0.347227	0.349572	0.087412	0.087412	3.972323
satisfaction → emotional loyalty	0.694299	0.700117	0.047372	0.047372	14.656329

satisfaction → emotional loyalty	0.514693	0.519720	0.088436	0.088436	5.819915
tangible quality →satisfaction	0.211626	0.210504	0.008915	0.008915	23.738467
intangible quality→ satisfaction	0.823593	0.824445	0.008502	0.008502	96.875407

Table 3. The result of the Hypothesis

Hypothesis	The amount of t	P value < 0.001, $\frac{z_{\alpha/2}}{2}$	Meaningfulness	Result
There's a meaningful relationship between the quality of services and the rate of customer's satisfaction	2463.138415	~3.3	yes	confirmed
There's a meaningful relationship between the quality of intangible services and the rate of customer's satisfaction	96.875407	~3.3	yes	confirmed
There's a meaningful relationship between the quality of tangible services and the rate of customer's satisfaction	23.738467	~ 3.3	yes	confirmed
There's a meaningful relationship between customer's satisfaction and their loyalty	19.568919	~ 3.3	yes	confirmed
There's a meaningful relationship between customer's satisfaction and their behavioral loyalty	14.656329	~ 3.3	yes	confirmed
There's a meaningful relationship between customer's satisfaction and their emotional loyalty	3.972323	~ 3.3	yes	confirmed
There's a meaningful relationship between customer's emotional and behavioral loyalty	5.819915	~ 3.3	yes	confirmed

4. Discussion

This research investigates the relationship between the quality of services, the rate of satisfaction and the customer's loyalty in insurance industry and it was done by path analysis method (KIC) in 2009. It was performed on 188 insured in Karafarin company. Considering this sample, the responses of the questionnaire were analyzed. Statistically, lots of studies were done about the quality of services and the rate of customer's satisfaction. But loyalty has drawn the attention of experts. Loyal customers are guarantee for a long life profit for selling section whether in services or products. Knowing what factors lead to customer's loyalty is of high importance for managers of insurance companies. Considering the quality of services represented that they aren't influential in the same level and influence of tangible characteristics are less than intangible influences. And this causes intangible insurance services. The more services intangible are more expectations customers have. Still, there is a great need for more studies (Tsoukatos and Graham, 2006). In most of researches, the theory of relationship between quality of services and the rate of customer's satisfaction in various sections was confirmed. Other factor such as value, situation of services can be influential on this relationship. Insurance studies show there's a direct relationship between the rate of satisfaction and emotional loyalty. Satisfaction is a factor that almost exists in every loyal sample. This factor is influential on many samples. The research confirms the direct relationship of customer's satisfaction on emotional loyalty. Direct and indirect coefficients shows that its influence on this research is indirect. Factors such as resistance against the change, value, satisfactory experience and deep commitment can justify the direct effect on behavioral loyalty. The results of the research show that there's a direct relationship between behavioral and emotional loyalty and it's compatible with similar studies (Tsoukatos and Graham, 2006). The quality of tangible and intangible services and behavioral and emotional loyalty show the tendency of customers to buy from the same insurance company and their tendency to advertise that company and its services respectively. The quality of services leads to satisfaction and satisfaction leads to customer's loyalty. But what makes this research significant is that the relationship between emotional and behavioral loyalty was confirmed. Emotional loyalty is a dimension of loyalty that the customer recommends his friends and relatives to use the companies' services. In addition to this, the results shows strong relation between rate of satisfaction and emotional loyalty and finally studies show the ratio and suitability conceptual model with data of the research.

According to the research, we can say that managers of insurance are looking forward to the improvement loyal levels of customers. On the other hand, having information about levels of quality and the effect of personal factors on customer's satisfaction and the effect of satisfaction on behavioral loyalty can be beneficial. The relationship between quality of services and rate of satisfaction was confirmed and represented that the company should utilize a customer information system in order to bring customer's satisfaction so that the company can extract the information it wants and can review them to get better understanding ofcustomer's behavior. Confirmation of the relationship between quality of tangible services and the rate of satisfaction showed that the amount of influence of the quality of tangible services regarding satisfaction is very low. As a result, managers should guide their

resources toward the improvements of intangible factors that are much more related to the staff and their way of functioning and the function of managers and their managerial decisions. Due to the growth of insurance industry, the company can sell its insurance products through interment with supplying complete internet equipment. Confirmation of relationship between the quality of intangible services and satisfaction showed that the managers should make use of their resources to empower intangible factors such as teaching and inspiring the staff, empowerment of being responsive to the customers, learning the executive skills, obliging the managers to develop matters related to customers and forecasting their future needs and demands. Confirmation of the relationship between satisfaction and customer's loyalty showed that the insurer should guide their mechanism of after-sale services toward the growing customers. The measurement amount of customer's loyalty is of high importance since the more time and support the customer allocates to buying, the more income the company has.

Recognizing the loyal customers causes the investment of the company on them and empowerment of beneficial chances. Confirmation of the relationship between satisfaction and behavioral loyalty leads the company toward empowerment of relations with customers and knowing more influential factors on the growth of lovalty. Because loval customers are attracted by moth-to-mouth advertisements. And as a result, the cost of marketing reduces. Relationship between emotional and behavioral loyalty was confirmed in this model. So recognizing customers and diagnosing their place in classification of different types of loyalty help the company to choose necessary strategies to give better services. Moreover, it can influential in managing the factors that cause rejection of loval customers. Insurance companies can identify their weaknesses in a competitive marketing by making use of this research. And according to the culture and demands of a district give insurance coverage.

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The chaotic ε-constraint approach

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Abstract: in this paper, we try to tackle the drawbacks of the well-known Multi-Objective technique ε -constraint method, namely the computational difficulties and obtaining proper efficient solutions. We incorporate a well-known chaotic function, so-called the logistic map to the classical ε -constraint method for improving its results. A well known bench-mark test function is adopted for validation of the new approach, showing its ability to explore various areas of the pareto-optimal front in an efficient way. The chaotic ε -constraint approach obtains diversified as well as well representative solutions.

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Keywords: Chaos, e-constraint method, Logistic Map, Multi-Objective Optimization

1. Introduction

Multi-Objective programming is a part of mathematical programming dealing with decision problems characterized by multiple and conflicting objective functions that are to be optimized over a feasible set of decisions. Such problems, referred to as Multi-Objective Programs (MOPs), are commonly encountered in many areas of human activity including engineering, management, and others [7]. In general, a k-objective minimization problem can be formulated as:

$$\min \{ (f_1(x), ..., f_k(x)) : x \in X \}$$
 (1)

We usually assume that the set X is given implicitly in the form of constraints resulted in the feasible region in the decision space [10], i.e.,

$$X := \{x \in \mathbb{R}^n : g_j(x) \le 0, j = 1,...,s; h_j(x) = 0, j = 1,...,m\}$$
 (2)

One of the main differences between single objective and multi-objective optimization is that in multi-objective optimization the objective functions constitute a multi-dimensional space, in addition to the usual variable space. For each solution x in the variable space, there exists a point in the objective space, denoted by $f(x) = z = (z_1, z_2, \ldots, z_k)^T$. A mapping exists between an n-dimensional solution vector and a k-dimensional objective vector through the objective function, constraints, and variable bounds [5]. Fig.1 illustrates these two spaces and a mapping between them.

Definition 1 (Pareto Dominance): Without loss of generality in a minimization problem, a decision vector $x_1 \in X$ is said to *dominate* a decision vector $x_2 \in X$ iff the following two conditions are satisfied:

1. The decision vector x_i is not worse than x_2 in all objectives, or $\forall i \in \{1,2,...,k\} : f_i(x_1) \le f_i$

 (x_2)

2. The decision vector x_i is strictly better than x_2 in at least one objective, or $\exists i \in \{1,2,...,k\}$: $f_i(x_1) < f_i(x_2)$.

If any of the above conditions is violated, then x_1 does not dominate x_2 . A decision vector $x_1 \in X$ is called Pareto-optimal if there is no another $x_2 \in X$ that dominates it and in this case x_1 is called nondominated with respect to X; also an objective vector is called Pareto-optimal if the corresponding decision vector is Pareto-optimal.

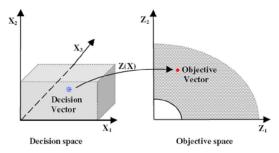


Fig. 1. Decision and Objective spaces in MOP [3]

Definition 2 (Pareto Optimal Set): The Pareto Optimal Set P^* is defined by [11]:

$$P^* = \{ x \in X \mid x \text{ is pareto-optimal} \}$$
 (3)

Many researchers had developed a lot of mathematical programming techniques to solve Multi-Objective Optimization problems, some representatives of this class of techniques are the weighting method, the ϵ -constraint method, and the goal programming; also some authors had adopted the Evolutionary Algorithms (EAs), Simulated Annealing (SA), Genetic Algorithms (GA), as well as Swarm Intelligence (SI) techniques to deal with Multi-Objective Problems [6].

The main purpose of this paper to obtain the pareto optimal solutions in an efficient way by incorporating chaos to the classical ϵ -constraint approach to enhance the performance and tackle the main drawback of the original method. The rest of the paper is structured as following; in section 2 the ϵ -constraint method is illustrated, section 3 is devoted to chaos, section 4 is made for the proposed method, finally section 5 is for the numerical example.

2. The ϵ -constraint approach

The ϵ -constraint method first appeared in [9] and is discussed in detail in Changkong and Haimes [4]. It is based on a scalarization where one of the objective functions is minimized while all the other objective functions are bounded from above by means of additional constraints in the following manner:

$$\min \{ (f_p(x): f_i(x) \le \varepsilon_i, i \ne p, x \in X \}$$
Where $\varepsilon_P = (\varepsilon_1, ..., \varepsilon_{P-1}, \varepsilon_{P+1}, ..., \varepsilon_k)^T \in R^{k-1} \text{ and } p \in \{1, ..., k\}.$

The main idea of the ϵ -constraint method is to solve a sequence of ϵ -constraint problems $P(\epsilon)$, that are defined by transforming one of the objectives into a constraint [8]. Many issues aroused considering the limitations and drawbacks after the original version appeared, especially, when dealing with high-dimensional problems. The process of obtaining a proper efficient solution of the reduced single program, stability of the solution, beside the feasibility of the single programs depending on values chosen of (ϵ) which definitely will be reflected on the number of computations done. Although, Recently Few proposals tried to tackle the limitations mentioned [7,8], it seems to be open challenging issues for researchers.

3. Chaos

The scientific meaning of the term Chaotic System or Chaos for short is a phenomenon that has deterministic rules behind irregular appearances [2]. Chaos is a kind of common nonlinear phenomenon, which has diverse, complex and sophisticated native apparent disorder. Chaotic motion is under characterized by ergodicity, randomness, 'regularity' which can traverse all status according to its own 'rule' without repetition [12]. In recent years, the theories and applications of nonlinear dynamics, especially of chaos, have drawn more and more attention in many fields. One is chaos controlling, and synchronization. Another field is the potential applications of chaos in various disciplines including optimization [13]. Mathematically, randomness of a simple deterministic dynamical system and chaotic system may be considered as sources of randomness. A chaotic map is a discretetime dynamical system running in chaotic state of the following form:

$$z_{k+1} = f(z_k), 0 < z_k < 1, k = 0,1,2,...$$
 (5)

The chaotic sequence $\{z_k : k = 0,1,2,...\}$ can be used as spread-spectrum sequence as random number sequence. Merely a few functions (chaotic maps) and few parameters (initial conditions) are needed even for very long sequences. In addition, an enormous number of different sequences can be generated simply by changing its initial condition. Recently, chaotic sequences have been adopted instead of random sequences and very interesting and somewhat good results have been shown in many applications [1]. The approach proposed through this paper based on a well known chaotic map in the field, so-called the logistic map [13]:

$$z_{k+1} = 4 z_k (1 - z_k) (6)$$

4. The chaotic ϵ -constraint approach

The aim of the ϵ -constraint is to approximate the Pareto set by solving a sequence of constrained single-objective problems depending on the ϵ values for all objectives considered, choosing these values improperly might leads that the single programs are not feasible or provide inefficient solutions. Chaotic sequences generated from maps (the logistic map is considered in this paper) are employed to guarantee the feasibility of the single programs, while the traverse without repetition of chaos make it explore the pareto front more efficiently, resulting in better diversification of solutions. Without loss of generality, the chaotic ϵ constraint method for k- minimization problem will be as following:

- Step 1. For $i \neq j$, j = 1,2,...,i-1,i+1,...,kSet i = 1
- Compute the Ideal and Nadir vectors: Step 2. $f^{1} = (f_{1}^{1}, f_{2}^{1}, f_{3}^{1}, ..., f_{k}^{1})$ $f^{N} = (f_{1}^{N}, f_{2}^{N}, f_{3}^{N}, ..., f_{k}^{N})$ Initiate the vector of chaotic variables (z)
- Step 3. $\in \mathbb{R}^{k-1}$ Such that $0 < z_i < 1$
- While $m \leq No$. of iterations, perform the Step 4. following steps:

 - (a) $\epsilon_j = f_j^N z_j (f_j^N f_j^I)$ (b) Solve $P_m(\epsilon)$ and add solutions obtained to the set of nondominated solutions
 - (c) $z_i = 4 z_i (1 z_i)$, m = m+1

Step 5. While i < k, Set i = i+1, j as shown in step 1, m = 1, and then go to step 4

5. Numerical example

In this section, we adopted one of the well known test functions in the specialized literature called ZDT1 [14], this bench-mark test function being used widely in Multi-Objective Optimization area, have different points of difficulties, which make the covering process of the pareto front is so complicated. ZDT1 have two objectives to be optimized over a feasible set originated from 30 design variables included, Pareto-optimal front is convex, continuous, and have uniform distribution of solutions.

ZDT1 (2-objective, 30 parameters):

min
$$f_1(x_1) = x_1$$

min $f_2(\vec{x}) = g(x_2, ..., x_n).h(f_1, g)$
 $g(x_2, ..., x_n) = 1 + 9(\sum_{i=2}^n x_i)/(n-1)$ (7)
 $h(f_1, g) = 1 - \sqrt{f_1/g}$
 $x_i \in [0, 1], n = 30, i = 1, ..., n$

A code was developed under MATLAB software environment to solve the ZDT1 problem, applying m=100, k=2 to solve this bi-objective problem. Fig. 2 shows the pareto-optimal front produced by the proposed approach in the Objective space after solving 200 single-objective constrained problems (100 for each objective).

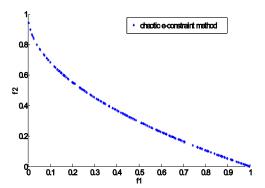


Fig. 2. Pareto-optimal front produced in ZDT1

As shown in Fig. 2, the pareto-optimal front shows the diversified set of nondominated solutions along all the pareto front, which reflects the ability of the new proposed approach to explore the whole solution set efficiently to produce well representative solution set. The new approach did not stuck into infeasible single-objective programs to be solved like the previous related work due to the ergodicity, and randomness of the chaotic variables leads to avoiding the limitation of improper efficient solutions, also the chaotic nature implies more diversification in solutions due to non repetition of the chaotic variables which limits extra computations.

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Effect of Tramadol and Ropivacaine Infiltration on Plasma Catecholamine and Postoperative Pain

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Abstract: A long acting local anesthetic; ropivacaine and a synthetic opioid; tramadol were used to improve pain relief and decrease postoperative systemic analgesic requirement after total thyroidectomy in patients with thyroid cancer. The study also assesses the effect of local infiltration with ropivacaine and tramadol on plasma catecholamine levels. Methods: Ninety six patients underwent thyroid surgery were randomly assigned to 3 groups. Before skin closure, tissues were infiltrated 10 ml of ropivacaine 0.75% plus 5 ml saline in Group R, with 1.5 mg/kg of tramadol in 15 ml saline in Group T, and with 15 ml containing 10 mL ropivacaine 0.75% plus tramadol 1.5mg/kg in Group RT. Plasma epinephrine and nor-epinephrine were recorded at preoperative (0), 1, 5, 15, 30min, 1, 2 and 4 h postoperative. Pain scores at min, 0.1/2, 1,2,4,6, 12, 18, and 24 hr post-operatively; time to first analgesic, number and % of patients requiring rescue analgesia, number of rescue analgesia and total dose of analgesic were recorded. Results; The pain scores in group RT were significantly lower in the first 24 hours than in groups R and T. Time to first analgesic (hrs) in group RT was significantly more than in either group R or group T. The percentage of patients in group RT requiring rescue analgesia was significantly less than the percentage of patients in other groups. Also, the numbers of rescue analgesia requests and the cumulative 24 h analgesic consumption were significantly smaller in group RT than other groups. The plasma epinephrine and nor-epinephrine increased significantly in three groups at 5 and 15 min when compared with the baseline then returned to near baseline value at 30 min 1,2 and 4 hrs. There was significant decrease in plasma concentration of epinephrine and nor-epinephrine in group RT than R or T groups. The aim of this study is to evaluate wound infiltration with ropivacaine, tramadol or their combination on plasma catecholamine levels and post-operative pain following thyroid surgery.

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Key words: Tramadol, Ropivacaine, local infiltration, catecholamine.

1. Introduction:

Post-thyroidectomy pain perception result from peripheral tissue injuries which lead to functional disturbances in the nervous system. There is peripheral sensitization by reducing the threshold of tissue noiception (hyperalgesia) and a central sensitization by increasing the excitability of spinal neurons. These two changes together contribute to the pain, which injury manifests hypersensitivity state found after peripheral tissue injury (Woolf, 1993). Inhibition of these changes by infiltration of local anesthetic has possible role in prevention of post-operative pain (Woolf, 1989). The primary goals for postoperative analgesia are to provide comfort to the patient with a few side effects as possible, to facilitate the patient's early functional recovery and to decrease length of hospital stay and convalescence. Multiple treatments and techniques have been designed to achieve these goals (Maheshwari et al., 2009). As a result, other analgesic systems have been developed, such as wound infiltration with local anesthetics and analgesics, as well as local anesthetic infiltration through

continuous infusion pumps. Recent studies of this technique have obtained promising results, showing a series of advantages for this technique compared with regional techniques or the use of intravenous opioids (Toftdahi et al., 2007). Local anesthetic use can produce analgesic effects through several mechanisms: afferent nociceptor blockade to prevent the transmission of painful nerve impulses, inhibition of inflammatory mediator release, and reduction of free radical and edema formation (Hahnenkamp et al., 2002).

Tramadol, which is a weak opioid, it's analgesic effects are mediated by at least three different mechanisms; it is weak μ opioid receptor agonist, it inhibits the reuptake of the neurotransmitters hydroxytryptamine (5HT) release (Roboux et al., 2004). Previous studies suggest that tramadol possesses some local anesthetic properties when applied to local nerves (Demiraran et al., 2006).

Ropivacine, a long acting amid local anesthetic, is chemically related to bupivacaine but it has less cardiac and central nervous system toxicity (Scott et al., 1989). It produces cutaneous

vasoconstriction that restricts systemic absorption of the drug and increases its local duration of action (Kopacz et al., 1989). Moreover, ropivacaine has anti-inflammatory activity that may further reduce pain when administered locally (Murtinsson et al., 1997). We therefore designed, a prospective, randomized, double-blinded study to compare the effect of infiltration of ropivacaine, tramadol or their combination on plasma catecholamine levels and analgesia efficacy and patient outcome after thyroid cancer surgery.

2. Patients and Methods:

Following approval from the south Egypt Cancer Institute-Assiut University Hospital ethics committee, 96 patients aged 18-50 years, with American Society of Anesthesiology classifications of I and II, undergoing thyroid cancer with block neck dissection under general anesthesia, consented to participate in this randomized, double blinded, clinical trial. Patients with a history of drug dependency, difficulty in communication or a history of allergic reaction to the study drugs, or contraindication to opioids, renal or liver failure, In addition, patients who had previously suffered from a difficult endotracheal intubation (more than two attempts at tracheal intubation) at the induction of anesthesia were also excluded.

Ninety six Patients fifty seven males and thirty nine females were allocated randomly into one of three groups of 32 patients each. Before skin closure, local tissues were infiltrated infiltrated 10 mL of hydrochloride R, ((Naropin; AstraZeneca), with with 1.5 mg/kg of tramad hydrochloride ol in 15 mL saline in Group T (October Pharma S.A.E) and with 15 ml containing 10 mL ropivacaine 0.75% plus tramadol 1.5mg/kg in Group RT.

Using the slandered infiltration technique. Randomization was performed with a computer generated randomization table using sealed envelopes. The anesthesiologist and patient were blinded to the study medicine. A third investigator not involved in the infiltration technique or the assessment of the patient response postoperatively prepared all syringes of the study medications. All patients were pre-medicated with 0.5 mg/kg of oral midazolam and atropine 0.02 mg kg-1. The same anesthetic technique was used for groups: 1 µg/kg IV fentanyl and 1-2 mg/kg IV propofol as induction agents. Routine monitoring devices (ECG, blood pressure cuff, oxygen saturation monitor and endtidal CO2) were used. succinylcholine 1 mg kg-1 was used to facilitate tracheal intubation. Anesthesia was maintained with isoflurane and. 0.15 mg/kg IV. Atracurium (0.1mg/kg iv) as a non-depolarizing muscle relaxant. The muscle relaxant effect was reversed at the end of surgery.

In the post anesthesia care unit (PACU), pain was assessed at (0.5,1,2,4,6,8,12,and 24 h)using a visual analogue scale (VAS) which is a psychometric response scale which can be used in questionnaires. It is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end-points (Grant et al., 1999). (VAS) from 0 to 10, with 0 meaning no pain and 10 meaning the worst pain imaginable. Patients requiring rescue analgesia (Paracetamol tab.) was prescribed for patients with a pain score >4. and local reaction(no reaction = 0, mild rash = 1, erythema=2,urticaria=3) and time for first analgesic requirement were recorded.

Plasma catecholamine levels were analyzed by high performance liquid chromatography (HPLC) were measured at 0, 1/2, 15, 30,1,2,4 hrs.

Patients were discharged from the PACU to the ward when they were oriented to time and place, were able to void, and had stable vital signs. Post operative assessment was performed by an investigator, who was unaware of which treatment each patient had received,

Catecholamine Detection:

Plasma catecholamine level was assayed by high performance liquid chromatography (HPLC) with electrochemical detection according to the method of (Nyssonen and Parariainen 1989). The 3, 4-dihydroxyphenyl structure of catecholamine will form cyclic complexes with aluminum oxide, so this property was used in selective pre-purification of catecholamines from biological fluids. A small amount of Alumina is mixed with 3, 4-dihydroxybenzyl amine and TRIS buffer was added.

Vigorous shaking followed by centrifugation was performed then the supernatant was removed and washing with distilled water was done. Diluted HCL was added to extract catecholamines from alumina, these extract was injected into reverse plasma HPLC column, and differences in the molecular structure of the sample molecules determine the attraction of each sample. The column effluent passes through the flow level of an electrochemical detector. The detector oxidizes oxidizable structures and measures the current produced during the transfer of electrons. The current is converted to a voltage signals and sent to an integrator. The detector response to occurs in proposition to the concentration of the analyte.

Statistical analysis:

All statistical analysis was performed using statistical package SPSS for Windows program, version 10.0 .Quantitative data were expressed as mean \pm SD or number (%), as appropriate. Qualitative data were analyzed by $\chi 2$ test. Mann-Whitney U-test for VAS score. Quantitative data were analyzed by analysis of variance (ANOVA) between groups and by Paired-Student's t-test within groups. A value of t <0.05 was considered statistically significant.

3. Results:

As shown in table (1), there were no statistically significant differences among the three groups with respect to age, weight, gender, and duration of surgery.

As shown in table (2), time to First analgesic (h) in group RT was (8.6 ± 0.8) which is significantly more (p 0.05), than in either group R (6.7 ± 0.8) h or group T $(6.9.2\pm0.9)$ h. The percentage of patients in group RT requiring rescue analgesia was 28%, which is significantly less than the percentage of patients in either group R (90%) or group T (86.7%). Also, the numbers of rescue analgesia requests as well as the cumulative 24 h analgesic consumption were significantly smaller in group RT compared with groups R or T (Table 2).

As shown in fig (1),the VAS score did not differ significantly between tramadol and ropivacaine groups during the 24 postoperative hours, but there was significant difference between ropivacaine and tramadol combination (RT)group and other two groups (P<0.0001).

As shown in fig (2,3), the plasma concentration of epinephrine and nor-epinephrine increased significantly in three groups at 5 and 15 min when compared with the baseline then returned to near baseline value at 30 min 1, 2, 4 h (P<0.001). There was significant (p 0.001) decrease in plasma concentration of epinephrine and nor-epinephrine in group RT than R or T groups.

No significant difference was observed in the incidence of local skin reaction at the injection site. Neither erythema nor urticaria was observed in all groups.

4. Discussion:-

In this study we are able to demonstrate clearly that as compared to infiltration of ropivacaine, tramadol 1.5 mg/kg and their combination after the surgical incision visibly improves post operative pain. Among those three groups who received infiltration of local anesthetic fewer analgesic requests, the time for the first analgesic request, number and % of patients requiring rescue analgesia and total consumption of analgesic medications was significantly little in combination group. This fact provides evidence that group of patients had better analgesic conditions and this confirmed by our clinical observation but in group tramadol and group ropivacaine these parameters lie in the same statistical range.

Table (1): Demographic characteristics, and surgical data of patients (Values are number (n) or $M \pm SD$)

Variable	Group R (n = 32)	Group T (n = 32)	Group RT (n = 32)	P-value
Age (yr)	51 ± 16	49 ± 15	46 ± 14	0.139
Weight (kg)	76 ± 17	78 ± 19	75 ± 16	0.091
Gender (female/male)	19 / 13	20 / 12	18 / 14	0.878
Duration of anesthesia (min)	163 ± 33	166 ± 34	168 ± 35	0.471
Duration of operation (min)	148 ± 30	150 ± 30	152 ± 31	0.379

Table (2): Postoperative Quality of Analgesia (mean \pm SD)

Variable	Group R	Group T	Group RT		P-value	
Variable	(n = 32)	(n = 32)	(n = 32)	R vs. T	R vs. RT	T vs. RT
Time to First analgesic (h)	6.7 ± 0.8	$6.9.2 \pm 0.9$	8.6 ± 0.8	0.804	0.054	0.079
No. and % of patients requiring	29 (90%)	28 (86.7%)	9 (28%)	0.689	0.001*	0.001*
rescue analgesia (Paracetamol)·						
No. of rescue analgesia	1.7 ± 1.0	1.4 ± 0.8	0.4 ± 0.6	0.190	0.001*	0.004*
Total dose (no. of tablets/24 h)	3.3 ± 1.9	2.7 ± 1.6	0.8 ± 1.3	0.177	0.001*	0.001*

^{*}p 0.05

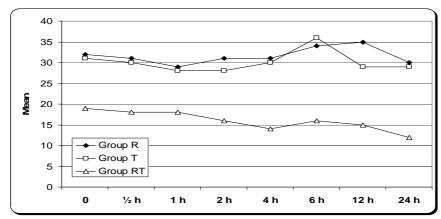
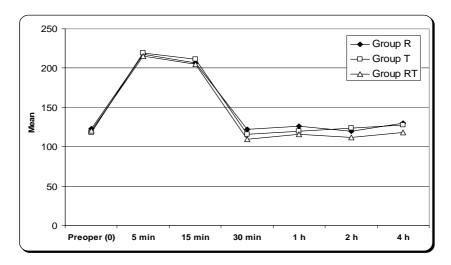
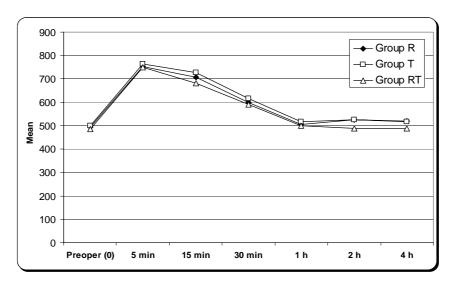


Fig (1): Visual Analog Scores (VAS) as Mean \pm SD at different time intervals following operations



 $Fig(2): Time\ course\ of\ changes\ in\ the\ plasma\ epinephrine\ \ after\ drugs\ infiltration$



Fig(3): Time course of changes in the plasma nor epinephrine after drugs infiltration

Non-steroidal anti-inflammatory drugs used in, decreasing pain and opioid requirements but in some patients may be limited by adverse renal, gastrointestinal, and hematological (Kam and Power, 2000). Also opioids can be used, although highly effective in managing pain have a range of side effects such as respiratory depression, sedation, nausea, and vomiting (Fishman and Borsook, 1999), so we are used local anesthetics infiltration as alternative method.

Post-thyroidectomy pain perception likely includes components linked to the deep and superficial layers of the wound, intra operative neck position and wound and drainage and this pain may be treated with NSAIDs or opioids (Dieudonne etal., 2001).

Infiltration with local anesthetic at operative sites can improve postoperative analgesia and reduce opioid requirements after different surgical procedures (Bianconi et al., 2003).

Postoperative analgesia using wound infiltration with ropivacaine 3.75% or 7.5% leads to a significant reduction of VAS values and opioid consumption in patients undergoing major shoulder surgery (Horn et al., 1999).

Ropivacaine (70ml of 0.25%) infiltrated into cholecystectomy wound significantly decreases wound pain and increases the time to the first request for post operative analgesia compared with saline (Johansson et al., 1994).

Wound infiltration with 0.25% ropivacaine or bupivacaine 40ml was equally effective in the management of post-herniorrhaphy pain (Erichsenet et al., 1995).

Ropivacaine produces vasoconstriction thus, it can provide further analgesic advantages (Burmester et al., 2005).

Local anesthetic wound infiltration with abdominal hysterectomy does not decrease post-operative opioid requirements or improve patient comfort (Klein et al., 2000 and Cobby and Reid, 1997).

Bupivacaine infiltration in thyroid surgery markedly reduced opioid requirements (Gozal et al., 1994).

Bupivacaine wound infiltration effectiveness was considered disappointing when compared with two opioid regimens (Lacoste et al., 1997).

In our study, we found that local wound infiltration with tramadol (1.5mg .kg) and ropivacaine combination prior to wound closure in thyroidectomy provided significant post operative analgesia and delayed onset of postoperative pain $(8.6\pm0.8, 6.7\pm.08, 6.9\pm0.9)$ hours respectively when compared to ropivacaine or tramadol with no significant side effects in this set of patients and this

regional analgesic effect may due to a multimodal mechanismof action, which gives a synergistic effect.

Tramadol possesses some local anesthetic properties when applied to peripheral nerves (Houmes et al., 1992).

A dose of 100 mg tramadol added to 40 mL of 1.5% mepivacaine improved the quality of the brachial plexus blockade in patients scheduled for forearm and hand surgery (Robaux et al., 2004).

Tramadol (2mg/kg) has a local anesthetic effects with minimal sedation and cardiovascular compromise (Demiraran et al., 2006).

Subcutaneous tramadol infiltration can provide effective analgesia and anti-inflammatory effects (Grecek et al., 2004).

Tramadol exerts its sensory blocking action by a mechanism similar to that of local anesthetics (Jou et al., 2003).

Subcutaneous 2 mg/kg tramadol had a local anesthetic action similar to 1mg/kg lidocaine and they correlated that to its antinocicceptive effect, which might be extended into the post-operative period (Alunkaya et al., 2004).

Tramadol is structurally related to codeine, which is, in fact, a methyl-morphine, so tramadol exerts its action on central monoaminergic systems and this mechanism may contribute to its analgesic effect (Shipton, 2000).

The duration of postoperative analgesia provided by subcutaneous tramadol was significantly longer compared with lidocaine (group 4.9 ± 0.3 , group L 4.4 ± 0.7 h) (Alunkaya et al., 2003).

Tramadol, added to mepivacaine for brachial plexus anesthesia, extend the duration and improve the quality of postoperative analgesia (Robaux et al. 2004).

Postoperative analgesia was significantly prolonged and fewer analgesics were required after wound infiltration with tramadol (2mg/kg) and this technique may be a good choice for postoperative analgesia in children having inguinal hernia repair (Demiraran et al., 2006).

Tramadol 100 mg intraarticular without local anesthesia provided lower VAS pain scores and longer analgesic effect more than after IV injection of the same doses with no significant side effects (Alagol et al., 2004).

In this study we found that local wound infiltration with tramadol (1.5mg .kg) and ropivacaine prior to wound closure in thyroidectomy provided nearly equal post operative analgesia and delayed onset of postoperative pain may be due to vasoconstriction of ropivacaine or action of tramadol on both opioid and non-opioid systems.

A smaller dose of tramadol (1 mg/kg) among adult post herniorrhaphy patients achieved the same

analgesic time (6.6 ± 0.9) hours and this was agreement with our study (group T 6.9 ± 0.9 hours) (Abdullah et al., 2008).

Subcutaneous wound infiltration with tramadol reduces postoperative opioid consumption and produces less nausea and vomiting than the intravenous administration after pyelolithotomy (Khajavi et al., 2009).

Our data indicate that wound infiltration with either ropivacaine 0.75% or tramadol hydrochloride or their combination produced an elevation in the plasma epinephrine and nor-epinephrine at 5 and 15 min and this elevation may be due to surgical stress or sympatho-adrenal response and return nearly to baseline at 30 min 1,2 4 h and there was significant decrease in plasma concentration of epinephrine and nor-epinephrine in group RT than R or T and this may be due to synergistic effect of the combination of the two drug infiltration or intra-operative fentanyl.

Injection of local anesthetic containing epinephrine resulted in an increase in plasma epinephrine level that is associated with cardiovascular changes (Dionne et al., 1984).

Nor-epinephrine is an endogenous catecholamine and is useful as an indicator of a patient's stress response (Lake et al., 1976).

Epidural ropivacaine 0.75% is more effective for the purpose of controlling surgical stress (catecholamine responses) than 0.375% under the same general anesthesia (Shinhe et al., 2004).

Tramadol inhibits catecholamine secretion at least partly by inhibiting nicotinic AChR functions at clinically relevant concentrations in a manner independent of opioid receptors and this inhibitory effects of tramadol on nicotinic AChR functions might be one of the antinociceptive mechanisms exerted by tramadol (Shiraishi et al., 2002).

In the present study no significant difference was observed in the incidence of local skin reaction at the injection site, neither erythema nor urticaria was observed in all groups and this was agreement with Kargi et al. when used tramadol for local infiltration analgesia without any local side effects.

Tramadol in IVRA it resulted in a skin rash distal to the tourniquet, suggesting histamine release (Acalovschi et al., 2001).

found that the incidence of painful or burning sensations at the intradermal injection site and local reactions (i.e. rash) were significantly greater in tramadol-treated than prilocaine-treated patients (Alunkaya et al., 2003).

In conclusion, Wound infiltration with ropivacaine 0.75% plus tramadol 1.5mg/kg combination produces the least percentage of increase in the plasma epinephrine and nor epinephrine and

improves postoperative pain control and patient comfort, and decreased the need for opioids than the use of either drug alone.

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Which Has Greater Analgesic Effect: Intrathecal Nalbuphine or Intrathecal Tramadol?

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Abstract: Nalbuphine and tramadol administered epidurally has been demonstrated to decrease postoperative analgesic requirements. However, its effect on postoperative analgesia after intrathecal administration has not will be established. In this double-blind, the effect of intrathecal tramadol and nalbuphine administration on pain control after gynecological surgery was studied. Sixty patients undergoing Transurethral resection of the bladder tumor were studied and randomized to receive bupivacaine 0.5% 3 ml intrathecally premixed with either tramadol 50mg [1ml], or nalbuphine 2mg[1ml]. After operation, paracetamol IV (1gm) was administered as needed for analgesia. Postoperative analgesic requirements, visual analogue scale for pain (VAS) and sedation scores, times to first analgesic, haemodynamic parameters and side effects were recorded by a blinded observe. There were no differences between the groups with regard to postoperative requirements in the first 24hours. Also there were no significant differences as regard sensory level, duration of motor block in hours and time to receive first analgesic between the two groups. Sedation scores in tramadol group were significantly higher than nalbuphine group. The homodynamic changes were similar in both groups and the incidence of nausea and vomiting was higher in tramadol group. On conclusion, the intrathecal administration of 50 mg tramadol and intrathecal 2 mg nalbuphine when used with 0.5% bupivacaine had a similar the postoperative analgesia in the patients without producing significant related side effects like nausea, vomiting, pruritus and respiratory depression.

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Keywords: Analgesic Effect; Intrathecal Nalbuphine; Intrathecal Tramadol

1. Introduction:

Transurethral resection of the bladder tumor is an operation leading to significant post operative pain and associated analgesic requirement and opioids are chosen for pain relief (Cohen et al, 1992). Intrathecal(IT) opioid administration has been demonstrated to provide effective postoperative analgesia after a variety of surgical procedures [Jacobson et al., 1988].

Although intrathecal morphine provides prolonged and excellent pain relief in various clinical settings [Wang et al., 1979 and Bailey et al., 1993], its use has been limited because of the dose-dependent risk of delayed respiratory depression which requires a close monitoring of respiratory patterns [Bailey et al., 1993].

Nalbuphine, a drug with mixed μ antagonist and κ agonist properties, has been used to prevent or treat these morphine-related adverse effects, especially after epidural administration of morphine [Alhashemi et al., 1997, Wittels etal., 1993 and Cohen et al., 1992]. The addition of intrathecal nalbuphine 0.4 mg to hyperbaric tetracaine, compared with intrathecal morphine 0.4 mg, for spinal anesthesia improved the quality of intraoperative and postoperative analgesia, with fewer side effects [Lin, 1992].

Tramadol is a centrally acting analgesic agent with a terminal elimination half-life of 5.5 hours and provides clinical analgesia for 10 hours after epidural administration [Vickers et al., 1992 and Tarkkila et al., 1998], as it has 6000 fold less affinity for μ receptors compared to morphine [Raffa et al., 1992 and Scott, 2000]. It also inhibits serotonin and norepinephrine reuptake in the spinal cord and has no reported neural toxicity [Tsai et al., 2001]. Inaddition, tramadol has the ability to provide effective postoperative analgesia with no risk of respiratory depression, pruritis, nausea, vomiting and urinary retention after central neuraxial administration (Douman et al., 2010).

Therefore, we undertook a prospective, randomized, double-blinded study to compare the analgesic effects and duration of analgesia as well as the side effects of 50 mg tramadol or 2 mg nalbuphine administered via the IT route for postoperative pain relief after transurethral resection tumor of the bladder.

There is little comparative data showing how post-operative analgesic effects differ between interathecal nalbuphine and interathecal tramadol.

The purpose of this study was to compare the analgesic effects of interathecal nalbuphine

(2mg), and interathecal tramadol (50mg) using analgesic demand and VAS pain scores.

2. Materials and Methods

After approved of the local ethics committee of South Egypt Cancer Institute, Assiut University, and written, informed consent was obtained from each patient, this prospective, randomized, double-blinded study was performed, 60 patients ASA class I - III under spinal anesthesia were recruited into this study. Patients who had a known allergy to nalbuphine or tramadol, Patients with a contraindication to spinal anesthesia or those who did not agree to participate in study were also excluded.

Patients were randomized to one of two study groups: intrathecal tramadol (group T) or intrathecal nalbuphine (group N) of 30 patients each. **Group T**: In which we administered intrathecal mixture of 15 mg hyperbaric bupivacaine 0.5 % [3 ml] [Marcaine®, Astra] in addition to 50 mg [1 ml] of preservative free tramadol hydrochloride [October Pharma S.A.E.] the final volume was 4 ml

Group N:The patients had received intrathecal mixture of 15mg hyperbaric bupivacaine 0.5 % [3 ml] plus 2 mg of preservative free nalbuphine in 1 ml [nalbuphine HCL 20 mg (SERB, rue Villiers de llsle Adam 75020 Paris FRANC].

Patients and anesthesia providers were blinded to the treatment group. [The study drugs were prepared by another investigator not included in the patient care]. An IV infusion of lactated Ringer's solution 500 ml through a peripheral venous catheter was started. In all patients, electrocardiogram, noninvasive arterial blood pressure, and peripheral oxygen saturation were monitored at baseline and every 5 min thereafter until the end of surgery, and an indwelling urinary catheter was inserted at the end of the operation. The skin of the back was prepared in the usual fashion, and was anaesthetized locally with lidocaine 2% 3 ml at level L3-4 with the patient in the sitting position. Spinal puncture was performed using a 25-gauge pencil-point spinal needle. All patients received bupivacaine 0.5% 15 mg intrathecally, co-administered in a blinded fashion with either preservative-free tramadol 50 mg 1 ml [group T] or preservative-free nalbuphine 2mg 1 ml(group N).

Ephedrine 6 mg i.v was used as needed to treat hypotension (defined as a 20% decrease in systolic blood pressure from baseline value). HR <55 beats/min was treated with atropine 0.5 mg i.v as required. After surgery, patients were transferred to the recovery room until the next morning and received 4L oxygen by face mask. As soon as the pain score at the operative site was higher than 3 cm

on the visual analogue scale (VAS, 0 cm no pain, 10 cm maximal pain). Pain score (VAS) assessed at 2,4,8,12,16 and 24 hours postoperative, respiratory rate, oxygen saturation, sedation score (1: awake and alert, 2: awake but drowsy, responding to verbal stimulus, 3: drowsy but rousable, responding to physical stimulus, 4: unrousable, not responding to physical stimulus) and hemodynamic changes were recorded. All patients remained in the recovery room for 24 h after their arrival paracetamol 1gm was given on the visual analogue scale higher than 3 cm, the time of first request of analgesia ,number of rescue analgesia, the duration of motor block from the time of drug administration to the time when patient was able to lift his leg and the adverse effects such as nausea, vomiting, pruritus, respiratory depression (respiratory rate = 8 breaths/min) were recorded

Statistical analysis

Descriptive values are expressed as mean $\pm SD$ or number. The Student t-test was used for comparison between means of continues variables and normally distributed data, proportions were compared using Chi-squared or Fisher's exact test as appropriate otherwise Mann-Whitney U test was used. P was considered significant if (p < 0.05).

3. Results:

As shown in table (1), there were no significant differences between the two groups as regard age year, weight, height or operative time

The duration and degree of the block were equal for all patients except one patient in tramadol group who required general anesthesia supplementation in the form of inhalational halothane via laryngeal mask for completion of surgical procedure due to failure of spinal anesthesia. The mean maximal level of sensory block for tramadol group was $T5\pm0.2$ and to $T6\pm0.1$ for nalbuphine group. Comparison of mean values of visual analogue scores in both groups revealed significant (p<0.05) lower score in both groups at all readings (Fig 1.)

As shown in table (2), the mean time to first rescue analgesic was 8.5 ± 3.67 in nalbophine group versus 7.35 ± 2.4 in tramadol group, sedation score was equal in both groups, number of rescue analgesia was small in nalbophine group and analgesic consumption (Paracetamol injection (gm/24h) was less in nalbophine group but this difference in these parameters was not significant (p>0.05) (Table 2).

As shown in table (3), the heart rate and mean blood pressure, they were stable with minimal variation, which were not significant. Four patient in the Tramadol group developed hypotension requiring treatment as opposed to two patients in Nalbuphine group. Seven patients had postoperative nausea and

vomiting in Tramadol group as opposed to three in Nalbuphine group. None of the patients had

postoperative pruritus or respiratory depression (p>0.05) (Table 3).

Table 1. Patient Characteristic. Data are mean± (SD)

	()	
Variable	Group T (n=30)	Group N (n=30)
Age (yr)	68 ± 8.1	66.23±9.2
Weight (kg)	64.51±3.18	66.51±4.1
Height (cm)	168 ± 3.1	165±1.4
Operative time (min)	130.5±35.9	126±39.5
GA supplementation(N of	1	0
patients)		

 Table 2 Sedation score and postoperative analgesia

Variable	GroupT (n=30)	Group N
		(n=30)
Maximal level of sensory block	T5±0.2	$T6\pm0.1$
Duration of motor block in hours	5.8 ± 0.8	5.9 ± 0.9
Sedation score	$1.1 \pm (0.2)$	$1.2 \pm (0.3)$
Time to first analgesia (Hours)	7.35 ± 2.4	8.5 ± 3.67
Number of rescue analgesia	2(0.6%)	1(0.3%)
Analgesic consumption Paracetamol injection(gm/24h)	2 gm	1 gm

 Table 3: Side effects and hemodynamic changes

Variables:-	Group T	Group N
	(n=30)	(n=30)
Nausea /vomiting	7(2.1%)	3 (0.9%)
Pruritus	0 (0%)	0 (0%)
Respiratory depression	0	0
Maximum change in MABP all over 24	21±5	20±9
hours(mmHg)		
Maximum change in heart rate all over 24 hours	7±4	6±9
(beat/min)		

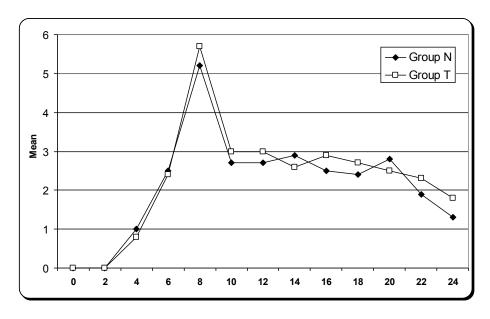


Fig. (1)VAS: Score versus Time for the two group

4. Discussion:-

Tramadol is a centrally acting analgesic agent with a terminal elimination half-life of 5.5 hours and provides clinical analgesia for 10 hours after epidural administration [Prosser et al, 1997]. Tramadol stimulates the μ - receptors and to a lesser extent the delta and kappa receptors. Although tramadol is one-fifth as potent as morphine as an analgesic, it causes less respiratory depression and pruritus (chakraborty et al., 2008).

Our results show that 2 mg interathecal nalbuphine had similar analgesic effects of 50 mg interathecal tramadol each of them prolonged the duration of post-operative analgesia and reduced VAS pain score. Also this study demonstrated that the interathecal tramadol (50mg) and intrathecal nalbuphine (2mg) with bupivacaine provides similar motor block in nalbuphine, and tramadol groups, nearly equal analgesia, delayed first analgesic request, less analgesic supplement, lower number of analgesic in the first 24 hours and the times to first analgesic request and the amounts of paracetamol administered over the first24 after operation were all comparable between the two study groups, which suggest that tramadol did not potentiate the local anaesthetic effects of bupivacaine.

Guduz and colleagues (2001), found that tramadol does not prolong the duration of action of bupivacaine when the drugs are co-administered caudally.

The effective intrathecal dose of tramadol is still confusing. Chakraborty et al.,(2008), has studied the effect of intrathecal tramadol (20mg) added to bupivacaine in patients undergoing major gynecological surgery and they found that the duration of analgesia provided by intrathecal administration of 20 mg tramadol with 15 mg of 0.5% hyperbaric bupivacaine was significantly longer than that provided by intrathecal bupivacaine alone.

Also they suggested using dose of 20mg of tramadol intrathecally with 15 mg of 0.5% hyperbaric bupivacaine can prolongs postoperative analgesia without serious adverse effects after major gynecological surgeries (chakraborty et al., 2008).

Wilder-Smith and colleagues (1998), suggest that epidural tramadol in a dose of 20 mg may have anti-analgesic effects. Alhshemi and Kaki (2003), reported that intrathecal tramadol (25mg) was not different from saline in its effect on postoperative morphine requirements after TURP and this may be due to dose used in this study could have been too small for a clinically relevant analgesic effect to be detected. Due to lipophilic properties of tramadol resulted in rapid diffusion of the drug out of the subarachnoid space. So, we used a large dose in this study

No Changes in haemodynamic variables or quality of analgesia after Intravenous tramadol 1.5 mg/kg and nalbuphine 0.1 mg/kg in total intravenous anaesthesia (TIVA) using a propofol infusion in patients undergoing dilatation and evacuation (Siddiqui and Chohan, 2007).

Fournier et al (2000), have demonstrated that after total hip replacement, administration of intrathecal nalbuphine resulted in a significantly faster onset of pain relief and shorter duration of analgesia than intrathecal morphine.

Xavier et al., (2000), suggested that intrathecal nalbuphine 0.8 mg provides good intra operative and early postoperative analgesia without side effect such as pruritis and postoperative nausea and vomiting and this allows earlier discharge of patients from the recovery room.

The addition of intrathecal nalbuphine 0.4 mg to hyperbaric tetracaine, compared with intrathecal morphine 0.4 mg, for spinal anesthesia improved the quality of intraoperative and postoperative analgesia, with fewer side effects (Lin, 1992). Intrathecal nalbuphine 0.8 –1.6 mg seems to improve the quality of intraoperative analgesia during cesarean deliveries and ncreasing the nalbuphine dose to 1.6 mg did not further improve analgesia due to this drug may have a ceiling effect above 0.8 mg due to its lipophilic properties (Wang et al., 1988).

Rawal et al (1991), showed, in a sheep model using histopathological methods, that intrathecal nalbuphine was not neurotoxic. Even large doses (15–24 mg) of intrathecal nalbuphine were not associated with histopathological changes of the spinal cord.

The hemodynamic variables and sedation score were comparable in the two groups in our study. Alhshemi and Kaki (2003), reported that intrathecal tramadol (25mg) did not seem to influence the intra operative haemodynamic profile of patients undergoing this type of anesthetic. These results are in keeping with those reported previously by other investigators who have demonstrated that parenteral tramadol does not have clinically relevant effects on HR and blood pressure [Tarkkila et al., 1997].

In this study seven patients in tramadol group and three patients in nalbuphine group had vomiting and none of the patients in both groups had postoperative complication like, itching, respiratory depression, neurological sequelae or complaints were observed until discharge of the patient from the hospital among the two groups. The incidence of hemodynamic side effects like decreased blood pressure, bradycardia, respiratory depression and other side effects like somnolence and dryness of mouth were minimum and well tolerated by the patients studied.

On conclusion, intrathecal administration of 50 mg tramadol and intrathecal 2 mg nalbuphine when used with 0.5% bupivacaine had a similar the postoperative analgesia in the patients without producing significant related side effects like nausea, vomiting, pruritus and respiratory depression and recommend a further study with a large dose in different surgical studies.

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Possible Synergistic Therapeutic Role of Taurine and Curcumin on Cerulein-Induced Acute Pancreatitis in Rats

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Abstract: Acute pancreatitis is an inflammatory condition of the pancreas characterized clinically by abdominal pain and elevated levels of pancreatic enzymes in the blood. A number of conditions are known to induce this disorder with varying degrees of certainty. However, the pathogenesis of this disorder is not fully understood. The current study comprised two experiments; the first was carried out to compare the levels of pancreas tumor markers and pancreas function as a result of cerulein treatment which experimentally induced acute pancreatitis. In the second experiment, pancreatitis rats groups were treated with taruine or curcumin and their mixture. A significant elevation in pancreatic tumor markers profile (CEA, CA19.9, CA72.4 and CA242) was occurred as a result of cerulein treatment which experimentally induced acute pancreatitis. Also, a significant increment in the activities of α-amylase and lipase accompanied with a significant elevation in the concentration of TAP was pronounced in pancreatitis rats group. On the other hand, a significant reduce in the content of glutathione (GSH) and in the activity of glutathione peroxidase (GpX) occurred. The concentration of thiobarbituric acid reactive substances (TBARS) and MOP in pancreatic tissue was elevated as a result of cerulean treatment. In the second experiment, all pervious parameters were corrected as a result of taruine or curcumine administration dependent on time of treatment. The best ameliorating effect occurred in all previous parameters in rats group which treated with both antioxidants (taruine & curcumin) dependent on time of administration. These findings are consistent with the concept that taruine, curcumin or their mixture is an antipancreatitis agent. The underlying mechanisms of these effects were discussed according to variable researches.

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Key word: Cerulein, Acute Pancreatitis, Curcumin, Taurine, pancreatic tumor marker.

1. Introduction:

Pancreatitis is the inflammation of the pancreas, an organ that produces several enzymes to aid in the digestion of food, as well as the hormone insulin, which controls the level of sugar (glucose) in the blood. The pancreas is located in the upper abdomen behind the stomach. When the pancreas is inflamed, the body is not able to absorb all the nutrients it needs (Schoenberg *et al.*, 1994). 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 (Uomo *et al.*, 1999, Toouli *et al.*, 2002 and Gultekin 2007).

Severe acute pancreatitis is characterized by acinar cell injury with extensive tissue necrosis, inflammation, and hemorrhage. In most patients it is associated with remote organ failure, sepsis, and a high death rate. In the absence of a clear pathophysiologic concept of acute pancreatitis, current treatment strategies still focus on the management of subsequent complications rather than the cause of the disease. In the search of an improved therapeutic concept, increasing experimental and

clinical evidence has arisen that oxidative stress and polymorphonuclear leukocytes play an instrumental role in the disease process (Dervenis *et al.*, 1999; Uomo *et al.*, 1999; Toouli *et al.*, 2002 and Ceranowicz 2010).

In the twenty last years, a number of articles had been published on the treatment of acute pancreatitis in experimental model animals and most of them concerned rats (Byung *et al.*, 2001; Alhan *et al.*, 2006) and mice (Pastor & Frossard, 2001).

Taurine, 2-aminoethanesulphonic acid is an essential amino acid. It is present at high concentrations in many tissues. It plays important roles in numerous physiological functions including conjugation with bile acids, modulation of calcium levels and maintenance of osmolarity, antioxidation and stabilization of membranes (Huxtable, 1992 and Schrader, 2009). It was reported to have beneficial effects in various physiological and pathological conditions (Ahn et al., 2001; Chiba et al., 2002; Ozturk et al., 2003) by mainly diminishing production of reactive oxygen species (ROS). It also can prevent DNA damage at physiological concentrations (Messina & Dawson, 2000; Heibashy

& El-Nahrawy, 2008 and Heibashy & Sharoud, 2008). Taurine has also hepatoprotective effects such as inhibition of extracellular matrix accumulation in experimental liver fibrosis (Chen & Zhang, 1999 and Balkan *et al.*, 2001) and improvement of liver function tests in fatty liver disease of children (Obinata *et al.*, 1996). Hepatoprotective feature of taurine is attributed to its inhibitory activity on generation of ROS, which are known to play an important role in hepatic injury both in vitro and in vivo (Pietrangelo, 1996 and Svegliati -Baroni *et al.*, 1998).

Moreover, several authors reported beneficial effects of taurine on histopathology and oxidative stress parameters in a rat model of CCl₄-induced liver fibrosis (Refik Mas *et al.*, 2004 and Tasci *et al.*, 2007) where remarkable histopathological improvement in taurine treated animals subjected to hepatotoxin was observed, and this was associated with oxidative stress reduction and hepatocellular apoptosis.

Curcuma longa Linn or turmeric is a tropical plant native to southern and southeastern tropical Asia. Curcumin is a diferuloylmethane present in extracts of the plant. Curcumin and it's derivatives that block or suppress the proliferation of tumor cells have potential as anticancer agents (Huang *et al.*, 1994; Piper *et al.*, 1998 and Lal *et al.*, 2000). They have been shown to inhibit the proliferation of a wide variety of tumor cells, including B-cell and T-cell leukemia], colon carcinoma and epidermoid carcinoma cells. It has also been shown to suppress the proliferation of various breast carcinoma cell lines in culture.

Gukovsky *et al.* (2003) reported that curcumin ameliorates pancreatitis in two rat models. In both cerulein pancreatitis and pancreatitis induced by a combination of ethanol diet and low-dose curcumin, curcumin decreased the severity of the disease. They reported that the administration of curcumin markedly inhibited NF-kB and AP-1, IL-6, TNF- α , and iNOS in the pancreas. So, the authors suggested that curcumin may be useful for treatment of pancreatitis.

The objective of the current investigation is to clarify the possible correction correct in the estimated parameters which accompanied the induction of acute pancreatitis in rats after treatment with taurine or curcumin and their mixture. The underlying mechanisms through those antioxidants that counteracted acute pancreatitis in rats were discussed according to available published researches.

2. Materials and Methods

Ninety five adult male albino rats (Rattus rattus) were maintained in the animal-holding room

under controlled environmental conditions (12/12 h light/dark cycle, 50% humidity, and 30°C) and fed rodent diet (NRC, 1977). They were housed in a well ventilated vivarum of Zoology Department, Women's Collage, Ain Shams University. The fresh tap water was available all the time. The animals were 8 - 10 weeks of age at the beginning of each study and caged in wire bottom galvanized metal wall boxes.

The study comprised two experiments; the first one was carried out to compare the levels of pancreas tumor markers and pancreas function as a result of cerulein treatment, to achieve this purpose, a comparison was done between a group of ten control rats received daily injections of normal saline (0.9%NaCl) for three days and other ten rats were daily injected subcutaneous with cerulein (Sigma Co. USA) at a dose of 40 µg/kg body weight for the same period as described by Niederau *et al.* (1990) to induce experimentally acute pancreatitis.

In the second experiment, five comparisons were made between normal control rats (n= 15 rats) and four groups of rats with experimentally acute pancreatitis. The first experimentally acute pancreatitis group was served as recovery group. The second acute pancreatitis group rats were treated (i.p.) with 500 mg taurine (Sigma Chem. Co., St. Louis, Mo., USA)/ kg b.wt/day for 30 days according to Byung et al. (2001). The third acute pancreatitis group rats were treated orally with 30 mg curcumin (Commercial curcumin was used)/ kg b.wt/day for 30 days according to Heibashy & Sharoud (2008). The fourth pancreatitis group rat was received both taurine and curcumin for the same previous period. All animal groups were divided into three intervals (10, 20 and 30 days and five rats in each interval).

At the end of each experimental period, blood samples were collected from each group by decapitation killing. Serum carcino-embryonic antigen (CEA) and the cancer antigens (CA_{19.9}), (CA_{72.4}) and (CA₂₄₂) were assayed by radioimmunoassay (RIA) kits using solid phase component system. (ICN Pharmaceuticals Inc, USA).

Serum α -amylase and lipase activities were estimated according to Garber & Wulff (1989) and Lott (1986) respectively using commercial ELISA kits (Diagnostic Automation, INC. USA). Serum trypsinogen activation peptide level was assayed by ELISA as described previously by Lee (2000).

After sacrifice, pancreases were obtained at the end of each experimental period and wash with saline solution (0.9 % NaCl). After washing, the kidneys were homogenized in ice-cold 0.25 M sucrose containing 1mM diethylenetriamine penta-acetic acid (1:1 w/v). Each sample was then centrifuged for 20 min at 20,000 g and 4°C. The supernatant was aspirated for measuring the content of reduced GSH

(Baker *et al.*, 1990), thiobarbituric acid reactive substances (TBARS) concentration (Devasagayam & Tarachand,1987) and the activity of glutathione peroxidase (GPX) (Ursini *et al.*, 1985) by the aid of ELISA technique and using commercial kits (IBL Gesellschaft, Hamburg, Germany).

The sequestration of neutrophils within the pancreas was evaluated quantity by tissue myeloperoxidase (MPO) activity using ELISA technique as described by Olsen & Little 1983. The kit was purchased from Gen Way Co. (USA).

Data were statistically analyzed using Student "t" test in the first experimental (Milton *et al.*, 1986). Moreover, two way analysis of variance (ANOVA) followed by Duncan's multiple range test in the second experimental according to Snedecor & Cochran (1982).

3. Results and Discussion

In man, acute pancreatitis is a severe disease with a significant morbidity and mortality (Lerch & Adler, 1994). In order to better understand the underlying cellu'lar mechanisms of acute pancreatitis in humans, several experimental animal models of acute pancreatitis have been developed. So, acute pancreatitis is an inflammatory condition of the pancreas characterized clinically by abdominal pain and elevated levels of pancreatic enzymes in the blood. A number of conditions are known to induce this disorder with varying degrees of certainty. However, the pathogenesis of this disorder is not fully understood (Pezzilli *et al.*, 2006).

The establishment of acute pancreatitis animal models makes enables the researchers to study the details of acute pancreatitis pathophysiology. It should be emphasized that the use of numerous acute

pancreatitis animal models is essential because it ensures that the acute pancreatitis -related biological factors are not model-specific (or animal-specific). Traditionally, the discovery of key biological factors relied on classical strategies such as investigation of gene or protein expression during the episode of acute pancreatitis. In the recent decade, the development of transgenic animals should shed light on acute pancreatitis pathogenesis. Transgenic animals are the animals that carry a transgene in addition to their complement DNA. The target transgene is cloned by recombinant DNA technology, is delivered to recipient zygote or embryonic stem cells, and integrates into the host's own genome. The incorporation would result in either gain-of-function or loss-of-function, thus generating knock-in or knockout animal, respectively (Galli-Taliadoros et al., 1995 and Schafer et al., 2005).

In the current investigation, acute pancreatitis was induced in rats by the administration of 40 µg cerulein /kg b.wt/ for three days as described by Niederau et al. (1990). A significant elevation occurred in the tumor marker profile (CEA, CA_{19.9}, CA_{72 4} and CA₂₄₂) as a result of cerulein administration in rats (Table 1). These results may be attributed to the elevation of free radical production, increasing lipid peroxidation concentration or defect in the immune system defense. Several studies have suggested that the elevation in the activities of phospholipase A2 (PLA2) and cyclooxygenase-2 (COX-2) may lead to pronounce acute pancreatitis in human (Hietaranta et al., 1999; Makela et al., 1999; Nevalainen et al., 2000; Ethridge et al., 2002; Zhou et al., 2004; Kihara et al., 2005) and in experimental animals (Yoshikawa et al., 1999; Tomita et al., 2004; Yan et al., 2004 and Camargo et al., 2005).

Table (1): Changes in serum tumor marker profile (CEA, CA19.9, CA72.4 and CA242) in acute pancreatic rats compared to those normal control ones.

Parameters	Normal rats (n=10)	Pancreatic cancer rats(n=10)
CEA (ng/ml)	0.23±0.006	3.18±0.042*
CA _{19.9} (U/ml)	7.82±0.107	50.73±1.283*
CA _{72.4} (U/ml)	4.19±0.091	21.41±0.216*
CA ₂₄₂ (U/L)	3.54±0.068	16.57±0.139*

- Values are expressed as mean \pm SE.

-n = number of rats.-

* Means a significant (P< 0.001).

Phospholipase A2 (PLA2) is one of the enzymes that catalyzes the hydrolysis of phospholipids, the products of which are free fatty acids and lysophospholipids. Several types of PLA2 have been identified including group I, II, V, and X. Among these, group II PLA2 has been identified as a particularly important mediator during acute inflammation. Group II PLA2 can be activated by proinflammatory cytokines such as interleukin (IL) 1,

IL-6, and tumor necrosis factor- α (Nevalainen *et al.*, 2000 and Heibashy & Sharoud, 2008).

Elevated serum PLA2 activity, primarily of the group II isoform, has been detected in patients with infections and inflammatory diseases. Intraductal infusion of PLA2 alone or in combination with another substance like deoxycholate can induce acute pancreatitis in rats (Hietaranta *et al.*, 1999 and Makela *et al.*, 1999). Plasma group II PLA2 activity has been shown to be elevated in the taurocholate-

induced (Uhl *et al.*, 1999) and deoxycholate-induced acute pancreatitis model (Furue *et al.*, 1999). These observations are in good agreement with the findings in the clinical setting. Patients diagnosed with acute necrotizing pancreatitis have elevated serum PLA2 activity (Makela *et al.*, 1999).

Cyclooxygenase (COX) is a key enzyme in the prostanoid system; it catalyzes the conversion of arachidonic acid to prostaglandin. Two isoforms of COX have been identified: the constitutively expressed COX-1 and the inducible COX-2. The expression of inducible COX-2 is controlled by certain inflammatory factors including IL-1 and tumor necrosis factor-α (Yan *et al.*, 2004 and Heibashy & Sharoud, 2008). This rate-determining enzyme in prostaglandin synthesis may play an important role in the pathophysiology of acute pancreatitis. COX-2 expression was found to be upregulated in caerulein-induced pancreatitis in mice (Song *et al.*, 2002) and rats (Yan *et al.*, 2004 and Zhou *et al.*, 2004).

In the current study, serum α -amylase, lipase activities and trypsinogen activation peptide (TAP) concentration were decreased significantly in cancer rats group (Table 2). These results may be due to disturbance inflammatory cytokines (IL-1 & IL-6), reactive oxygen species (ROS) and mediators of inflammatory pathways such as cyclooxygenase-2 (COX-2) and Nuclear Factor Kappa B (NFkB). However, they are associated with oncogene expression, silencing of tumor suppressor genes and affect the cell cycle, all of which may facilitate pancreatic carcinogensis. Moreover, mediators of the inflammatory response may also induce genetic damage, cell proliferation and inhibition of apoptosis in the pancreas. Because ROS contribute to the inflammatory process, evaluating the potential cancer protective effects of dietary antioxidants is a logical step in this area of research. These results were confirmed by Song et al. (2002); Yan et al. (2004); Zhou et al. (2004); Alhan et al. (2006); Tasci et al. (2007) and Buyukberber et al. (2009).

Table (2): Changes in serum α-amylase, lipase activities and trypsinogen activation peptide (TAP) concentration in acute pancreatic rats compared to those normal control ones.

Parameters	Normal rats (n=10)	Pancreatic cancer rats(n=10)
α-amylase (U/L)	186.47±2.593	935.274±6.386*
Lipase (U/L)	92.61±1.107	395.44±2.482*
TAP (ng/ml)	9.42±0.261	23.19±0.497*

⁻ Values are expressed as mean \pm SE.

-n = number of rats.

The present study developed and characterized a new and highly reproducible rat model of acute pancreatitis using a dose of 40 μ g cerulein/kg body weight. The administration of cerulein resulted in a significant decrease in the content of GSH and the activity of G_{px} while, the concentration of thiobarbituric acid reactive substances (TBARS) and the activity of myeloperoxidase (MPO) in tissues were significantly elevated in pancreatitis rats group

(Table 3). These data may be attributed to the disturbance in the serum α -amylase, lipase activities and trypsinogen activation peptide (TAP) concentration, alteration in the cellular endoplasmic reticulum of pancreas or/ and histological changes (including accumulation of fluid, disruption of histoarchitecture, acinar cell vacuolization, extensive acinar cell necrosis and neutrophilic infiltration) resembling acute pancreatitis in humans.

Table (3): Changes in GSH content, Gpx activity, TBARS, MPO concentrations in acute pancreatic rats tissue compared to their corresponding normal control ones.

Parameters	Normal rats (n=10)	Pancreatic cancer rats(n=10)
GSH (mg/g protein)	14.56 ± 0.493	6.93±0.275*
Gpx (μmol /min / g protein)	73.14 ± 1.062	42.36±0.684*
TBARS (nmol / 100mg Protein)	2.09 ± 0.069	4.27±0.089*
MPO (U/mg protein)	9.12±0.374	27.81±0.873

⁻ Values are expressed as mean \pm SE.

-n = number of rats.-

* Means a significant (P< 0.001).

Judging from these data, Malo *et al.* (2010) reported that acute pancreatitis is accompanied with disturbance in glutathione pool, inflammatory cytokines (IL-10 & TNF- α) and the formation of nitric oxide (NO) due to the disturbance in citrulline/NO cycle.

Taurine is a semi-essential sulphur amino acid derived from methionine and cysteine metabolism and promotes neurological function - neurotransmitter/neuromodulator, neurotrophin, antioxidant, and osmolyte (Gibson *et al.*, 2007 and Heibashy & Sharoud, 2008).

The administration of taurine to acute pancreatitis rats led to a significant correction in all studied parameters dependent on time of treatment (Tables 4, 5 & 6). These results may be attributed to the magic physical and chemical characteristic powerful of taurine which immediately stop cancer from spreading and start killing existing cancer cells, acts as a free radical scavenger, decreases lipid peroxidation production via increases β-oxidation in the mitochondria matrix, rebuild the immune system and damaged tissue. So, the body can naturally transform or expel any tumorous masses and eliminate the causal factors that destroyed immune system in the first place. These results are in harmony with those obtained by Lee et al. (1992); Ebrahim et al. (2001) and Tasci et al. (2007&2008).

Lee *et al.* (1992) postulated that the protective action of taurine on oxidant-induced damages of tissue components including degradation of hyaluronic acid may be attributed to both its scavenging action on hypochloriate (HOCl) and chloramine and the complex formation of taurine with HOCl or NH₂Cl without scavenging action on oxygen free radicals.

The protective capacity of taurine was attributed to free radicals scavenging. Subjects treated with placebo showed a significant increase in the number of severely damage mitochondria after reprefusion, whereas the number of damaged and necrotic myocytes also increased significantly in these subjects after infusion. No such damage to mitochondria or myocytes was observed in the taurine treated subjects (Lee et al., 1992). The use of supplemental taurine as a physiological protective against lipid peroxidation was advocated by Gordon et al. (1986) who demonstrated the protection of hamaster bronchioles from acute NO2-induced alterations. The authors outlined the mechanism through which acute ROS tissue damage is believed to act. NO2 and its highly ROS interact directly with plasma membrane of cell products, possibly via lipid peroxidation triggering a series of events that include the release of chemotactic factors and acute phase reactions responsible for the influx of neutrophils. Activation of neutrophils results in production of superoxide, free radicals and hydrogen peroxide (H₂O₂), which cause further epithelial damage. Activated neutrophils also release proteolytic enzymes that have the capacity to alter alveolar interstitial components. It was proposed by Gordon et al. (1986) and Cardin et al. (1999) that the protective activity of taurine may reside in its ability to become chlorinated in the presence of HOCL, thereby preventing the direct attack of this oxidant on cell membranes (Rock et al., 1996).

Turmeric, derived from the plant Curcuma longa, is a gold-colored spice commonly used on the Indian subcontinent, not only for health care but also for preservation of food and as a yellow dye for textiles. Curcumin has been shown to exhibit antioxidant, anti-inflammatory, antiviral, antibacterial, antifungal, and anticancer activities and thus has a potential against various malignant diseases, diabetes, allergies, arthritis, Alzheimer disease, and other chronic illnesses (Huang *et al.*, 1994; Piper *et al.*, 1998 and Lal *et al.*, 2000)

These effects are mediated through the regulation of various transcription factors, growth factors, inflammatory cytokines, protein kinases, and other enzymes. Curcumin exhibits activities similar to recently discovered TNF blockers (e.g; humira, remicade and enbrel), vascular endothelial cell growth factor blocker (e.g; avastin), human epidermal growth factor receptor blockers (e.g; erbitux, erlotinib, and geftinib), and HER2 blocker (Chattopadhyay et al., 2004; Hong et al., 2004 and Prasad et al., 2004 and Heibashy & El-Nahrawy; 2008).

Gukovsky *et al.* (2003) reported that curcumin ameliorates pancreatitis in two rat models. In both cerulein pancreatitis and pancreatitis induced by a combination of ethanol diet and low-dose curcumin, curcumin decreased the severity of the disease. Curcumin markedly inhibited NF-kB and AP-1, IL-6, TNF α , and iNOS in the pancreas. Based on these studies, Gukovsky *et al.* suggested that curcumin may be useful for treatment of pancreatitis.

Soni *et al.* (1992) examined the effect of curcumin on serum levels of cholesterol and lipid peroxides in 10 healthy human volunteers. A dose of 500 mg of curcumin per day for 7 days significantly decreased the level of serum lipid peroxides (33%), increased HDL cholesterol (29%) and decreased total serum cholesterol (11.63%). The results suggest curcumin as a chemopreventive substance against arterial diseases.

Numerous studies have been performed on the biotransformation of curcumin. Lin et al. (2000) showed that curcumin was first biotransformed to dihydrocurcumin and tetrahydrocurcumin and that these compounds subsequently were converted to monoglucuronide conjugates. Thus, curcuminglucuronide, dihydro-curcumin-glucuronide, tetrahydrocurcumin-glucuronide and tetrahydrocurcumin are major metabolites of curcumin in mice.

To test the hypothesis that curcumin metabolites resemble their progenitor in that they can inhibit COX-2 expression, curcumin and four of its metabolites at a concentration of 20 mM were compared in terms of their ability to inhibit phorbol

ester-induced prostaglandin E2 (PGE2) production in human colonic epithelial cells. Curcumin reduced PGE2 levels to preinduction levels, whereas tetrahvdrocurcumin. hexahydrocurcumin, curcumin sulfate had only weak PGE2 inhibitory activity, and hexahydrocurcuminol was inactive. The results suggested that (a) the major products of curcumin biotransformation by hepatocytes occurred only at low abundance in rat plasma after curcumin administration and (b) metabolism of curcumin by reduction or conjugation generates species with reduced ability to inhibit COX-2 expression (Lin et al., 2000; Ishida et al., 2002; Gukovsky et al., 2003 and Heibashy and El-Nahrawy, 2008). Because the gastrointestinal tract seems to be exposed more prominently to unmetabolized curcumin than any other tissue, the results support the clinical evaluation of curcumin as a colorectal cancer chemopreventive agent.

Treated acute pancreatitis rats with curcumin led to a significant amelioration in all studied parameters dependent on time of treatment (Tables 4, 5 & 6). These results may be due to the powerl of curcumin which suppresses the activation of the transcription factor NF-KB, which regulates the expression of proinflammatory gene products, downregulates the expression of COX-2, an enzyme linked with most types of inflammations: inhibits the expression of another proinflammatoryenzyme 5-LOX; downregulates the expression of various cell surface adhesion molecules that have been linked with inflammation; downregulates the expression of various inflammatory cytokines including TNF, IL-1, IL-6, IL-8 and chemokines and a potent antioxidant of curcumin which reduces free radical production and stabilizes cell membrane. These data are in agreement with those obtained by Chattopadhyay et al. (2004); Hong et al. (2004); Prasad et al. (2004); Lantz et al. (2005); Lee et al. (2005); Gulcubuk et al. (2006); Tunstall et al. (2006) and Heibashy & El-Nahrawy (2008).

While, prooxidants are consider mediators of numerous diseases, antioxidants are generally believed to delay or halt the disease. However, this paradigm is not always valid as most cytokines mediate their effects through prooxidant mechanisms. Reactive oxygen species (ROS) also play an important role in cell-mediated cytotoxicity (CMC) of the immune system. Numerous reports indicate that curcumin could mediate both prooxidant and antioxidant roles. First, curcumin could induce the expression of ROS, which plays an important role in the antiproliferative effects of this molecule (Prasad

et al., 2004; Lantz et al., 2005 and Lee et al., 2005). Second, curcumin binds thioredoxin reductase (TR) and converts this enzyme to NADPH oxidase, thus leading to the production of ROS. Because TR is overexpressed in tumor cells, curcumin kills tumor cells through this mechanism. (Rao et al., 1995; Lal et al., 2000; Gulcubuk et al., 2006; Tunstall et al.; 2006 and Heibashy & El-Nahrawy, 2008). Third, curcumin suppresses lipid peroxidation (Gulcubuk et al., 2006; Tunstall et al.; 2006 and Heibashy & El-Nahrawy, 2008). Fourth, curcumin increases the expression of intracellular glutathione (Chattopadhyay et al., 2004; Hong et al., 2004 and Prasad et al., 2004 and Heibashy & El-Nahrawy: 2008). Fifth, curcumin could also play an antioxidant role through its ability to bind iron (Jiao et al., 2006).

All these reports combined suggest the ability of curcumin to modulate the redox status of the cells. So, curcumin can modulate the cellular action of various growth factors and cytokines. However, curcumin has the ability to downregulate the effect of growth factor epidermal (EGF) downregulation of expression and activity of EGF receptors (Smith et al., 2004; Chen et al., 2006 and Kim et al., 2006). Curcumin downregulates the activity of human EGFR-2 (called HER2/neu) which is a growth factor receptor closely linked with cancer of breast, lung, kidney and prostate (Hong et al., 1999). Also, curcumin suppresses the action of intereleukin (IL-6) through the downregulation of STAT3 activation and modulates the action of TNF (Chattopadhyay et al., 2004; Hong et al., 2004 and Prasad et al., 2004 and Heibashy & El-Nahrawy; 2008).

Maximum amelioration occurred in tested parameters of acute pancreatitis rats treated with both antioxidants (Taurine and curcumin). These results may be attributed to the synergistic effects of both antioxidants which act as anti-cancer agents (Table 3).

In conclusion, this study substantiates that taurine and curcumin, through their marked antioxidant activities, coupled with favorable anticancer effects salvages in acute pancreatitis of rats induced by cerulein administration depending on the time of treatment.

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Table (4): Amelioration effects of the administration of tarurine or curcumin and their mixture on serum tumor marker profile (CEA, CA19.9, CA72.4 and CA242) in acute pancreatic rats

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Pa	Parameters		Parameters Normal rats (n=15)		+ Tarurine	Pancreatic cancer + Curcumin rats(n=15	Pancreatic cancer + Tarurine + Curcumin rats(n=15)	
CEA	10 Days	0.22 ± 0.005^{A}	3.26 ± 0.047^{B}	2.68 ± 0.039^{E}	2.86±0.042 ^H	2.37±0.038 ^F		
	20 Days	0.23 ± 0.006^{A}	3.79 ± 0.052^{C}	2.41 ± 0.036^{F}	2.71 ± 0.039^{E}	2.03±0.031 ^G		
	30 Days	0.23±0.005 ^A	3.86 ± 0.059^{D}	2.07±0.032 ^G	2.47±0.037 ^F	1.74±0.028 ¹		
	10 Days	7.86 ± 0.109^{A}	54.66±1.292 ^B	46.52±1.127 ^E	50.93±1.238 ^H	40.88±1.102 ^F		
$CA_{19.9}$	20 Days	7.79±0.104 ^A	58.37±1.322 ^C	40.46±1.039 ^F	45.82±1.163 ^E	34.02±1.083 ^G		
	30 Days	7.83±0.106 ^A	61.58±1.419 ^D	33.81±1.076 ^G	40.97±1.114 ^F	28.56±1.039 ^I		
	10Days	4.21±0.087 ^A	22.53±0.227 ^B	18.02±0.217 ^C	20.36±0.221 ^F	16.23±0.212 ^D		
$CA_{72.4}$	20 Days	4.19±0.092 ^A	22.71±0.232 ^B	16.35±0.211 ^D	17.98±0.216 ^C	13.24±0.197 ^E		
	30 Days	4.22±0.089 ^A	22.74±0.238 ^B	13.04±0.219 ^E	16.11±0.214°	10.18±0.186 ^G		
	10 Days	3.57±0.071 ^A	20.35±0.147 ^B	15.48±0.126 ^E	16.87±0.34 ^H	14.62±0.125 ¹		
CA_{242}	20 Days 30 Days 10 Days 20 Days 30 Days 10Days 20 Days 30 Days	3.54 ± 0.069^{A}	25.02±0.159 ^C	13.27±0.118 ^F	14.58±0.123 ¹	10.54±0.105 ^G		
	30 Days	3.55 ± 0.071^{A}	28 97+0 168 ^D	10 59+0 109 ^G	13 11+0 123 ^F	7.48+0.093 ^K		

⁻ Values are expressed as mean \pm SE.

Table (5): Amelioration effects of the administration of tarurine or curcumin and their mixture on serum α amylase, lipase activities and trypsinogen activation peptide (TAP) concentration in acute pancreatic rats

Paran	Parameters		Pancreatic cancer rats(n=15)	Pancreatic cancer + Tarurine rats(n=15)	Pancreatic cancer + Curcumin rats(n=15	Pancreatic cancer + Tarurine + Curcumin rats(n=15)
α-Amylase	10 Days	188.19±2.612 ^A	1237.21±8.357 ^B	911.32±6.534 ^D	927.11±6.613 ^D	811.42±4.983 ^G
(U/L)	20 days	185.47±2.588 ^A	1391.41±9.185 ^C	727.43±5.937 ^E	731.69±5.886 ^F	529.71±4.589 ^F
	30 days	187.39±2.595 ^A	1251.92±0.059 ^D	538.11±4.612 ^F	543.31±4.722 ^F	310.27±3.816 ^H
	10 Days	93.12±1.112 ^A	424.13±2.932 ^B	336.21±2.457 ^D	387.91±2.712 ^C	281.14±2.237 ^E
Lipase	20 days	92.78±1.104 ^A	396.46±2.717 ^C	272.93±2.128 ^E	350.72±2.426 ^D	201.91±1.924 ^F
(U/L)	30 days	92.94±1.117 ^A	390.58±2.687 ^C	198.36±1.827 ^F	323.61±2.398 ^{DF}	163.57±1.492 ^G
	10Days	9.47±0.263 ^A	25.31±0.527 ^B	21.19±0.482 ^E	23.64±0.508 ^H	19.04±0.388 ^F
TAP	20 days	9.43±0.261 ^A	27.56±0.613 ^C	18.86±0.429 ^F	21.24±0.486 ^E	15.93±0.364 ¹
(ng/ml)	30 days	9.49±0.258 ^A	30.71±0.672 ^D	16.27±0.387 ^G	15.13±0.417 ¹	13.47±0.319 ^K

Table (6): Amelioration effects of the administration of Tarurine or Curcumin and their mixture in GSH content, Gpx activity, TBARS, MPO concentrations in cute pancreatic rats tissue in acute pancreatic rats

Paramet	ers	Normal rats (n=15)	Pancreatic cancer rats(n=15)	Pancreatic cancer + Tarurine rats(n=15)	Pancreatic cancer + Curcumin rats(n=15	Pancreatic cancer + Curcumin rats(n=15)	
GSH	10 Days	14.52±0.487 ^A	6.62±0.265 ^B	7.58±0.289 ^D	7.49±0.291 ^D	8.22±0.327 ^E	
(mg/g protein)	20 days	14.61±0.491 ^A	6.13±0.239 ^C	8.32±0.321 ^E	8.18 ± 0.316^{E}	9.81±0.392 ^F	
	30 days	14.57±0.491 ^A	6.07±0.228 ^C	9.76±0.386 ^F	9.63±0.379 ^F	11.57±0.413 ^G	
G_{PX}	10 Days	73.31 ± 1.072^{A}	40.78±0.663 ^B	47.24±0.692 ^D	46.93±0.687 ^D	49.87±0.729 ^E	
(μmol/min / g	20 days	71.97±1.069 ^A	36.19±0.614 ^C	50.43±0.727 ^E	50.09±55.78 ^E	56.31±0.811 ^F	
protein)	30 days	72.58±1.074 ^A	35.88±0.597 ^C	56.12±0.809 ^F	55.78±0.789 ^F	60.57±0.868 ^G	
TBARS	10Days	2.11±0.071 ^A	4.63 ± 0.092^{B}	4.09±0.087 ^D	4.13±0.089 ^D	3.72 ± 0.081^{E}	
(nmol/ 100mg	20days	2.08±0.069 ^A	4.91±0.104 ^C	3.66 ± 0.078^{E}	3.74 ± 0.081^{E}	$3.19\pm0.075^{\mathrm{F}}$	
Protein)	30 days	2.09±0.068 ^A	5.05±0.109 ^C	3.07 ± 0.072^{F}	$3.13\pm0.076^{\text{F}}$	2.77±0.073 ^G	
MPO	10 Days	9.17±0.371 ^A	29.34±0.934 ^B	25.51±0.782 ^E	27.82±0.819 ^H	24.62±0.718 ^E	
(U/mg protein)	20 days	9.11±0.369 ^A	33.78±1.123 ^C	21.16±0.734 ^F	24.36±0.752 ^E	17.39±0.641 ^G	
	30 days	9.21±0.378 ^A	36.85±1.3598 ^D	16.84±0.629 ^G	20.93±0.714 ^F	12.04±0.527 ^K	

⁻n = number of rats

A,B,C,D,E,F,G,H,LJ,K, Means with a common superscript within a row are not significantly different (P>0.05).

⁻ Values are expressed as mean \pm SE. - n = number of rats A,B,C,D,E,F,G,H,I,J,K. Means with a common superscript within a row are not significantly different (P>0.05).

⁻ Values are expressed as mean \pm SE. - n = number of rats A,B,C,D,E,F,G,H,L,J,K. Means with a common superscript within a row are not significantly different (P>0.05).

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The Curative Role of Taurine or Zinc and their Mixture on the Harmful Effects of Genistein Administration in Male Rats

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Abstract: The current study was designed to reveal the curative effects of taurine or zinc and their mixture against hazardous effects of genistein. Sixty male albino rats $(160 \pm 10g)$ were divided into two main groups, the first group of rats (n=15 rats) acts as normal control. The second group of animals (n =45 rats) was daily injected with 500 mg genistein/kg b.wt. for one month of injection. The last group (G. gr.) was divided into 3 subgroups each one 15 rats. The first subgroup of rats (genistein) was treated with 500 mg taurine while the second one was received 200 mg of ZnSO₄ was added to each Kg diet for 60 days and the third subgroup was treated with both antioxidant agents for 30 and 60 days after one month of genistein administration. The blood samples and parts of testis were collected after 0, 30 and 60 days of treatment to estimate the physiological and biochemical parameters. Treatment animals with genistein led to a significantly elevation in the total number of abnormal sperms, sperm malformed head & tail, serum LH and FSH and serum malondialdehyde levels. On the other hand, the obtained data recorded a numerical decrease in total number of sperms associated with a remarkable reduction in the serum testosterone level. Moreover, significant decreases were pronounced in serum TAC level, testes GSH content and testes GP_x activity. Treatment of the rats with taurine or zinc showed a significant amelioration in all previous biochemical parameters which estimated in this study. The maximum correction was reached in rats which received the both antioxidants dependent on the time of treatment. These results my be due to the synergistic effects of both taurine and zinc. [Magda Sayed Hassannin. The Curative Role of Taurine or Zinc and their Mixture on the Harmful Effects of Genistein Administration in Male Rats. Journal of American Science 2011;7(7):496-503].(ISSN: 1545-1003). http://www.americanscience.org.

Key Words: Genistein – Taurine – Zinc – Male Rats - Antioxidants- Phytoestrogens

1. Introduction:

Phytoestrogens are estrogenic plant-derived non-steroidal compounds comprised of three classes: isoflavonoids, coumestans and lignans (Murkies, 1998; Tham et al., 1998 and Davis et al., 1999). Because many of these environmental estrogens are generally less potent than other estrogenic substances, exposure to them has been regarded as even beneficial. non-harmful. For isoflavones, such as genistein, occur in high quantities in beans (such as the soy bean), and it is the ingestion of this soy meal, the staple diet of many Asian communities, that has been suggested by numerous epidemiological and experimental studies to cause a protective effect against hormonedependent cancers (such as breast and prostate) in these populations (Whitten & Naftolin, 1998). Interestingly, feeding rats with a phytoestrogen or genistein rich diet resulted in lower serum testosterone levels, but had no obvious effect on testicular StAR protein levels when compared with those fed with a regular diet and they added that serum genistein levels were approximately 1.5 µM in rats (Weber et al., 2001) and 10 µM in men (Joseph et al., 2011) after consumption with a phytoestrogenrich diet. However, it was not clear whether such concentrations of genistein are sufficient to suppress StAR gene expression.

The phytoestrogens, namely genistein and coumesterol, are able to bind to estrogen receptors, particularly the ERB isoform, in an agonistic fashion with high affinity (Strauss *et al.*, 1998). Given that both ER isoforms, but particularly ERB, are localized to sites important for male reproduction (Turner *et al.*, 2000), it is reasonable to speculate that these agonistic ligands may have direct effects on male reproductive function. It has been determined that virtually all natural rodent diets that include soy as a source of protein have detectable levels of estrogenic isoflavones (Atanassova *et al.*, 2000 and Mei *et al.*, 2011) and therefore, such diets may be capable of sustaining estrogen-like effects (Weber *et al.*, 2001 and Joseph *et al.*, 2011).

Taurine (2-aminoethane sulphonic acid) is a unique sulfur derivative that has a putative nutritional and osmo-regulatory effect possibly functioning by counteracting ion and water leakage of the membrane or by modulating intracellular calcium levels. Taurine is highly concentrated within the mammalian cells and its concentration is high in mammalian sperm and seminal fluid (Huxtable, 1992). Now, it has been shown to be involved in many important physiological functions e.g., as topic in the development of the CNS, maintaining the structural integrity of the cell membrane (Chesney et al., 1998)

Several authors reported that taurine has the ability to protect the damage which occurred by different cytotoxic substances (Trachtman *et al.*, 1995). Moreover, taurine supplementation led to increase the activity and motility of human sperms and also prolong their life-span (El-Agouza *et al.*, 2009). Also, taurine can be applicable as therapeutic agent against adriamycin induced testicular damage although complete reversal to normal was not observed (Heibashy and Badie-Bakshwan, 1999).

Zinc is also involved in a number of functions of importance to sperm physiology (Riffo et al., 1992). In an in vitro study using rat testis tissues, the response of cyclic AMP and testosterone to human chorionic gonadotropin (hCG) was found to be augmented by zinc ion in the presence of calcium ion. This augmentation by zinc ion did not occur in the absence of calcium ion, indicating that zinc ion acts synergistically with calcium ion and plays an essential role in testicular function (kendall et al., 2000). Moreover, zinc deficiency causes atrophy of the seminiferous tubules, failure of spermatogenesis and decreased testosterone secretion in the rat Hafiez et al. (1989), they observed appropriate responses of pituitary luteinizing hormone (LH) and folliclestimulating hormone (FSH) to gonadotropin-releasing hormone (GnRH) administration and insufficient response of testosterone to hCG administration in zinc-deficient rats. They concluded that the hypogonadism in zinc-deficient rats resulted mainly from Leydig cell failure, but not from hypothalamopituitary dysfunction (Prasad, 2001).

The current study was conducted to demonstrate the chemoprevention efficacy of taurine or zinc and their possible amelioration effect on hazard effect of genistein which induced disturbance in the testis function and led to infertility in rats.

2. Material and Methods

Sixty male albino rats with ages 12 ± 1 weeks old and their weight averaged 160 ± 10 g were employed in this study. They were housed in a well ventilated vivarum of Zoology Department, Women's Collage, Ain Shams University. The animals were caged in wire bottom galvanized metal wall boxes under controlled environmental and nutritional conditions (25°C and 55-60 % relative humidity). They fed on a standard diet according to National Research Council (NRC, 1977). Feed and tap water were available *ad libitum*.

The study included two main categories; the first category was carried out on two main groups of rats to study the destructive properties of genistein on the genital system of male rats. To achieve this proposal, fifteen male rats were served as normal control rats group. The remaining rats (forty five of

male rats) were daily injected (s.c) with 500 mg genistein / kg body weight for 30 days (Fritz *et al.*, 2002).

After one month of injection 500 mg genistein to rats, the animals were divided into three subgroups, the first subgroup of animals injected daily with 500 mg taurine / 100 g body weight for 30 and 60 days. The second subgroups of male rats, supplemented with 200 mg ZnSO₄ (Equal 81 ppm elemental zinc), added to each kg diet (Bettger *et al.*, 1978) for 30 and 60 days. The third subgroup, male rats were treated with both antioxidants for the same intervals. All used drugs were purchased from Sigma Chem. Co., St. Louis, Mo, USA.

At the end of each experimental periods (zero, 30 & 60 days), the rats were slightly anaesthetized by diethyl ether (Sigma Chem. Co., St Louis, Mo. U.S.A.) and blood was collected from the heart in clean dry test tubes. Sera were separated and kept at -20°C until analysis. Testis of all rats groups were taken quickly on an ice cold plate for immediate estimation of glutathione and glutathione peroxidase.

Examination of semen: A-Spermatic count and forms:

The scrotal sac was cut and code epididymis was removed and put in a drop of saline and cut into pieces to release the sperms. The sperms were smeared onto a clean glass slide. Then, the slides were stained with haematoxylin and eosin. one thousand sperms were examin under the oil immersion of research microscop to score the head morphology abnormality and the tail defromaties.

B-Microscopical examination

Smear of mature spermatozoa, collected from the cauda epididymis were stained with haematoxylin and eosin. Examination of normal and malformed sperms was carried out using light microscope fitted with oil immersion lenses

Hormonal assay:

Serum testosterone, rat-luteinizing hormone (Rat-LH) and rat- follicle stimulating hormone (Rat-FSH) were estimated by radioimmunoassay (RIA) technique using solid phase component system (Diagnostic Product Corporation (DPC) USA).

Determination of oxidative and antioxidative status:

The lipid peroxidation (malondialdehyde) assay is based on the reaction of a chromogenic reagent (R1) with MDA at 45°C. One molecule of MDA reacts with two molecules of reagent (R1) to yield a stable chromphore with maximal absorbance at 586 nm. Analysis was performed with a colorimetric

commercial kit (Oxis, USA) according to Beom and Deloy (1995).

Serum total antioxidant capacity (TAC) was estimated according to the method which was described by Koracevic *et al.* (2001) and using ELISA commercial kit (Labor Diagnostika Nord GmbH & Co.). The determination of TAC was performed by the reaction of antioxidants in the sample with a defined amount of exogenously provided hydrogen peroxide (H₂O₂). The antioxidants in the sample eliminate a certain amount of the provided H₂O₂ and the residual H₂O₂ is determined colorimetrically by an enzymatic reaction which involves the conversion of 3,5,dicholoro-2-hydroxybenzensulphonate to a colored product.

Glutathione (GSH) content was determined according to Wafers & Sies (1983) using a commercial ELISA kit (IBL – Hamburg, Germany). Glutathione peroxidase activity (G_{px}) was determined by measuring the oxidized NADPH in the presence of glutathione reductase after addition of H_2O_2 substrate at 25°C for 1 min. The results were expressed as nmol of NADPH oxidized / min / mg protein (Zhang et al., 1989).

Statistical analysis

Data were calculated with the aid of analysis of variance (ANOVA) followed by Duncan's multiple range test as described by Snedecor & Cochran (1989).

3. Results and Discussion

Phytoestrogens were first associated with adverse effects on mammalian development and fertility from observations of animals consuming phytoestrogen-rich plants (Adams, 1995). Limited studies completed in the male have suggested a role for these compounds in male reproductive processes (Carreau *et al.*, 1999; Ebling *et al.*, 2000 and O'Donnell *et al.*, 2001). The phytoestrogens, namely genistein and coumesterol, are able to bind to estrogen receptors, particularly the ERB isoform, in an agonistic fashion with high affinity (Strauss *et al.*, 1998).

The similarities, at molecular level of estrogen (estradiol-17 β) and isoflavone (genistein and daidzein) allow them to mildly mimic and sometimes act as antagonists to estrogen (Yildiz, 2005). Isoflavones can also alter the pattern of synthesis and / or metabolism for the endogenous hormones (Sonnenschein and Soto, 1998; Yildiz, 2005). The soy isoflavones act by (1) Inhibiting the enzyme 17-hyroxysteroid oxidoreductase, type 1,which converts the relatively impotent estrone to the much more potent estradiol; (2)occupying the estrogen receptor, thus acting as antagonists

to the naturally produced estradiol, inhibiting its effects (this behaviour is similar to that of another estrogen agonist-antagonist, tamoxifen) (Adlercreutz et al., 1994) The consequent reduction in estrogenic action appears to have a useful prophylactic effect against many estrogen dependent disorders in adults, including mammary and prostatic tumours (Clarkson et al., 1995). However, the same effect is deleterious in infants.

According to Yildiz (2005) the key structural elements crucial for the estradiol-like effects of soy isoflavones are: (1) The phenolic ring that is indispensable for binding to estrogen receptors; (2) The ring of isoflavones mimicking a ring of estrogens at the receptors binding site; (3) Low molecular weight similar to estrogens (MW=272). (4) Distance between two hydroxyl groups at the isoflavones nucleus similar to that occurring in estradiol and (5) Optimal hydroxylation pattern.

In addition to interaction with estrogen receptors (ERs), phytoestrogens isoflavones may also modulate the concentration of endogenous estrogens by binding or inactivating some enzymes and may affect the bioavailability of sex hormones by binding or stimulating the synthesis of sex hormone binding globulin (Johnston, 2004).

However, it must be remembered that isoflavones may exert biological activity by other mechanisms, for example, the isoflavone genistein is a potent selective inhibitor of tyrosine kinase in both man and rat myometrial cells (Palmier *et al.*, 1996).

The data which tabulated in table (1) were showed a numerical increase but not significant in the total number of sperms in the normal control rats. The total number of sperms was decreased (P< 0.05) significantly after the animals received 500mg genistein for 30 days. The percent of this decrease was 39.92.

On the other hand, a significant correction was occurred in the total number of sperms after treatment of rats with taurine or zinc and their mixture dependent on the time of treatment. The percent of these decreases were 7.90, 7.27 and 13.58 for taurine, zinc and mixture animal groups, respectively (Table 1).

Indeed, dietary phytoestrogen exposure in animals grazing estrogenic pastures has long been known to cause significant impairment of reproductive function (Adams, 1995).

Recent reports of the gradual decline in human semen quality have sparked much debate as to causes/risk factors. Some have suggested that spermatogenesis can be significantly affected by environmental and lifestyle factors that appear to have no other detrimental affect to the health of the individual (Sharpe, 2000 and Sharpe & Franks 2002). Two such factors associated with adult exposure are seasonality, with demonstrably reduced sperm counts in summer months and dietary effects in adulthood have primarily been associated with women (Sharpe & Franks, 2002).

From tables (1 & 2), the administration of 500mg genistein for 30 days to rats led to increase in the total number of malformed sperms (Total, head, tail and head & tail). The animal groups which treated with taurine, zinc and their mixture led to a significant amelioration effect dependent on the time of treatment (30 & 60 days). These results may be attributed to the antioxidant powerful properties of taurine or zinc which acts as free radicals scavenger. decreases the lipid peroxidation production, elevates the immune system defense and their ability to correct the hypothalamus-pituitary-gondal axis (HPGA). The maximum correction was recorded in the animal group which treated with both antioxidants due to zinc administration which improve the physical and chemical properties of taurine. This improvement was dependent on the time (30 & 60 days) of treatment (Tables 1 & 2). These data are in harmony with those obtained by Heibashy & Badie-Bakshwan (1999) and El-Agouza et al. (2009). These authors attributed the elevation in the total number of sperms and correction in the number of malformed sperms (Total, head, tail and head & tail) after treated with taurine due to the correction in the levels of LH and FSH.

From table (3),a significant decline in the testosterone level while, a significant elevation was occurred in both LH and FSH levels after the rats received 500mg genistein for 30 days. The percent of

these changes were -8.74 for testosterone and 163.64 and 35.70 LH and FSH, respectively. These results may be attributed to the estrogenic effects of genistein which led to the disturbance in the hypothalamus-pituitary-gonadal axis. These data were supported by Strauss *et al.* (1998); Tou and Thompson. (1999); Thigpen *et al.* (2001); Weber *et al.* (2001) and Chavarro *et al.* (2008).

Interestingly, experiments to examine the effects of phytoestrogens on human reproduction or sexual development are extremely difficult to conduct for both practical and ethical reasons (Murkies, 1998; Tham et al., 1998 and Davis et al., 1999). Most of the published work has been performed using laboratory animals, mainly rodent species. extrapolation and interpretation of this research to humans is complicated by a number of species differences mostly notably in sexual development and reproductive function. A small number of studies has been conducted in non-human primates, which are of more relevance in terms of human risk assessment. However, there are ethical considerations that limit the use of these experimental models. Factors such as species, age, gender, diet, dose, route of administration, and metabolism, strongly influence the ultimate biological response to phytoestrogen exposure (Weber et al., 2001).

The concentrations of testosterone, LH and FSH were corrected after the animals treated with taurine or/and zinc dependent on the time of treatment (Table 3). These results may be due to the antioxidant properties of taurine and zinc. These data are in harmony with those obtained by Whitten *et al.* (1995); Williams *et al.* (2001).

Table (1): The curative effects of taurine or zinc and their mixture on total count and abnormalities of sperm in normal and genistein treated rats.

	No. of			Total no of sperm	count		
Groups	rats	0 Days	30 Days		60 Days		
Control	15	881.47 ± 17.3^{a}		885.14 ± 17.9^{a}		912.22 ± 19.5^{a}	
Genistein	15	$529.56 \pm 14.3^{\text{ b}}$	- 39.92	$719.18 \pm 17.4^{\circ}$	- 18.75	881.19 ± 19.1^{a}	- 3.40
Genistein + Tau	10			793.08 ± 17.7 d	- 10.40	$984.25 \pm 18.7^{\text{ e}}$	7.90
Genistein + Zn	10			797.15 ± 19.1 d	- 9.94	$978.51 \pm 20.5^{\text{ e}}$	7.27
Genistein + Mixture	10			814.44 ± 18.9^{a}	- 7.99	1036.11 ± 19.1 f	13.58
			Total no	of abnormal spern	n count		
Control	15	92.17 ± 10.17^{a}		92.59 ± 11.07^{a}		91.11 ± 10.92^{a}	
Genistein	15	$162.63 \pm 12.12^{\text{ b}}$	76.45	137.42 ± 11.75 °	48.42	111.25 ± 10.56 d	22.11
Genistein + Tau	10			127.51 ± 11.31 °	37.71	95.62 ± 10.47^{a}	4.95
Genistein + Zn	10			133.81 ± 10.63 °	44.52	102.91 ± 9.51 d	12.95
Genistein + Mixture	10			100.67 ± 9.58 d	8.73	88.41 ± 9.69 a	- 2.96

⁻ Values are expressed as means \pm S.D.

⁻ a, b, c, d, e, f means with a common superscript within a column are significant different at (p<0.05).

Table (2): The curative effects of taurine or zinc and their mixture on sperm abnormalities in normal and
genistein treated rats.

genisten treat	No. of	Sperm malformed	Sperm malformed head								
Groups	rats	0 Days	Days 30 Days		60 Days						
Control	15	50.42 ± 9.14^{a}		53.92 ± 10.12^{a}		50.84 ± 10.44 a					
Genistein	15	101.29 ± 13.17^{b}	100.89	$79.43 \pm 9.63^{\circ}$	47.31	62.63 ± 10.07 d	23.19				
Genistein + Tau	10			66.71 ± 11.91 d	23.72	57.98 ± 11.72 °	14.04				
Genistein + Zn	10			69.83 ± 10.37 d	29.51	58.93 ± 9.92 °	15.91				
Genistein + Mixture	10			62.27 ± 9.38 d	15.49	53.17 ± 8.82 ^e	4.58				
	Sperm m	alformed tail									
Control	15	20.14 ± 1.92^{a}		21.61 ± 1.83 a		19.52 ± 1.91 a					
Genistein	15	25.51 ± 2.04 b	26.66	23.88 ± 1.77 °	10.50	$20.42 \pm 1.75^{\text{ a}}$	4.61				
Genistein + Tau	10			21.39 ± 1.88 a	- 1.02	$20.55 \pm 1.79^{\text{ a}}$	5.28				
Genistein + Zn	10			20.54 ± 1.94^{a}	- 4.95	20.42 ± 1.82^{a}	4.61				
Genistein + Mixture	10			20.83 ± 1.74^{a}	- 3.61	20.93 ± 1.75^{a}	7.22				
	Sperm n	alformed head & tai	1								
Control	15	21.16 ± 1.83 a		17.06 ± 1.91 b		20.75 ± 1.86 a					
Genistein	15	35.83 ± 2.19 °	65.80	34.11 ± 2.22 °	99.94	28.00 ± 1.98 d	34.94				
Genistein + Tau	10			39.41 ± 2.38 e	131.01	17.09 ± 1.79^{b}	- 17.64				
Genistein + Zn	10			43.44 ± 2.43 f	154.63	$18.04 \pm 1.82^{\text{ b}}$	- 13.06				
Genistein + Mixture	10			17.57 ± 1.84 b	2.99	$5.64 \pm 0.92^{\text{ g}}$	- 72.82				

⁻ Values are expressed as means \pm S.D.

Table (3): The curative effects of taurine or zinc and their mixture on serum testosterone, LH and FSH in normal and genistein treated male rats.

normar and ger	No. of			Carum tastastaran	(ng / ml)					
			i	Serum testosteron	e (ng / nn)					
Groups	rats	0 Days		30 Days		60 Days				
Control	15	1.83 ± 0.027 a		1.80 ± 0.031 a		1.90 ± 0.029 a				
Genistein	15	1.67 ± 0.031 b	- 8.74	1.69 ± 0.036 b	- 9.44	1.87 ± 0.033 a	- 1.58			
Genistein + Tau	10			1.78 ± 0.034 a	- 1.11	1.97 ± 0.033 a	3.68			
Genistein + Zn	10			1.69 ± 0.035 b	- 6.11	1.91 ± 0.032^{a}	0.53			
Genistein + Mixture	10			1.92 ± 0.036 a	6.67	2.04 ± 0.034 °	7.37			
		Serum LH (ng/ml)								
Control	15	1.21 ± 0.017 a		1.26 ± 0.021 a		1.25 ± 0.022 a				
Genistein	15	3.19 ± 0.059 b	163.64	3.07 ± 0.069 °	143.65	2.88 ± 0.043 d	130.4			
Genistein + Tau	10			2.58 ± 0.067 e	104.76	2.01 ± 0.059 f	60.8			
Genistein + Zn	10			2.61 ± 0.079^{e}	107.14	2.24 ± 0.075 g	79.2			
Genistein + Mixture	10			2.18 ± 0.077 g	73.01	1.63 ± 0.069 h	30.4			
			Se	erum FSH (ng/ml)						
Control	15	3.37 ± 0.037 a		3.45 ± 0.044 a		3.41 ± 0.041 a				
Genistein	15	5.18 ± 0.069 b	53.70	5.11 ± 0.074 b	48.11	4.95 ± 0.082 °	45.16			
Genistein + Tau	10			4.48 ± 0.077 d	29.85	3.87 ± 0.088 e	13.48			
Genistein + Zn	10			4.77 ± 0.078 f	38.26	4.06 ± 0.069 g	19.06			
Genistein + Mixture	10			4.08 ± 0.086 g	18.26	3.52 ± 0.094 a	3.22			

⁻ Values are expressed as means \pm S.D.

The taurine-conjugate bile salt taurolithocholic acid 3-sulfate exerts a beneficial action in the prevention of sexually transmitted diseases (STD). By virtue of its detergent activity, taurolithocholic acid 3-sulfate demonstrates excellent anti-pathogen activity against chlamydia, herpes simplex (types 1 and 2), gonorrhea, and human immunodeficiency virus. It is also less cytotoxic than other agents used. Hence, taurolithocholic acid 3-sulfate may be a valuable topical STD microbiocidal agent (Herold et al., 1999 and Schaffer et al., 2000).

Taurine regulates the most basic of cell functions genetic transcription Maar *et al.* (1998). The authors demonstrated in mice that taurine acts as both an osmoregulator (to balance cell volume) and neuromodulator (protecting against over-excitation that may lead to cell death). Taurine plays these roles in human cells likewise, from head to toe. Also, taurine is found abundantly in tissues that are excitable, rich in membranes, and that generate oxidants. Thus, it is the most prevalent of all the amino acids in the tissues comprising the skeletal and

⁻ a, b, c, d, e, f means with a common superscript within a column are significant different at (p<0.05).

⁻ a, b, c, d, e, f, g, h means with a common superscript within a column are significant different at (p<0.05).

cardiac muscles and the brain. It is critical to the proper function of the brain, heart, lungs, and blood. Because it performs key functions in cholesterol metabolism related to bile acids, it is essential to the

role of the liver, pancreas and gall bladder. It also is a key in the renal function of the kidney (Heibashy, 2000).

Table (4): The curative effects of taurine or zinc and their mixture on serum malondialdehyde & total antioxidant capacity and testes GSH, Gpx in normal and genistein treated male rats.

		testes doin, opa		iai anu genistem			
	No. of rats		Serun	n malondialdehyde	e (μM / 10	00 ml)	
Groups		0 Days		30 Days		60 Days	
Control	15	0.187 ± 0.004 a		0.191 ± 0.004 a		0.188 ± 0.005 a	
Genistein	15	0.242 ± 0.007 b	29.41	0.231 ± 0.007 b	20.94	0.208 ± 0.009 °	10.64
Genistein + Tau	10	•		0.223 ± 0.008 b	16.75	0.197 ± 0.011 a	4.79
Genistein + Zn	10			$0.228 \pm 0.010^{\text{ b}}$	19.37	0.199 ± 0.012 °	5.85
Genistein + Mixture	10			0.211 ± 0.012^{c}	10.47	0.189 ± 0.011 a	0.53
	No. of rats			Serum TAC (m	mol/L)		
Groups		0 Days		30 Days		60 Days	
Control	15	1.83 ± 0.027 a		1.80 ± 0.31^{a}		1.76 ± 0.029 a	
Genistein	15	1.11 ± 0.031 b		1.19 ± 0.36 b		1.36 ± 0.33 °	
Genistein + Tau	10			1.48 ± 0.34^{d}		1.81 ± 0.33^{a}	
Genistein + Zn	10			1.42 ± 0.35 d		1.76 ± 0.32^{a}	
Genistein + Mixture	10			$1.62 \pm 0.36^{\text{ e}}$		$1.94 \pm 0.34^{\text{ f}}$	
			Teste	es GSH (mg/g tiss	ue)		
Control	15	5.71 ± 0.031 a		5.74 ± 0.032^{a}		5.70 ± 0.032 a	
Genistein	15	3.69 ± 0.026 b	- 35.38	3.89 ± 0.027 b	- 32.23	4.42 ± 0.029 °	- 22.46
Genistein + Tau	10			4.12 ± 0.028 °	- 28.22	4.86 ± 0.029 d	- 14.74
Genistein + Zn	10			4.23 ± 0.027 °	- 26.31	4.97 ± 0.029 d	- 12.81
Genistein + Mixture	10			4.58 ± 0.028 d	- 20.21	$5.23 \pm 0.030^{\text{ e}}$	- 8.25
			Gp _X (μm	ol GSH oxidized /	min / g tis		
Control	15	2.37 ± 0.020^{a}		2.45 ± 0.020^{a}		2.41 ± 0.021 a	
Genistein	15	1.18 ± 0.016 b	- 50.21	1.29 ± 0.017 b	- 47.35	1.32 ± 0.018 b	- 41.08
Genistein + Tau	10			1.39 ± 0.017 b	- 44.90	1.61 ± 0.018 °	- 33.20
Genistein + Zn	10			1.57 ± 0.017 °	- 40.00	1.83 ± 0.016^{d}	- 24.07
Genistein + Mixture	10			1.88 ± 0.018 d	- 35.92	2.14 ± 0.019^{e}	- 11.20

⁻ Values are expressed as means \pm S.D.

Data presented in table (4) showed that harmful effect of genistein for one month. There is a significant increase in serum malondialdehyde where the increment percentage 29.41, while it was decreased gradually after stop the injection of 500mg. of genistein recorded 20.94 and 10.64 at the end of 30 and 60 days, respectively, on the other hand, a significant decreased was noticed in serum total antioxidant capacity TAC and testes GSH, GPx after treated the previous dose, respectively relative to control level These results may be, due to the increment of free radical production, decrease in the immune system defense and lowering in the β oxidation of lipid in the matrix of mitochondria.

The additional of taurine or zinc correct the levels of all previous parameters dependent on the time of treatment (Table 4). These data may be contributed to the antioxidant powerful of taurine and/or zinc. Moreover, the best correction was occurred in the animals group which treated with both them due to the synergistic effect However, the

administration of zinc improve the biochemical and physical action of taurine (Trachtman et al., 1995).

More than 70 metalloenzymes are known to require zinc as a cofactor. One of these is the zincand copper-containing superoxide dismutase (SOD), which is important in the oxidative defense system. Zinc also induces metallothionein, a free radical scavenger. Metallothionein also binds other heavy metals, especially cadmium, and as such acts as a detoxifying agent. Although zinc levels in the body are regulated by homeostatic mechanisms and do not accumulate with continued exposure (Kendall et al... 2000).

It could be concluded that the obtained data highlighted the general protection sustained by taurine and zinc against the oxidative damage induced by genistein. Pervious studies supported that taurine and zinc have a potential role in mediating the harmful effects of genistein, therefore their mixture manifested a great correction reached to near values of control levels in all previous parameters.

⁻ a, b, c, d, e means with a common superscript within a column are significant different at (p<0.05).

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Evaluating Management Effectiveness of in-service Training Programs in Human Resources Development Office at Ministry Of Road and Transportation

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Abstract: The main purpose of this study was to evaluate of effectiveness of management of in-service training programs in Human Resources Development Office (HRDO) at Ministry of Road and Transportation. The target population includes: 1) Total number of Chief Executive Officers (CEO's) was 116, 2) Total number of personnel include 290 personnel members. To conduct the study two measurement scales were designed: (a) Task Performance Quality Scale, (b) Organizational Effectiveness Scale. The validity and reliability of each scale was tested and approved. A random sample of 86 CEO's and personnel participated in the study by fill out both scales. The collected data was analyzed through descriptive statistics, t-test and multi-variate regression procedures. The following results were concluded: Both group, the CEO's and personnel evaluated the quality of the performance of HRDO personnel at median level. The personnel evaluated the effectiveness of HRDO personnel at median level. The CEO's evaluated the effectiveness of HRDO personnel at low level. No meaningful difference was observed between the viewpoints of CEO's and personnel about the quality of task performance of HRDO personnel. A meaningful difference was observed between the viewpoints of CEO's participants evaluated the effectiveness of the HRDO lower than personnel participants. Both variables "Organizational Effectiveness" and "Task Performance Quality" of personnel can be predicted by the "training evaluation" variable.

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1. Introduction and Explaining Problem

Human development through training as a process for improvement and raising capability and powers, increasing of knowledge and awareness, change of tendency and humans' perception play the most fundamental role in improvement and development of Human Capital in Organization (Seyed Javadein, 2003). By virtue of multi-factors theory of efficiency and systematic model of slection and effective utilization of Human Resources of Organizations (HRO), educated and skilled human resources is of the most important factors on efficiency of organization. Therefore, in order to achieve educated human resources, effective training of personnel; is accounted from the most fundamental interorganization effective factors on efficiency of organization (Saatchi, 2003). Employees' educating is such as maintenance of properties and equipment. Tools and equipments for joining of more efficiency

need to continuous repair and regulation. Therefore, for maximization of effectiveness and proficiency of Organization' individuals. suitable educating programs should be compiled for them (Seved Javadein, 2003). Educating is a certain matter. Therefore, its performance and its representation in a manner that have useful results is a must not a choice (Brinkerhaf, 2005). Thus, educating is one the most complex tasks in each organization which is resulted to empowerment of human force and while guaranteeing their success, also cause achieving to organizational goal by more effectiveness. Therefore, one of the factors has more impact on organization effectiveness and can pay an important role in its improvement is educating human forces(Nikookar, 2001). But training when is effective that be evaluated to by performance of it the shortages of job be specified and shifts organization to achieving its goals. On this basis, most organizations including

Ministry of Road and Transportation held courses of training program for its personnel and execution of each course requires huge investment. Therefore, awareness of effectiveness of educating courses scale and result of them is very important for managers and can help thems in making decision about course, adjustment or expansion of programs. Thus, present research pays to evaluation of effectiveness of training operation of Ministry of Road and Transportation Human Resource Development Office. Main tasks approved by this office are: Preparation and adjustment of training programs, training needs assessment, preparation and collection of training instructions and by-laws, execution of training programs, supervision on execution of training courses, continuous evaluation of knowledge and skill of personnel and evaluation of held training courses. Under investigation dimensions conceptive model of research are shown in Figure 1.

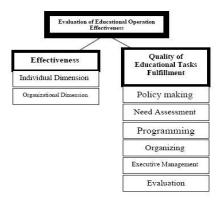


Figure 1: Evaluation of Educational Operation

2. A review on Former Researches

According to figure No. 1, performed researches in 6fold dimensions of training quality and two effectiveness dimensions, have been investigated. Evaluation of Human Resources Unit of Cambridge University (2008) indicated that processes of personnel training in this university enjoys of desired condition. Also in this investigation in managers and personnel of university point of view, there is suitable connection and partnership between personnel training goals and current strategies of university. Giving critique feedbacks through execution of evaluation of courses and programs process in point of view of managers, personnel, clients and revision of programs through results obtained from evaluation including reasons of fair quality of personnel training activity and process of training evaluation has been mentioned in this university. On the basis of report of improvement unit of London University Personnel (2008), training programming, executive activities and process of evaluation of personnel training in this

university enjoys of desired condition. Also on the basis of evaluation of mentioned unit, among reasons of suitable condition of executive activities and training programming in this university is performance of evaluation and use of its results in modification and revision of training programs and activities at the beginning and end of academic year. Woodal and Wheel (2005), in their research on training activities and improvement of human resources in France concluded that observance of strategic orientation in training activities, training policy making, attention of senior manager of organization to the improvement of human resources enjoys of suitable condition but, after training evaluation, there has been less attention to other activities of training area of personnel.

In a research that on behalf of Smith (2002), in investigation of scale of made investments on behalf of governmental organizations and private companies of Australia on training and improvement of personnel was performed, it was indicating of existence of a strong relation between training and business strategies. Dehghani (2008), has performed a research under title of comparison evaluation of personnel training circle in Shiraz and Medical Science universities. Research findings indicate that in Shiraz University, executive management process in comparison with three other processes (training policy making, training planning and evaluation) has higher quality and evaluation process to other three processes has very low quality. And in Shiraz medical science university, training policy making processes and executive management have high quality and evaluation process have low quality relative to three other processes. Embrahimipour (2001), has performed a research under title of Comparative Investigation of training Program Management of Beginning of Service and In-service of personnel of Iran medical Science University Hospitals. On the whole, findings of research indicates that training management in viewpoint of condition of training courses execution, needs assessment before holding courses, manner of programming, scale of holding courses, scale of effect of company on training programs on job promotion and scale and manner of evaluation of training courses, has been very weak. In a research has been performed by Vang (1998), under title of Evaluation of Personnel Programs in Hong Kong, he concluded that process of training planning (needs assessment, designing and collection of training programs), executive management and training evaluation don't enjoy of necessary quality of effectiveness and in this among training evaluation relative to other training activities of personnel is joined of lower quality. Mason and Van (1994), in a

research paid to investigation and comparison of job efficiency and quality and application of physical capabilities and work force skills in three different production sections in Britain and Holland. Results showed that higher level of average efficiency of personnel nearly is related to increasing of rate of knowledge and skill of personnel. This investigation also considered that level of efficiency of work force in productive industries of Britain from 0.25 to 0.35 is lower than efficiency level of work force in Holland. It is considered that little investment of Britain in equipping and educating of workforce and low quality of represented training is one of effective factors in decreasing the rate of efficiency of production industry. In policy making dimension, research team of Management and Programming Organization of Iran (2002), on pathology of personnel concluded that: Generally, policy making of official personnel training has not fair condition; lack of governance of systematic perception in circle of personnel training, lack of personnel training system connection with other systems of Human Resource Management, lack of managers who believe to personnel training affair and considering training charges as necessary organizational investment, is among main problems of this dimension and the other conclusion of mentioned research is unfair condition of policymaking and training evaluation relative to other dimensions of personnel training system. Adonel and Garvan (1997), in investigation of future landscape of senior policy makers in governmental and private organizations of Britan were achieved to importance of training from policy makers' point of view and its relation with organizational success from senior managers of organization insight.

Sing and Kadwani (2004), in investigation of effectiveness of training process and development of governmental organizations in India, concluded that training and development have a main role in improvement of effectiveness of organization. Hillel (2002) in his research paid to investigation of relation between organizational features (focus, making official strength, personnel authority, coordination, control, ability making and training) and organization effectiveness, in non-beneficial organizations of human services and concluded that between educational programs and organizational effectiveness and organizational operation there is the positive and meaningful relation. In a research Anderson (2000), investigated relation between business strategy and organizational effectiveness and resulted that there is positive and meaningful between organization strategy organizational effectiveness. Shamima (1999), in investigation of organizational effectiveness various

operations of Human Resources Management on experts of one of USA Institutes, applied to criteria of acknowledgement of organization mission and support of personnel as combined and finally concluded that Human Resources operations (attraction, maintenance, training and application) is effective on organizational effectiveness. Craft and Jash (1996), in US, investigated organizational effectiveness of 53 Services Company different industry and realized that personnel are most important executive groups in relation with administration of Services Organizations. In this among, executive managers considered human factor the most important factor in organizational effectiveness and effectiveness criteria by grading factors such as training, efficiency, planning, job condition and job satisfaction was considered. The result gained by this investigation was indicating of a meaningful different between governmental and companies in services section organizational effectiveness. Hatrap and Kazalavesky (1993) in a research under title of Advance technology execution organizational analysis in organizations concluded that between training activities and increasing efficiency and effectiveness there is meaningful relation.

On this basis and with regard to lack of studies on educational effectiveness in Iranian organization and with regard to the matter that variables of this research are studied a few, this research pays to relations between quality of fulfillment of educational tasks (policy making, needs assessment, training planning, organizing, executive and evaluation management) and organizational effectiveness in two individual and organizational dimensions in Ministry of Road and Transportation.

3. Question Research

In what scale is the quality of fulfillment of training tasks from view point of managers and experts of Ministry of Road and Transportation?

How much is organizational effectiveness of Human Resources Development Office from view point of managers and experts of Ministry of Road and Transportation? Is there any meaningful different between mangers and experts' point of view on training tasks fulfillment quality? Is there any meaningful different between managers and experts' point of view on organizational effectiveness? Which variables of Training task fulfillment, anticipate organizational effectiveness of HRDO of Ministry of Road and Transportation? Which of quality variables fulfillment of training tasks anticipate individual dimension of organizational effectiveness of HRDO? Which of quality variables fulfillment of training anticipate organizational dimension organizational effectiveness of HRDO?

4. Methodology

Method of Research: In respect to the present research it is paid to evaluation of effectiveness of training operation of HRDO of Ministry of Road and Transportation, method of research of present study is descriptive from measurement type.

Statistical Society: In this research two statistical communities are investigated: 1- Managers society including: All staff managers of Ministry of Road and Transportation (116 persons); and 2- Experts society including: All staff experts of Ministry of Road and Transportation (290 persons). In respect to relatively restricted numbers of statistical society of managers and for having enough sample by using of random simple sampling about 75% of managers which was equal to 86 person out of 116 persons, were selected and also with regard that in present research comparison of experts and managers' point of view was considered, while number of expert was 290, 86 of them also by using of random simple sampling equal to number of managers sample were elected and questionnaire was distributed between two groups. Out of 86 persons, the number of 86 questionnaires, 86 of them were returned, but from 86 expert. 76 of them answered to the questionnaire and delivered it.

5. Research Tools: In this research two scales have been used: 1- Scale of Training Tasks Fulfillment Quality: which assesses policy making, needs assessment, training planning, organizing, executive and evaluating management dimensions. 2- Scale of **Organizational Effectiveness:** which individual and organizational dimensions. Considered scales on the basis of theoretical frames represented in management books such as: Management and training strategy in organizations (Pakdel, 2004), human capitals (Abtahi, 2004), personnel training (Novi, 2002) and Educational Manaement (Hoi and Miskel, 1991) have been made: Applicable scales are adjusted on the basis of 5 degree spectrum of Likert and there was no reversed question in it.

Justifiability and Stability of Tools: Justifiability of content scale designed in this research on the basis of views of three managers and five experts of HRD Office and six mangers and six experts of staff units of Ministry of Road and Transportation (by agreement co-efficient between 80%-100%) has been certified. For certification of justifiability of convergence of quality scale of training tasks fulfillment, cohesion co-efficient of each under scale was calculated by total number of scale which was certified by cohesion co-efficient spectrum of 0.81 to 0.91 and meaningful level of 0.0001. This amount for organizational effectiveness scale was indicated cohesion co-efficient of 0.95 to 0.97 in meaningful level of 0.01. For final calculation of scales also

Kronbackh α co-efficient was used which for scale of quality of training tasks indicated 0.95 and for organizational effectiveness scale indicated amount of 0.97 which was certifying of strong stability of these scales.

6. Manner of Execution and Collecting Data: Researcher in purpose of execution of each of scales, after coordination made by Research Assistant and related authorities in Ministry of Road and Transportation in due time for distribution and completion of scales was presented in under-study place. Totally 172 scales have been distributed and 162 scales have been completed, returned and collected. Information of received scales after classification by using of SPSS ver 14 soft ware and statistic tests were analyzed.

7. Statistical Methods of Analyzing Questions: For analyzing of 1st and 2nd question plenitude and percent, 3rd and 4th questions t-Test and 5th and 6th and 7th question multifold regression were used.

Research Findings

1st Ouestion: In what scale is quality of training tasks from point of view managers and experts of Ministry of Road and Transportation? For inspection of this question, firstly on the basis of 5 degree scale of Likert we gain levels low (1, 2.3), average (3.67 and 2.34) and high (5, 3.68), then number and percent of the individuals numbers of whom are held in this range, were located in this table. Quality of fulfillment of training tasks and each dimension of it are considered from managers and expert's point of view. On this basis, level of quality of fulfillment of training tasks has been evaluated from point of view of mangers and experts of Ministry of Road and Transportation. Also in all dimensions quality of fulfillment of training tasks has been investigated (Table 1 and 2).



Table 1: Quality of Training Tasks Fulfillment form point of view of Ministry of Road and Transportation Managers

Variables	Low		Average		High		General Total	
Property and the North Control of	No.	%	No.	%	No.	%	No.	%
Policy Making	28	32.6	58	67.4	0	0	86	100
Needs Assessment	22	25.6	43	50	21	24.4	86	100
Planning	34	39.5	52	60.5	0	0	86	100
Organizing	28	32.6	51	59.3	7	8.1	86	100
Executive Management	30	39.4	54	62.8	2	2.3	86	100
Training Evaluation	33	38.4	45	52.3	8	9.3	86	100
Quality of Training Tasks Fulfillment	23	62.7	63	73.3	0	0	86	100

2nd Question: In the what scale is Organizational Effectiveness of HRDO from view point of managers and experts of Ministry of Road and Transportation? For investigation of this question also, firstly on the basis of 5 degree Likert scale we gain levels of low (2.33,1), average (3.67, 2.34) and high (5, 3.68), the number and percent of individuals whom numbers is located in this range, are located in this table. Organizational effectiveness of HRDO and each of its dimensions are considered from managers and experts' point of view. On this basis organizational effectiveness of HRDO is evaluated from point of view of managers and experts of Ministry of Road and Transportation.

Table 2: Quality of Training Tasks Fulfillment form point of view of Ministry of Road and Transportation Experts

Variables	Low		Average		Н	igh		eral tal
	No.	%	No.	%	No.	%	No.	%
Policy Making	26	34.2	45	59.2	5	6.6	76	100
Needs Assessment	17	22.4	42	55.3	17	22.4	76	100
Planning	18	23.7	53	69.7	5	6.6	76	100
Organizing	22	28.9	46	60.5	8	10.5	76	100
Executive Management	22	18.9	48	63.2	6	7.9	76	100
Training Evaluation	21	27.6	48	63.2	7	9.2	76	100
Quality of Training Tasks Fulfillment	21	27.6	50	65.8	5	6.6	76	100

Table 3: Organizational Effectiveness of HRDO form point of view of Ministry of Road and Transportation Managers

Variables	Low		Average		High		General Total	
	No.	%	No.	%	No.	%	No.	%
Individual Dimension	42	48.4	41	47.7	3	3.5	86	100
Organizational Dimension	51	59.3	25	29.1	10	11.6	86	100
Organizational Effectiveness	45	52.3	34	39.5	7	8.1	86	100

On this basis 48.8% of managers (42 persons) have evaluated effectiveness individual dimension of

HRDO in low level. 47.7% (41 persons) have evaluated it in average level and 3.5% (3 persons) in high level. In effectiveness organizational dimension 59.3% (51 persons) have evaluated managers of organizational effectiveness in low level, 29.1 (25 persons) in average level and 11.6% (10 persons) in high level. From manager's point of view 52.3% (45 persons) have evaluated organizational effectiveness in low level, 29.5% (34 persons) in average level and 8.1% (7 persons) have evaluated it in high level.

Table 4: Organizational Effectiveness of HRDO form point of view of Ministry of Road and Transportation Experts

Variables	Low		Average		High		General Total	
(MIRE - 100 / 100	No.	%	No.	%	No.	%	No.	%
Individual Dimension	33	43.4	39	51.3	4	5.3	76	100
Organizational Dimension	26	34.2	45	59.2	5	6.6	76	100
Organizational Effectiveness	26	34.2	45	59.2	5	6.6	76	100

On this basis, 43.4% of experts (33 persons) have evaluated effectiveness of individual dimension of HRDO in low level. 51.3% (39 persons have evaluated effectiveness individual dimension in average level and 5.3% (4 persons) have evaluated in high level. In effectiveness organizational dimension 34.2% (26 persons) experts have evaluated organizational effectiveness in low level. In experts point of view 59.2% (45 persons) have evaluated organizational effectiveness in average level and 6.6 percent (5 persons) have evaluated it in high level. Totally 36.8% (28 persons) have evaluated organizational effectiveness of HRDO in low level, 57.9% (44 persons) in average level and 5.3% (4 persons) have evaluated it in high level.

3rd Question: If there is meaningful difference between managers and expert's point of view on fulfillment of training tasks? For response to 3rd question t-test is used for dependent groups. In this question, firstly the test was made between managers and experts on quality of training tasks quality which according to table 5 meaningful different didn't observed. (P>0.05). Then it was paid to comparison of managers and experts' point of view on quality of training tasks fulfillment. This comparison indicates that in different dimensions of training tasks fulfillment quality there is not meaningful difference between viewpoints of managers and experts of Ministry of Road and Transportation. (P>0.05).

Table 5: Comparison of Managers and Experts' point of view on Training Tasks Fulfillment quality

Variable	Ministry of Road and Transportation N-86		Exper Minis Road Transpo	try of and ortation	т	Meaningful level (P)	
Quality of Training Tasks Fulfillment	2.65	0.56	2.78	0.65	1.352	0.178	
Policy Making	2.62	0.61	2.61	0.69	0.088	0.9	
Need Assessment	2.93	0.77	3	0.89	0.52	0.6	
Programming	2.5	0.61	2.68	0.61	1.919	0.06	
Organizing	2.61	0.71	2.71	0.75	0.866	0.4	
Executive Management	2.66	0.62	25.86	0.7	1.873	0.06	
Training	2.59	0.84	2.8	0.72	1.744	0.08	

4th Question: Is there any meaningful different between managers and experts' point of view on organizational Effectiveness? For response to 4th question, firstly test was made between managers and experts on organizational effectiveness which according to table 6 there is not meaningful difference between managers and experts' point of view (P>0.05). Then it was paid to comparison of managers and experts' point of view on various dimension of organizational effectiveness. This comparison indicates that in organizational dimensions there is meaningful difference between view points of managers and experts of Ministry of Road and Transportation (P≤0.05). In the other word managers investigated organizational dimension of organizational effectiveness, in lower level than experts.

Table 6: Comparison Managers and Experts' point of view on Organizational Effectiveness

Variable	Ministry of Road and Transporta tion N-86		Minis Road Trans	erts of stry of d and sporta on	t	Meanin gful level	
Organizat ional Effectiven ess	2.39	0.76	2.58	0.65	1.7 32	0.08	
Individual Dimension	2.35	0.87	2.51	0.68	1.2 53	0.21	
Organizat ional Dimension	2.41	0.74	2.63	0.67	1.9 82	*0.05	

5th Question: Which of training task quality variables anticipate organizational effectiveness of HRDO of Ministry of Road and Transportation? For determining share of each variables of training task fulfillment quality on organizational effectiveness of Education Department multiple regression analysis was used which with regard to results gained of collection of management tasks of Education Department, training evaluation variable (β =0.263 and P=0.01) has meaningful relation with organizational effectiveness. Results gained of table 7 indicate that training evaluation variable is anticipant

of organization effectiveness of HRDO, because a meaningful level only in this variable has gained less than 0.05.

Table 7: Results of anticipating organizational effectiveness of HRDO on the basis of quality of training tasks fulfillment

Anticipate Variables	Co- efficient B	Standard error	Standard co- efficient β	Meaningful Level	R	R²
Policy Making	0.161	0.110	0.145	NS		
Need Assessment	0.053	0.108	0.061	NS		
Planning	0.248	0.135	0.212	NS	0.67	0.44
Organizing	0.063	0.01	0.064	NS	0.67	0.44
Executive Management	0.031	0.131	0.029	NS		
Training Evaluation	0.239	0.091	0.263	0.01		

 6^{th} Question: Which of variables of quality of training tasks fulfillment, anticipate individual dimension of organizational effectiveness of HRDO? For determining share of each variables of training task fulfillment quality on organizational effectiveness of Education Department multiple regression analysis was used which with regard to results gained of collection of management tasks of Education Department, training evaluation variable (β =0.26 and P=0.01) has meaningful relation with organizational effectiveness.

Table 8: Results of anticipating individual dimension of organizational effectiveness of HRDO on the basis of dimensions of training tasks fulfillment quality

Anticipate Variables	Co- efficien t B	Standa rd error	Standard co- efficient β	Meani ngful Level	R	R²
Policy Making	0.168	0.124	0.137			
Need Assessment	-0.11	0.122	-0.012	NS		
Planning	0.288	0.153	0.224	NS		
Organizing	0.062	0.115	0.058	NS	0.6 4	0.4
Executive Management	0.085	0.148	0.072	NS		
Training Evaluation	0.26	0.104	0.26	0.01		

Results of table 9-4 indicate that training evaluation variable is anticipant of individual dimension of organizational effectiveness of HRDO, because meaningful level only in this variable has gained less than 0.05.

7th Question: Which one of variables of training tasks fulfillment quality, anticipates organizational dimension of organizational effectiveness?

For determine share of each variables of training tasks fulfillment quality on organizational effectiveness of training unit multiple regression analysis was used which with regard to results of collection of training unit management tasks, variable of training evaluation (β =0.249 and P=0.01) has meaningful relation with organizational dimension of organizational effectiveness. Results gained from

table 9 indicates that variable of training evaluation is anticipant of organizational effectiveness of HRDO, because meaningful level only in this variable has been gained less than 0.05.

Table 9: Results of anticipating organizational dimension of organizational effectiveness of HRDO on the basis of dimensions of training tasks fulfillment quality

Anticipate Variables	Co- efficie nt B	Standar d error	Standar d co- efficient β	Meaningf ul Level	R	R ²
Policy Making	0.156	0.111	0.141	NS		
Need Assessment	0.096	0.109	0.096	NS		
Planning	0.222	0.137	0.191	NS		
Organizing	0.063	0.103	0.065	NS	0.6 5	0.4
Executive Manageme nt	-0.005	0.133	-0.005	NS		
Training Evaluation	0.225	0.093	0.249	0.01		

8. Discussion and Conclusion:

The results obtained of investigation of 1st question based upon manner of quality of training tasks fulfillment in each one of policy making, need planning, organizing, assessment. management and training evaluation from managers and experts of HDRO point of view indicated that quality of training tasks fulfillment is in average level; in other word quality of fulfillment of training tasks in each dimension of it is in suitable level. These results is parallel to results of London University Personnel Improvement Unit Research (2008), based upon that employees training process in this university enjoys of appropriate situation. In research of Human Resources Unit of Cambridge University (2008), employees training process from point of view of managers and personnel of university enjoys of appropriate situation. In present research also this process from point of view of managers and experts there is in an appropriate level. Ouality of training tasks fulfillment is a very important section organization. in organizations intend to ascertain their goals (continuous improvement), preserve of quality of training programs is a necessary issue for them (Kadvani and Manjari, 2004).

Results produced by investigation of 6th question indicated that from collection of variables of training tasks fulfillment quality (policy making, need assessment, planning, organizing, executive management and training evaluation), training evaluation variable is anticipant of individual dimension of organizational effectiveness of HRDO. This result with results of Edonel and Garvan (1997), based upon relation between training strategy and organizational success and research of Anderson

(2000), based upon a relation between organizational strategy and organization effectiveness is parallel. Results produced by 7th question investigation indicated that from collection of variables of training tasks fulfillment quality (policy making, need assessment, planning, organizing, executive management and training evaluation), variable of training evaluation is anticipant of organizational dimension of organizational effectiveness of HRDO. Results of this research with result of a research is made by Hassi (1985), on relation of training activities by organizational goals and strategies in organization, is not parallel. In need assessment dimension also is not parallel to research of Desimon and Harris (1998). In training planning dimension, results of this research is not parallel with result of Aganerbend's (2001) research, based upon positive and meaningful relation between strategic planning and organizational effectiveness. In dimension of training organizing, result of this research with results of Kashner and Pol's (1996) researches, based upon existence of positive and meaningful relation organizational effectiveness organizational structure is not paralle. In dimension of training evaluation, results of this research with result of a research was made by Anderson (2001) on relation of training evaluation with training success and organization effectiveness, is parallel. Anderson declares that training evaluation has positive and meaningful relation with training success and organizational effectiveness, and also by researches of Hanson (2003), Planco (2005) and Sharon (2008) who emphasize on important role of evaluation on training transfer and job operation, is parallel. In other word, exact performance and execution of evaluation process on behalf of executor of plan and managers of training units can be containing of useful and effective feedback for personnel, experts, training managers, executive managers and senior managers and finally cause providing necessary conditions for improvement of individual organization operation and increasing organizational efficiency and effectiveness.

Generally from produced results we can conclude that all training activities should be on the basis of training goals and policies of organization and training goals and policies also be in direction of organizational goals and policies. Therefore, in respect to relation and paralleling which should be between organization goals and training activities we can declare that quality of training activities and plans is one of the important and effectiveness factors in improvement of individual and organization operation and increasing of scale of efficiency and effectiveness and finally ascertain of organizational goals. In respect to conclusions based upon quality of

training tasks fulfillment impact on organizational effectiveness and also by virtue of emphasize and specifying some researches based upon centralization of training activities and programs in all dimensions and organizational process and its effect on organizational effectiveness, it is necessary that training issue in macro planning of organization be considered and emphasized.

In this direction one of the most important tasks and most indicator of administrators' and training managers' responsibilities in organizations is increasing of knowledge level, awareness and perception of human resources in different dimensions which for ascertaining of this important task, recognition of needs and necessary planning and organizing in this relation is necessary.

In deed we should emphasize on key and strategic role of training in competitive space of present world through national strategic planning and development plans to through necessary background for drawing attention and struggle and creating preparation and acceptance of performance educational of investments on behalf of governmental agencies and senior managers be provided. Correct evaluation of programs as fully and comprehensive can specify the scale of achieving to training goals and defects of work and help training managers in qualitative of reform and improvement of training courses. Also all authorities of training by considering extent and range of results of their effective and constructive activities on training processes, in applying and using of methods, human resources, physical and efficient and suitable equipment, more motivate and pay more attention and sensibility to performance and optimized execution of their activities. In addition, senior and middle managers also for achieving to organizational goals and increasing of effectiveness and efficiency by maximum use of minimum facilities and gaining desired profits and results from opportunities and conditions can encounter with training activities and its consequences with more optimism and more clear -sightedness and be aware of its necessity and importance, however this results have late output and will show themselves in long

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Study of different concentration of sodium alginate as a coating film on the shelf- life of frozen dressed kilka (Clupeonella cultriventiris)

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Abstract: The aim of the present study was to investigate the impact of sodium alginate coating on quality and shelf life of frozen dressed kilka fish. Sodium alginate edible coating was prepared in four different concentrations, including 0.25, 0.75, 1.25, 1.75 %. Then dressed kilka were coated for 1h, packed in polyethylene dishes with cellophane blanket and stored at -18 °C. Percentage of moisture and protein, Peroxide value and total microbial count were performed within 0, 1, 2, 3 and 4 months (sample size: 120 packs of 250 g). SPSS Statistical Software, One Way ANOVA test, Turkey test with the 5% significant level (significance level of 5%) have been used as for data analysis. Significant reduction was found in moisture value with increase of Sodiume Alginate concentration during the study (P<0.05). There were no significant differences in protein content (P>0.05). Results showed that there was significant difference between peroxide and total microbial count samples (P<0.05). Use of sodium alginate due to decrease peroxide production and slowing microbial growth speed, can increase shelf life of kilka in storage of freezing up to 4 months.

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Keywords: Kilka, edible coatings, sodium alginate, shelf life

1. Introduction

Fish meat is an important source of protein supply and other nutrients which developing countries have heavily relied on its export (Mahboob et al., 2008). Kilka (Clupeonella cultriventiris) is one of the economically valuable species of Clupeidae living in Caspian Sea that has naturally a significant status among other foodstuffs for vitamins, essential oils and various types of minerals. Evidently, less than 10% of the fish catchment is directly use by human being and the remaining section has been powdered for consumption(Moradi, 2001).

Freezing is a common preservation method to control or decrease biochemical alterations that occur during meat storage. It, however, doesn't completely inhibit chemical reactions, that lead to quality deterioration of fish. Preservatives such as phosphates are often applied to improve of shelf life of seafood's products. There are numerous studies that focused on natural ingredients to enhance shelf life and avoid of synthetic preservative application (Williams *et al.*, 1978). An edible film is generally defined as a thin layer that formed as a coating between food materials. This film can be applied by immersion, spraying and or panning (Chapman *et al.*, 1997; Regalado *et al.*, 2006).

Edible films and coatings, as well as biodegradable materials offer alternative packaging systems, which may replace some synthetic packaging materials or reduce their application by partially replacement (Regalado *et al.*, 2006).

Previous studies show that coatings have some advantages on edible supplies such as reduction of oil based polymeric films, decrease of solid materials and their consumption value, harmlessness for the consumer and selective permeability (Kester & Fennema, 1986; Draget *et al.*, 1998; Crapo *et al.*, 1999; Cutter, 2006).

Edible films and coatings are intended to maintain the quality and shelf life of food products by controlling the transfer of moisture, oxygen, carbon dioxide, lipids, aromas, flavors, and food additives (Sothornvit & Krotcha, 2005). Polysaccarides and proteins could be used to coat of fish fillets and suppress of quality changes during frozen storage (Sathivel, 2005).

Alginate is a hydrophilic colloidal carbohydrate extracted from various species of brown seaweeds (*Phaeophyceae*). It is molecularly a member of unbranched binary compolymers, residues of D- β -mannuronic acid and L- α -guluronic acid, they are widely varying composition and sequential structure (Draget et al., 1998; King, 1983). Ability to react with polyvalent metal kations to produce strong gels is the most useful and unique property of alginates (Grant *et al.*, 1973). this gel is used for in food processing industry to produce restructured foods such as meat products, onion rings, pimento olive fillings, crabsticks, and cocktail berries(Moe et al., 1995), and in the biotechnology industry for producing beads for immobilization of cells or

enzymes (Rhim, 2004; Pavlath et al., 1999; Williams et al., 1978).

According to basic nutrition alginate films and nutrition coatings researches (Maftoonazad et al., 2008), Alginate nutrition films have anti -microbus factors that could enhance shelf-life quality of sliced peach and melon (Maftoonazad et al., 2008; Pearson, 1997). Besides, alginate and gelan based coatings is to improve barrier, texture and edible properties of fresh-cut papaya (Tapia et al., 2008). Kilka is abundantly available and caught in Caspian Sea. However, there are few efforts on their preservation using edible coating. Accordingly, the present research has been assigned to investigate the effect of sodium alginate coating on shelf life of kilka. Besides, antimicrobial and chemical properties of coated kilka have been considered during frozen storage.

2. Materials and Methods

This study was conducted in the National Research Fish Processing Center, Anzali, Guilan province, Iran. Sodium alginate (Product No: 650.0489) have diluted been to different concentrations of 0.25%, 0.75%, 1.25%, 1.75% Maftoonazad (\mathbf{w}/\mathbf{w}) according to method (Maftoonazad et al., 2008). Sodium alginate powder was broken up to 50, 150, 250, and 350 g and diluted in separate tanks containing 20 L tab water.

35 kg fresh kilka were provided from quay of Anzali and then carefully gutted and dressed by hand. The fish were divided to 5 separate treatments including treatment 1 (control, uncoated fish), treatment 2 (coated with 0.25 % sodium alginate), treatment 3 (coated with 0.75 % sodium alginate), treatment 4 (coated with 1.25 % sodium alginate), treatment 5 (coated with 1.75 % sodium alginate). The treated kilka were immersed in nominative concentration of sodium alginate solution for 1h in 3.5 °C and kept in baskets for 1 min to dissenting surplus of solution from fish surfaces. These samples were then packed in polyethylene dishes with cellophane blanket and frozen at -18°C for 4 month. The control group of fish were just packed in similar polyethylene dishes and stored in accord with treated fish.

Sampling was carried out in 4 phases, numbered as 1 to 4. Phase 1 performed one month after storage and remaining phases were done each one month after each other (2, 3 and 4 month). Moisture were measured by (A.O.A.C, 2000) standard method, protein by method of digestion, titration and distillation by Kajedal (Pearson, 1997), amount of peroxide and total microbial count were determined for each sampling. Lee method was used to determine

amount of peroxide (Pearson, 1997) according to the following formula:

Peroxide value (meq/1000g) = (A-B) \times M \times 1000/W Where: A = Titration value of sample

B = Titration value of blank (ml of thiosuphate)

M = Molarity of sodium thiosuphate

W = Weight of sample (g)

Total microbial count has also done according to standard ISIRI no. 2394-1 (ISIRI no 2394-1., 2000). Data were statistically analyzed using one—way ANOVA and the mean values were compared using Tukeys' HSD. A p—value less than 0.05 were considered as significant. All statistical analyses have been done using SPSS software 16.0.

3. Results Moisture

Study of treatment effect showed significant difference among average moisture of different treatments of 0, 1, 2, 3, and 4 months (p<0/05). Study of time effect showed significant difference among different times 1, 2, 3, 4 and 5 treatments (p<0.05). Both treatment and time averages have been compared in table 1 and showed in figure 1.

Table 1: one way variance analysis results turkey test of treatment and time effects moisture of data

			Treatment		Time in
5	4	3	2	1	(Month)
74/00±0/14 ^{b,A}	74/15±0/03ab,A	74/26±0/05 ^{a,A}	74/30±0/07 ^{a,A}	74/11±0/09 ^{ab,A}	0
73/70±0/04 ^{c,B}	$73/78\pm0/09^{bc,B}$	74/10±0/06 ^{a,A}	$74/17\pm0/06^{a,A}$	$73/90{\pm}0/08^{b,A}$	1
73/24±0/04 ^{e,C}	73/47±0/02 ^{b,C}	$73/87\pm0/06^{a,B}$	73/96±0/09 ^{a,B}	$73/56\pm0/09^{b,B}$	2
72/85±0/05 ^{b,D}	$72/86\pm0/08^{b,D}$	$73/54\pm0/06^{a,C}$	73/65±0/05 ^{a,C}	$73/00{\pm}0/08^{b,C}$	3
72/50±0/06 ^{c,E}	72/57±0/02 ^{bc,E}	73/20±0/07 ^{a,D}	$73/39\pm0/01^{a,D}$	$72/75\pm0/17^{b,C}$	4

a-c)) are used to compare treatments average that have significant difference with different letters, (p<0.05 $^{\circ}$

 $(A-E) \ are \ used \ to \ compare \ times \ average \ that \ have \ significant \ difference \ with \ different \ letters, \ (p<0.05).$

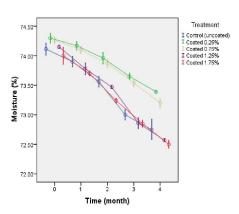


Figure 1: effect of time and treatment on moisture data of uncoated and coated samples with sodium alginate

Protein

There were no significant differences of protein between different treatments (p>0/05). Also study of time effect showed no significant difference among different times (p>0.05). Both treatment and time averages have been compared in table 2 and showed in figure 2.

Table 2: one way variance analysis results turkey test of treatment and time effects protein of data

			-		
			Treatment		Time in
5	4	3	2	1	(Month)
17/68 ± 0/02	$17/70 \pm 0/05$	$17/68 \pm 0/07$	17/62 ± 0/02	17/65 ± 0/04	0
$17/67\pm0/08$	$17/63 \pm 0/11$	$17/65\pm0/05$	$17/60\pm0/11$	$17/58\pm0/07$	1
$17/68 \pm 0/10$	$17/65 \pm 0/05$	$17/60\pm0/00$	$17/57\pm0/03$	$17/53 \pm 0/05$	2
$17/64 \pm 0/05$	$17/61 \pm 0/07$	$17/57 \pm 0/06$	$17/59 \pm 0/07$	$17/55 \pm 0/08$	3
$17/60 \pm 0/05$	$17/61 \pm 0/05$	$17/55 \pm 0/10$	$17/57 \pm 0/08$	$17/50 \pm 0/04$	4

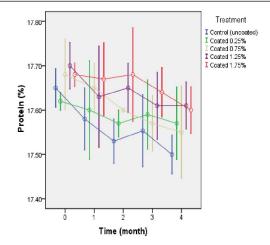


Figure 2: effect of treatment and time on protein data of uncoated and coated samples with sodium alginate

Peroxide

Study of treatment effect showed significant difference among average peroxide of different treatments of 1, 2, 3, and 4 months (p<0/05). Study of time effect showed significant difference among different times 1, 2, 3, 4 and 5 treatments (p<0.05). Both treatment and time averages have been compared in table 3 and showed in figure 3.

Total microbial count

There were significant differences of total microbial counts between treatments during 4 months (p<0/05). Study of time effect showed significant difference among different times of 1, 2 and 3 treatments (p<0.05). Both treatment and time

averages have been compared in table 4 and showed in figure 4.

Table 3: one way variance analysis results tukey test of treatment and time effects peroxide of data (meg/kg)

		Treatment		Time in
4	3	2	1	(Month)
$0/91 \pm 0/01^{E}$	$0/85 \pm 0/06^{E}$	$0/90 \pm 0/05^{E}$	$0/90 \pm 0/02^{D}$	0
$1/07\pm0/07^{\text{ab,D}}$	$0/98\pm0/02^{b,D}$	$1/13\pm0/03^{a,\overline{D}}$	$1/00\pm0/05^{\textbf{b,D}}$	1
$1/37\pm0/03^{b_iC}$	$1/52 \pm 0/05^{a,C}$	$1/41 \pm 0/03^{ab,C}$	$1/45\pm0/06^{ab_iC}$	2
$1/69 \pm 0/03^{\text{c,B}}$	$2/08\pm0/08^{\text{ab,B}}$	$2/13 \pm 0/01^{\mathrm{a,B}}$	$2/00 \pm 0/05^{\text{b,B}}$	3
$2/04 \pm 0/06^{c_s A}$	$2/45 \pm 0/00^{ab,A}$	$2/36 \pm 0/11^{b,A}$	$2/63 \pm 0/06^{a,A}$	4
	$0/91 \pm 0/01^{E}$ $1/07 \pm 0/07^{ab,D}$ $1/37 \pm 0/03^{b,C}$ $1/69 \pm 0/03^{c,B}$	$0.91 \pm 0.001^{\text{L}}$ $0.885 \pm 0.006^{\text{L}}$ $1.077 \pm 0.007^{\text{ak}D}$ $0.98 \pm 0.002^{\text{k}D}$ $1.37 \pm 0.03^{\text{k}C}$ $1.52 \pm 0.03^{\text{k}C}$ $1.69 \pm 0.003^{\text{L}B}$ $2.08 \pm 0.08^{\text{ak}B}$	$\begin{array}{llllllllllllllllllllllllllllllllllll$	

(a-d)) are used to compare treatments average that have significant difference with different letters, (p<0.05)

(A-E) are used to compare times average that have significant difference with different letters, (p<0.05).

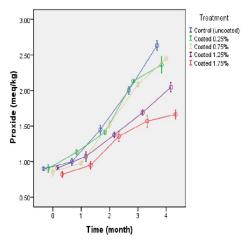


Figure 3: effect of treatment and time on peroxide data of uncoated and coated samples with sodium alginate

Table 4: one way variance analysis results tukey test of treatment and time effects Total microbial count of data (log CFU/g)

			Treatment		Time in
5	4	3	2	1	(Month)
2/56 ± 0/72	$2/61 \pm 0/65$	$2/63 \pm 0/68^{B}$	$2/56 \pm 0/72^{B}$	$2/31 \pm 1/19^{B}$	0
2/64 ± 0/67	$2/66\pm0/65$	$2/97\pm0/15^{AB}$	$2/67\pm0/66^B$	$2/46\pm1/04^B$	1
2/98 ± 0/13	$2/75\pm0/66$	$2/64\pm0/73^B$	$2/94\pm0/31^{\text{B}}$	$2/87\pm0/37^{AB}$	2
2/81 ± 0/71	$2/91\pm0/55$	$3/46\pm0/40^{AB}$	$4/01\pm0/38^{AB}$	$3/80\pm0/56^{AB}$	3
3/08 ± 0/28 ^b	$3/11 \pm 0/28^b$	$4/07 \pm 0/07^{ab,A}$	$4/89 \pm 0/71^{a,A}$	$5/08 \pm 0/68^{a,A}$	4

A-B) are used to compare times average that have significant difference with different letters. (p<0.05)

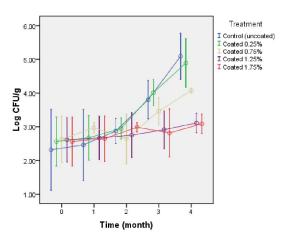


Figure 4: effect of treatment and time on Total microbial count data of uncoated and coated samples with sodium alginate

Discussion

We also significant differences in moisture content in all treatments at months 0, 1, 2, 3 and 4 of storage time, as moisture content was reduced significantly. The studies have demonstrated that linked coatings and alginate films with CaCl₂ cations increase water resistance qualities, but applied alginate coatings increase steam permeability and reduce the moisture consequently, ((Rhim et al., 2006; Rhim, 2004). Increased resistance of coated samples rather than uncoated samples Its also found that the content of sodium alginate in coating has a significant effect on moisture content, as treatments No. 2 and 3 (with 0.25 and 0.75 % sodium alginate) had higher moisture content with comparison of control samples, while treatments No. 4 and 5 (with 1.25 and 1.75 % sodium alginate) had lower higher moisture content with comparison of control samples.

There is due to increased lipid to improve water resistance of alginate, and glean coatings (Rojas-Grau et al., 2007). Tapia et al. (2008) observed that gelan coatings resist better against steam than that of alginate.

They proposed that applied higher density rates of alginate (2%) than gelan (0.5%) may be the cause of water resistant reduction of against coated kulak when the moisture is reduced. According to the studies of Maftoonazad et al. (2008) on peach, shelflife increased with applying the sodium alginate and methyl cellulose. They observed that moisture reduction of the coated fruits with sodium alginate has been more than that of coated fruits with methyl Lazarus cellulose. (1976)studied effectiveness of alginate calcium and protective plastic cover to control reduced body weight of sheep. He observed that nutritional film of calcium alginate increased weight of the hot body up to 270g.

In fact it is a moisture extractor rather than moisture barrier.

According to the obtained results, protein content of different treatments at months 0, 1, 2, 3 and 4, did not remarkably changed in 0 to 4 months, but coated samples have generally had more proteins than that of testifiers. As alginate is a poly anion and easily reacts to cations and poly cations produce a structure named Egg box, when a network of resembling cavities is formed, the network prohibits heavier proteins than 100KD to pass (Mortazavi, 2006). Thus, sodium alginate coating prevents water contained proteins to erupt.

Preservers can prevent growth of ice crystals and migration of water molecules of protein, thus, they preserve natural form of protein during freeze process (Yoon & Lee, 1990).

Obtained results demonstrated that peroxide average of samples has had significant increase during 4 months and maximized in treatment 1 (uncoated kilka). Generally, performed processing of lipid oxidation and peroxide increased during storage. The coated samples reduced their peroxide by increase of sodium alginate concentration. It is, therefore, concluded that sodium alginate solution effectively prevents peroxide increase. When hydro peroxide content of fish muscles is reduced the compositions compound faster than break up, then peroxide content of fish muscles is increased based on one molecular mechanism (Vidya Sager Peddy & Sriker, 1996). The previous studies showed that peroxide content of Sardine at -18°C increased in 6 month fridge but it was decreased after 6 month due to decomposition of oxidation product (Pacheco-Aguilar et al., 2000).

The present study demonstrated significant differences of total microbial count between treatments throughout 4 month. Treatment 1 (uncoated kilka) contained the most bacteria count, while the coated exhibited bacterial count reduction by increasing of sodium alginate concentration, so that the treatment 5 had the least bacteria. It is could be related to anti microbial property of sodium alginate. The recommended shelf-life of frozen stored fish in the present study was 4 months, if the acceptability limit of 107 CFU/g is applied (Duan et al., 2010).

Cutter and Siragusa (1996) observed a lack of effectiveness to control the growth of *Brochothrix* thermosphacta when nisin was applied on beef carcass surface for a long period of storage. In order to improve the efficiency of this bacteriocin, these authors immobilized the antimicrobial peptide in an alginate gel. This gel allowed a controlled release of nisin on meat, which resulted in a 3 log CFU/cm² reduction of *B. thermosphacta* on meat carcass

surfaces as compared with beef covered whit nisin solution. Apparently, bactericidal activity of nisin was able to control the growth of *B. thermosphacta* in ground beef when entrapped in alginate gel (Moe *et al.*, 1995). The efficiency of numerous films formulation based on calcium- alginate or agar containing nisin to inhibit the antibiotic resistant *Salmonella typhimurium* on poultry drumstick skin was demonstrated by Natrajan and Sheldon (Natrajan & Sheldon, 2000).

Alginate has gel properties which its gel porosity is affected by rate of gluronic acid and mannuronic acid of alginate molecule. Both of the properties produce a semi permeable layer to effectively trap microorganisms (Mir Nezami Ziabari, 2002).

Oms-Oliu et al (Oms-Oliu et al., 2008) investigated the polysaccharide-based edible coating of fresh-cut melon and found out the highest growth rate of psychrophilic aerobic microorganisms during 15 days at 4°C on gellan-coated, reaching counts of 8 log CFU/g at the end of storage. On the contrary, its counts in both uncoated and alginate- or pectin-coated samples exceeded 7 log CFU/g after the period of experiment.

It is concluded from the present research that application of sodium alginate due to slowing effect of microbial growth and decrease of peroxide production can increase shelf life of kilka. Finally, 1.25% concentration of sodium alginate has been chosen as the most effective one and it is recommended that lipid based materials must be used in the compound of sodium alginate nutritional film to prevent moisture reduction of kilka when it is preserved in freezer.

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Active contours in Brain tumor segmentation

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Abstract: Image segmentation plays a central role in biomedical imageprocessing. Tumor segmentation from MRI data is an important but time consuming task performed manually by medical experts. Automating this process is challenging due to the high diversity in appearance of tumor tissue, among different patients and in many cases, similarity between tumor and normal tissue. Parametric active contour method is one of many segmentation approaches. In this paper we used four type of parametric active contour (snake) for Brain tumor segmentation. [Ali Elyasi, Mehdi Hosseini, Marzieh Esfanyari. Active contours in Brain tumor segmentation. Journal of American Science 2011;7(7):519-524]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Image segmentation; Brain tumor; snake; GVF.

Introduction:

Medical imaging allows scientist and physicians to decide about life saving information regard to the human physiological activities. It plays an important role in the diagnosis, therapy and treatment of various organs, tumors and other abnormalities. There are more than 120 types of brain tumors; Brain tumors contain all tumors inside the cranium or in the central spinal canal. They are produced by an abnormal and uncontrolled cell division, normally either in the brain itself (neurons, glial cells (astrocytes, oligodendrocytes, ependymal cells, myelin-producing Schwann cells), lymphatic tissue, blood vessels), in the cranial nerves, in the brain envelopes (meninges), skull, pituitary and pineal gland, or spread from cancers primarily located in other organs (metastatic tumors). Any brain tumor is naturally serious and dangerous because of its invasive and infiltrative character in the limited space of the intracranial cavity. However, brain tumors (even malignant ones) are not invariably fatal. Brain tumors or intracranial neoplasms can be cancerous (malignant) or noncancerous (benign); however, the definitions of malignant or benign neoplasms differs from those commonly used in other types of cancerous or noncancerous neoplasms in the body. Its threat level depends on the combination of factors like the type of tumor, its location, its size and its state of development. Because the brain is well protected by the skull, the early detection of a brain tumor only occurs when diagnostic tools are directed at the intracranial cavity. Usually detection occurs in advanced stages when the presence of the tumor has caused unexplained symptoms. Image segmentation is typically used to locate objects and boundaries in images and should stop when the object of interest in an application have been isolated .It is used to

calculate the geometric shape and size of tumors and abnormal growth of any tissue. There are many techniques available for auto-segmentation of images like Active contours [1], Fuzzy based classifiers, Gradient Vector Field theory, Tensor based segmentation, Level set [2], etc. But many of them are suffering from problems like optimization, initialization and insufficient results in noisy images. Active contour can be roughly classified in to two types: parametric and geometric active contours. The parametric active contours are explicitly represented as parameterized curves in Lagrange formulation .They are sensitive to the initial contour and cannot naturally handle topological changes. While the geometrical active contours are represented implicitly and evolve according to the Euler formulation based on the theory of surface evolution and geometric flows.

Parametric Active contours:

Parametric active contours were originally developed by Kass, Witkin et al [3]. The method is considered parametric because the snake evolution in the Euclidean space is controlled by a temporal function (i.e., the functions are parameterized in time). The function, or more accurately the functional, is formulated as an energy minimization problem. Thus, given an initial contour, the snake deforms to the global optimum of an objective function.

It is often the case in object recognition problems that constraints of the object boundary (like continuity, smoothness, etc.) are not imposed a priorion the problem; rather, they are expected to evolve from the solution to the problem. However, parametric active contours impose a prioriknowledge

of the object (or expected attributes) on the problem domain via an internal energy function that imposes such traits on the contour.

Parametric snakes are described by an objective function that consists of three parts the internal energy of the snake, the image energy and external energies. One approach is to formulate the internal energy of the snake by using the (weighted) first and second derivatives of the curve. The first derivative term is indicative of the "elasticity" of the snake, in that it penalizes points that move away from each other. The second derivative term is a measure of the stiffness of the snake, viz., how strongly it resists bending. It is also possible to pick more complex shape constraints like rectilinearity, parallelism [4] and radial symmetry [5].

The image energy term determine what features of the image the snake seeks, e.g., edges, lines and terminations. The image energy term is chosen so that it minimizes the energy at the features where the snake is expected to converge. For example, in a binary edge image, the pixel intensity can be a good term for the image energy. This term can also factor in the area enclosed, as proposed in [6]. External forces are extremely important since they determine behavior of the snake imposed by a higher level algorithm. For example, the external force can be used to force a snake to expand, knowing that the snake has been initialized inside the contour to be determined.

Original Snake:

A snake is an energy minimizing parametric curve, C, represented by the vector v(s) = (x(s), y(s)), where x and y are coordinate functions of s, the normalized arc length. s[0, 1] is the parametric domain. in this paper we will be dealing exclusively with closed curves so C(0) = C(1). To conform to the boundary of an object it is placed in proximity to. a snake works by minimizing an associated energy functional. The energy functional associated with the snake can be viewed as the representation of the energy of the snake and the final snake corresponds to the minimum of this energy [7]. A snake conforms to the boundary of an object by deforming its shape and moving through the spatial domain of the image until it reaches a location (theoretically the object's boundary) where its energy functional is at a minimum. The energy functional is defined as follows:

$$E_{snake} = \int_0^1 E_{snake} (v(s)) ds \tag{1}$$

$$E_{snoks} = \int_0^1 E_{int}(v(s)) + E_{sxt}(v(s))ds \qquad (2)$$

$$E_{ext} = E_{image}(v(s)) + E_{con}(v(s))$$
 (3)

$$E_{snake} = \int_0^1 E_{int}(v(s)) + E_{image}(v(s)) + E_{cen}(v(s)) ds$$
(4)

Where E_{int} , E_{ext} , E_{image} and E_{con} respectively denote internal energy, external energy, external image energy and external constraint energy [3]. The internal energy, E_{int} , is calculated based on the shape and location of the snake and serves to preserve the continuity and smoothness of the snake. The external energy term, E_{ext} , is composed of two terms: the external image energy term and the external constraint energy term. The external image energy, E_{image} , is calculated using image information, typically the negative magnitude of the gradient of the image, and is used to drive the snake towards image features like lines, edge and subjective contours [3]. The external constraint energy, E_{con} , is an optional term that is responsible for forcing the snake away or towards any particular feature in the image. This optional term is defined by a user or some other higher level process. The expanded general form of the energy functional without the optional constraint energy term is:

$$E_{smake} = \int_0^1 \frac{1}{2} \alpha(s) \left| \frac{dv}{ds} \right|^2 + \frac{1}{2} \beta(s) \left| \frac{d^2v}{d^2s} \right|^2 + E_{ext}(v(s)) ds$$
(5)

Where $\alpha(s)$ and $\beta(s)$ are non-negative weighting parameters that control the snake's tension (elasticity) and rigidity (inability to bend). In most applications and for this paper they are treated as constants. From calculus of variations, the snake that minimizes the energy functional must satisfy the following Euler equation:

$$-\frac{\partial}{\partial s}\left(\alpha(s)\frac{\partial v(s)}{\partial s}\right) + \frac{\partial^{2}}{\partial s^{2}}\left(\beta(s)\frac{\partial^{2}v(s)}{\partial s^{2}}\right) + \nabla E_{ext} = 0 \qquad (6)$$

In compact form:

$$\alpha(s)v''(s) - \beta(s)v'''(s) - \nabla E_{swt} = 0$$
 (7)

The above equation can be viewed as a force balance equation:

$$F_{\text{inst}} + F_{\text{ext}} = 0 ag{8}$$

Where
$$F_{\rm int} = \alpha(s) v''(s) - \beta(s) v^{\rm int}(s)$$
 and $F_{\rm ext} = -\nabla E_{\rm ext}$. $F_{\rm int}$ and $F_{\rm ext}$ denote internal force

and external force respectively. The internal force discourages stretching and bending while the external force pulls the snake towards the desired image edges [8]. Using these force terms, the deformation process of the snake can be viewed as an interaction of forces. The deformation process stops when the forces balance each other out $F_{\text{full}} = -F_{\text{ext}}$.

In order to find the solution to (7), the snake is treated as a function of time t as well as s i.e. v(s, t) [10]. The partial derivative of v with respect to t is then set equal to the left hand side of (7):

$$v_t(s, t) = \alpha v''(s, t) - \beta v''''(s, t) - \nabla E_{ext}$$
 (9)

When the solution v(s, t) stabilizes, the term $v_{\mathbb{T}}(s, t)$ goes to zero and we obtain the solution $v(s, t_{\text{final}})$ to equation (7).

Balloon Snake:

The internal constraint to minimize the length of the snake causes the snake to shrink to nothing when placed on a uniform gray scale. Pressure forces were introduced by Cohen in [8] to counter the effect of the shrinking energy term. The method allowed for the inclusion of information from a good local edge detector. Internal pressure forces were introduced that allowed the snake to expand, allowing it to find the edges even when initialized within the Region of Interest (ROT). In addition to the above properties, the balloon force also allows the snake to pass through weak edges and actively seek the desired edge. The modified force equation thus becomes

$$F(v) = k_1 \vec{N} - k_1 \frac{\nabla y}{|\nabla y|}$$
 (10)

Where \overline{N} is the normal unit vector with magnitude k_1 (inflation force), and k is the external force weight.

Distance snake:

Cohen and Cohen [9] used a finite element method to implement a deformation strategy called the distance snake. Compared with the original snake, the external force field on the image is constructed also as the negative of the external energy gradient. which is the distance from each point to its closest edge points in the image. The new external energy enables a large magnitude for the external force everywhere in the image. Thus, the distance snake has a large capture range, i.e., the initial contour can be located far away from the desired boundary if there are no spurious edges along the way. By using a finite element method, the deformable contour is represented as a continuous curve in the form of weighted sum of local polynomial basis functions. The result has good stability and convergence in the energy minimization process. The distance snake uses the external force function

$$F = -\nabla Q(v) \tag{11}$$

In Equation Q(v) = d(v) and d(v) is the smallest normalized Euclidean distance from v to an edge point withthe edge point identified by a threshold gradient.

Gradient Vector Flow (GVF) Snake:

This approach is external force model for active contours and deformable surfaces, which is called the gradient vector flow (GVF) field [10]. The field is calculated as a diffusion of the gradient vectors of a gray level or binary edge map. It allows for flexible initialization of the snake or deformable surface and encourages convergence to boundary concavities. We define the gradient vector flows field to be the vector field V(x,y) = [u(x,y), v(x,y)] that minimizes the energy functional:

$$E = \iint \mu (u_x^2 + u_y^2 + v_x^2 + v_y^2) + |\nabla f|^2 |V - \nabla f|^2 dx dy$$
(12)

This variation formulation follows a standard principle that of making the result smooth when there is no data. In particular, we see that when $|\nabla f|$ is small; the energy is dominated by sum of the squares of the partial derivatives of the vector field, yielding as lowly varying field. On the other hand, when ∇f is large, the second term dominates the integrand, and is minimized by setting $V = \nabla f$. This produces the desired effect of keeping V nearly equal to the gradient of the edge map when it is large, but forcing the field to be slowly varying in homogeneous regions. The parameter μ is a regularization parameter governing the tradeoff between the first term and the second term in the integrand. This parameter should be set according to the amount of noise present in the image (more noise, increase µ). We note that the smoothing term the first term within the integrand of(1) is the same term used by Horn and Schunck in their classical formulation of optical flows [11]. It has recently been shown that this term corresponds to an equal penalty on the divergence and curl of the vector field [11]. Therefore, the vector field resulting from this minimization can be expected to be neither entirely irrational nor entirely solenoidal. Using the calculus of variations it can be shown that the GVF field can be found by solving the following Euler equations.

$$\mu \nabla^{z} u - (u - f_{x}) (f_{x}^{z} + f_{y}^{z}) = 0$$
 (13a)

$$\mu \nabla^2 v - (v - f_y)(f_x^2 + f_y^2) = 0$$
 (13b)

Where ∇^2 is the Laplacian operator. These equations provide further intuition behind the GVF formulation. We note that in a homogeneous region [where I(x, y) is constant], the second term in each equation is zero because the gradient of f(x, y) is zero. Therefore, within such a region, u and v are each determined by Laplace's equation, and the resulting GVF field is interpolated from the region's boundary, reflecting a kind of competition among the boundary vectors. This explains why GVF yields vectors that point in to boundary concavities. Clearly, the capture range of traditional snake is very small

and GVF snake has a much larger capture range than traditional snake.

Experimental results:

The goal of the Brain tumor image (fig. 1) was to determine which method could better segment tumor. The test images are at different sizes and resolutions. Included are also images with added noises (Gaussian, salt and pepper) corrupting the overall quality of the images Fig.1. Although these types of noise are normally modality dependent or not present due to the high quality of today's imaging devices, it is still interesting to show the performance of the methods in the presence of different types of noise.

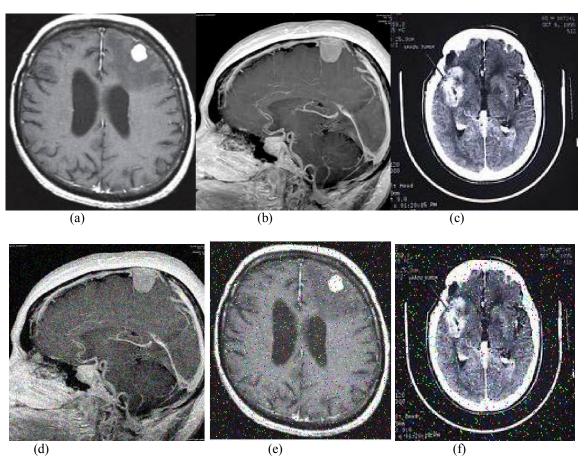


Figure 1: (a),(b),(c) Brain tumor (c),(d),(e) images with noise (Gaussian and Salt & pepper)

We add noise to images with Matlab program and noise density in salt & pepper is 0.05, the balloon snake is more insensitive to initial contour locations than the methods do not have pressure forces like the distance snake and GVF snake. This is due to the shape and edge strength of the desired boundary. The best results for the distance snake and the original snake occurred with the upper middle initial location and are shown in fig.4, fig. 3,

respectively. Distance snake required a bigger initial contour (e.g., double and triple the initial contour radius) than others in order to catch the attraction forces from the edge points in all directions.

When we add noise (Gaussian and salt & pepper), these methods cannot segment like in original image. Balloon snake in image that add Gaussian noise have some wrong part but with salt & pepper noise it can segment interest part of image as

shown in fig.2. Distance snake and original snake work better than other methods when noise (Gaussian and salt & pepper) is added in images (fig.3 (b),(c)),(fig.4(b),(c)).

GVF snake cannot segment images with and without noise of course when salt & pepper noise is added this method cannot work (fig.5).

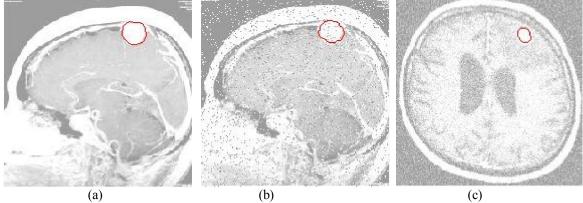


Fig.2(a) segmentation of original image with balloon snake (b), (c)balloon snake segmentation in image with salt &pepper and Gaussian noise

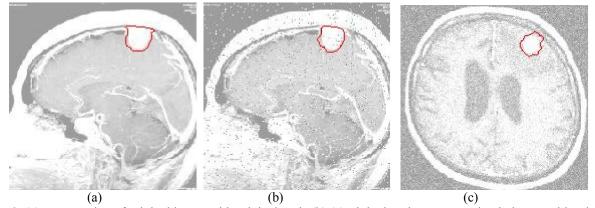


Fig. 3. (a)segmentation of original image with original snake(b),(c)original snake segmentation in image with salt & pepper and Gaussian noise

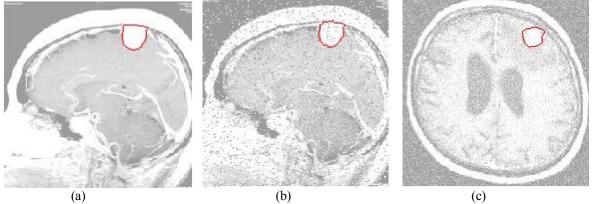


Fig. 4(a) segmentation of original image with distance snake (b), (c) distance snake segmentation in image with salt &pepper and Gaussian noise

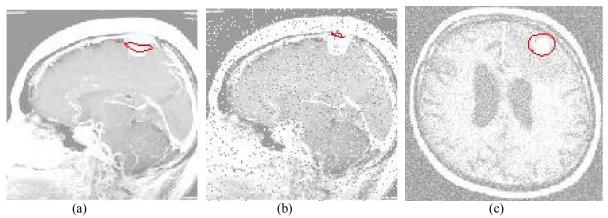


Fig. 5 (a) segmentation of original image with GVF snake (b), (c) GVF snake segmentation in image with salt & pepper and Gaussian noise

Discussion:

This paper presents a study of four deformable contour methods applied to segmentation of Brain tumor imagery. These methods can be used for image segmentation but original and distance snake have better segmentation result. Even in images that are added noise in them, distance and original snake have good result in compare of other methods of course balloon snake have good result in noisy image in compare of original image.

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Fault Detection using ANFIS for the Magnetically Saturated Induction Motor

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Abstract: The problem of fault detection of the π -model induction motor with magnetic saturation is considered in this paper. In this paper we use a new technique which is the Adaptive Neuro Fuzzy Inference Systems (ANFIS) technique for online identification of the different motor fault conditions. A simulation study is illustrated using MATLAB simulink depending on stator currents measurement only for online detection of the motor faults. The proposed technique shows promising results using the simulation model.

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Keywords: Fault detection, ANFIS, saturated model and induction motor

1. Introduction:

In the last decade, a tremendous development in the theory of nonlinear control has been achieved. The common assumption made in the development of these control laws is the linearity of the magnetic circuit of the machine. This assumption is usually justified by including the flux magnitude in the outputs to be regulated by the controller and keeping this magnitude regulated at a value far from the saturation region. However there are no guarantees that the flux magnitude remains in the linear magnetic region during machine transients. Moreover in many variable torque applications, it is desirable to operate the machine in the magnetic saturation region to allow the machine to develop higher torque [1] and [2]. Saturation effects are also known to be pronounced in drives operating in the field weakening region, or in drives that operate with varying flux levels to achieve optimally in a specified sense [3]. However, the operation of the motor at various magnetization levels makes the nominal inductance a bad approximation. researchers have been attracted to induction motor control with magnetic saturation. Feedback inputoutput linearization schemes for induction motors with magnetic saturation were proposed in a fixed stator frame [4] and in a synchronously rotating frame [5]. While in [4] the control signal is the stator voltage, but in [5] it is the stator current. Both papers treat the *T-model* of an induction motor. Unfortunately, due to the complicated nature of the T-model, drastic simplifications are required to facilitate the use of this model in nonlinear control synthesis. The major drawback in [4] (also present in the optimal flux reference selection of [5]) is the assumption that the stator and rotor leakage parameters os and or, as defined by W. Leonard in [6], are equal and constant. This assumption has the indirect effect of neglecting any cross-saturation

effect that might appear in the dynamics of the motor. On the other hand, the model in [5] is obtained by firstly simplifying the motor equations assuming a linear magnetic circuit and then including a mutual inductance that varies with mutual current. This approach does not include derivatives of the saturation function that should appear in a complete model which was driven by Gokdere in [7]. A similar modeling approach can also be found in [8] for incorporating magnetic saturation in the passivitybased control design methodology appears in the work of H. A. Abdel Fattah and K. A. Loparo that was proposed in [9]. It is worth pointing out that the work published in [8] similar to [5] that stator currents are used as the control signal. All the work presented so far is based on a T-model of the induction motor, contrary to the π -model proposed in [1]. The π -model differs from the conventional T*model* in that it is more closely related to the physical structure of the machine, since its derivation is primarily based on the stator-rotor tooth pair magnetic circuit. Even though the work in [1] is based on a wound rotor motor, it is shown in the same paper how the modeling approach can be applied to a squirrel cage motor. It is not difficult to show that both models are equivalent when a linear magnetic circuit is assumed, this equivalence does not hold when main flux saturation is included. In the published work of H. A. Abdel Fattah and K. A. Loparo as in [10]. It was shown that considering magnetic saturation explicitly in nonlinear control synthesis is of foremost importance especially when the machine is voltage actuated. Because the π -model was experimentally found in [1] to be better suited to capture the nonlinear magnetic effects. E Levi have designed a simplified saturated model of induction motor that was proposed in [11].

Many techniques are performed for detection of the motor faults [12] to [29]. The previous procedure are deal with the linear model of the induction motor and deal with the online diagnostics of the motor fault detection, from the previous work we find that many factors are lead to motor faults such that bearing faults induce 40% of the motor faults , 38% are due to the stator winding , 10% are due to rotor faults and 12% other faults ,the new in this paper that the saturated model of induction motor is considered and the fault conditions are performed using simulation model in matlab simulink.

2. Induction Motor Saturated Model

The main results of the dissertation on induction motor control under magnetic saturation will be based on the π - model. The π -model for the complete motor, at zero speed, is shown in Figure (1). The two phase electrical equations for an induction machine in an arbitrary frame rotating with speed $(\omega 0)$ are given by:

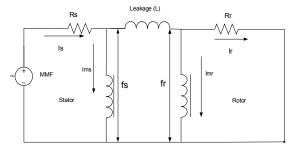


Figure (1): Induction Motor π - Model

$$V_{s} = R_{s} I_{s} + \frac{d \psi_{s}}{dt} + \omega_{0} J_{2} \psi_{s}$$

$$0 = R_{r} I_{r} + \frac{d \psi_{r}}{dt} + (\omega_{0} - \omega_{e}) J_{2} \psi_{r}$$
(1)

Where; Vs is the stator phase voltage vector, Is is the stator phase current vector, Ir is the rotor phase current vector, p is the number of pole pair s,

 ω is the rotor speed, Rs is the stator phase resistance, Rr is the rotor phase resistance, Ψ s and Ψ r are the stator and rotor flux linkage vector s respectively.

Equation (1) holds whether the induction motor magnetic circuit is considered linear or saturated and J2 is the 2×2 rotating matrix defined by;

$$J_2 = [0 - 1; 1 \ 0] \tag{2}$$

The mechanical equation can be expressed as:

$$J\frac{d\omega}{dt} + b\omega = T - T_L \tag{3}$$

Where J is the motor inertia, b is the viscous damping, T_L is the load torque and T is the generated torque. The relationship between the currents and the fluxes for the π model at d-q frame rotating with speed (ω 0) are given by:

$$\begin{bmatrix}
I_{s} \\
I_{r}
\end{bmatrix} = \begin{bmatrix}
G_{s}(\|\psi_{s}\|) \\
G_{r}(\|\psi_{s}\|)
\end{bmatrix} + \begin{bmatrix}
g_{1}I_{2} & -g_{1}I_{2} \\
-g_{1}I_{2} & g_{1}I_{2}
\end{bmatrix} \begin{bmatrix}
\psi_{s} \\
\psi_{r}
\end{bmatrix}$$
(4)

Where gl is defined as:

$$g \quad l = \frac{1}{L \quad l} \tag{5}$$

Where Gs and Gr are the stator and rotor vectorvalued nonlinear functions and defined as:

$$G_{\mathbf{X}}(\psi_{\mathbf{X}}) = G_{\mathbf{X}} \left(\begin{bmatrix} \psi_{\mathbf{X}d} \\ \psi_{\mathbf{X}q} \end{bmatrix} \right) = \begin{bmatrix} I_{\mathbf{m}\mathbf{X}d} \\ I_{\mathbf{m}\mathbf{X}q} \end{bmatrix} = I_{\mathbf{m}\mathbf{X}}$$
(6)

Where; Im and Ψm are the mutual current and flux vector, respectively, and subscript (x) can be (s) for stator and (r) for rotor. The relationship between the currents and the fluxes for the π model can be compactly written as:

$$\begin{bmatrix} I_{S} \\ I_{\Gamma} \end{bmatrix} = \begin{bmatrix} (g_{S}(\|\psi_{S}\|) + g_{I})I_{2} & -g_{I}I_{2} \\ -g_{I}I_{2} & (g_{\Gamma}(\|\psi_{S}\|) + g_{I})I_{2} \end{bmatrix} \psi_{S} \\ \psi_{\Gamma} \end{bmatrix}$$
(7)

Where; I2 is the 2×2 identity matrix, gl is defined as the reciprocal of the leakage inductance (Ll), gs and gr are the stator and rotor vector-valued nonlinear saturation functions. The scalar saturation functions gs and gr only affect the magnitude, while keeping the directions of the fluxes and currents the same. These functions are monotone increasing and are non zero at the origin. The saturation functions gs(x) and gr(x) have to be identified experimentally for each motor as shown in the next section.

Finally, the generated torque (T) and p is the poles number is given by;

$$T = P g_{i}(\psi_{s})^{T} J_{2}(\psi_{r})$$
(8)

3. Fault Detection Using Anfis

The new in this paper is the online detection of the motor fault conditions using ANFIS technique. The induction motor monitoring diagnosis techniques such that magnetic flux, vibration, stator currents, induced voltage, power and surge testing are used for detection of the motor faults.

Stator current signal are contains potential fault information and is the most suitable measurements for diagnosing the faults under consideration, in term of easy accessibility, reliability, and sensitivity. A simple construction using stator current for motor fault detection is indicated in figure1, the linguistic variables of the induction motor stator conditions are shown in figure 2.

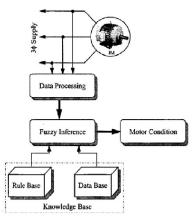


Fig 1 Block diagram of induction motor condition monitoring system

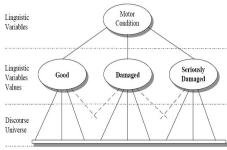


Fig2 Linguistic variables of the induction motor stator condition.

The fault condition that taken in consideration using stator current measurement in this paper will be

- 1- Line to ground fault of the motor supply voltage
- 2- Line to line fault of the motor supply voltage
- 3- One phase is lost of the motor supply voltage
- 4- Short circuit occur in the stator winding of the induction motor (Rs=0)
- 5- Short circuit occur in the rotor winding (Rr=0)

A. Neuro Fuzzy Controller

During the past three decades, fuzzy logic has been an area of heated debate and much controversy. The first implementation of Zadeh's idea was accomplished in 1975 by Mamdani, which demonstrated the viability of fuzzy logic control (FLC) for a small model steam engine. After this pioneer work, many consumer products as well as other high technical applications have been developed using fuzzy technology.

A list of industrial applications and home appliances based on FLC can be found in several recent references [30] to [36]. However, the design of a FLC relies on two important factors: the appropriate selection of knowledge acquisition techniques, and the availability of human experts.

These two factors subsequently restrict the application domains of FLC. In this paper, the application of Adaptive Neuro Fuzzy Inference Systems (ANFIS) is presented to overcome such restrictions.

An adaptive neuro -Fuzzy Inference System (ANFIS) is a cross between an Artificial Neural Network (ANN) and a fuzzy inference system (FIS). An artificial neural network is designed to simulate the characteristics of the human brain and consists of a collection of artificial neurons. An adaptive network is a multi-layer feed-forward network in which each node (neuron) performs a particular function on incoming signals. The form of the node functions may vary from node to node. In an adaptive network, there are two types of nodes, adaptive and fixed. The function and the grouping of the neurons are dependent on the overall function of the network. Based on the ability of an ANFIS to learn from training data, it is possible to create an ANFIS structure from an extremely limited mathematical representation of the system. In sequel, the ANFIS identify the architecture can near-optimal membership functions of FLC for achieving desired input-output mappings. The network applies a combination of the least squares method and the back propagation gradient descent method for training FIS membership function parameters to emulate a given training data set. The system converges when the training and checking errors are within an acceptable bound. The ANFIS system generated by the fuzzy toolbox available in MATLAB allows for the generation of a standard Sugeno style fuzzy inference system or a fuzzy inference system based on subclustering of the data. Figure 2 shows a simple twoinput ANFIS architecture. The above ANFIS architecture is based on a Sugeno fuzzy inference system. The Sugeno FIS is similar to Mamadani format except the output memberships are singleton spikes rather than a distributed fuzzy set. Using singleton output simplifies the defuzzification step.

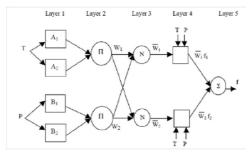


Figure (2): ANFIS Architecture for a Two-Input System

The ANFIS network shown in Figure (2) is composed of five layers. Each node in the first layer is a square (adaptive) node with a node function. The basic diagram computation in ANFIS is sown in Figure (3). This structure contains the same components as the FIS, expect for the NNblock. The structure of the network is composed of a set of units (and connections) arranged into five connected network layers, via., 11 to 15 as shown in the Figure (4).

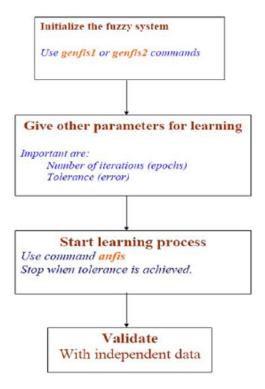


Figure (3): Basic Diagram Of ANFIS Computation

Layer 1: This layer consists of input variables (membership functions), via., input 1 & input 2. Here, triangular or bell shaped MF can be used. This layer just supplies the input values x to the next layer, where i= 1 to n.

Layer 2: This layer (membership layer) checks for the weights of each MFs. It receives the input values x from the 1st layer and act as MFs to represent the fuzzy sets of the respective input variables. Further, it computes the membership values which specify the degree to which the input value x belongs to the fuzzy set, which acts as the inputs to the next layer.

Layer 3 : This layer is called as the rule layer. Each node (each neuron) in this layer performs the pre-condition matching of the fuzzy rules, i.e., they compute the activation level of each rule,

the number of layers being equal to the number of fuzzy rules. Each node of these layers calculates the weights which are normalized.

Layer 4: This layer is called as the defuzzification layer and provides the output values y resulting from the inference of rules. Connections between the layers 13 and 14 are weighted by the fuzzy singletons that represent another set of parameters for the neuro fuzzy network.

Layer 5: This layer is called as the output layer which sums up all the inputs coming from the layer 4 and transforms the fuzzy classification results into a crisp (binary). The ANFIS structure is tuned automatically by least-square estimation as well as the back propagation algorithm. The algorithm shown above is used in the next section to develop the ANFIS technique to control the various parameters of the induction motor. Because of its flexibility, the ANFIS strategy can be used for a wide range of control applications.

B. ANFIS Design for motor fault detection conditions

The main purpose of using controller in this paper is for identification of the fault occurrence in the saturated model of induction motor. The ANFIS controller structure is shown in Figure (4). The fuzzy logic membership functions for the input and output are turned using neural network method which is well known in MATLAB program as ANFIS structure. The parameters are selected such that, optimization method is hybrid, the membership function is gbellmf, the membership function output is linear, error tolerance was chosen to be 0.01, the no of epochs are 1000, grid partitions, the inputs of the grid partitions are the number MFS are 3, MF type is gbellmf, the outputs is MF type defined to be constant. The motor parameters that used in simulation are shown in table 1.

Table 1 motor parameters

parameters	π — model	unit
R_s	8	Ω
R_r	6	Ω
$L_{\sigma s}$	N/A	H
$L_{\sigma r}$	N/A	H
L_m	N/A	H
L_I	0.062	H
J	0.06	Kgm^2
b	0.04	N_s/rad

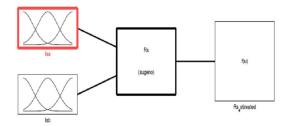


Fig 4 Fault detection controller using ANFIS

I. SIMULATION RESULTS

Using the saturated model of induction motor with the parameters in table 1 , the applied supply voltage are $:U_a$ =380 sin (2π 50 t) , U_b = 380 sin (2π 50 t - 2π/3) , U_c = 380 sin (2π 50 t + 2π/3) the simulation duration is 20 second .

The fault conditions are performed using simulation and by using the ANFIS programming, the controller will detect that there is a fault occurrence to the motor during the operation. The controller will also state which type of fault in each case.

Simulation1

Start the simulation of the motor by performing the different fault conditions stated before and plotting the effect of the faults on the measured signals of the stator currents. The result of the simulation is indicated in figures (5) to (12).

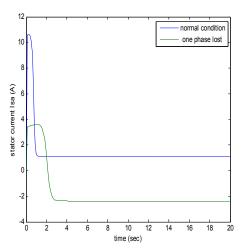


Fig 5 Stator current Isa in case of one phase is lost or line to ground fault of the motor supply

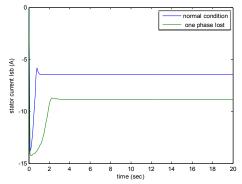


Fig 6 Stator current Isb in case of one phase is lost or line to ground fault of the motor supply

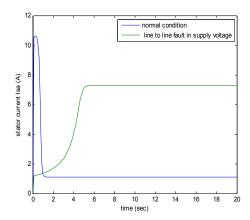


Fig 7 Stator current Isa in case of line to line fault of the motor supply

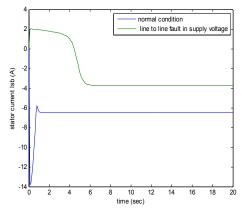


Fig 8 Stator current Isb in case of line to line fault of the motor supply

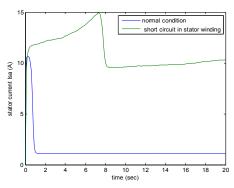


Fig 9 Stator current Isa in case short circuit in the stator windings

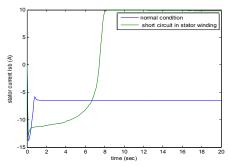


Fig 10 Stator current Isb in case short circuit in the stator windings

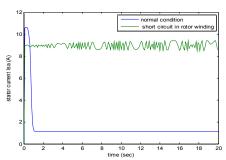


Fig 11 Stator current Isa in case short circuit in the rotor windings

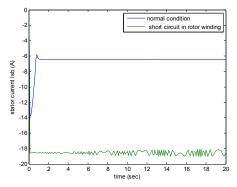


Fig 12 Stator current Isb in case short circuit in the rotor windings

Simulation 2

Using ANFIS controller to detect online the type of fault that occur to the induction motor as follows:

Item	Type of fault	ANFIS output
1	One phase loss or line to	0-0.5
	ground fault	
2	Line to line fault	1-1.5
3	Short circuit in the stator	2-2.5
	winding	
4	Short circuit in the rotor	3-3.5
	winding	

We start the simulation in normal conditions with line voltage 380V then and reducing the voltage magnitude of the supply voltage at 5 second to 220 V then at 10 second the supply voltage will be 110V then we perform a line to ground fault at 15 seconds and the result of the ANFIS controller is shown in figure (13)

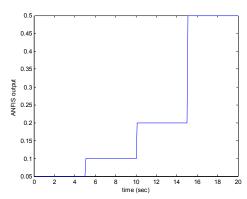


Fig 13 ANFIS output in case line to ground fault

Next we start the simulation in normal conditions with line voltage 380V then and we perform a line to line fault at 10 seconds and the result of the ANFIS controller is shown in figure (14)

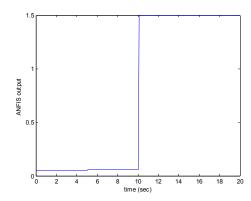


Fig 14 ANFIS output in case line to line fault

Next we start the simulation in normal conditions and the stator resistance is reduced from 8

ohm to 4 ohm at 5 seconds and to 3 ohm at 10 second then we perform a short circuit in stator winding at 15 seconds and the result of the ANFIS controller is shown in figure (15)

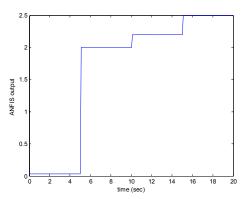


Fig 15 ANFIS output in case of stator winding short circuit

Finally we start the simulation in normal conditions and the rotor resistance is reduced from 6 ohm to 3 ohm at 5 seconds and to 2 ohm at 10 second then we perform a short circuit in rotor winding at 15 seconds and the result of the ANFIS controller is shown in figure (16)

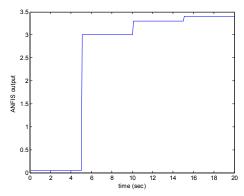


Fig 16 ANFIS output in case of rotor winding short circuit

4. Conclusion

The new in this paper is using ANFIS technique for detection of the induction motor different fault conditions. This paper is different from the previous work that we are using ANFIS controller for detection of the supply voltage faults as well as any short circuit appears in the motor windings. The percentage of the fault is appear in the ANFIS controller output so we can early detect any failure start in the motor winding for predictive maintenance

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Effect of Adding Green Tea Extract, Thyme Oil and/or their Combination to Luncheon Roll Meat during Refrigerate Storage

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Abstract: Green tea extract (GTE) and thyme oil extract (TOE) were added individually and/or in combination during the preparation of luncheon roll meat. Some chemical and sensory attributes of the prepared luncheon were investigated during storage at 4 °C for 4 months. Luncheon samples with (GTE) and (TOE) realized significant reduction towards lowering biogenic amines (BAs) formation, thiobarbituric acid reactive substances (TBARS) levels, volatile basic nitrogen (VBN) and total acidity % relative to control sample. Reduction effect was ranked as: combination of GTE and TOE > GTE > TOE. Phenolic content in green tea extract was significantly higher than in thyme oil extract. Antioxidant activities of (GTE) and (TOE) were evaluated using DPPH radical scavenging assay. Sensory evaluation was acceptable with good scores for luncheon samples. This study indicated that the addition of natural antioxidant extracts (GTE and TOE) during luncheon meat processing could enhance quality and provide safer product.

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Key words: Green tea extract-thyme oil extract-antioxidant-luncheon roll meat-chemical and sensory attributes-refrigerated storage.

1. Introduction:

The inhibition of oxidation process is very important in foodstuffs. Oxidative processes lead to the degradation of lipids and proteins and are one of the primary mechanisms of quality deterioration and limiting the shelf life in meat and meat products (Pizzalle *et al.*, 2002., Lui *et al.*, 2010).Oxidative processes also responsible for the reactive oxygen species (ROS) that cause oxidative changes in carbohydrate, DNA, lipids and protein (Koşar *et al.*, 2008).

Antioxidants can delay or inhibit the oxidation propagation of oxidizing chain reactions in the oxidation process (Zheng and Wang, 2001) and considered as important nutraceuticals because of many health benefits (Valko, 2007).

Due to concerns about toxicological safety of synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), naturally derived antioxidants are perceived as better and safer than synthetics. Meat products containing natural antioxidants, as opposed to synthetic derivatives, are more desirable from a consumer viewpoint (Mitsumoto, et al., 2005; Yen et al., 2002). Moreover; natural antioxidants are reported to be more powerful than the synthetic antioxidants, especially, rosemary, sage, and green tea extracts. Therefore, natural antioxidants are very important for human health (Bozkurt, 2006).

The interest in the antioxidant activity of plant extracts has become larger and very important due to

the fact that free radicals e.g. reactive oxygen species (ROS) can be responsible for various diseases, e.g. heart diseases, stroke, arteriosclerosis and cancer, as well as for aging process (Mothana, *et al.*, 2008).

The effects of plant extracts or essential oils classified as greatly recognized as safe (GRAS) following their addition, have been studied and reported in a variety of meat types including pork, beef and lamb (Nieto *et al.*, 2010).

Compounds from herbs and spices contain many phytochemicals which are potential sources of natural antioxidants including phenolic diterpenes, flavonoids, tannins and phenolic acids (Dawidowicz *et al.*, 2006). Various plant materials containing phenolic compounds have been demonstrated to be effective antioxidants in model systems (Lui *et al.*, 2010)

Green tea leaf extracts are becoming increasingly important as a functional food in the diet because of their high poly-phenols contents. (Manzocco *et al.*, 1998). These tea compounds promote health by preventing lipid oxidation and providing antibacterial, anti-carcinogenic and antiviral ability (Katiyar and Mukhtar, 1998; Yang *et al.*, 2000). The strong free-radical-scavenging ability plus the iron-chelating effects of tea catechins provide a plausible mechanism for the antioxidant effects of added tea catechins in meat system *in vitro* (Tang *et al.*, 2002)

Thymbra spicata (a member of Lamiaceae family) is used in meat, fish and foodstuffs as a spice.

The major essential oil components derived from *T. spicata* are carvacrol (~86%), thymol (~4%), *E*-3-caren-2-ol (~3%), *C*-terpinene (~1.9%) (Özel. *et al.*, 2003). The essential oil has antioxidant, antibacterial, and antifungal activities (Baydar *et al.*,,2004; Dorman, 2003 and Hanci *et al.*; 2003).

Biogenic amines are basic nitrogenous compounds found in a wide variety of foods such as meat and meat products (Vinci and Antonelli, 2002). The presence of biogenic amines in food constitutes a potential public health concern due to their physiological and toxicological effects. Biogenic amines can be produced during storage or processing of the products by thermal or bacterial enzymatic decarboxylation of free amino acids, or exposed to microbial contamination during processing or storage. Their production depends on the quality of raw materials and hygienic conditions during processing and storage (Önal, 2007).

Luncheon meat is an important industrial meat product, one of the most acceptable food products, widely consumed and used for fast meats. It is usually consist of finely chopped meat and fat with or without some added cereals, cured with salt and nitrite and heat processed (Ranken, 1984). Minced meat undergo oxidative changes and develop rancidity more quickly than intact muscle since grinding exposes more of the muscle surface to air and microbial contamination (Mitsumoto et al., 2005). Much attention has been focused on extracts from herbs and spices which have been used traditionally to improve the sensory characteristics and extend the shelf-life of foods (Botsoglou et al., 2003). Refrigeration storage is usually the most common preservative method of meat and meat products. In order to extend refrigerated storage time, antimicrobial and antioxidant additives are added to muscle foods (Solomakos et al., 2008). So, the use of natural antioxidants to produce luncheon roll meat of high quality and safety is important.

The present study aimed to: i) evaluate the total phenolic compounds, total antioxidant activity of green tea and thyme leaves.; ii) investigate the effect of using green tea extract and thyme oil extract, applied individually and/or in combination, on biogenic amines, thiobarbituric acid reactive substances (TBARS), volatile basic nitrogen (VBN) and total acidity % as well as sensory attributes of luncheon roll meat during refrigerated storage at 4 °C for 4 months.

2. Materials and Methods: Chemicals:

Antioxidant standards of gallic acid (GA), butylated hydroxyanisole (BHA), 1- naphthaleneacetic acid (NAA), 6-benzyladenine (BA),1,1,3,3-

tetraethoxypropane (TEP), 2-thiobarbituric acid, histamine dihydrochloride, putrescine, tyramine hydrochloride and tryptamine hydrochloride, sodium carbonate and methanol were obtained from Sigma Chemical Co (St. Louis, MO). Dimethyl sulphoxide (DMSO) was purchased from Merck Co (Darmstadt. Germany). Other chemicals used were of analytical grade and obtained from Sigma Chemical Co (St. Louis, MO).

Materials:

Frozen beef meat and back fat were obtained from a local slaughter house. The ingredients used in preparation of the luncheon roll meat were purchased from national food ingredients market. Dried green tea (*Camellia sinensis L.*) leaves and thyme (*Thymbra spicata*, a member of *Lamiaceae* family) leaves were obtained from local market, then powdered and kept in tightly closed amber glass containers.

Preparation of plant extracts:

The green tea extract and thyme oil extract were prepared according to the methods described (Bozkurt, 2006) with a slight modification:

Green tea extract:

About 20 g of air dried and ground green tea leaves were mixed with 500 ml of boiling water and left for 5 min. The extract was obtained by filtration and the soluble solid content of green tea extract was measured using a refractometer (ATAGO, N1E, Japan).

Thyme oil extract:

The separation of essential oil from the air dried thyme leaves was conducted by steam distillation in a Clavenger apparatus for 3 h. The essential oil was dried over anhydrous sodium sulfate and stored in a dark glass bottle until using in formulation of luncheon roll meat.

Luncheon rolls meat preparation:

The luncheon roll meat batter was prepared according to the following formula: 75% minced lean beef meat, 25% back beef fat, 2.5% salt, 4% soy bean, 1% spices, 1% ground garlic, 2% onion, 4% potato starch, 0.15% Na HP₂ O₇, 0.2% STPP, 0.1% sodium nitrite, 0.02% soy protein isolate and 20% ice. The procedure used in preparation of luncheon roll was carried out according to the protocol described by Zhanc *et al.* (2004) with some modifications in a local Egyptian factory pilot plant. Processing of the batter involved blending the frozen minced meat and fat with the other ingredients. The prepared luncheon meat batter was divided into four parts then green tea extract and thyme oil extract

were added: i) Luncheon roll meat sample (1) prepared as control sample without adding any natural extract; ii) Sample (2) was prepared by adding 300ppm green tea extract; iii) Sample (3) was prepared by adding 300ppm of thyme oil extract and iv) Sample (4) was prepared by adding 150ppm green tea extract plus 150ppm of thyme oil extract. Each batter was mixed well to be homogenous and stuffed into round bottom tubes 5-cm diameter and 15-cm long, fibrous casings (about 500g each) and sealed with plastic cable-ties (Maplin electronics, Dublen, Ireland). Luncheon roll meat samples(1-4) were cooked in a thermo statically controlled KERRES smoke-air steam oven (Type CS 350,Raicher-und-Kochanlagen, D-71560 Sulzbach-Murr, Germany) set at 80°C until the internal temperature reached ~ 67 to 69 °C, then held under refrigeration (~1-4°C) for 10 h. After processing, the luncheon roll meat samples were stored for 4 months at 4°C. The analyses were performed on luncheon samples at different periods of storage.

Chemical analyses:

Total phenolic compounds content:

Total phenolic compounds were estimated according to the method described by Meda et al. (2005). A known quantity of green tea or thyme leaves was taken in 100 ml conical flask and 25 ml 0.3 N HCl in methanol was added, and then kept on a shaker at 150rpm for an hour. After shaking, crude extract was filtered through filter paper (Whatman No.1). The filtrate obtained was evaporated to dryness in a boiling water bath. Hot water was added to the residue and final volume was adjusted to 100 ml with distilled water, then 1 ml aliquot was taken in a test tube and 1 ml each of Folin-Ciocalteu reagent (dilute 1:2) and 35% sodium carbonate were added and mixed well. After 10 min, 2 ml of distilled water was added and intensity of the color was recorded at 620nm in the UV spectrophotometer (model T80 x UVNIS Spectrometer PG Instruments Ltd) against the reagent blank. The content of total phenolic compounds was determined using a standard curve prepared with gallic acid.

Total antioxidant activities:

Fine ground powder (150mg) of green tea leaves or thyme leaves was taken in 250 ml conical flasks and 50 ml water was added then kept on a shaker at 150rpm for an hour. The flask contents were filtered using filter paper (Whatman No.1). Similarly, methanol extracts were also prepared. The filtrate was used directly for 1.1-dipheny-2-picrythydrazyl (DPPH) assay without storage.

DPPH radical scavenging activity:

The method was adopted as described Sharma and Bhat, (2009). Methanolic and water extracts of green tea leaves and thyme leaves were evaluated in terms of their hydrogen donating or radical scavenging ability using DPPH radical. For assay, 200ul filtrate was taken in test tubes and volume made up to 1 ml with methanol. Three milliliters of the freshly prepared solution of DPPH (200 mM) in methanol was added to the sample tube and mixed vigorously for 15s. The sample tube was then kept in a water bath at 37°C for 20 min. The absorbance of the sample was measured at 517nm using the UV Spectrophotometer (model T80 **UVNIS** X Spectrometer PG Instruments Ltd). Gallic acid and BHA were used as standard references. DPPH radical scavenging effect was calculated as "inhibition of percentage" according to the following formula:

Inhibition of percentage (%)=[$A_{c\ (0)}$ - $A_{a\ (t)}$ / $A_{c\ (0)}$]x100 Where: $A_{c\ (0)}$ is an absorbance of control DPPH solution at 0 min, and $A_{a\ (t)}$ is absorbance of test sample after 20 min.

Total acidity:

The total acidity was obtained by direct titration with (0.1M) NaOH and phenol- phthalein as indicator (Egan *et al.*; 1987).Ten grams of each sample were magnetically stirred in a total volume of 100 ml distilled water for 30 min, and filtered. 10 ml filtrate was titrated with (0.1M) NaOH using three drops of phenolphthalein as indicator. The total acidity was calculated as 1.0 ml of (0.1M) NaOH = 0.0090 g lactic acid.

Total volatile basic nitrogen (VBN):

A sample (10 g) was minced with 100 ml distilled water and washed into a distillation flask with 100 ml distilled water; then 2g of magnesium oxide and an antifoaming agent were added. The mixture was distilled using the micro Kjeldahl distillation apparatus. Distillate was collected for 25 min into 25 ml 4% boric acid and five drops of Tashero indicator. The solution was titrated using (0.1 M) HCl to calculate the total volatile basic nitrogen in the sample in terms of mg VBN/100g luncheon meat as described Pearson (1976).

Thiobarbituric acid reactive substances (TBARS):

The TBARS values were determined spectrophotometrically according to the method described by Byun *et al.* (2001). Homogenized luncheon samples (2g) were taken and TBARS were extracted twice with 10 ml of 0.4 M perchloric acid. Extracts were collected and made up to 25 ml with 0.4 M perchloric acid and then centrifuged for 5 min at 1790g. After centrifugation, 1ml of the extract was poured into a glass test-tube with a stopper. TBARS

reagent (5ml) was added and the extract was heated in a boiling water bath for 35 min. After cooling in tap-water, the absorbance of the sample was read against the appropriate blank at 538 nm. A standard curve was prepared using 1, 1, 3, 3-tetraethoxypropane (TEP).

Biogenic amines:

Histamine, tyramine, putrescine tryptamine were extracted as follows: five grams of the sample were blended with 25 ml 5% trichloroacetic acid. Filtration was achieved using filter paper whatman No.1. Five ml of the extract were transferred into a suitable culture tube with 4 g NaCl and 1ml of 50% NaOH then shacked for 2 min. Centrifugation were carried out for 5 min at 5000xg and the upper layer was transferred to 50 ml separating funnel. To the upper layer extract, 15 ml of *n*-heptane were added and extracted 3 times with 1ml portions of 0.2 N HCl. The extracts were collected in a glass stoppard tube and evaporated to dryness using water bath at 95°C with the aid of a gentle current of air. This was followed by the formation of Dansylamines as described by (Mijalla and Eerola, 1993).

Biogenic amines concentrations were determined Deabes, (2000) using HPLC. The HPLC system (Waters 600) equipped with delivery system. HPLC column: Reverse phase C18 Nucleosil column 250x4 mm, 10 μm packing, (Macherey-Naggl). The detection was performed using U.V detector (waters 486) at 254 nm wavelength, using linear program of 25 min period and 1 ml/min constant solvent flow rate. Data were integrated and recorded using a Millennium Chromatography; Manger software 2010, (Waters, Milford MA 01757).

Sensory evaluation:

The sensorial criteria (taste, flavor, texture and color) of the four luncheon samples under investigation were evaluated by twenty five untrained panelists. Luncheon samples were cut into 2mm thick slices and served in numerically-coded glass petri dishes. Each panelist received four coded samples

(one from each tested samples) then independently evaluated the luncheon meat for texture, flavor, color and taste using a 5-point hedonic scale (1= extremely poor, 2 = poor, 3= acceptable, 4= good, 5= excellent), according to the described method Lavrova and Krilov, (1975).

Statistical analysis:

The conventional statistical methods were used to calculate means and standard deviations. All the measurements were replicated three times and the data are presented as mean \pm SD. The effects of natural antioxidant extracts addition and storage period were analyzed and the obtained data were subjected to analysis of variance (ANOVA) according to PC-STAT, Version I A Copyright 1985, the University of Georgia (PC-STAT, 1985).

3. Results and Discussion Total phenolic compounds:

Total phenolic compounds contents of green tea and thyme leaves are recorded in Table1. The total phenolic compounds content (on dry weight basis) in green tea leaves (34.32mg/g) was significantly higher (p< 0.05) than the corresponding in thyme leaves (24.30 mg/g). Green tea leaf extracts had high polyphenols content (Manzocco et al., 1998). It has been mentioned Wanasundara and Shahidi, (1998) that polyphenols content in green tea can increase up to 36% (dry basis) due to climate, season or variety. Catechins is a predominant group of polyphenols present in green tea leaves composed of four compounds epicatechin, epicatechin gallate, epigallocatechin, and epigallocatechin gallate (Zhong et al., 2009). The phenolic monoterpenes in thyme, thymol and carvacrol, are the primary compounds that contribute to the characteristic aroma of its essential oil and also known to inhibit lipid peroxidation (Yanishlleva et al., 2006). Phenolic compounds are very important plant constituents because of their scavenging ability due to the presence of their hydroxyl groups (Oktay et al., 2003).

Table (1): Total phenolic compounds content of green tea and thyme leaves

Total phenolic content of green tea and thym	e leaves (mg/g dry weight basis) (Mean ±SD)			
Green tea leaves	Thyme leaves			
34.32 ± 0.59^{a}	24.30±0.37 ^b			

All values are mean of triplicate determinations \pm standard deviation (SD) Means within row with different letters are significantly different (P<0.05)

Antioxidant activity:

The antioxidant activity of water and methanolic extracts of green tea and thyme leaves equivalent to gallic acid (GA) and butylated hydroxyanisole (BHA) were determined. The results in (Table 2) demonstrated the absorption at 593nm against (GA) and (BHA) as standards in water and methanolic extracts of green tea and thyme leaves. Gallic acid was found to be the strongest antioxidant in both water and methanolic extracts, whereas BHA proved to be a weak antioxidant. Methanolic extract of green tea showed significant (p<0.05) high antioxidant activity equivalent to gallic acid (11.55mg) and to BHA (34.71mg). Meanwhile, water extracts of green tea and thyme leaves did not show significant difference in antioxidant activity when expressed in terms of BHA and were significantly (p<0.05) of high activity compared to the methanolic

extracts of green tea and thyme. On expressing the antioxidant activity in terms of gallic acid as a standard the methanolic extracts of green tea and thyme leaves showed slightly higher values; whereas on expressing in terms of BHA the methanolic leaves extract showed higher value compared to the water extract. It was reported that green tea leaves (Camellia sinensis L.) contain 10-30% (dry leaf weight) of polyphenols, including catechins, flavonols, flavanones, phenolic acids, glycosides and the aglycones of plant pigments (Farhoosh et al., 2007). The author added that tea polyphenols have a stronger anti-oxidative activity than butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT) and DL-α-tocopherol; and the toxicity of tea polyphenols is lower than that of BHA, BHT and DLα-tocopherol.

Table (2): Antioxidant activity and inhibition DPPH radical of green tea and thyme leaves

Antioxidant activity of water and methanolic extracts of green tea and thyme leaves equivalent to (GA)*and (BHA)** (Mean±SD)

Antioxidant activity(mg equivalent/g on dry weight basis)										
Green tea leaves extract Thyme leaves extract										
Item	water	Methanolic	water	Methanolic						
GA	9.69 ± 0.16^{b2}	11.55 ± 0.16^{b1}	8.62 ± 0.11^{b3}	9.76 ± 0.05^{b2}						
BHA	19.74 ± 012^{a2}	34.71 ± 0.16^{a1}	18.75 ± 0.13^{a3}	17.90 ± 0.09^{a4}						
The inhibition	(%) of DPPH radic		acts of green tea and	thyme leaves						
Inhibition %	35.58 ± 0.20^{63}	31.78 ± 15^{64}	53.39 ± 0.33^{b2}	54.37 ± 0.30^{b1}						
IC ₅₀ μg of sample	622.15 ± 5.18^{a2}	682.82 ± 1.06^{a1}	462.09 ± 0.79^{a3}	452.21 ± 1.67^{a4}						

Sample 1= control without any extract, Sample 2=with green tea extract, Sample 3=with thyme oil extract, Sample 4= with combination of green tea extract + thyme oil extract.

All values are mean of triplicate determinations \pm standard deviation (SD).

IC₅₀: Concentration required for 50 % inhibition

Means within column and row with different letters and numbers are significantly different (P<0.05)

DPPH radical scavenging assay:

DPPH radicals are widely used to investigate scavenging activities of several natural compounds. The effect of antioxidant on DPPH radical scavenging was thought to be due to their hydrogen donating ability or radical scavenging activity. When DPPH radical is scavenged, the color of the reaction mixture changed from purple to vellow with decreasing of absorbance at wave length 517nm. The inhibition % of DPPH radical with different extracts of green tea and thyme leaves are recorded in Table 2. Water extracts of green tea and thyme leaves inhibitions % were 35.58 and 53.39 %; whereas they reached 31.78 and 54.37%s for methanolic extract respectively. Also, the results in the same Table indicated that IC50 was found to be 622.15 and 462.09µg for green tea and thyme samples for water extract and 682.82 and 452.21µg for methanolic extracts, respectively. Water and methanolic extracts of thyme were of higher inhibition percent than DPPH radical compared to water and methanolic extract of green tea leaves. Tea extracts are powerful antioxidants, mainly owing to the presence of catechin compounds which are effective free radical-scavengers (Salah et *al.*, 1995). Also the anti-oxidative effect of thyme ethanol extract is associated with the high content of carvacrol and thymol (Nguyen *et al.*, 2000).

The present work was continued to evaluate the effects of adding green tea and thyme extracts on some chemical characters: Thiobarbituric acid reactive substances (TBARS), Biogenic Amines (BAs), volatile basic nitrogen (VBN) and total acidity of the prepared luncheon meat samples during refrigerated storage at 4°C in order to shed more light on their safety and quality.

^{*}GA= Gallic acid. **BHA= butylated hydroxyl anisole

Thiobarbituric acid reactive substances (TBARS):

TBARS values were affected significantly (p< 0.05) by the storage time and addition of green tea extract, thyme oil extract and their combination to luncheon rolls meat (Table 3). TBARS values of the luncheon meat samples (1-4) showed no differences between all prepared samples with 0.197 mg malonaldehyde/kg luncheon meat at zero time. These values increased for all the investigated samples gradually during storage period. Addition of the natural antioxidant extracts (green tea and thyme extracts) reduced TBARS values of luncheon meat samples compared to control sample. For instance, the highest TBARS values at the end of storage were found in control sample; while the lowest were noticed in sample 4 (containing combination of green tea plus thyme oil extracts). Thus, the best antioxidative effect was obtained by the combination of green tea and thyme oil extracts, as noticed in

sample 4 containing the combination of both extracts which had significant lower TBARS concentrations than those containing the individual extracts. Green tea extract decreased the formation of TBARS and added tea catechins significantly reduced the TBARS values of beef, duck, ostrich, pork and chicken during 10 days refrigerated storage as reported (Bozkurt, 2006., Tang et al., 2001 and Choi et al., 2003). The phenolic mono-terpenes in thyme, thymol and carvacrol are known to inhibit lipid per-oxidation, pcumene-2, 3-diol isolated from thyme was reported as a strong antioxidant (Yanishlleva et al., 2006). So, green tea extract and thyme oil extract containing high level of total phenolic compounds content can contribute in retardation of lipid per-oxidation and hence for gaining low TBARS concentration during luncheon roll meat processing.

Table (3): Thiobarbituric acid (TBARS) values (mg malonaldehyde/kg) of the luncheon rolls meat samples during storage at 4°

Thiobarbituric acid values (mg / kg) of Luncheon meat samples (Mean \pm SD)												
Storage period *Sample 1 *Sample 2 *Sample 3 *Sample 4 (month)												
0	0.197 ± 0.003^{e}	0.197 ± 0.003^{e}	0.197 ± 0.003^{e}	0.197 ± 0.003^{e}								
1	0.272 ± 0.004^{d1}	0.231 ± 0.004^{d2}	0.238 ± 0.004^{d2}	0.216 ± 0.004^{d3}								
2	0.389 ± 0.004^{c1}	0.286 ± 0.004^{c3}	0.295 ± 0.004^{c2}	0.242 ± 0.003^{c4}								
3	0.459 ± 0.006^{b1}	0.314 ± 0.005^{b2}	0.322 ± 0.004^{b2}	0.284 ± 0.004^{b3}								
4	0.508 ± 0.008^{a1}	0.370 ± 0.002^{a2}	0.378 ± 0.003^{a2}	0.313 ± 0.005^{a3}								

^{*}Sample 1= control without any extract, Sample 2=with green tea extract, Sample 3=with thyme oil extract, Sample 4= with combination of green tea extract + thyme oil extract.

All values are mean of triplicate determinations \pm standard deviation (SD).

Means within column and row with different letters and numbers are significantly different (P<0.05)

Biogenic amines (BAs):

The effect of adding green tea and thyme oil extracts and their combination to the prepared luncheon meat samples stored for four months at 4°C on formation of biogenic amines is presented in Table 4. Tyramine, histamine, putrescine and tryptamine were not detected in luncheon meat samples at zero time of storage period. It was generally observed that storage time and addition of natural antioxidant extracts caused a significant effect (p<0.05) on the formation of all the estimated biogenic amines.

Tyramine concentration increased gradually in all luncheon meat samples during storage period. Tyramine concentration in red meat and in sausages increased during 36 days and during 7 days storage period, respectively (Vinci and Antonelli, 2002 and Eerola *et al.*, 1997). Sharp increase was observed in tyramine concentrations of control sample and

reached 220 mg/kg at the end of storage time. This concentration was found in the safe range and within the permitted level. The permitted level of tyramine in foods is 100-800 mg/kg; while 1080 mg/kg is toxic (Shalaby, 1996). The tyramine contents in the studied luncheon meat samples containing green tea extract, thyme oil extract and their combination were found to be less than that of control. During the storage period the highest tyramine level was observed in control sample (1) and the lowest tyramine formation was in sample 4 (containing combination of green tea extract plus thyme oil extract). Thus, addition of this natural antioxidant extracts decreased tyramine formation in the investigated luncheon meat samples in the following order: green tea extract + thyme oil extract > green tea extract > thyme oil extract. The reduction in tyramine formation by natural antioxidant extracts is important with respect to

human health because tyramine causes migraine headaches, increased blood pressure and an increase in noradrenalin as it has been previously reported (Ruiz-Capillas and Jimenez-Colmenero, 2004).

Histamine concentrations increased significantly during storage period in all the investigated luncheon samples (Table 4). It was observed that histamine level was the highest in control sample 1; whereas its level varied from 21mg/kg at 1st month to 243 mg/kg at the end of storage period at 4°C. Significant decrease in histamine levels was noticed in luncheon meat samples (2-4) compared to the control. The order of decline in histamine level can be arranged as follows: green tea extract + thyme oil extract > green tea extract > thyme oil extract.

Mixing of the tested plant antioxidant extracts to the luncheon meat samples stored at 4°C affected significantly (p<0.05) putrescine formation (Table 4). Its concentration was noticed to increase gradually during the refrigerated storage period. At the end of storage period, the highest putrescine concentration was observed in control sample, while the lowest was for sample 4 containing combined green tea and thyme oil extracts. Apparently, this reduction in putrescine level could be due to the antimicrobial activities of the natural extracts. Ranking in decreasing order of the effectiveness of the used extracts on putrescine concentration in the luncheon samples was: combination of green tea and thyme oil extracts > green tea extract >thyme oil extract. The decrease in putresine formation can also, achieved by reduction of total aerobic viable count. Antimicrobial activity of green tea extract and T. spicata has been previously reported (Baydar et al., 2004.; Higdon and Frei, 2003.; Manzocco et al., 1998 and Tang.; et al., 2001).

Spices (including thyme), in general, are well known for their antimicrobial ability mainly due to their content of phenolic compounds. The possible mechanisms for antimicrobial effect of phenolic compounds include altering microbial permeability; interfering with membrane function including electron transport, nutrient uptake, protein and nucleic acid synthesis, and enzyme activity; interacting with membrane proteins causing deformation in structure and functionality; and substituting alkyls into phenol nucleus (Zhang et al., 2010).

Reduction of tyrptamine in luncheon samples (2-4) containing the natural extracts under investigation relative to control sample (Table 4) was about 10.27% for sample 2 (containing green tea extract), 6.10% for sample 3 (mixed with thyme oil extract) and 22.91% for sample 4 (mixed with combination of green tea and thyme oil extracts) at

the end of storage time. Storage time had a significant effect (p<0.05) on tryptamine formation, its concentrations in the tested samples increased significantly during storage period and reached at the end of 4th month to 10.60, 22.02, 29.01and 37.01mg/kg in the three luncheon samples(2-4), respectively. So, combination of green tea and thyme oil extracts realized the lowest tryptamine contents over storage time in the studied luncheon roll meat samples.

Therefore, it can be stated that the addition of natural plant extracts (green tea, thyme oil and their combination) realized significant reduction and showed marked effect towards histamine, tyramine, putrescine and tryptamine formation in the refrigerated stored luncheon roll meat samples.

Volatile basic nitrogen (VBN):

Effects of addition green tea and thyme oil extracts individually or combined to the studied luncheon roll meat on the volatile basic nitrogen % were determined and compared (Table 5). At zero time of the refrigerated storage period, the VBN of luncheon meat samples showed no significant differences between the control sample and the studied samples (2-4) containing green tea extract, thyme oil extract and their combination. During refrigeration at 4°C and storage for 4 months of the luncheon meat samples the VBN % tended to increase gradually. The control sample had higher VBN % than samples 2, 3 and 4. The luncheon sample 4 mixed with combination of the two extracts was significantly of lower VBN% than sample 2 (with green tea extract) or sample 3 (with thyme oil extract). Addition of green tea or thyme oil extracts either individual or combined caused decrease in VBN% and thus improvement of the luncheon meat characters can occur. In pork sausages, green tea powder could partly substitute nitrite, and resulted in lower TBARS value and decreased volatile basic nitrogen contents compared to samples prepared with nitrite alone (Choi et al., 2003).

Total acidity:

Total acidity (% lactic acid) of all the tested luncheon meat samples stored for 4 months and refrigerated at 4°C were of the same acidity % at zero time of storage (Table5). Total acidity percentage was observed to increase throughout the storage period. The initial amount of total acidity in luncheon increased with increasing storage time was reported (Al Bachir, 2005). Higher acidity of meat may be a positive indicator of storability due to the inhibition of microbial growth by acid and can improve the storability of the luncheon meat treated with natural extracts (AL-Bachir and Mehio, 2001).

All

Table (4): Changes of Biogenic amine concentrations of the luncheon roll meat sample during storage at 4°C.

Biogenic amine concentrations (mg / kg) of luncheon meat samples (Mean ± SD)

Storage period (month) *Sample 1 0		Tyramine	Histamine	Putrescine	Tryptamine
		ND	ND	ND	ND
•	1	25.01 ± 0.110^{d}	21.00 ± 0.261^{d}	42.00 ± 0.264^{d}	20.03 ± 0.101^{d}
	2	41.08 ± 0.149^{c}	83.05 ± 0.474^{c}	79.09 ± 0.159^{c}	32.02 ± 0.371^{c}
	3	98.00 ± 0.198^{b}	135.07 ± 0.203^{b}	122.00 ± 0.238^{b}	39.02 ± 0.263^{b}
	4	220.01 ± 0.265^{a}	243.04 ± 0.043^{a}	162.00 ± 0.140^{a}	48.01 ± 0.259^{a}
Sample 2	0	ND	ND	ND	ND
1	1	19.12 ± 0.093^{d}	17.07 ± 0.218^{d}	30.08 ± 0.150^{d}	16.13 ± 0.080^{d}
	2	28.00 ± 0.049^{c}	55.08±0.281°	49.03±0.161°	24.01 ± 0.362^{c}
	3	41.08 ± 0.162^{b}	79.01 ± 0.263^{b}	75.07 ± 0.165^{b}	33.01 ± 0.165^{b}
	4	69.02 ± 0.237^{a}	86.09 ± 0.083^a	89.01 ± 0.207^{a}	43.08 ± 0.216^{a}
Sample 3	0	ND	ND	ND	ND
1	1	22.08 ± 0.167^{d}	19.08 ± 0.158^{d}	33.00 ± 0.173^{d}	18.02 ± 0.170^{d}
	2	34.01 ± 0.274^{c}	59.09±0.153°	55.00 ± 0.133^{c}	26.01 ± 0.278^{b}
	3	43.03 ± 0.223^{b}	82.00 ± 0.104^{b}	78.06 ± 0.193^{b}	36.01 ± 0.424^{c}
	4	73.013 ± 0.263^{a}	93.01 ± 0.133^{a}	92.01 ± 0.180^{a}	45.08 ± 0.168^{a}
Sample 4	0	ND	ND	ND	ND
1	1	13.03 ± 0.274^{d}	15.03 ± 0.191^{d}	20.02 ± 0.184^{d}	10.60 ± 0.122^{d}
	2	21.01±0.263°	51.06±0.195°	41.01 ± 0.274^{c}	22.02 ± 0.090^{c}
	3	35.02 ± 0.250^{b}	73.34 ± 0.4239^{b}	63.02 ± 0.108^{b}	29.01 ± 0.261^{b}
	4	49.01 ± 0.372^{a}	79.08 ± 0.070^{a}	79.02 ± 0.238^{a}	37.01 ± 0.358^a

^{*}Sample 1= control without any extract, Sample 2=with green tea extract,

Table (5): Volatile basic nitrogen (%) and total acidity (% lactic acid) of the luncheon rolls meat samples during storage at 4 °C

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Volatile basic nitrogen (%) of Luncheon meat samples								
Storage period (month)	*Sample 1	(Mean ± SD) *Sample2	*Sample 3	*Sample 4				
0	0.037 ± 0.002^{e}	0.037 ± 0.002^{e}	0.037 ± 0.002^{e}	0.037 ± 0.002^{e}				
1	0.043 ± 0.003^d	0.041 ± 0.001^d	0.043 ± 0.0001^d	0.040 ± 0.0006^d				
2	0.049 ± 0.003^{c}	0.046 ± 0.002^{c}	0.047 ± 0.002^{c}	0.045 ± 0.002^{c}				
3	$0.057 \pm 0.003b^{1}$	$0.053\pm0.003^{b2,3}$	$0.054\pm0.003^{b1,2}$	0.049 ± 0.0006^{b3}				
4	$0.064 \pm 0.002a^{1}$	$0.060\pm0.001^{a2,3}$	$0.063\pm0.002^{a1,2}$	0.059 ± 0.002^{a3}				
	Total acidity (%	lactic acid) of Lunch	eon meat samples					
0	0.36 ± 0.015^{e}	0.36 ± 0.015^{e}	0.36 ± 0.015^{e}	0.36 ± 0.015^{e}				
1	0.42 ± 0.025^d	0.39 ± 0.010^{d}	0.40 ± 0.010^{d}	0.39 ± 0.006^d				
2	0.49 ± 0.019^{c1}	0.43 ± 0.015^{c2}	0.44 ± 0.019^{c2}	0.42 ± 0.009^{c2}				
3	0.54 ± 0.015^{b}	0.51 ± 0.019^{b}	0.52 ± 0.031^{c}	0.49 ± 0.019^{c}				
4	0.59 ± 0.020^{a1}	$0.57\pm0.015^{a1,2}$	0.58 ± 0.099^{a1}	0.54 ± 0.010^{a2}				

^{*}Sample 1= control without any extract, Sample 2=with green tea extract,

Sample 3=with thyme oil extract, Sample 4= with combination of green tea extract + thyme oil extract. values determinations \pm standard deviation (SD) are mean of triplicate. ND = not detected. Means within column with different letters are significantly different (P<0.05).

Sample 3=with thyme oil extract, Sample 4= with combination of green tea extract + thyme oil extract. All values determinations \pm standard deviation (SD) are mean of triplicate. ND = not detected. Means within column and row with different letters and numbers are significantly different (P<0.05).

Sensory Evaluation:

The sensorial criteria (texture, flavor, color and taste) of the tested luncheon meat samples were evaluated at the end of storage and presented in Table 6. The results of sensory tasting showed that the taste was acceptable with good score for all treated luncheon meat samples. The order of taste scores of the tested samples was found as: combination of green tea extract and Thyme oil extract > green tea extract> thyme oil extract > control sample. With regard to texture, sample 4 (mixed with combination of green tea extract and thyme oil extract) was found to be of highest texture score; while sample 3

containing thyme oil extract was of lowest score. Flavor score was found to be the highest in luncheon sample 3 compared to other studied luncheon samples; while control sample was of worst score. The phenolic monoterpenes in thyme, thymol and carvacrol, are the primary compounds that contribute to the characteristic aroma of its essential oil (Yanishlieva *et al.*; 2006). The highest color score was for sample 4, followed by sample 2, meanwhile the control sample 1 showed a relative low score. However, all the investigated samples (including the control) realized good color scores.

Table (6): Sensory evaluation of the luncheon roll meat samples during storage at 4° C (Mean \pm SD).

Luncheon meat samples	Texture	Flavor	Color	Taste
Sample 1	3.72 ± 0.010^{c}	3.69 ± 0.009^{d}	4.06 ± 0.010^{d}	3.81 ± 0.009^{d}
*Sample 2	3.87 ± 0.010^{b}	3.93 ± 0.010^{c}	4.29 ± 0.009^{b}	3.97 ± 0.009^{b}
*Sample 3	3.65 ± 0.009^{d}	4.18 ± 0.009^{a}	4.18 ± 0.009^{c}	3.90 ± 0.00^{c}
*Sample 4	3.94 ± 0.010^{a}	4.02 ± 0.001^{b}	4.40 ± 0.010^{a}	4.06 ± 0.010^{a}

^{*}Sample 1= control without any extract, Sample 2=with green tea extract, Sample 3=with thyme oil extract, Sample 4= with combination of green tea extract + thyme oil extract.

Means within column with different letters are significantly different (P<0.05).

Conclusion:

The obtained results indicated that green tea and thyme leaves extracts contained high level of total phenolic compounds content. The addition of green tea extract, thyme oil extract either individually or combination (as natural antioxidant extracts) to luncheon roll meat was found to be effective towards reducing BAs formation, TBARS levels, VBN% and acidity %; hence improvement of the stored and refrigerated luncheon meat samples characters can occur. The best anti-oxidative effect was obtained by the combination of green tea and thyme oil extracts. Also, the sensorial criteria of the prepared luncheon roll samples gained acceptable and good scores. Thus, the use of natural antioxidants is important to preserve the quality of meat products and prevent their oxidative deterioration in order to produce luncheon roll meat of high quality and safety.

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Onshore and Offshore Pile Installation in Dense Soils

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Abstract: Open-ended pipe piles are often used for the foundations of both on-land and offshore structures because of their relatively low driving resistance. Piles are usually subjected to the highest level of stresses during installation. Three case histories for overwater bridge pile damage during installation are presented in detail. Also, several case studies for onshore and offshore piles installed in dense soils are compiled and analyzed in an attempt to improve the available guidelines. Based on field data analyses for many case studies of piles installed in dense soils, a limitation for pile diameter to thickness ratio adjusted for driving energy is proposed. A maximum driving stress at the pile head and toe of about 50% of the steel yield stress should be considered for piles installed into very dense soils. Also, general guidelines and recommendations from a design and construction prospective are provided. [Yasser E. Mostafa. Onshore and Offshore Pile Installation in Dense Soils. Journal of American Science 2011; 7(7):549-563]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: pile driving; dense soils; pile damage; pile installation

NOTATION

A_s	Cross sectional area
d	Pile outside diameter

F_{hc} Critical hoop buckling stresses

F_y Yield Stress

L Pile penetration length t Pile wall thickness

CSX Maximum compressive stress at sensors CSB Maximum compressive stress at pile toe

En Energy

EMX Maximum transferred energy at sensors

ETR Energy transfer ratio

1. Introduction:

Bridges, offshore platforms, marine structures and different structures are sometimes installed in dense sands. With high demands on piles, high axial and lateral pile capacities are required, which results in the need to penetrate deeper in denser soils. In general, geotechnical pile capacity calculations are based on soil properties, pile diameter and length. Preliminary design and analysis conducted by many practitioners does not usually take into consideration the potential problems encountered during pile installation through strata that may contain cobbles and boulders. Initial attempts of pile installation in these soils have been frequently unsuccessful. Consequently, construction delays and costs increase substantially.

Although general guidance on pile driving is provided in the literature but insufficient information is available for pile installation in very dense soils.

This paper presents three case histories for pile damage during driving into very dense soils with some cobbles and/or boulders. Pile Dynamic Analyzer (PDA) tests and Case Pile Wave Analysis Program (CAPWAP) analyses were conducted to confirm pile capacities, evaluate the driving system and to determine the location of pile damage if any.

Observations and data analyses from the three presented case histories and from several other projects at different onshore and offshore sites comprising dense soils are compared to published guidelines and literature. Based on the data analyses, a limitation for pile diameter to thickness ratio adjusted for driving energy is proposed. Also, a limit for maximum driving stress at the pile head and toe is proposed.

2. Background Information

General reasons of pile damage during driving include the use of inappropriate hammer, insufficient cushion, tight pile cap, misalignment between pile and driving system, difficult driving conditions, obstructions in the ground, uneven contact between hammer and pile head and concentrated soil resistance (Hussein and Goble, 2000).

Wave equation analysis is very important for the preparation of pile driving, selection of hammer,

cushion and determination of bearing capacity and driving set criteria. Dynamic measurements using Pile Driving Analyzer (PDA) is preferred to evaluate the performance of hammer-cushion-pile-soil system during driving. PDA testing has been well accepted worldwide for onshore industry projects. Dynamic testing has been also used in the oil and gas industry for offshore piles and has been reported in some publications (Harnar and Likins, 1996, Webster et al., 2008 and Rusche et al., 2009).

From a design prospective, main factors should be considered to reduce the risks of steel pipe pile damage during driving. These factors are mainly: hammer type and energy, pile diameter (d), pile thickness (t) and pile yield stress.

A brief review of available guidelines in some codes and the literature for selection of pile diameter (d) to thickness (t) ratio, d/t, and of limiting hammer energy and pile buckling stresses to certain levels is presented in the following subsections.

2.1 Hammer energy

The minimum pile wall thickness recommended by the American Petroleum Institute (**API, 2007**) for offshore piles subjected to hard driving (250 blows/300 mm) is given as:

$$t = 6.35 + d/100 \tag{1}$$

where t and d are the wall thickness and pile diameter in mm, respectively. Based on the above equation, d/t ratio for typical offshore steel pipe piles ranges from 47 to 82. However, **API** (2007) recommends decreasing d/t ratio with increasing hammer energy as shown in Figure 1. This figure presents the relation between d/t and rated hammer energy divided by the pile cross sectional area (En/A_s).

The Canadian Foundation Engineering Manual (CFEM, 2006) recommends limiting the rated hammer energy to 6000 kJ times the pile cross sectional area. It states that pile head damage is not usually induced from large impact force, but from misalignment of the pile in the helmet and nonconcentric impacts.

2.2 Local Buckling Stress

Elastic and inelastic local buckling stresses are discussed in **API** (2007). The inelastic buckling stress, which is considered more critical, depends on the steel yield stress, F_{ν} , and d/t ratio.

2.3 Hoop Buckling Stress

The elastic and critical hoop buckling stresses for cylinders can be calculated using the **API** (2007) guidelines for structural steel design. The main parameters affecting the critical hoop buckling stresses are the elastic hoop buckling stress, d/t ratio,

yield stress for steel and the length of cylinder between stiffening rings or end connections.

2.4 Denting Damage

As described in the offshore technology report provided by the Health and Safety Executive (HSE, 2001) a theoretical comparison with Ellinas and Walker (1983) was conducted to determine the load causing damage in the form of a dent or dental damage in tubular members due to handling operations. The maximum load applied to a cantilevered end of a pile depends on steel yield stress, pile diameter, wall thickness and the dent depth. As discussed in HSE (2001), the subsequent loading during driving could lead to enlargement of the initial dental damage.

3. Case Histories of Pile Damage During Driving

In the following subsections, three case histories of steel pipe pile damage during driving in dense sand with some cobbles and/or boulders are reported. The author was directly involved in these case histories. The three case histories were located in British Columbia, Canada.

3.1 Case History 1

Design and construction phases of a river bridge in the Lower Mainland, British Columbia, Canada were carried out between 2004 and 2005. The bridge comprised two abutments and three piers. The piers were supported on five piles each and the abutments were supported on 12 piles each. Due to environmental concerns, only limited geotechnical investigation was feasible. The investigation included some test holes and penetration resistance profiling using a Becker Hammer drill.

The soil at the site comprised compact to dense sand and gravel with some cobbles and boulders over very dense sandy gravel to gravely sand. Figure 2 shows the soil conditions at the site, required pile penetration length and Becker Penetration Test (BPT) results corrected to N_{60} .

Without consideration of potential driving stresses, piles with an outside diameter, d, of 1219 mm and a wall thickness, t, of 12.7 mm (d/t=96) were selected and then pre-ordered by the owner. Fifteen spiral welded open ended steel pipe piles were required to be driven to 10 to 12 m penetration. The piles were Grade 3 steel with a yield stress of more than 300 MPa. An internal driving shoe of about 2 m length was utilized to reduce the risk of pile toe damage. Before construction, the boulders were removed by excavation to the depth indicated on the test hole logs. However, during pile driving, it appeared that some cobbles/boulders were present

above the anticipated depth of pile toe and well below the depth encountered in the test holes.

Before construction, wave equation analyses were performed using the software program GRLWEAP 2005 to select the driving hammer and to determine the required criteria (blows/300 mm) to achieve the required axial pile working capacity of 4000 kN. The analyses indicated that the output is very sensitive to the choice of toe quake value which is usually assumed to be between d/60 to d/120. The analyses indicated that a hammer with a rated energy of 223 kJ such as Delmag D60-62 is needed to achieve the required capacity with a factor of safety (FoS) of at least 2. However, the analyses indicated that it may be very difficult to install the pile to the required capacity depending on the toe quake value. The predicted impact driving stress was about 200 MPa, which is below 0.7 times the pile yield stress (F_v).

Although precautions were taken during pile driving, the pile head and toe were damaged locally at a resistance of about 90 blows/300 mm using a Delmag D60-62. Figures 3 and 4 present photos of pile head and toe damage, respectively. To reduce impact stresses and potential damage, it was decided to drive the remaining piles with a Delmag D30-32 diesel hammer, which has a rated energy of about 102 kJ. No additional evidence of pile head damage was observed. However, the toes of six piles were damaged even before reaching the required driving resistance of 200 blows/300 mm. Furthermore, one of the piles experienced toe failure at about 40 blows/300 mm. All damaged piles had to be replaced and driven again.

To avoid further damage to the pile shells, different methods were utilized to install the piles. At several locations, vibratory hammer was used to advance the piles until it reached obstruction, then churn drilling was conducted to the required pile penetration depth, and then the piles were seated (driven) using the D30-32 diesel hammer. The churn drilling was very slow and time consuming. At one pile, a 508 mm diameter pile (insert pile) was driven inside the 1219 mm diameter pile so that both piles would be able to achieve the required axial capacity.

During pile driving, pile dynamic analyzer (PDA) tests were conducted on three piles, located on two different bridge piers, to confirm their axial capacity at restrike and to allow the use of a FoS of 2. The Delmag D62-22 diesel hammer and a 44.5 kN drop hammer were used during the testing. Table 1 presents summary data of the three tested piles and hammer information.

Table 2 presents the dynamic test data including transferred energy, hammer stroke, equivalent penetration resistance values, maximum

compressive stresses at sensors (pile head) and at pile toe. Case Pile Wave Analysis Program (CAPWAP) analyses were performed on the three tested piles to interpret the mobilised static resistance, smith damping factor and quake values. Summary of CAPWAP results are shown in Table 2. Figure 5 shows the maximum compressive stress, maximum transferred energy and maximum velocity along the length of Pile No. 1 derived from CAPWAP analyses.

The impact force on the three tested piles ranged between about 7600 to 9500 kN. The maximum compressive stresses measured at sensors close to pile heads (CSX) ranged between 158 to 195 MPa. The maximum measured compressive stresses at pile toes (CSB) ranged between 135 and 151 MPa. The mobilized vertical compression resistance ranged between about 5600 and 7000 kN. The interpreted toe quake values ranged from about 6.6 and 10.9 mm. The mobilized toe resistance accounted for about 70% to 80% of the total static resistance. As expected, the hammers could not fully mobilize the tested piles as dynamic testing is not designed to effectively mobilize the soil plug.

Another useful application of PDA testing is that it can detect the location of pile damage. During PDA monitoring of the three tested piles, damage was observed within the lower 1.0 to 1.5 m of Pile 2 as shown in Figure 6.

One of the lessons learnt from this case history is that lack of geotechnical investigation can be very costly. For this case, the pile diameter to thickness ratio, d/t was high. It is believed that a lower d/t ratio would have helped reduce the risk of pile damage. It was also learnt that pile heads and toes could experience significant damage even with a maximum driving stresses of less than $0.7F_y$, which is normally used as a driving stress limit, and without exceeding the design set criteria.

3.2. Case History 2

An overwater bridge in the Lower Mainland, British Columbia, Canada was designed and constructed between 2004 and 2005. The bridge comprised two abutments supported on eight piles at each side. A very limited field geotechnical investigation was conducted due to environmental concerns. The soil at the site comprised dense to very dense sand and gravel to about 8.5 m depth over till-like soil comprising silt and very dense sand with some gravel and cobbles to the end of borehole depth at refusal at about 10 m. Figure 7 shows the soil conditions at the site, required pile penetration length and Becker Penetration Test (BPT) blow counts corrected to N_{60} .

The piles had an outside diameter of 508 mm and a wall thickness of 15.9 mm (d/t=32).

Sixteen open ended steel pipe piles were required to be driven to nominally 10 m depth such that pile toes penetrate about two pile diameters into the till-like soil. The piles were Grade 3 steel with a yield stress of more than 300 MPa. The required axial pile working capacity was 1400 kN. Wave equation analyses were performed using the software program GRLWEAP. Based on the analyses, a Delmag D30-32 diesel hammer was selected to drive the piles to the required depth. The analyses were performed to obtain a factor of safety (FoS) of 3 assuming toe quake value ranging from 5 to 12 mm. The maximum calculated compressive stress ranged between about 150 to 210 MPa. The termination criteria was selected to be 200 blows/300 mm.

After driving the first pile, a PDA test was conducted on that pile to confirm pile compressive resistance, hammer energy and efficiency at restrike. Table 3 presents summary data of the tested pile and hammer information. Table 4 presents the PDA data and results of CAPWAP analyses performed on the tested pile. Figure 8 shows the maximum compressive stress, maximum transferred energy and maximum velocity along pile length derived from CAPWAP analyses.

The maximum transferred energy at sensors near the pile head was about 52 kJ. The maximum compressive stresses at pile head and toe were 223 and 221 MPa, respectively, which were about 0.7F_y. The mobilized static resistance was 4100 kN indicating that a FoS of about 2.9 was achieved.

Pile driving continued using the same diesel hammer. Almost 50% of the piles experienced local toe failure at resistance of 200 blows/300 mm or less. The main reason for pile damage is believed to be the presence of obstructions during driving. No evidence of pile head damage was observed. All damaged piles had to be pulled out and driven again. To avoid pile damage in the second attempt of installation, churn drilling was conducted to the required depth, and then the piles were seated (driven) using the Delmag D30-32 diesel hammer.

3.3. Case History 3

A bridge over a creek in British Columbia, Canada was constructed in 2005. The bridge abutments were supported on five, Grade 3, 610 mm diameter by 12.7 mm wall steel pipe piles (d/t=48). The required pile penetration length was about 20 m. The top 3.5 m were cleaned out and filled with concrete. The design vertical dead and dead plus live load for each pile was 720 and 950 kN, respectively.

Test holes indicated that soil conditions comprise loose to compact sand and gravel with some cobbles to about 6 m depth over dense to very dense sand and gravel with some cobbles to 14 m depth underlain by hard silt and very dense silty sand. The logs indicated that the maximum particle size was less than 100 mm. Figure 9 shows the soil conditions at the site, required pile penetration length and BPT blow counts corrected to N_{60} .

Wave equation analysis was performed using the software program GRLWEAP. The analysis considered using a 44.5 kN drop hammer, 2.75 m drop height inducing an equivalent energy of 60 kNm and using 102 mm thick oak or hardwood cushion. To achieve a Factor of Safety (FoS) of 3 on working load, a driving resistance of at least 130 blows/300 mm was predicted. As PDA testing was planned for, a FoS of 2 on the working load was specified. To achieve a FoS of 2 a driving resistance of at least 25 to 35 blows/300 mm was predicted.

PDA tests were conducted on the first two driven piles, named here as Pile 1 and 2, at restrike. Table 5 presents summary data of the two tested piles and hammer information. Table 6 presents the PDA data and results of CAPWAP analyses performed on the tested piles. The maximum transferred energy at sensors near the heads of Pile 1 and 2 was about 41 and 38 kJ, respectively. The mobilized static resistance for the two piles was 2300 and 2200 kN. The mobilized toe resistance was about 60% of the total resistance. The maximum compressive stress at the sensors (CSX) near the heads of Pile 1 and 2 was 181 and 169 MPa, respectively. The maximum estimated compressive stress at the toes (CSB) of Pile 1 and 2 was 93 and 107 MPa, respectively. These values were well below 0.7F_v.

The same hammer and driving criteria were used during the driving of the remaining piles. Out of the ten driven piles, two piles were buckled at the head and toe due to obstructions with cobbles.

To reduce the risk of obstructions affecting the pile driving schedule, it was decided to drive the remaining piles using a down-hole-hammer. At the design penetration, piles were seated using a 44.5 kN drop hammer. Drilling the piles using a down-hole hammer proved to be a successful solution and faster than using churn drilling. However, it should be noted that using down-hole hammer tends to loosen the soil surrounding the pile as the hammer has a slightly larger diameter than the pile which may result in reduction of lateral pile capacity.

4. Observations from Presented Case Histories and Other Collected Data

In this paper, data was collected from case studies of steel pipe piles driven in dense soils. The data from the presented three case histories and other data collected from the literature and by personal communications are presented in Tables 7 and 8. Table 7 summarizes the cases that encountered pile

damage during driving in dense soils. Table 8 summarizes the cases in which piles were driven successfully, without damage, in dense soils. The data represents piles for bridges, fixed offshore platforms, marine structures and buildings. A comparison between observations and available guidelines from literature was conducted. The observations indicate that some available guidelines should be refined to account for pile installation in very dense soils with cobbles/boulders as discussed in the following subsections.

4.1. Pile Diameter to Thickness Ratio and Hammer Energy

Tsinker (1997) reported that, for offshore piles, bending stress is not critical when d/t is less than or equal to 60 and if d/t is greater than 60, the piles should be checked for buckling stability. However, Tsinker's recommendation did not consider soil type or hammer energy. Gerwick (2000) reported that, in the case of Goodwin offshore platform on the Northwest Shelf of Australia, piles were driven into dense sands and they had to first penetrate a surface layer of cemented sands (calcarenite). The pile diameter and wall thickness were 2.6 m and 45 mm, respectively (i.e., d/t=58). It was believed that the relatively thin walled piles driven into the calcarenite is the major reason for the historic pile damage that occurred at this platform.

Figure 10 presents a relationship between normalized d/t ratio and hammer rated energy to cross sectional area (En/A_s) ratio for steel pipe piles. The figure shows some available data presented in Tables 7 and 8. The impact hammers were either diesel hammers or drop hammers.

It can be shown in Figure 10 that pile damage during driving in strata that contains cobbles/boulders may occur even with relatively low d/t and En/As ratios. Also, it is noted that the Canadian Foundation Engineering Manual (CFEM) recommended driving energy limit of 6000 kJ times pile cross sectional area (A_s) proved to be sufficient to avoid pile damage during driving. However, this limit should be reduced if piles are driven into very dense soils comprising cobbles and/or boulders. It should be noted that the CFEM recommended driving energy limit does not take into consideration d/t ratio while **API** (2007) guidelines do consider the d/t ratio.

Tables 7 and 8 and Figure 10 indicate that steel pipe piles driven into soils that contain cobbles/boulders are susceptible to head and/or toe damage even if d/t ratio is as low as 32. Based on the presented case histories and the compiled data, it appears that a d/t ratio of less than 32 and a rated energy of less than 3000 kJ times the pile cross sectional area should be considered if piles are to be

driven into very dense soils comprising some cobbles or boulders.

4.2. Maximum Driving Stresses

Dismuke (1979) recommended a limiting driving stress of 1.4 to 1.7 times the specified yield strength (F_y) . **Davisson** (1979) recommended a maximum dynamic stress level of $1.1F_y$. It is believed that the allowable driving stress recommended by **Dismuke** (1979) and **Davisson** (1979) is too high.

Thompson and Thompson (1979) reported that steel piles with yield strengths of 240 to 350 MPa (Grade 2 to 3) were driven to impact stresses of more than 0.8F_y without damage, as long as the seating of the helmet was satisfactory. They compiled data from nine sites as included in Table 8. Most of their reported cases were for steel piles driven in sandy silt till or dense to very dense sand. They reported that in a few cases, gravel or shale bedrock was encountered at pile toes. Lee *et al.* (1995) recommended limiting the driving stress of steel pipe pile to 1.0F_y and 0.5F_y at pile head and toe, respectively, based on field test results.

The American Association of State Highway and Transportation (**AASHTO**, **2002**) indicated that the maximum allowable driving stresses for top driven steel piles should be limited to $0.9F_{\nu}$.

US Army Corps of Engineers (2004) recommended the maximum allowable driving stresses for steel piles be limited to 0.85F_v.

Schneider et al. (2003) reported that published mean hammer efficiencies may be unconservatively low. Due to different hammer performance and soil conditions, significant variation in transferred energy may induce high compressive stresses near the end of driving. They concluded that eccentric pile stresses ranges between 15% to 25% may be induced during driving, especially during restrikes. This implies that allowable driving stresses close to the pile yield stress may cause pile damage during driving in dense soils.

Figure 11 presents a chart between d/t ratio and the impact driving stresses at pile heads for some case studies. Data from Tables 7 and 8 is used in Figure 11. The driving stresses shown in this figure represent the maximum stresses at the pile heads measured during PDA tests or calculated using the wave equation analysis. It can be shown in this figure that several piles installed in dense soils were damaged at pile head and/or toe even when the driving stresses were below $0.6F_{\rm V}$.

It is noted that most recommendations reported in the literature for maximum driving stresses are somewhat general and do not provide limits for piles driven into very dense soils comprising cobbles and/or boulders.

Based on field observations and data analyses for several case studies, it is recommended that the driving stresses be generally limited to about $0.5F_y$ if piles are driven in very dense sands, especially if cobbles and/or boulders are present.

4.3. Critical Hoop Buckling Stresses

The critical hoop buckling stresses, F_{hc} , for piles were calculated using the API (2007) equations. Figure 12 indicates that F_{hc} for piles with d/t ratio of greater than 80 can be as low as about 25 MPa. This suggests that piles with high d/t ratio could potentially fail in hoop buckling, especially when driven in dense or till-like soils. Also, it is clear that F_{hc} decreases significantly with the increase in d/t ratio. However, in case of driving in cobbles/boulders, local buckling may still occur.

5. General Recommendations for Pile Driven Into Dense Soils

Different construction methods and precautions should be utilized to reduce the risk and extent of damage caused by steel pile driving into dense soils. Some of these methods were utilised successfully to overcome the problem of hard driving in the three presented case histories in Section 3. Other precautions and construction methods provided in the literature are also listed for guidance. These precautions and construction methods are listed as follows:

- 1- Usually, open ended piles are easier to drive into difficult soil conditions. If closed ended piles are required, conical driving tip should be utilized.
- 2- For large diameter piles such as those used for offshore platforms, the pile shoe should be reinforced to at least one diameter in length and have a wall thickness 1.5 times the minimum thickness of pile section in that pile. However, if piles are driven through limestone containing cobbles, the pile shoe should be increased to two diameters in length to prevent buckling **Tsinker** (1997). This recommendation was used in Case History 1 but was not sufficient to mitigate pile damage.
- 3- Reinforcing pile toe with APF type hardened cast shoes which retains the roundness of the pile toe

- cross section. This reinforcement type works well during driving into soft rock.
- 4- Reinforcing pile toe with a Doubler plate. This reinforcement type is generally stronger than the driving shoe but it does not maintain the roundness of the pile toe cross section.
- 5- Using Spin-Fin piles, which are large radial fins welded on the bottom 2 to 3 m of the pile. This pile type was driven successfully through rip rap and boulders such as in the Bell Street Pier Wave Barrier in Seattle (**Peratrovinch**, **1998**).
- 6- Drill and drive using a churn drill or hammer grab for cleaning out the material inside the piles (**Gerwick**, **2004**). This method was used in Case Histories 1 and 2. However, this method may be very slow and time consuming.
- 7- Drill and drive using down-hole-hammer which is faster than the churn drill. This method was used successfully in Case History 3 especially after the damage of some piles. However, it should be noted that this method may loosen the soil surrounding the pile which may result in reduction of lateral pile capacity.
- 8- Have a heavy duty jet and pumps able to develop pressure (**Gerwick**, **2004**). However, jetting may reduce the axial and lateral pile capacities.
- 9- Using toe driving instead of head driving.

If a large number of blow counts is required to achieve a certain pile axial capacity, consideration may be given to the following solutions: (a) Constructing a composite step-tapered pile by advancing a smaller diameter pipe out of the base of the larger pile, so that the total capacity is distributed between the two piles. This solution was used successfully in Case History 1 to achieve the capacity in one of the piles. (b) Driving the pile open ended and placing a plate inside the pile at a certain depth. This plate will act as an internal diaphragm forming a plug, which results in axial pile capacity increase. This method was utilised in some offshore piles (Tomlinson, 1993).

The recommendations outlined in this section should be considered before the beginning of construction, so that construction delay and overrun cost are minimized.

Table 1. Summary information of Pile data for Case History 1

	Table 1. Summary mior mation of the data for Case History 1										
Pile	Hammer type	Testing	Pile type	d	t	d/t	A_s	Total pile	Length below	Embedded pile	Notes
No.		condition		(mm)	(mm)		(m^2)	length (m)	gauges	length (m)	
1	Delmag D62-22 diesel hammer		Spiral welded pipe	1219	12.7	96	0.0481	20.1	12.5	8.8	
2	Delmag D62-22 diesel hammer	Restrike	Spiral welded pipe	1219	12.7	96	0.0481	18.9	11.7	10.2	Damage observed within the lower 1.5 m of pile
3	44.5 kN drop hammer	Restrike	Spiral welded pipe	1219	12.7	96	0.0481	15.2	9.7	9.4	

Table 2. Summary information of PDA data and CAPWAP results for Case History 1

Pile	Equivalent		Pile Driving Analyzer (PDA) Data						CAPWAP Results						
No.	penetration	EMX	Hammer	ETR	Impact	CSX	CSB	Mo	Mobilised static Smit				mping Quake		Max.
	resistance		stroke	(%)	force				resistance			tor			
	(bl/25 mm)	(kJ)			(kN)	(MPa)	(MPa)	Total	Shaft	Toe	Shaft	Toe	Shaft	Toe	displ.
			(m)					(kN)	(kN)	(kN)	(s/m)	(s/m)	(mm)	(mm)	(mm)
1	9.8	69.8	2.6	44%	7604	158	135	6200	1900	4300	0.35	0.3	2.5	7.5	7.8
2	19.5	71.0	2.3	51%	8356	172	139	7000	1500	5500	0.3	0.3	2.5	6.6	7.0
3	>20	83.2	4.9	37%	9477	195	151	5600	1100	4500	0.4	0.3	2.5	10.9	11.0

EMX: Maximum transferred energy at sensors CSX: Maximum compressive stress at sensors

ETR: Energy transfer ratio

CSB: Maximum compressive stress at pile toe

Table 3. Summary information of Pile data for Case History 2

							- J				
	Pile No.	Hammer type	Testing	Pile type	d	t	d/t	A_s	Total pile	Length below	Embedded pile
			condition		(mm)	(mm)		(m^2)	length (m)	gauges	length (m)
	1	Delmag D30-32 diesel hammer	Restrike	Pipe	508	15.9	32	0.0245	13.5	10.4	9.2

Table 4. Summary information of PDA data and CAPWAP results for Case History 2

			,										_			
ſ	Pile	Equivalent	Pile Driving Analyzer (PDA) Data							CAPWAP Results						
	No.	penetration	EMX	Hammer	ETR	Impact	CSX	CSB	Mobilised static			Smith damping		Smith damping Quake		Max.
		resistance	(kJ)	stroke	(%)	force	(MPa)	(MPa)	resistance		factor				toe	
		(bl/25 mm)		(m)		(kN)			Total	Shaft	Toe	Shaft	Toe	Shaft	Toe	displ.
									(kN)	(kN)	(kN)	(s/m)	(s/m)	(mm)	(mm)	(mm)
ſ	1	>20	52.2	2.9	30%	5049	223	221	4100	300	3800	0.5	0.3	2.5	8.5	8.9

EMX: Maximum transferred energy at sensors

ETR: Energy transfer ratio

CSX: Maximum compressive stress at sensors

CSB: Maximum compressive stress at pile toe

Table 5. Summary information of Pile data for Case History 3

Pile No.	Hammer type	Testing condition	Pile type	d (mm)	t (mm)	d/t	A_s (m^2)	Total pile length (m)	Length below gauges	Embedded pile length (m)	
		condition		(11111)	(111111)		(111)	iciigui (iii)	gauges	iciigiii (iii)	
1	44.5 kN drop hammer	Restrike	Pipe	610	12.7	48	0.0238	36.5	28.5	27.3	
2	44.5 kN drop hammer	Restrike	Pipe	610	12.7	48	0.0238	24.3	22.0	21.0	

Table 6. Summary information of PDA data and CAPWAP results for Case History 3

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Pi	le Equivalent	Pile Driving Analyzer (PDA) Data							CAPWAP Results								
No	 penetration 	EMX	Hammer	ETR	Impact	CSX	CSB	Mobilised static			Smith damping		Mobilised static Smith damping		Qu	ake	Max.
	resistance	(kJ)	stroke	(%)	force	(MPa)	(MPa)		resistance	,	fac	ctor			toe		
	(bl/25 mm)		(m)		(kN)			Total	Shaft	Toe	Shaft	Toe	Shaft	Toe	displ.		
								(kN)	(kN)	(kN)	(s/m)	(s/m)	(mm)	(mm)	(mm)		
	1 4	40.7	2.0	45%	4193	181	93	2300	930	1370	0.3	0.1	2.5	6.0	10.2		
	2 4	37.7	2.0	42%	3912	169	107	2200	900	1300	0.3	0.1	2.5	6.0	10.4		

Table 7. Summary information of damaged steel pipe piles during construction

		<i>J</i>		ILLUCIO	or adminged steel	pipe piies dain	ag comper a			
Pile No.			d/t L (m)		Soil conditions at pile toe	Hammer Type	Estimated Impact driving stresses (MPa)		Failure Location	Source/Location
					-		Pile Head Pile Toe			
1	1219	12.7	96	10	Very dense sand with occasional Cobbles/boulders	Diesel D60-62 & Diesel D30-32	175-220	135-150	Head & Toe	Case History 1 (this paper)
2	508	15.8	32	10	Very dense sand 10 with occasional Diesel D30-32 220 220 Cobbles/boulders		Toe	Case History 2 (this paper)		
3	610	12.7	48	20	Very dense sand with occasional Cobbles	44.5 kN drop hammer	170-180	70-180 110-170		Case History 3 (this paper)
4	219	6.4	34	20	Compact to dense sand	22.25 kN drop hammer	175-240	50-125	Head	Building, BC, Canada
5	219	6.7	33	20	Compact to dense sand	22.25 kN drop hammer	175-240	50-125	Head	Building, BC, Canada
6	2600	45.0	58	N/A	Calcareous sand	N/A	N/A	N/A	Toe	Goodwyn Platform, Australia
7	1219	15.0	81	N/A	Till-like	N/A	N/A	N/A	Toe	A Dock, BC, Canada
8	1016	12.7	80	N/A	Cobbles/boulders	N/A	N/A	N/A	Toe	A Dock, BC, Canada
9	1829	19.1	96	N/A	Cobbles/boulders	N/A	N/A	N/A	Toe	A Bridge, BC, Canada
10	2134	19.1	112	N/A	Cobbles/boulders	N/A	N/A	N/A	Toe	A Bridge, BC, Canada
11	324	9.5	34	41	Dense sand	Vulcan 80C	138	N/A	Splice	Hussien and Rausche (1991)

Table 8. Summary information of steel pipe piles driven in very dense soils without obvious damage

Table	8. Summ	ary intori	nation	of steel	pipe piles driven in very dense soils without obvious damage					
Pile	d	t	d/t	L	Soil conditions at pile toe	Impact driving	Source/Location			
No.	(mm)	(mm)		(m)		stresses at pile				
						head (MPa)				
1	406	12.7	32.0	30	Gravel	N/A	A Bridge over a river, BC, Canada			
2	610	12.7	48.0	30	Gravel	N/A	A Bridge over a river, BC, Canada			
3	1300	50	26.0	70	Concretions	N/A	North Rankin Offshore Platform, Australia			
4	1219	50.8	24.0	N/A	Occasional Cobbles/Boulders	N/A	A Dock, BC, Canada			
5	610	12.7	48.0	N/A	Occasional Cobbles/Boulders	N/A	A Dock, BC, Canada			
6	914	19.1	48.0	N/A	Occasional Cobbles/Boulders	N/A	A Building, BC, Canada			
7	610	12.7	48.0	10	Occasional Cobbles/Boulders	N/A	A Highway Bridge, BC, Canada			
8	610	19.1	32.0	10	Cobbles/Boulders	N/A	A Highway Bridge, BC, Canada			
9	219	12.7	17.2	25	Dense sand	N/A	A Pedestrian Overpass, BC, Canada			
10	324	8.4	38.6	19	Sandy silt till-N=50-100	251	Thompson, C. and Thompson, D.(1979)			
11	324	9.5	34.1	19	Sandy silt till-N=50-100	192.0	Thompson, C. and Thompson, D. (1979)			
12	324	6.9	47.0	15	Sandy silt till-N=50-100	154.0	Thompson, C. and Thompson, D. (1979)			
13	324	9.4	34.5	24	Silt till/gravel-N=80 to >100	203.0	Thompson, C. and Thompson, D. (1979)			
14	324	7.1	45.6	24	Silt till/gravel-N=80 to >100	175.0	Thompson, C. and Thompson, D. (1979)			
15	324	6.4	50.6	25	Silt till/gravel-N=80 to >100	261.0	Thompson, C. and Thompson, D. (1979)			
16	178	7.9	22.5	15	shale bedrock, weathered	188.0	Thompson, C. and Thompson, D. (1979)			
17	610	12.7	48.0	35	shale bedrock, weathered	216.0	Thompson, C. and Thompson, D. (1979)			
18	1067	51	21	47 - 60	Gypsum rock	225	Sites C, D, Offshore platforms (Webster et al., 2008)			
19	1067	44	24	88	Very dense calcareous sand	N/A	Site B, Offshore platform (Webster et al., 2008)			
20	1067	38	28	100	Dense Sand/Very stiff clay	224	Offshore pile (Rausche et.al., 2009)			
21	1067	44	24	100	Dense Sand/Very stiff clay	224	Offshore pile (Rausche et.al., 2009)			

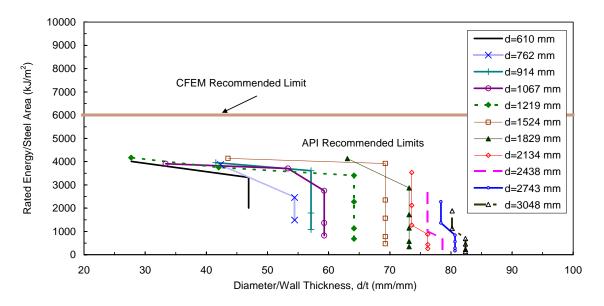


Fig.1. The ratio between pile diameter to wall thickness, d/t, versus rated hammer energy/steel area (based on recommendations of API, 2007 and Canadian Foundation Engineering Manual (CFEM), 2006)

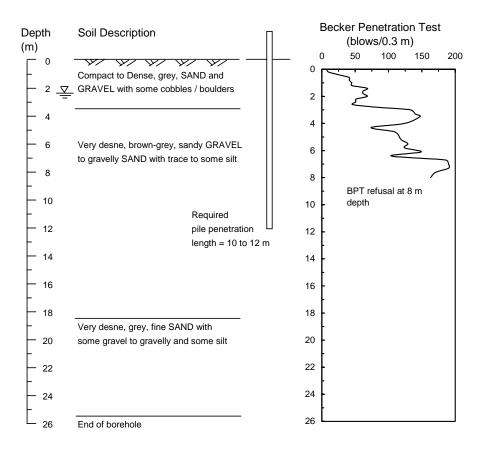


Fig.2. Soil conditions and Becker Penetration Test results for Case History 1

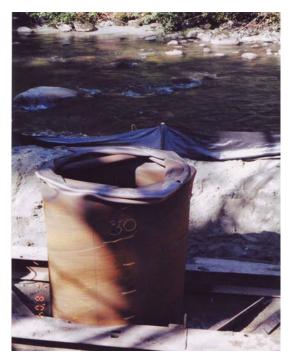


Fig. 3. Pile head failure (d=1219 mm, t=12.7 mm), driven by D60-62 diesel hammer (Case History 1)



Fig. 4. Pile toe failure (d=1219 mm, t=12.7 mm), driven by D30-32 diesel hammer (Case History 1)

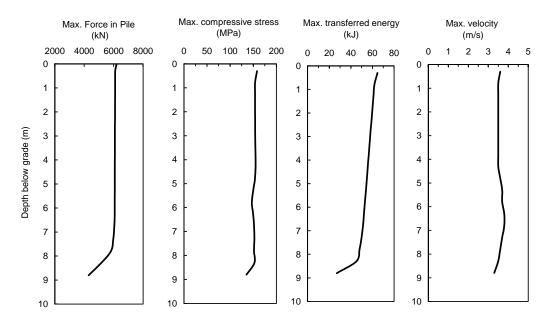


Fig. 5 Maximum force, compressive stress, transferred energy and velocity along the length of Pile No. 1 derived from CAPWAP results (Case History 1).

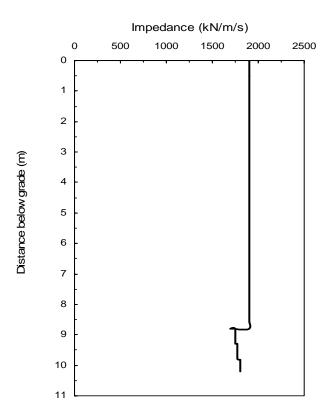


Fig. 6 Impedance profile for Pile 2 indicating damage within the lower 1.5 m (Case History 1)

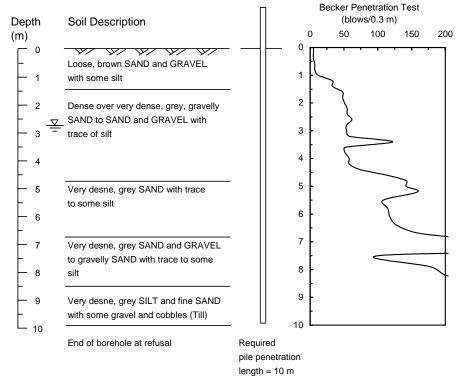


Fig.7 Soil conditions and Becker Penetration Test results for Case History 2

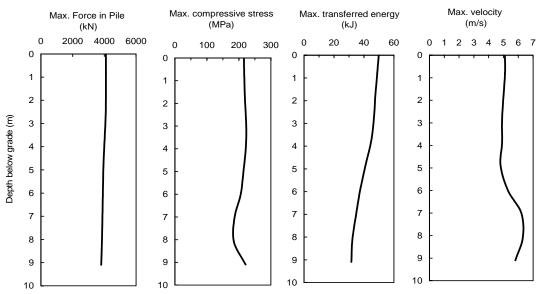


Fig. 8 Maximum Force, compressive stress, transferred energy and velocity along pile length derived from CAPWAP results (Case History 2)

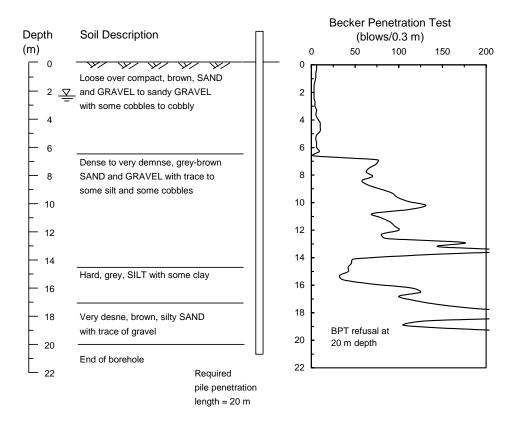


Fig.9 Soil conditions and Becker Penetration Test results for Case History 3

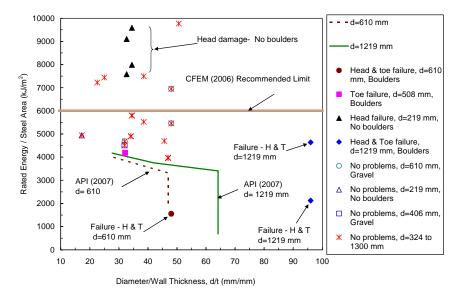


Fig. 10. Data presentation of case studies for d/t ratio versus hammer energy/ A_s showing API and CFEM recommended limits

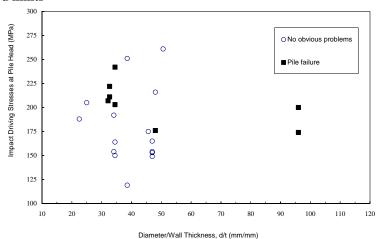


Fig. 11. Data presentation of case studies for d/t ratio versus impact driving stresses at pile head ($F_y = 300$ MPa)

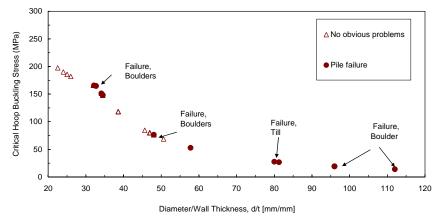


Fig. 12. Data presentation of case studies for d/t ratio versus critical hoop buckling stresses ($F_v = 300 \text{ MPa}$)

6. Conclusions

This paper discusses the installation of steel pipe piles in very dense soils from a design and construction perspective. The main design factors impacting pile integrity during driving are the hammer energy, driving stresses and pile diameter to thickness ratio.

Three case histories for overwater bridge pile damage during driving are presented. Additional data from several onshore and offshore steel pipe piles installed in very dense soils are collected and analyzed to examine the design factors impacting the pile integrity during driving.

For piles driven in very dense soils comprising some cobbles or boulders, the following conclusions are drawn:

- 1- The pile diameter to thickness ratio, d/t, should not exceed 32 providing that the used rated hammer energy is less than 3000 kJ times the pile cross sectional area, especially for large pile diameters such as those used in offshore platforms.
- 2- The maximum driving stresses at the pile head and toe should not exceed $0.5F_{\nu}$.
- 3- A detailed and comprehensive geotechnical investigation is always desirable in spite of budget constraints during the design phase of some projects. If some cobbles or boulders are encountered, a large number of boreholes should be considered to determine the extent and size of cobbles/boulders and to improve the assessment of pile installation methods.
- 4- From construction prospective, general recommendations for installing steel piles into dense soils derived from the presented case histories and from literature are discussed in Section 5 and should be taken into consideration together with the above conclusions.

It should be noted that the objective of these conclusions is to reduce, and not to eliminate, the risk of pile damage during installation in very dense soils with cobbles and/or boulders. More field data for pile damage during driving is required to further adjust the limitations in hammer energies and driving stresses.

7. Acknowledgment

The author was directly involved in the three presented case histories while he was working at Thurber Engineering Ltd, Canada. The author would like to thank Mr. David Tara of Thurber Engineering Ltd. for the data he provided and for many valuable discussions.

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6/29/2011

Effect of Osmo-Dehydration on the Rehydration Properties Structural Aspects and Antioxidant Activity of Banana and Tomato Rings

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Abstract: The objectives of this research were mainly directed towards microstructure and the influence of different osmotic solutions on the rehydration capacity. In banana rings, it is indicated that using sucrose: glucose as an osmotic solution with different concentration gave the highest rehydration ratio. Regarding tomato, the osmosed solutions were different concentrations of NaCl and NaCl: Sucrose; they gave an inversely proportional relationship with rehydration capacity. Antioxidant activity was measured by conjugated diene method, and it is strongly affected by the type of pre-treatments applied. Regarding the microstructure, this study showed important changes in the cell wall cytoplasm and the intercellular spaces

[Gamal. H. Ragab, Mostafa T. Ramadan, Hesham. A. Moharram and Hatem. S. Ali. Effect of Osmo-Dehydration on the Rehydration Properties Structural Aspects and Antioxidant Activity of Banana and Tomato Rings. Journal of American Science 2011;7(7):564-568]. (ISSN: 1545-1003). http://www.americanscience.org.

Keyword: Banana rings – Tomato halves – Osmotic dehydration solutions – Antioxidant activity – Conjugated diene method.

1. Introduction:

Over the past few years, consumers, have increasingly demanded food products providing, both good sensorial quality and specific nutritional properties. In this issue, a great effort has been made in food technology to adequately posses particular consumer requirements.

Partial dehydration and solute intake can be achieved by immersion in a concentrated aqueous solutions, this process is called osmotic dehydration(Lazarides et al., 1999) by modifying the extent of the partial dehydration and syrup composition; not only the end product be diversified but chemical, physical and functional properties can be improved (Torregiant and Bartelo, 2001). It was found that solute loss during rehydration is increased due to structural changes induced by osmotic pretreatments and interaction of the osmo-active substances with the cell components.

Osmotic dehydration of banana rings and tomato halves; can be carried out as a means of predrying treatment (Ali *et al.*, 2010). It was found that desirable functional properties can be obtained.

During rehydration, absorption of water into the tissue results in an enhancement in the mass, simultaneously leaching out of solutes (sugars, acids, minerals, vitamins) occur and both phenomena are influenced by the nature of the product and conditions analyzed for rehydration (Korkida and Marinos-Kouris, 2003). Rehydration kinetics can be applied to ascertain the net extent of injures and other processing step prior to it(Restogi *et al.*, 2000). A solute loss during rehydration is enhanced due to

structural changes induced by osmotic pretreatments and interaction of the osmo-active substances with the cell components.

Rehydration is influenced by several factors grouped as- intrinsic factors (chemical composition, pre-drying treatment, product formulation, drying techniques and post drying procedure, etc) and extrinsic factors such as: (composition of media used -hydrodynamic conditions (Oliveria and Ilineanu, 1999).

Therefore, this work was carried out to investigate how different osmotic solutions could affect the rehydration properties and structural aspects and antioxidant activity of the osmodehydrated banana and tomato rings.

2. Material and Methods

1- Materials

Banana (*Musa cavendishii* var balady) and tomato (*Lycopersicon esculentum* L) were obtained from the local market, Giza, Egypt. The tips of the banana were first removed and its medium part, were cut into rings of 1cm length with a knife. Tomatoes were sorted and sliced to an average thickness of 10mm, and each halve was longitudinally cut into two halves.

2- Methods:

Banana rings were subjected to the following osmotic treatments as follows:-

 $T_1 = 100\%$ sucrose

 $T_2 = 50:50$ glucose: sucrose.

 $T_3 = 30:70$ glucose: sucrose

Tomato halves were also subjected to different NaCl: sucrose combinations (1:1.5). The samples were ranked as follows:

T₄: 5% Na Cl T₅: 10% Na Cl T₆: 20% Na Cl T7: 30%Na Cl T₈: sucrose: Salt 5% T₉: sucrose: Salt 10% T₁₀: sucrose: Salt 20% T₁₁ sucrose: Salt 30%

The experimental procedures were carried out as described by (Ali *et al.*, 2010).

Methods:

1- Microstructure:

Scanning election micrographs were obtained using scanning electron microscope, Joel JSM-6100 Joel ltd. Tokyo-Japan as described by (Aguilera and Stanely, 1999). These micrographs were taken to investigate the microstructure of Banana rings; osmosed dried with sucrose and glucose solutions. Tomato halves were also osmosed dried with different concentrations of Na Cl and Na Cl: Sucrose.

2- Rehydration Experiments:-

Rehydration experiments were carried out as mentioned by (Maskan, 2001). The rehydration was calculated using the following equation.

Weight gain %=(w_s - w_d)/wd(1) Where:

 W_t = weight of the rehydrated samples at any time (g) W_d = weight of the dried sample (g)

The data were expressed as an average of different rehydration time at 0, 30, 60, 90, 120 and 180 mins.

3- Antioxidant activity:

The antioxidant activity was measured by applying the conjugated diene method using pure sunflower oil as described by (Lingnert *et al.*, 1989). The A_{234} min. was taken as an indication of the course of oxidation using untreated Banana rings and tomato halves as a control.

3. Results and Discussion Osmotic dehydration microstructure:

Figs.(1, 2 and 3) showed the microstructure of the osmosed dried tomato halves and Banana rings, respectively. Those figures showed a disruption of cell walls, covered with cytoplasm. Osmotic treatment of Banana rings and tomato halves caused an important changes in their microstructure levels i.e; cells become, elongated with cell wall, plasma membrane is folded and separated; as quickly as the

salt content of the osmotic solution is enhanced; (Tonon *et al.*, 2007). After a certain time a protoplast is released and adapted. a spherical shape, thus reducing the excess of energy associated to the matrix contraction (Barat *et al.*, 1998). Great compacting of the cell structure and disorganization of the protoplast contents were also observed by (Heredia *et al.*, 2009). Tedjo *et al.*(2002) suggest that different pretreatments caused different cell poration, which suggests that the mechanisms of cell permeability by the different pretreatments are not the same.

Changes that occurred in Tomato and Banana after osmotic dehydration showed a net like pattern of the intercellular spaces which is no longer distinct and it appears as if these intercellular have been filled with the osmotic solution; which indicated that, there was an accumulation of sugars on the periphery of the fruit, also it is suggested that as the solid gains were enhanced with osmotic dehydration time, the thickness of the sugar layer increased and the viscosity of such layer is getting higher which retards the diffusion of water through this layer into the osmotic solution.



Fig(1) Microstructure of Banana rings osmosed dried with 100% sucrose.



Fig(2) Microstructure of osmo-dehydrated Tomato rings with 30% Nacl



Fig(3) microstructure of osmo-dehydrated Tomato rings with 30% sucrose :Nacl

Influence of osmotic pretreatments on the rehydration capacity

The weight gain of the rehydrated banana rings and tomato halves samples were shown in tables (1, 2 and 3). As the sucrose levels are getting lower; an enhancement in the rehydration capacity was observed; specially when using glucose as a synergistic osmotic solution; an enhancement in the rehydration capacity was observed.

It seems that the lower concentration of sucrose pretreatment might take part in importing structural and mechanical strength to the tissues (Lewicki *et al.*, 2005). Sugar protects the functionality of protein; stabilizing its three dimensional structure; attributed to an enhancement in hydrophobic interactions and hydrophilic properties due to the formation of protein-sugar complex.

Lesile *et al.* (1995) reported that disaccharides maintain the general protein structure in dry state;

hence the membrane is protected and upon rehydration, its functionality restored.

Regarding tomato, table (2) showed clearly an inversely proportional relationship between the suggested levels of the previously mentioned osmotic solutions used; and the rehydration capacity as a function of different duration time at the stationary phase.

The same effect was noticed when sucrose was used as osmotic solution in addition to in Nacl. Increasing the level of salt caused the same effect with somewhat higher rehydration level, these changes could be related to the synergistic effect of sucrose as previously mentioned (Figs. 2.3).

Osmotic dewatering affects the rehydration properties of the dried material, because of cell permeabilization due to osmotic stress and hence upon rehydration, these cells cannot absorb as much as control. At the same time, solute loss during rehydration also enhance that possibility due to the structural changes induced by the osmotic pretreatments and interaction of the osmoactive substances with the cell components (Restogi *et al.*, 2004).

Antioxidant activity:-

Table (4) showed the pattern of antioxidant activity, the highest antioxidant activity was found in 100% sucrose. It seems that at 100% sucrose, the antioxidant activity could be preserved. The data also showed an inversely proportional relationship between Na cl concentration and antioxidant activity, adding sucrose with small levels in 5%, 10% causes a preservative effect. These data are confirmed with those presented by Azoubell and Murr, 2003, Tonon *et al.*, 2008 and Ali *et al.*, 2010, who reported that lower redness value a* could be used as a useful indicator for correlating it with lower a* value.

Table (1): Rehydration of Banana rings as a function of different osmotic solutions.

	Banana rings rehydration time (min)							
	0	30	60	90	120	180		
100% sucrose	0	0.441	0.636	0.854	1.037	1.054		
30:70	U	0.441	0.030		1.037	1.034		
100% sucrose	0	0.47	0.720	0.062	1.062	1.260		
50:50	0	0.47	0.729	0.962	1.062	1.360		
100% sucrose	0	0.522	0.012	0.000	0.110	1.650		
30:70	0	0.533	0.812	0.988	0.110	1.650		

Table (2): Rehydration of Tomato rings as a function of different Na cl osmotic solutions.

	Tomato Halves rehydration time (min)						
	0	30	60	90	120	180	
5% Na cl	0	1.246	1.670	2.08	2.561	3.04	
10% Na cl	0	0.909	0.909	1.187	1.811	1.95	
20% Na cl	0	0.531	0.767	0.939	1.108	1.42	
30% Na cl	0	0.501	0.721	0.893	0.969	1.01	

Table (3): Rehydration of Tomato rings as a function of different sucrose: salt ratio.

	Tomato Halves rehydration time						
	0	30	60	90	120	180	
Sucrose: salt 5%	0	1.304	1.852	2.111	2.642	3.07	
Sucrose: salt 10%	0	1.347	1.749	2.414	2.134	2.439	
Sucrose: salt 20%	0	0.861	1.136	1.461	1.525	1.726	
Sucrose: salt 30%	0	0.639	0.986	1.112	1.125	1.386	

Table (4): Antioxidant activity of Banana and Tomato rings as affected by different osmotic solutions

Treatments	samples	A ₂₃₄ .min	Antioxidant Activity %	
control	Banana Rings	0.002	0	
100 % sucrose	Banana Rings	0.006	83.3	
50:50 Glucose: Sucrose	Banana Rings	0.011	45.4	
30:70 glucose: Sucrose	Banana Rings	0.32	25	
5% Na Cl	Tomato halves	0.005	90.5	
10% Na Cl	Tomato rings	0.007	71.42	
20% Na Cl	Tomato rings	0.007	62.50	
30% Na Cl	Tomato rings	0.068	67.50	
Sucrose: Salt 5%	Tomato halves	0.10	67.50	
Sucrose: Salt 10%	Tomato rings	0.010	56.5	
Sucrose: Salt 20%	Tomato rings	0.009	45	
Sucrose: salt 30%	Tomato rings	0.009	4.5	

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6/1/2011

REUSE OF WATER TREATMENT SLUDGE AND SILICA FUME IN BRICK MANUFACTURING

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Abstract: The work done in this study was devoted to the development of a procedure to produce brick from water treatment plant sludge and silica fume as a modern way for sludge reuse. Disposing the sludge to the nearest watercourse is the common practice all over the world, which accumulatively rise the aluminum concentrations in water and consequently in human bodies. This practice has been linked to occurrence of Alzheimer's disease. Landfill disposal of the sludge is impractical because of the high cost of transportation and it depletes the capacity of the landfill. The use of sludge in construction industry is considered to be the most economic and environmentally sound option. Due to the similar mineralogical composition of brick clay and water treatment plant sludge, this study focused on the reuse of sludge incorporated with silica fume in brick making through the sintering process. The study investigated the complete substitution of brick clay by water treatment plant sludge incorporated with silica fume (SF). In this study, three different series of sludge to silica fume (SF) proportions were studied, which exclusively involved the addition of sludge with ratios 25, 50, and 75% of the total weight of sludge-SF mixture. Each brick series was fired at 900, 1000, 1100, and 1200 °C. The physical and mechanical properties of the produced bricks were then determined and evaluated according to Egyptian Standard Specifications (E.S.S.) and compared to control brick made entirely from clay. From the obtained results, it was concluded that by operating at the temperature commonly practiced in the brick kiln, 50 % was the optimum sludge addition to produce brick from sludge-SF mixture. The produced bricks properties were obviously superior to the 100 % clay control-brick and to those available in the Egyptian market.

[Badr El-Din E. Hegazy, Hanan A. Fouad, and Ahmed M. Hassanain. REUSE OF WATER TREATMENT SLUDGE AND SILICA FUME IN BRICK MANUFACTURING. Journal of American Science, 2011;7(7):569-576]. (ISSN:1545-0740). http://www.americanscience.org

Keywords: Water treatment sludge – sludge disposal – clay – brick –silica fume.

Introduction

The sludge disposed during the treatment of surface water can be a major concern for water treatment plants. Most of the water treatment plants in Egypt discharges the sludge into the river Nile with no treatment at all. The discharging of sludge into water body leads to accumulative rise of concentrations in aluminum water, organisms, and human bodies. High concentrations of aluminum have been linked to occurrence of Alzheimer's, and children mental retardation [1]. Consequently, stringent standards of effluent discharge are coming into effect, and thus proper management of the sludge becomes inevitable.

The use of water treatment sludge in various industrial and commercial manufacturing processes has been reported in UK, USA, Taiwan, Egypt and other parts of the world. Successful pilot and full-scale trials have been undertaken in brick manufacture, cement manufacture, commercial land application, and artificial aggregate making. The mineralogical composition of the "water treatment sludge" is particularly close to that of clay [2]. This fact encourages the use of water treatment sludge in brick manufacture.

Several trials have been reported in this purpose. Research carried out in the UK, assessed the potential of incorporating aluminum and ferric coagulant sludge in various manufacturing processes including clay brick making [3]. A mixture consists of about 10 % of the water treatment sludge and sewage-sludge incinerated-ash was added to about 90 % of natural clay to produce the brick. Some other researchers also investigated the incorporating of two waste materials in brick manufacturing [4]. The study used waterworks sludge and the incinerated sewage sludge ash as partial replacements for traditional brick-making raw materials at a 5% replacement level. In Taiwan, a study had been made to use a mixture of water treatment plant (WTP) sludge and dam sediment as raw materials for brick making through the sintering process [5]. A satisfactory result was achieved when the ratio of the WTP sludge was less than 20% of the mixture. In another study, some researchers blended the water treatment sludge with the excavation waste soil to make bricks [6]. The conclusion of the study indicated that 15% was the maximum water treatment sludge addition to achieve first-degree brick quality. In Egypt, similar studies investigated the use of sludge as a complete or partial substitute for clay in brick manufacturing [7,8,9]. In

this trend, different series of sludge and clay proportioning ratios were tried, which involved the addition of sludge with ratios between 50 and 100 % by weight. Each series was fired at different temperatures between 950 and 1100 °C. The physical properties of the produced brick were then determined and evaluated according to E.S.S. From the obtained results, it was concluded that 50 % was the optimum sludge addition to produce brick from sludge-clay mixture.

Silica fume is a by-product of producing silicon metal or ferrosilicon alloys in smelters using electric arc furnaces. While these are very valuable materials, the by-product silica fume is of more importance to the concrete industry [10]. It falls into the general category of nuisance dust. Because of the name "silica fume" there are frequently questions raised regarding health issues of using this material in concrete. The general concern is with silicosis, which has been widely publicized within the construction industry. Because silica fume is amorphous and not crystalline, silicosis is not an issue. High dust concentrations may cause irritation to mucous membranes. Successful studies have been carried out on using silica fume in concrete making. Also, in an Indian study, active silica from silica fume (SF) was incorporated progressively in a whiteware composition in substitution of quartz [11]. This study indicated the possibility of using silica fume in brick manufacture due to its high content of amorphous silica.

Objectives of the Study

The main object of the study was to produce a lab scale brick units made of mixtures of water treatment plant sludge and silica fume with various ratios, through the sintering process, that meet the obligatory values of compressive strength, water absorption, and efflorescence assigned by the Egyptian Standard Specifications E.S.S. 1524/1993 [12] for load bearing bricks.

Also it was objected in this research to produce bricks that can compete with 100 % clay control-brick, which was made under the circumstances of the study, and most of the commercial brick types available in the Egyptian market.

Materials

The sludge used in the study was the coagulant sludge withdrawn from the clariflocculation tanks of the Giza Water Treatment Plant at Giza Governorate, Greater Cairo, in which aluminum sulfate was used in the coagulation process. The alum sludge is composed of about 1 % of suspended solids and 99 % of water, which is difficult to dewater. The chemical composition of sludge was identified by using the X-ray fluorescence (XRF) spectrometer according to ASTM C114-00. The complete chemical composition of alum sludge is summarized in Table (1).

Table (1): Chemical Composition of WTP Sludge

Ingredient	Ratio by weight(%)
SiO ₂	43.12
Fe ₂ O ₃	5.26
Al_2O_3	15.97
CaO	5.56
MgO	0.85
SO_3	1.49
Na ₂ O	0.52
K ₂ O	0.26
Cl	0.012
L.O.I	26.79

From Table (1), it is obvious that is the major chemical compositions of the sludge were silicon, aluminum, and iron oxides, which are extremely similar to the major chemical compositions of the brick clay, but with higher alumina content. The phase composition was identified by using the X-ray diffraction (XRD) diffractometer according to ASTM C114-00. The phase composition of alum sludge is shown in Figure (1).

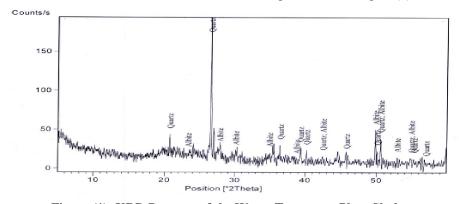


Figure (1): XRD Patterns of the Water Treatment Plant Sludge

The XRD scans were recorded from 5-60 °20. The XRD pattern of the water treatment plant sludge, shown in Figure (1), indicates the presence of two major crystalline phases, namely, quartz [SiO₂] and albite [Na Al Si₃ O₈]. These results indicate that the water treatment plant sludge presents, in its composition, minerals that are similar to those commonly occurring in brick clays.

The sludge was dewatered to achieve a concentration of suspended solids in sludge not less than 20 %. This process is accomplished by filtering the sludge through a specially designed filter. The details of that filter are shown in Figure (2). The concentration of the suspended solids of the sludge, which trapped in the sludge-concentrating layer, reaches 20 % after two days. The thickened sludge are then collected from the filter, distributed, spread and subjected to air drying and direct sunlight for at least 14 days. The dried sludge is pulverized using a pestle and mortar. The powder is then sieved through a series of sieves. The sieving process is done to separate the impurities and large particles (> 0.075mm) of sand that may be included within the sludge.

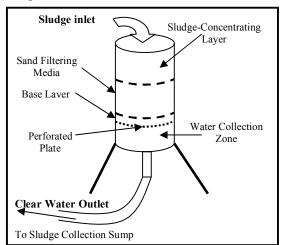


Figure (2): The Sludge Filter Used for Concentrating the Sludge

The last stage of sludge preparation process involves the removal of the organic content, which indicated by a relatively high value of loss on ignition (L.O.I) given in Table (1). This was done by burning the sludge at moderate range of temperatures ranged from 150 to 350°C for 1 and 2 hours period. It was found that, burning pulverized sludge dust at 350°C for 1 hour causes a loss in sludge weight equals 25%. This removal ratio of organic content could be accepted.

The clay used in this study was obtained from a local brick factory at Imbabah, Giza Governorate, Greater Cairo. The typical compositions

of such clay are quite variable in minerals proportions. The chemical composition of clay was identified by using the X-ray fluorescence (XRF) spectrometer according to ASTM C114-00. The complete chemical composition of alum sludge is summarized in Table (2).

Table (2): Chemical Composition of Clay

Ingredient	Ratio by weight(%)
SiO ₂	65.32
Fe_2O_3	7.51
Al_2O_3	13.89
CaO	1.09
MgO	0.95
SO_3	0.05
Na ₂ O	2.61
K ₂ O	0.75
TiO ₂	1.46
P_2O_5	0.28
L.O.I	5.87

From Table (2), it is clearly obvious that is the major chemical compositions of the clay were silica, alumina, and ferric oxide. This indicates the similar compositions of the water treatment plant sludge and the brick clay. The strength of the brick depends largely on the percentage of silica in the raw materials. So, it was anticipated that the clay is more suitable for brick making than the sludge due to its obviously higher silica content. Also, the very low value of L.O.I. indicates low organic content, which suggested that the removal or reduction of the organic content in the clay before sintering was not required. The phase composition of clay was identified by using the X-ray diffraction (XRD) diffractometer, according to ASTM C114-00. The phase composition of clay is shown in Figure (3).

The XRD scans were recorded from 0-30 °2 θ . The XRD pattern of the powder clay, shown in Figure (3), indicates the presence of five major crystalline phases, namely, kaolinite [Al₂ Si₂O₅ (OH)₄], montmorillonite [(Nax (Al,Mg)₂ Si₄ O₁₀ (OH)₂!z H₂O)], quartz [SiO₂], microcline [K Al Si₃ O₈], and illite-montmorillonite, regular [K- Al₄ (Si Al)₈ O₂₀ (OH)₄!x H₂O]. The clay is obtained in the form of large consolidated boulders, which require pulverizing and sieving before using in brick manufacturing, as in case of dried sludge. The clay is then oven dried to remove its moisture content.

The silica fume (SF) used in this study was the commercially available silica fume in the Egyptian market. The chemical composition was identified by using the X-ray fluorescence (XRF) spectrometer according to ASTM C114-00. The complete chemical composition of silica fume (SF) is summarized in Table (3).

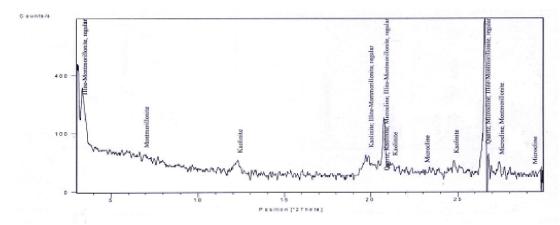


Figure (3): XRD Patterns of the clay

Table (3): Chemical Composition of Silica Fume

Ingredient	Ratio by weight(%)
SiO ₂	96.19
Fe_2O_3	0.47
Al_2O_3	1.41
CaO	0.01
MgO	0.75
SO_3	0.02
Na ₂ O	0.31
TiO ₂	0.01
L.O.I	0.81

From Table (3), it is evident that silica fume (SF) contains mainly silica, which is the major chemical composition of the brick clay and a small amount of alumina. As mentioned previously, the strength of the brick depends largely on the percentage of silica in the raw materials. These facts indicate that silica fume (SF) could be an excellent substitute for brick clay. The phase composition of SF was identified by using the X-ray diffraction (XRD) diffractometer, according to ASTM C114-00. The phase composition of silica fume (SF) is shown in Figure (4).

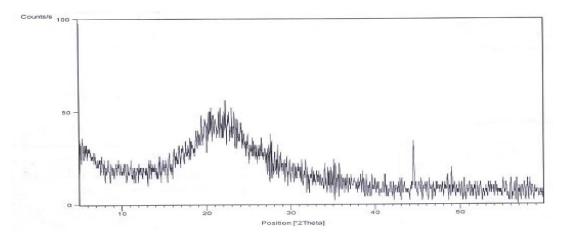


Figure (4): XRD Patterns of Silica Fume

The XRD scans were recorded from 5-60 °20. The XRD pattern of the silica fume (SF), shown in Figure (4), indicates that silica in the silica fume initially exists in the amorphous form, but will not remain porous and amorphous, when incinerated for a prolonged period at a temperature above 500° C [10]. These results indicate that silica fume (SF) presents, in its composition, amorphous silica that is similar to that commonly occurring in brick clays.

Sample Preparation

Four different series of mixing ratios were tried. However, the batching proportions of raw materials required to produce lab-scale brick with nominal dimensions of $(5 \times 5 \times 2)$ centimeters are shown in Table (4).

Table (4): Different Batching Proportions of Raw Materials

Brick Series	Proportions by Weight (%)						
Designation	Sludge SF Clay		Water (additional)				
Control Brick	0	0	100	30			
Series-A	25	75	0	40			
Series-B	50	50	0	50			
Series-C	75	25	0	50			

Several mixing and preparation techniques were attempted. The best sample preparation technique was adopted. Mixing of the raw materials includes two main steps, dry mixing and the blending with water. To ensure homogeneity in the properties of the mixture, mechanical mixing is adopted.

The placement of raw materials in the mould as one clot and the compressing of the mixture, using a hydraulic piston, into the brick nominal dimensions was the followed practice. This process is an analog for the extrusion machine, which is used in modern brick factories.

The drying of green molded bricks is then carried out in two steps. The first step is the enclosing and stacking of the green bricks in an air-tight box for not less than six days, till complete volumetric shrinkage takes place without cracking. The green bricks are then subjected to direct air drying and sunlight for another six days.

Each of the four brick series, which mentioned previously in Table (4), were then fired at four different firing temperatures, 900, 1000, 1100, and 1200 °C giving a 16 different brick types. The produced bricks were tested for mechanical properties.

Evaluation of Brick

The evaluated mechanical and physical properties of the manufactured bricks were namely, water absorption, efflorescence, and compressive strength. The test methods were carried out according to E.S.S. No. 48,619/ 2003 [13] and the results of these properties are evaluated according to E.S.S. No. 1524/1993 [12], as shown in Table (5).

Table (5): E.S.S. 1524/1993 Brick Specifications

Purpose	Compressive Strength (kg/cm ²)	Water Absorption (%)	Efflorescence
Load Bearing	35	27	Slight
Non Load Bearing	15	30	Slight

Results and Discussion

All tests were performed on $(5 \times 5 \times 2)$ centimeters prisms, to ensure the reliability of the results. The test results of the 16 different types of brick, which include the control clay brick, are listed below. The results were also compared to two of the commercial clay-brick types available in the Egyptian market, taking into consideration that all physical properties are comparable. With respect to mechanical properties, the use of $(5 \times 5 \times 2)$ centimeters prisms should under estimate the obtained strength of the research brick types. The first, which will be referred to as "commercial brick sample (1)", is a solid clay-brick type, while the other, which will be referred to as "commercial brick sample (2)", is a perforated wirecut clay-brick type.

The durability of the brick is largely dependent upon their water absorption. The water absorption test results are shown in Figure (5). The water absorption test results of control clay brick ranged between 9.94 and 11.18 %. On the other hand, the water absorption test results of sludge-SF brick ranged between 6.10 and 26.44 %, which comply with the requirements of the E.S.S. 1524/1993 for the load bearing walls. Compared to the control clay brick type, there were only two sludge-SF brick types that achieved lower water absorption than that of the 100 % clay brick type for the same firing temperatures, which contains 25 % of sludge (series A) and fired at 1100 and 1200 °C. The effect of firing temperatures on water absorption is attributable to the fact that increasing firing temperature ensures the completion of the crystallization process and closes the open pores in the sinter. While the effect of the sludge ratio is explained by the fact that increasing sludge ratio decreases the proportion of silica in the mixture which reduce the strength of the sinter and increase the open pores.

Compared to the commercial brick types, there were only four of the sludge-SF brick types that exhibited higher water absorption than Commercial Brick Sample (1), which attained 21.19 % water absorption. While only three types of the research sludge-SF brick types achieved lower water absorption than Commercial Brick Sample (2), which attained 10.77 % water absorption. These results are considered to be good enough to accept the water absorption ratio of the sludge-silica fume brick types.

Brickwork sometimes develops an efflorescence of white salts brought to the surface by water and deposited by evaporation. These salts may have an external origin, like the water in soil in contact with the brickwork, or may derive from the mortar. However, the salts frequently originate in the bricks themselves. Visible efflorescence can be formed from very small amounts of salts.

Efflorescence may be disfiguring but it is often harmless and disappears after a few seasons. However, efflorescent salts may contain a high proportion of sulfates and may cause sulfate attack on the cement mortar joints. The efflorescence was of "Nil" class for all of the control clay brick and

sludge-SF brick types, which comply with the requirements of the E.S.S. 1524/1993. These results could be considered as an indicator for the very low values of soluble salts content of the brick. Also, the commercial brick types exhibited no efflorescence.

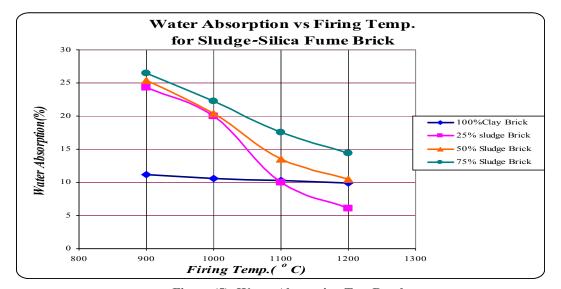


Figure (5): Water Absorption Test Results

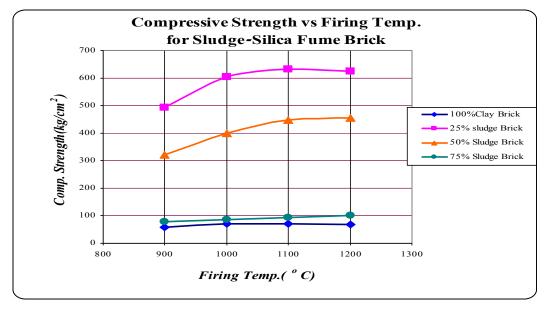


Figure (6): The Compressive strength Test Results

Compressive strength determines the potential for application of the bricks. Compressive strength is usually affected by the porosity, pore size, and type of crystallization. It is usually defined as the failure stress measured normal to the bed face of the brick. The compressive strength test results are shown in Figure (6). The compressive strength test

results of control clay brick ranged between 58.09 and 69.44 kg/cm². On the other hand, the compressive strength test results of sludge-SF brick ranged between 78.54 and 632.14 kg/cm², which comply with the requirements of the E.S.S. 1524/1993 for the load bearing walls. According to these results, the sludge-SF brick could be used in

brickworks that require high strength. The effect of firing temperatures on compressive strength may be attributable to the fact that increasing firing temperature ensures the completion of the crystallization process, closes the open pores in the sinter, and, consequently, increases compressive strength of the crystalline aluminosilicate brick. While the effect of the sludge ratio is explained by the fact that increasing sludge ratio decreases the proportion of silica in the brick mixture, which, consequently, increases the open pores and reduce the compressive strength of the crystalline aluminosilicate sinter. Compared to the control clay brick, all of the sludge-SF brick achieved higher compressive strength than that of the control clay brick type for the same firing temperatures. Compared to the commercial brick types, all of the sludge-SF brick types achieved higher compressive strength than Commercial Brick Sample (1), which attained 27.51 kg/cm² compressive strength. While only one type of the research sludge-SF brick types achieved lower compressive strength Commercial Brick Sample (2), which attained 79.57 kg/cm² compressive strength. Generally, the compressive strength of all the research sludge-SF brick types is superior to that of the control clay brick types and the commercial clay-brick types that available in the Egyptian market. It should be noted that the use of $(5 \times 5 \times 2)$ centimeters prisms as brick will significantly reduce the compressive strength compared to similar sample of $(25 \times 12.5 \times 6.5)$ centimeters size [14].

Conclusions

Based on the experimental program executed in this research, and limited on both the tested materials and the testing procedures employed, the following conclusions had been reached:

- 1. Brick can be successfully produced from water treatment plant sludge incorporated with industrial waste materials; which contain high silica content; under the conditions, mixing proportions, firing temperatures, and manufacturing methods used in this study.
- 2. The water treatment plant sludge almost resembled the brick clay in its chemical composition but higher sintering temperatures are required, if used as a partial substitute for brick clay incorporated with industrial waste materials, due to its lower silica and higher alumina contents.
- 3. Incineration of water treatment plant sludge is needed before using in brick manufacturing to evaporate the major part of its relatively high organic content, which indicated by its high loss on ignition (L.O.I) value.

- 4. The physical properties of sludge brick can be enhanced by the addition of some industrial waste materials; which contain high silica content; such as silica fume, but the maximum percentage of water treatment plant sludge, which can be used in the mixture, is dominated by the practiced firing temperatures.
- Generally, the test results of the research brick types were superior to both the research control clay brick types and commercial clay brick types available in the Egyptian market.
- 6. By operating at the temperatures commonly practiced in the brick factories and based on the experimental program executed in this research, and limited on both the tested materials and the testing procedures employed, 50 % was the optimum sludge addition to produce brick from sludge and silica fume mixture.

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Effect of Nigella Sativa Supplementation in Diet on Metabolic Syndrome in Aged Rats

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Abstract: Metabolic syndrome is a serious health problem that is increasing worldwide particularly in aged people due to increased fructose intake in processed foods as well as physical inactivity. The present study was conducted to investigate the effect of dietary supplementation with ground seeds of Nigella sativa on the criteria of metabolic syndrome in aged rats. The present study was carried out on 52 aged Wistar male albino rats (18-20 months). Rats were allocated into the following 3 groups: Control rats C (n=20) fed standard rat diet; metabolic syndrome group M (n=14) fed high fructose diet (60 % of diet in the form of pure fructose) and metabolic syndrome/Nigella sativa group M/NS (n=18) fed high fructose diet as M group but mixed with ground seeds of Nigella sativa (1.7 g/ Kg diet) to achieve daily intake of Nigella sativa (180 mg/Kg b.w). Throughout the study, rats were examined for daily food intake and weekly body weight. After 4 weeks, rats were subjected to estimation of the following parameters; final body weights, body mass index (BMI) and serum levels of glucose, insulin, total cholesterol, HDL-c, LDL-c, VLDL-c and adiponectin. Insulin resistance was estimated by calculating HOMA-R. Histopathological examination of rat livers, kidneys and brains was also done. Obtained results revealed that visceral fat weight increased significantly in M group compared to C group and decreased significantly in M/NS group compared to M group. Both M and M/NS groups had significant increase in serum levels of fasting glucose, insulin, total cholesterol, LDLc. VLDL-c and HOMA-R as well as significant decrease in serum adiponectin compared to C group. However M/NS group showed significant decrease of serum levels of fasting glucose, insulin, total cholesterol, LDL-c and HOMA-R as well as significant increase of serum adiponectin compared to M group. Histopathological examination revealed vascular congestion in the liver and kidneys, necrosis of hepatocytes and renal tubular cells as well as focal cerebral hemorrhage in M group and almost normal histological picture in M/NS group. In conclusion; Nigella sativa seeds co-feeding with high fructose diet improved some criteria of metabolic syndrome in aged rats. [Nehal M. Bahgat and Ghada Z.A. Soliman Effect of Nigella Sativa Supplementation in Diet on Metabolic

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Key words: HOMA-R, metabolic syndrome, dyslipidemia, fatty liver, adiponectin, visceral adiposity.

Introduction:

Third Report of the National Cholesterol Education Program -Adult Treatment Panel III (ATPIII) report (2002) identified the metabolic syndrome as a clustering of metabolic complications of obesity and that it constitutes a multiple of risk factors that deserve more clinical attention. Individuals with metabolic syndrome are susceptible to cardiovascular disease (CVD) ,type II diabetes, polycystic ovary syndrome, fatty liver, cholesterol gallstones, asthma, sleep disturbances, and some forms of cancer (Lorenzo et al., 2007). ATP III report (2002) identified 6 components of the metabolic syndrome that relate to cardiovascular risk which are abdominal obesity, atherogenic dyslipidemia, raised blood pressure, insulin resistance ± glucose intolerance, proinflammatory state, prothrombotic state. An individual that meets three or more of these criteria yields a clinical diagnosis of metabolic syndrome (Kraja et al., 2006).

The number of individuals with metabolic syndrome is increasing worldwide, constituting a

major social problem in many countries (*Lim et al.*, 2010). Several population studies have reported an increase in the prevalence of the metabolic syndrome with age with more susceptibility to morbididty and mortality (*Sanisoglu et al.*, 2006 and Hildrum et al. 2007).

The black seed, *Nigella sativa* (NS), a member of the family of ranunculaceae, contains more than 30% of fixed oil and 0.4-0.45 % wt/wt of volatile oil which contains 18.4-24% thymoquinone (TQ) and 46% many monoterpenes such as p-cymene and α-piene (*El-Kadi and Kandil*, 1987). Clinical and animal studies have shown that extract of the black seeds has immunomodilative (*Hanafy and Hatem, 1991*), antibacterial (*Zaoui et al., 2000*), hypotensive (*Turkdogan et al., 2001*), hepatoprotective (*Kanter et al., 2003*) and antidiabetic effects (*Bamosa et al., 2002*).

The present study was conducted on aged rats fed high fructose diet to find out if *Nigella sativa* ground seeds co-feeding with high fructose diet could prevent or ameliorate criteria of metabolic syndrome.

Material and Methods Experimental animals:

This study was approved by the high society of scientific ethic committee of NNI (National Nutrition Institute) & GOTHI (General Organization for Teaching Hospitals and Institutes).

The present study was carried out on 52 aged male Wistar albino rats (18-20 months) purchased from Helwan Animal Farm and were housed in National Nutrition Institute (NNI). All rats were housed individually in wire meshed cages. Animals were fed *ad libitum* on water and the standard rat diet (AIN-93 M diet formulated for adult rodents) prepared according to the National Research Council (NRC), 1978 and Reeves et al. (1993). Rats were randomly allocated in three groups:

Control group C (n=20): comprised of rats fed standard rat diet.

Metabolic syndrome group M (n=14): comprised of rats fed high fructose diet (60 % of diet in the form of pure fructose). Fructose was added as 100% pure powder (SAFI) as described by *Kasim-Karakas et al.*(1996).

Metabolic syndrome and Nigella sativa group M/NS (n= 18); comprised of rats fed high fructose diet as M group and supplemented with ground seeds of Nigella sativa (1.7 g/ Kg diet) to achieve a daily dietary intake of (180 mg/kg b.w) modified from Buriro and Tayyab, (2007). The mean daily intake of Nigella sativa per rat was calculated to be 54±1.5 mg.

Throughout the study period, rats were examined for daily food intake and weekly body weight. After 4 weeks, rats were fasted overnight, weighed and anesthetized by thiopental sodium (40mg/kg b.wt.: i.p). The animal was placed on its back, fixed on the dissecting table, and the length of the rat was measured from the tip of the nose (while the neck is extended) to the anus to calculate body mass index (BMI) according to the following equation BMI= Body weight (Kg)/ length (m²) (Guyton & Hall 2006). A midline abdominal incision was made, the abdominal aorta was exposed and blood samples were collected in plastic tubes, centrifuged at 4000 r.p.m. for 15 minutes to separate serum which was stored at - 80°C for later biochemical study. Visceral fat was excised and weighed with 5 Digit-Melter balance (AK 163).

Biochemical assay of serum levels of:

Glucose using (Randox kit) according to Barham and Trender (1972), insuln using rat insulin ELISA kit EIA 2018 (DRG international inc, USA) according to Korner et al. (2001). Total cholesterol (TC), using Bio Mérieux kit according to Richmond (1973) and Allain et al. (1974), HDL-c using Bio Mérieux kit (Burstein et al., 1970 and Lopes Virella

et al., 1977), LDL-C was determined using Bio Mérieux kit (Friedewald et al., 1972, Levy et al., 1981 and Fruchart, 1982), serum adiponectin using Alpco ELISA kit for rat adiponectin (ALPCO Diagnostics) according to the method described by Shimada et al., (2004).

VLDL-c was determined by using the following equation: VLDL-c=total cholesterol-(HDL-c +LDL-c).

The homeostasis model assessment of insulin resistance (HOMA-R), an index of insulin resistance was calculated from the product of the fasting concentrations of plasma insulin (microunits per milliliter) and plasma glucose (millimoles per liter) divided by 22.5 according to *Matthews et al.*, (1985).

Histopathological study

Livers, kidneys and brains of rats were excised and kept in 10% formaline for histopathological examination, dehydrated, cleared in zylol and embedded in parablast. Paraffin sections were cut serially at 6 μ m thickness and stained by Hematoxylin and Eosin (Hx & E) as described by *Drury and Wallington* (1980).

Statistical Analysis:

All statistical data and significance tests were performed by using SPSS (Statistical Program for Social Science) statistical package (SPSS Inc) version 8.0.1 according to *Armitage and Berry* (1987). Statistical significance was determined by one-way ANOVA (analysis of variance) for differences between means of different groups; further analysis was made by LSD (least significance difference) to find intergroupal differences. A probability of P< 0.05 was considered statistically significant. Correlations and Lines of Regression were calculated by linear regression analysis using the Least Square Method. A probability of (P<0.05; 2tailed) was considered statistically significant .All data were expressed as mean ±SEM.

Results

In the fourth week of the study M rats exhibited 30% death rate compared to 10 % death rate in M/NS rats.

Food intake, initial and final body weight, weight gain and BMI were not significantly different among the three studied groups. However, visceral fat weight increased significantly (P < 0.05) in M group compared to C group and decreased significantly (P < 0.05) in M/NS group compared to M group approaching normal control values. Serum adiponectin level decreased significantly (P < 0.05) in both M and M/NS groups compared to C group but

increased significantly (*P*<0.05) in M/NS group compared to M group (Table 1).

Serum levels of glucose, insulin as well as HOMA-R increased significantly (P < 0.05) in M and M/NS groups compared to C group and decreased significantly (P < 0.05) in M/NS group compared to M group (Table 2).

Serum levels of total cholesterol, LDL-c and VLDL increased significantly (P < 0.05) in M and M/NS groups compared to C group. Total cholesterol and LDL-c showed significant (P < 0.05) decrease in M/NS group compared to M group, while HDL-c was not significantly different among the three studied groups (Table 2).

Correlation study in M and M/NS groups revealed that visceral fat weight correlated significantly and positively with serum levels of glucose, insulin, HOMA-R, total cholesterol, LDL-c,VLDL-c and negatively with serum levels of adiponectin (Table 3; Figs. 1,2).

Histopathological examination of livers of M rats showed congestion of central vein and blood sinusoids, necrosis of hepatocytes in the form of pyknosis of their nuclei and hepatocellular vacuolations. Livers of M/NS group exhibited less extensive changes in the form of congestion of central veins (Figs. 3; a.b.c).

Histopathological examination of the kidneys from M rats showed necrobiotic changes of epithelial lining of renal tubules and congestion of renal blood vessels. These changes were less extensive in the kidneys of M/NS rats (Figs. 4; a.b.c).

Histopathological examination of brains from M rats showed focal gliosis, pyknosis of neurons and focal cerebral hemorrhage. Brains from M/NS rats showed pyknosis of some neurons and neurophagia of pyknotic neurons (Figs. 5; a.b.c).

Table (1): Changes in initial body weight (IBW,g),final body weight (FBW,g),weight gain (WG,g), food intake (g), Body mass index (BMI, Kg/m²), visceral fat (VF,g) and serum adiponectin (ADPN, ng/ml) in control group (C), metabolic syndrome group (M) and metabolic syndrome/*Nigella sativa* group (M/NS).

Groups	IBW	FBW	WG	Food intake	BMI	VF	ADPN
	(g)	(g)	(g)	(g)	(Kg/m^2)	(g)	(ng/ml)
$\mathbf{C}(n=20)$	295.6±3.7	356.8±5	61.2±2.3	30.7±0.6	8.8±0.1	9.6±0.2	1.06 ± 0.04
M(n=14)	296.2±6.7	364.2 ± 7.6	68.1±4	31.1±0.5	8.5 ± 0.3	25.6 ± 2.1^{a}	0.4 ± 0.02^{a}
M/NS(n=18)	305.1±3.5	367.5±1.8	62.3±2.7	31.7±0.6	8.4 ± 0.1	11.8 ± 0.3^{b}	0.5 ± 0.01^{ab}
P	NS	NS	NS	NS	NS	< 0.001	< 0.001

a:significance by LSD at significance level P< 0.05 from C group.

b:significance by LSD at significance level P < 0.05 from M group.

P: significance by one way ANOVA among the three studied groups.

NS: not significant

In parenthesis is the number of rats.

Table (2) :Changes in serum levels of glucose (S.glucose , mg/dl), insulin (S.insulin , μU/ml),total cholesterol (TC, mg/dl), high density lipoprotein cholesterol (HDL-c, mg/dl), low density lipoprotein cholesterol (LDL-c,mg/dl), very low density lipoprotein cholesterol (VLDL-c, mg/dl) and HOMA-R in control group (C), metabolic syndrome group (M) and metabolic syndrome/*Nigella Sativa* group (M/NS).

Groups	S. glucose	S. insulin	HOMA-R	TC	HDL-c	LDL-c	VLDL-c
	(mg/dl)	$(\mu U/ml)$		(mg/dl)	(mg/dl)	(mg/dl)	(mg/dl)
C(n=20)	87.9±0.8	12.2±0.1	2.6± 0.04	84.6±0.8	34.7±0.3	34.1±0.4	15.8±0.7
M(n=14)	138.1 ± 4.4^{a}	30.8 ± 0.3^{a}	10.5 ± 0.3^{a}	219.4±2.1 ^a	35.2 ± 0.5	154.7 ± 1.4^{a}	29.4 ± 2.4^{a}
M/NS(n=18)	106.7±1.6 ^{ab}	14.2 ± 0.2^{ab}	3.7 ± 0.08^{ab}	120.5±1.8 ^{ab}	35.1±0.7	58.8 ± 1.2^{ab}	26.6 ± 1.2^{a}
P	< 0.001	< 0.001	< 0.001	< 0.001	NS	< 0.001	< 0.001

a:significance by LSD at significance level P< 0.05 from C group.

b:significance by LSD at significance level P< 0.05 from M group.

P: significance by one way ANOVA among the three studied groups.

NS: not significant

In parenthesis is the number of rats.

Table (3): Correlations of visceral fat weight versus serum levels of total cholesterol, LDL-c, VLDL-c, glucose, insulin, adiponectin (ADPN) and HOMA-R in metabolic syndrome group (M) and metabolic syndrome/*Nigella Sativa* group (M/NS).

Groups		Glucose (mg/dl)	Insulin (µU/ml)	HOMA-R	TC (mg/dl)	LDL-c (mg/dl)	VLDL-c (mg/dl)	ADPN (ng/ml)
M (<i>n</i> =14)	r	0.79	0.87	0.85	0.87	0.82	0.95	-0.77
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
M/NS(n=18)	r	0.71	0.88	0.83	0.7	0.68	0.47	-0.77
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001

r: correlation coefficient

P is significance at 0.05 level

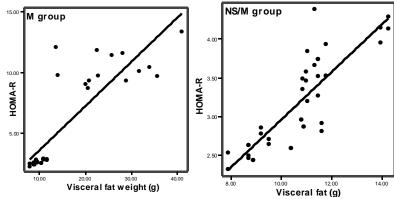


Fig. (1);Correlation of visceral fat weight (g) versus The homeostasis model assessment of insulin resistance (HOMA-R) in metabolic syndrome group (M) and metabolic syndrome/*Nigella Sativa* group (M/NS).

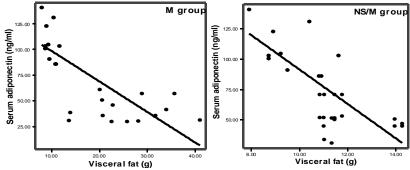


Fig. (2); Correlation of visceral fat weight (g) versus The homeostasis model assessment of insulin resistance (HOMA-R) in metabolic syndrome group (M) and metabolic group /*Nigella Sativa* (M/NS).

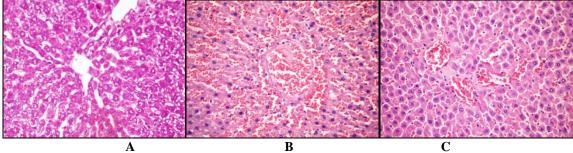


Fig. (3): (A) Microscopic examination of liver of C rat showing normal histological picture. (B) Liver of M rat showed congestion of central vein and blood sinusoids, necrosis of hepatocytes in the form of pyknosis of their nuclei and vacuolations. (C) Livers of M/NS group with almost normal picture (Hx & E 400 x).

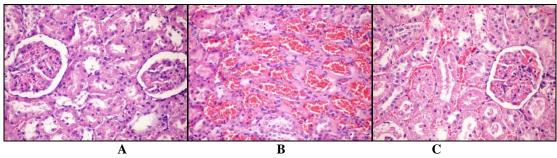


Fig. (4): (A) Microscopic examination of kidney of C rat showing normal histological picture of renal corpuscles and tubules. (B) Kidneys of M rats showing congestion of renal blood vessels and necrosis of tubular cells. (C) Kidneys of M/NS group showing less vascular congestion and less necrosis of tubular cells (Hx & E 400x).

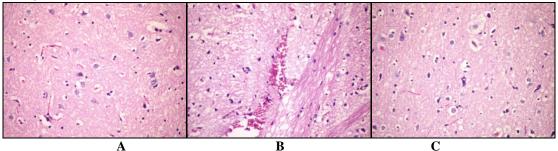


Fig. (5): (A) Microscopic examination of brain of C rat showing normal histological appearance of brain tissue. (B) Brain of M rats showing focal gliosis, pyknosis of neurons and focal cerebral hemorrhage. (C) Brain of M/NS rats showing pyknosis of some neurons (Hx & E 400x).

Discussion

Metabolic syndrome increasing worldwide due to increased fructose intake and sedentary life style. The current investigation revealed that rats fed high fructose diet (M group) for 4 weeks developed three criteria of the metabolic syndrome namely visceral adiposity, insulin resistance and atherogenic dyslipidemia in the form of increased total cholesterol, LDL-c and VLDL-c. The high death rate in M compared to M/NS rats suggests development of fatal complications by the end of the study. Histopathological examination rat livers, kidneys and brains revealed vascular congestion, cellular degeneration, necrosis and cerebral hemorrhage in M group which might explain the higher death rate in this group. The observation that M rats developed significant visceral adiposity as early as 4 weeks of high fructose feeding without significant change in final body weight indicates that visceral adiposity and not obesity that contributed to the development of metabolic syndrome and its complications. The observation that food intake was not significantly changed among the three studied groups suggests that metabolic syndrome might evolve with normal food and energy intake if fructose comprised an increasing proportion of the ingested food. Fructose-induced visceral adiposity might be due to hypertriglyceridemia and development of hepatic insulin resistance (Tappy et al., 2010). Excess visceral fat was found to increase level of inflammatory mediators like IL-6 and TNF- α which were reported to be implicated in insulin resistance (Cartier et al., 2008). Our study demonstrated that visceral fat weight correlated significantly and positively with insulin resistance and dyslipidemia which agree with Yatagai et al .(2003) and negatively with serum adiponectin, a correlation previously validated in human patients with increased waist -hip ratio (Nasseri et al., 2008) as well as normal men (Nakamura et al., 2009). The absence of any significant difference in BMI between M and C group excludes the contribution of total body fat to hypoadiponectinemia as recently reported by Nasseri et al. (2008). Decreased seum adiponectin with increased visceral adiposity would be expected to deprive the animal from a natural antinflammatory (Alkharfy et al., 2011) antioxidant (Kruk et al., 2000), cardioprotective (Kondo et al., 2010) and hepatoprotrctive (Hamed et al., 2011 and Latif et al., 2011) molecule which might explain the vascular and cellular microscopic changes observed in M rat livers, kidneys and brains. Finding the causative link between visceral adiposity and hypoadiponectinemia in metabolic syndrome might be helpful in establishing a prophylactic approach to the complications of metabolic syndrome particularly in

old age. The contribution of visceral adiposity to insulin resistance was demonstrated in our study by the significant positive correlation between visceral fat and HOMA-R and was in accordance with previous reports in human and animal models of metabolic syndrome (Barzilai et al., 1999; Frayn, 2000 and Yatagai et al., 2003). However, the mechanism underlying this correlation has not been well elucidated. Proposed mechanisms included visceral fat lipolysis and enhanced non-esterified free fatty acid flux into the portal vein blood to the liver (Frayn, 2000) as well as hypo-adiponectemia (Yatagai et al .,2003). Hypercholesterolemia observed in M rats in the current study was due to increased LDL and VLDL fractions rather than HDL which was consistent with the ATPIII (2000) criteria of metabolic syndrome. Insulin resistance might have contributed to this unfavorable lipid profile due to increased LDL and VLDL synthesis by the liver as well as decreased removal from the circulation (Ganong, 2001).

Nigella Sativa seeds supplementation with the high fructose diet in M/NS rats decreased visceral insulin resistance, hyperlipidemia adiposity, hypoadiponectinemia and alleviated histopathological abnormalities seen in M group. This beneficial outcome of Nigella Sativa came in accordance with the results of Hildrum et al. (2007); Najmi et al. (2008) and Parhizkar et al. (2011). Amelioration of all criteria of metabolic syndrome by Nigella sativa despite continued intake of the high fructose diet indicates that it targeted the mechanism responsible for eliciting this syndrome which might be visceral adiposity or insulin resistance. Nigella sativa seeds was reported to possess hypoglycemic (Benhaddoual., 2010), hypolipidemic, Andaloussi etantinflammatory and antioxidant properties (Abd-El-Fattah et al., 2000; Kruk et al., 2000 and Alkharfy et al., 2011). The cholesterol- lowering effect of Nigella Sativa was reported to be due to either inhibition of de novo cholesterol synthesis by downregulating 3 hydroxy -3-methylglutaryl-coenzyme A reductase (HMGCR) genes in HepG2 cells as reported by Al-Nageep et al. (2009) or stimulation of bile acid excretion (Bamosa, 1997). The significant decrease in LDL-c was reported to be due to upregulation of LDL –receptor gene (Al-Nageep et al., 2009).

Previous interventions to metabolic syndrome aimed at modification of the life style of patients by restricting caloric intake, promoting physical activity and encouraging intake of polyunsaturated fatty acids. However, elderly people may not always yield to these approaches partially due to low compliance or the presence of associated health problems that limit physical activity.

The present study showed that increased fructose content in diet for 4 weeks resulted in development of metabolic syndrome in aged rats with appearance of vascular and cellular degenerat changes. *Nigella Sativa* co-feeding with high fructose diet conferred protection against the development of three criteria of metabolic syndrome which could be of value for aged people particularly those who cannot engage in other therapeutic or prophylactic regimens.

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Broadcast Story Genre Survey in Television

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Abstract: Present article is taken away of a research about practical analysis of Genres of journalism that has made don by relying on Post-consultative science, in this research because of closeness of some Genres with literary text, researcher particularly, has tried to pay surveying Genre of broadcast story writing which is named Ucherck. Investigating model of this research is chronological order of events model and in this angle it is paid to influence of literary Genres on mind of viewers and their memorization. On this basis of texts of some broadcast story in visual angle of an individual (individual-based) and on the basis of occurrence time (time-based) has been written and then into rate of perception and memorizing information issued in news, the addresses were assessed. Results of this research is showing the matter that story news writing by observance of sequence of occurrence in news stories in comparison with non-time-based does not result to perception and understanding and better memorizing of realities information existent in broadcast story.

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Keywords: Publicity Genres, Ucherk Genre, chronological story structure, non-chronological story structure, individual story structure, non-individual story structure.

1. Introduction

In researches of many industrial countries. television news are known as the most trustworthy resources in forming of public thoughts, and addressees also know the television as the most important resource for receiving information. For viewers of television news, perception of what they observe is important, because they use them in general conversation and form their social ideas and believes. Since the news consider its spoken through represents documented and live pictures of report subject and live interviews of news resources, it is supposed that it will be remained in mind of addressee (Klein 2003). But last studies have shown that even if viewers remember information existing in television news, it is possible that this information is fault or its meaning is ambiguous. A research shows that out of whole information related to a television news agency more than one third of people can remember, had not been accurate (Jacoby-Hoyer 1982).

Newspaper stories mostly follow of reverse pyramidal structure and on this basis author holds outline of events on the basis of their importance and brings up the most important issues in introduction. But in some news agency the use of a style that in it topic of news is brought up at first and then the cause is explained, then text of news will continue (Stovall, 2002). But finally manner of telling the subject in news agency seldom depends on existent and available pictures, the amount of information of reporter and the rate of existent time for assembling story. Authors and producer of news in the case of

having suitable time, sometimes use of story or timebased (Chronological order) (Keller and Hawkins. 2002). This style is different from time-based style. because in it the story begins by an adventure that occurs first, then adventure is specified and topic and its related details by observance of time sequencing is declared. Main feature of story style in evident occurrence sequence model which base of this research, is that story be explained by sequence of time of occurrence and introduction and conclusion in the following it and then compared with a story in which sequence of occurrence time has not explained. May we can say that the best way for telling broadcast story in television is this literary style, in which reporters tells their stories from an individual vision angle (Murray, 1998) (in postconsultative science it is named Oucherk). In another side the best model of writing news is moving from the most attractive part to least attractive part of it. This research by set forth of four hypothesizes and two questions compare perception of addressees of time-based story and non-chronological based story structure in broadcasting of news. In addition, this research, surveys the effect of telling story from insight of a person of news subject on perception and memorizing of addressee.

2. Theoretical Basics of Research:

In most of news agencies, they use simple text for achieving their goal and attraction of addressees. This text could has information nature or as analysis (publicity) or be written in a literature type method (Grasser, 2002). Publicist's writings are on the basis

of current social situations. On this basis publicist use journalistic medium such as statement, thoughtnewspapers, radio and television because of their speed in delivering matter and transfer it to society. Journalistic nature of publicity when appears that it is published in medium but it does not mean that each publicist's writing is journalistic. Since journalist deliver news and publicist analyses it.

Publicist Genres in television include: News, explain events, plays about economic, art and literature, science, etc. Since in them information are given around special matters. If in a media such as television journalist and publicist have jointly cooperation, publicity of journalistic medium becomes comprehensive and this causes success of media in attraction of addressee, of course it is final goal of each media. Publicity Genres are divided into three complementary groups.

- News Genres. Intent of these publicities is to accelerate in giving information and accurate analysis. Content base of these Genres is logic of realities and or events and consist of news, interview, reportage. News Genres have special characteristics, new reality and having social importance, relatively little analysis which is result of briefing of truth and low use of literary elements.
- 2) Analytical Genres. In this group of Genres there are article, borrowing, composition, and summary of newspapers. Among important features of these Genres, is paying to idea on the basis of several truth related to each other
- 3) Third group is named as publicity and literary which is considered by researcher in this research. Publicity and literary Genres utilize both publicity element and literary element and the aim is speed in statement and nice statement and literary formation of subject arise from its content. These Genres are about persons and events that are determined in specified name and place and mean of literary statement of subjects is paying to nature and its manner.

Publicist and literary Genres are held in two separated category. First category: Tablet, Genres Ucherk which explains event and person and creates characters in detail.

Other genres of this group have paid to ridicule and penetration of negative events of society are named satirical genres and filitan and Pamphlet are of their examples. Their difference of literary satire is that they lie on reality.

Genre Ucherk is a mix of journalistic and literature and instead of reporting event, picture the

event itself. Genre Ucherk (story news writing) is a mix of newspaper and literature style. This genre in look of form and literary structure is similar to genre of story, but in this genre realities are used and value is given to realities. In this genre main character should be introduced in his true name and descent and author cannot plan the flow of event according to his desire. This genre asserts that event clearly and correctly pictured, because in case of doubt about event, addressee on the basis of provided specifications can refer to issued specifications about introduced character. For writing the story main character of story should be deeply perceived and reveal it by all specifications and wishes and goals. to addressee can aware of manner of living of character, imitate him/her or avoid him/her. In classification of this literary genre divided in to three groups. Portrait Ucherk which is named "individual-based" and Ucherk problematic in which report during explaining a work represent the role of persons who participated in this work and the aim of this type is to plan the problem and the other is travelling Ucherck which in this type the reporter in collection of what he has heard and seen, only choose and picture the things that is goal, in this genre when author wants to draw the event as clearer to increase its influence, pictures some implicit events or in case of important, or take action to write them in the case of times of occurrences. But we should know without four factors: character, problem, effect and to explain solution, writing story (Genre Ucherk) is not achieved its goal. Author by using literary skills, during deep relation which arises from joining life of reader to main character of story, provides more perception of story.

According to R. Fisher Walter – Communication Expert (March 1989), human originally is narrator of events. According to this theory, being narrator of humans is on the basis of writing story. In this insight, retelling events is one of the main features of nature of human. In other word, humans are experiencing and understanding life such as number of current stories, such as conflicts, special features which has beginnings, middles and ends.

But in this among, creator of literary text should effort in selection of subject, then writing subject, literary forming of story, to both be acceptable for reader and more attract senses of addressee (Y CMOHOB H., 2009) and thus news in form of story news melodrama has the highest rate of notice and memory near addressee.

3. Reporter and Drawing Attention of Addressee

Reporter for drawing attention of addressee to news by writing text as documented melodrama, broadcast story melodrama, during providing remembered aim, close news to addressee and resulted in better memorization of it. Upon this, another research scopes about television news is assessment of rate of addressees' understanding and memorization of a news program. Reason of interesting of researchers to addressee's memory is hidden in this reality that the first step in investigation of effect of new on an addressee is assessment of memory of him/her immediately an hour then or even many days after viewing the news. Because, if a news didn't remind in memory of addressee and he/she does not remember it, in view of researchers we cannot claim that news has influenced on memory of addressee and thus, make a relation between two factors of form of presenting new and resulted changes in memory of addressee. Researches show that whatever the rate of attention to a news program is more, perception of addressee of mentioned news also naturally is became more and finally memory of addressee goes higher than content of mentioned news. In this subject, whatever, making more interesting the news, i.e, increasing the rate of entertainment in a news program, is one of the important methods in direction of drawing attention and improving memory. On the basis of Brown Yensen's researches addressees, news report in the form of simple and human broadcast story create higher rate of memory among addressees.

Therefore, with regard to mentioned views mentioned theories, research model I used in my plan is sequence of occurrences of events to can pay to inspection of effects on this genre. In this model occurrences in account of important (unchronological-based) or through chronological based (occurrence moments) is considered that with regard to individual-based was brought up at the first of this theory, we can classify them as bellow and use them. 1) Chronological based, individual-based broadcast story structure; 2) non-chronological based individual-based broadcast story structure; 3) nonindividual and non-chronological based broadcast story structure; 4) individual-based, chronological based broadcast story structure.

4. Research Background:

The goal of story comprehension is to obtain a coherent representation of the situation in long-term memory (Zwaan & Radvansky, 1990). Retrieval of this information depends upon how many situation models are created during the original exposure to the story. resulting in either a longer time to recall specific information or no information may be retrieved. However, if there is a single situation model created, there is less interference, resulting not only in a more coherent representation, but shorter retrieval time in recalling related facts. Zwaan and his

colleagues(Radvansky, Zwaan, Federico, & Franklin, 1998; Zwaan, Langston, & Graesser, 1995; Zwaan et aI., 1995; Zwaan & Radvansky, 1998) conducted a similar study using "talking head" broadcast stories on a space shuttle trip and skydiving. Two versions of the stories were used between participants-the original broadcast story and a version rewritten in chronological order. In order to test for accuracy of memory, a multiple-choice test was administered immediately after the mini-newscast. Although the study did not find support for a main effect for story style, the author found that the skydiving story written in the chronological narrative produced more accurate memory than the same story written in nonchronological style. We use situation models to comprehend texts. As we follow a text, we construct a situation model based on this text. As new information is encountered, we incorporate this information based on the situation model currently in memory. Kelley (2003) conducted a similar study using "talking head" broadcast stories on a space shuttle trip and skydiving. Two versions of the stories were used between participants-the original broadcast story and a version rewritten in chronological order. In order to test for accuracy of memory, a multiplechoice test was administered immediately after the mini-newscast. Although the study did not find support for a main effect for story style(e.g., Brosius, 2003; Brosius & Bathelt, 1994; Gibson & Zillmann, 1994; Zillmann, 1999; Zillmann & Brosius, 2000), the author found that the skydiving story written in the chronological narrative produced more accurate memory than the same story written in nonchronological style. if a story is explained through one person's point of view, viewers are able to comprehend these stories better than if the story has little personalization. Personalization of a news story. that is, referring to a central news source and how that person is affected by the story's event, can reflect narrative discourse. Similar to a protagonist of a story, a news subject explains his or her own version of the news event. Details about the news event can be weaved into this story, compared to a standard news story that reports several facts and several points of view. Situation models are used to interpret and evaluate later information an individual might encounter(Bower & Morrow, 1990; Schank & Abelson, 1995; Wyer, 2004). Exemplification theory suggests that comprehension of concrete examples is much better than abstract information. Because comprehension for these exemplars is better, they are more easily retrieved later. Research investigating the effect of exemplars on judgments relies on the assumption that these case histories are more vivid, and therefore create stronger memory traces than base rate, or more statistical information A situation

model could have an exemplar, or a person, as the header of the situation model (Wyer, 2004).

On the basis of mentioned studies, theories bellow for foundation of this research brought up and took action about its prove in television. Theories on the basis of which phases research has made, has two procedures:

- European researchers who more by art of writing news, interview and reportage draw attention and know newness of occurrence and its attractiveness base of this practice.
- Post-consultative researchers who confirm all cases, also remember other genres such as article, tablet and uchrek which the aim of these writings is leading of thought.

Really, knowing these two theories clears us this truth that what should be said and what should be displayed. This withdrawal of researches is very important for better knowing of professional activity of television reporters and analyzing their written. Therefore, here two questions arise about this research:

- 1) Research Question 1) Whether, interaction between two style of chronological based and individual-based resulted in perception of more number of truth existed in story?
- 2) Research Question 2) Whether, interaction between two style of chronological-based and individual based resulted in more exact remembering of existent information in story?

In order to response to considered questions there are four theories:

First Theory: In comparison with stories that are written in non-time-based story frame, the events of stories which are written in story structure of time-based are better remind.

Second Theory: In comparison with stories are written by non-based-time structure, identification of information in stories written by time-based story structure are more accuracy.

Third Theory: Stories that consist of specified axial character in comparison with stories does not have axial character, better are reminded.

Forth Theory: In comparison with stories that are not character-based, information provided in character-based stories could be realized more exactly.

5. Methodology

Method of Research:

This research that was performed in measuring approach (interview, questionnaire) was a plan mix of structure of story (chronological-based against non-chronological-based), (individual-based against un-individual-based). Criteria existed in selection of

story subject were: Structure of story, individual-based, and title of story. The only criteria existed in selection between two subject was layout. Latin square method for designing story titles layout, was used. Therefore, each type of story (for example chronological-based/private) in all story layouts in each position only once appears.

6. Statistic Society

202 persons were invited for performance of test. Participants divided in groups of 10 persons and each of them, randomly were given one of the 16 tapes. Surveyor gave remarks to participant in the case of importance of research and that how individuals process news message of television. Also, participant were told that have fully notice to messages, because after representing messages they would be examined. This practice was made in order to ensure viewer full attention to report text. After showing considered tape, for 10 minutes an unrelated text for studying provided to participant in order to keeping a way the attention of viewer of subject of broadcasted report.

Then packet content of questionnaire distributed among them and gave 3 minutes time to participant to remember each key point they could, remember about broadcasted news. After 3 minutes against each key point 2 minutes time was given to participants. Participants expressly were noticed that to the end of two minutes don't go to the page they haven't remember or to next point they have remembered. Then four response tests represented to them. After that all participants filled up their sheets, they were interviewed and after appreciation left.

Each participant viewed 4 main broadcast story were placed in two sub-broadcast story. On this basis, participants viewed a story in style of non-chronological-based and individual-based, a story of individual-based in chronological-based style and four stories in chronological-based style and non-individual-based. In stories which were written in non-chronological-based style, topics of story at first was began by an event and at the end was ended by other event. Individual-based stories were followed angle vision of an individual and on the basis that this individual how experienced occurrence were shifted.

7. Experiment Cases:

Stories were taken from general affairs related to news channel of radio-television of Iran. Since origin of stories in the case of subject was very far from thought circumstance of participant, probability of familiarization of participants with generalities of stories was very weak. Therefore in an interview was performed by participant, this question was asked that if they had viewed a story about that position and

place before in news media? None of participants didn't declare that they have viewed the stories before. One of the stories was that in a hospital lift is damaged and 11 persons for 1.5 hours were caught in it. The second story was reported damages arise from a huge flood in north of Iran. The third story displayed consequences of flood in Zahedan province and fourth story paid to the subject of a man that his children falls in port and two driver of trailer help him and save his children. Two un-considered story was related to event of preparation of candidates of taking part in conquered and flow of hard accident in Tehran-Karaj highway that had resulted to killing of 14 persons.

8. Related Variables:

Remembering: For remembering two scale of non-remembering and remembering were used. The non-remembering scale is for determining what stories are more significant for participants. Scale is having reflector remembering of situation of a real life in which we use of lists, topics or similar titles to participants remember information exiting in conversations.

Non-remembering scale was classified from 0 to 30 (0=Individual didn't remember anything, 1= person only remember subject of story, 2= Individual remember main port of story. 3= individual remember main point and details). This issue is a mix of classification non-remembering by using of Ganter, Gliford and Berry (1980) and Edwardson, Engstrom & Hofmann (1992). remembering, participants were given 1 or 2 advising word (for example "lift" or "flood") and they were asked, all information they can explain about these two words. Remembering or reminder by using of Rabinson and Levy (1986) criterion, they were classified between 0 to 8 (0= wrong remembering, 1= lack of remembering, without response, 2= remembering a little thing without details, 3= ambiguous, general response related to story, 4= remembering little of details of story without main details, 5= remembering main point without details, 6= remembering main point with a one case of details, 7=remembering main point with two case of details, 8=remembering main point with 3 or many cases of details)...

9. Recognition Accuracy:

A multiple choice test on the basis of 10 propositions about each four story title provided. This 40 question test for assessment of amount of accuracy of memory of participants in these stories designed. For each question, there were four options only one of them was correct response. Reported results were explanatory of percent of correctness and

25% also for probability of non-responding were considered. For each story results in each group of participants calculated.

10. Review of Research Findings and Conclusion:

For achieving to manner of influence of news stories on addressees we paid to analyzing of four type of story. For achieving to scientific glance in this field, differences were investigated. Participants attended in related experimental test (viewing stories and response to questions) and results were investigated and results by using Analyzing Of Variance or ANOVA were analyzed and point of this method is that they can used simultaneously for investigation of several independent variable. ANOVA is a multipurpose statistics which is common in mass media researches. For reviewing impact of sequence, one ANOVA side method on the basis of all depended variables applied. Because sequence in this analysis was not in important factor, this factor removed from consecutive analysis. All hypothesis and questions of research by using of two variables 1(chronological and non-chronogical) 2 (individual based) is done and repeated measurement of ANOVA is on dependent variables. In this method each group are exposed to experimental different behaviors then assessment is done. Resulted remarks from measurement, are used for ratio calculation of variance, known as F ratio are used. In ANOVA sum of square of groups (individuals under surveying) inside groups (individuals under surveying) and totally (sum of figures within and inside of groups) are calculated. Sum of squares within groups and inside groups divide to freeness degree to gain an average in power 2 (M). After calculation amount of F of variables, for measurement of degree there is relation between two variables. But the most applicable of them that is Pierson moment cohesion coefficient which usually is shown by r which is fluctuations between -1 and +1 which +1 is showing full positive cohesion and the least amount is 0 that shows that there is no relation between two variables. Power of relation of variables only is related to figure not to its sign. For example cohesion of -0.83 is a relation stronger than of cohesion of +0.32. If its rate is between 0.40 to 0.70, should name the relation balanced, while between 0.71 and 0.90 should be known very much. A capital r means that probability of correctness of value of a variable foreseen by accuracy survey of another variables which is correlated with it, is very much.

Beside this co-efficient, there is another coefficient in the name of (partial correlation) which is shown by letter **P**, which another variable, impact on relation between two dependent and independent variable. Then after final calculation by SPSS software and compatibility of achieved number with related statistics tables, took action about analyzing of gained information.

First theory) In comparison with stories are written frame of non-chronological-based story, events of stories which are written in frame of chronological-based story structure, more can be remembered.

In this theory it is anticipated that participants percept more realities in chronological story structure into stories with non-chronological structures.

$$F(1,202) = 4.28, P < .05, partial \eta 2 = .02$$

But free remembering of each participant of each type of story form has been in opposite direction. By using free remembering scale (no part of history is not reminded) to 3 point (main points and some remember details are reminded) free remembering of participant to stories in non-chronological form M=.9 considerably (meaningful) was higher than free remembering of participants in chronological story structure M=.76, and in remark remembering there was not seen also considerable difference in story and non-chronological structure F(1,202)=.03

Second theory) In comparison with stories are written by non-chronological-based structure, identification of information in stories which are written by chronological-based story structure, are more accurate and thus second theory is not confirmed F(1.2020)=2.48, P>.10. partila p=0.025

Third theory) Individual stories would have better perception into non-individual stories.

$$F(1,2020)=5.07,P>.05.partilan_2=.04.$$

For free perception, influence of individual-based is more and results relative to what was foreseen, was in opposite direct. Amounts of average of addressees perception M=.78 for individual based-stories against non-individual stories M=.88, axis shows that participants remember individual-based stories less than non-individual-based stories and thus 3rd hypothesis is not confirmed.

Fourth theory) foresees that stories with individual perspective will follow more accurate perception for realities. Research measurements didn't show high influence of personalization for perception of story. Therefore, fourth theory also is not confirmed.

 $F(1,2020)=1.65,P>.10.partilan_2=.02$

Also resulted conclusions about questions show that:

First question of research: There is not any type of interaction individual-based and chronological style in free remembering F(1,2020)=1.41, P>.10 or sign of television broadcast story F(1,2020)=2.14, P>.10.

Second question of research: Variance analysis in measurement of accuracy identification, created an interaction between chronological style and individual-based. Calculations show that there is a type of individual-based entering and chronological story structure in identification accuracy of the information is taken in this story in the case the story is individual-based, would be more. Conversely, if the story is not individually, accuracy of information identification existence in story in the case of writing to a non-chronological style becomes worse.

11. Discussion and Conclusion:

Conclusions of these studies show that writing news by observance of chronological sequence in story in comparison with non-chronological structure don't show good memory for seeking realities and don't result to better remembering of existence realties in story. Indeed, inspire of forecasts, nonchronological stricter showed better remembering for issuing information in stories. But in sign remembering (that exactly remembers important or special points) story structure or identity data have not any effect. Of course these results is against forecasts and researches was made on behalf of researchers such as Lang (1988) and Kelly (2003) that was showing chronological-based stories are resulted to more accurate remembering and events of stories.

Lang (1983) in his research achieved basic influence of chronological style in accuracy of identification and only one of these two subjects show better remembering in chronological style to non-chronological style. Kelly (2003) also found basic effects on accuracy of identification only in one story subject. But this research had accuracy of identification in comparison with many story together. In these studies also it was foreseen that individual-based story was resulted to enhancement of reader's perception for finding realities of television broadcast story. However there is very few researches in impact of individual-based in perception and remembering of addressee in television broadcast story, but it forecasted that if addressees focus on broadcast story, remembering would be higher. In other word, if the story became individually, this news subject is as a label in memory which helps to remembering. Results show that the stories have not any individual perspective, follow more remembering.

In addition there have not been any main effect for chronological sequence or individual-based in identification memory. However, participant were able remember more information by non-individual and non-chronological stories. But accuracy of identification didn't show any effect for two factors. But there is very interaction between story structure and identification memory of participant in story. This important interaction of chronological and individual story showed that in accuracy of memory there is entering, especially when two factor are in practice. When the story is used in the form of nonchronological structure, these memories individual stories is caused problem. If the story is in the form of chronological structure and the story has not individual perspective, identification memory would practice better. Van in conflict with results of researches of Van Den Brok showed news texts are read quicker than literary texts. He concluded that news texts readers don't effort to memorize unrelated and low important details, because readers of news texts don't combine these details in position model and for this reason it should be created a better model of position. Here it is necessary we refer to separation of "literary" and "story" conditions. In story structure, mean of literary style is referring to language in use, while, style of story refers to the events that is occurring and or events which has happened in past.

Van Den Brok associated with Zwaan researches (1994, 1993), more emphasized on aim of individuals to the reading of text to the text itself and if individuals read the text in order to learning, they will have explanatory understanding. And in another research they displayed that chronological of reading for news text is longer than chronological of reading for literary texts. On this basis they suggested because of pause in identification and understanding the texts on behalf of readers, chronological of reading news become longer.

Also they concluded that the readers of news texts displayed a behavior in type of more study and surveying into other readers of literary texts. Also they suggested that because of variety of explanatory text structure (against integrated structure of literary texts) process of comprehension for these genres would be different. According to previous researches of Zwaan, stories in which chronological sequence is observed have better remembering and viewers process information on the basis of chronological index. It is better other indexes in narrative literature considered.

13. Suggestion:

Since, society use of television news for learning, it is important we use researches about television application in society and remembering of news. Results of this experiment show that text of television news is not processed in the same approach of literary texts and by revision in models of comprehension and correct choose, we facilitate comprehension of television news texts. Since picturing and voicing and also immediate speed of

information, make the process of information in television news more complex and researches in television news should combine two aspects of communication and recognition psychology to have clear picture of individual process relative to television news. This type of researches for researchers would useful want to know how enhance perception and memorization of addressee for television news.

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Television, Election, Political Impartiality

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Abstract: Interviews and television debates among political faces has important rule in manner of audiences taking of candidates and finally is influenced on voting of audiences. With regard to placement of medias as public and operation of television in the form of special and it important on elections, present article by utilization of performed research texture about role of television (visual media) in trend of elections has paid to impartial survey of media in current of presidential election from people insight and intend to find response to this question that: In covering of television, 10th Period of Election Campaign program whether any support is seen on behalf of television? In order to impartial weighing of media on behalf of people, we pay to survey media trust index in 10th Period of Presidential Election debates and for this purpose behavior of television and speaker of debates in regard to accurate, justice and balance in transfer of message to audience is being assessed and analyzed. Results of this research is explanatory of lack of television bias in 10th period of presidential election program and being index of media credit higher than average in both political group.

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Keywords: Fundamentalist, reformist, index of television validity, accurate, equity, election bias.

1. Introduction

In competitions of this period, elections candidates of each two flow of fundamentalists and reformist showed non-descriptive desire to presence in the magic box. People also preferred instead of take part in crowded and expensive sessions, lie in their sofa in their guest room and to watch campaign of election on television. But by the existence of all these interpretations, main winner of this battle field was television, which lonely covered all debates and news relative to elections. People of Iran selected television in the first instance because of introducing their favorite candidate and in second instance because of ensuring of correct election or final election among one of the candidates. By continuing this trend, a number of people believed that effective role of television in election of final candidate was explicit and this was highly arise from special route was followed in election programs. So that role of executor of the program in television arguments and debates of candidates was considerable and set forth questions of candidates, their order and manner of leading arguments, could be known as sample of manner of television policy makings execution in Presidential Elections. So, television in President of Republic of Iran Elections could introduce itself as the greatest news media and data base to people.

In this research we investigated about two political groups:

Fundamentalists that really are the same governed and winner of flow of 10th Period of Elections, who forms broad scope of political parallel groups, meanwhile enjoyment of many common

points, have different tastes and reformers groups are considered as flow of competent of fundamentalists and their failure in elections made an opportunity for detail appearance of inside confusions of some groups relative to fundamentalist group.

Final goal of research is finding level of real bias in content of program of 10th Period of Presidential Elections. Upon this, the main question of research is that: Whether in television covering of 10th period election campaign program, is seen any support on behalf of television?

To response to this question we obliged to determine and explain exactly the issues mentioned bellow:

- Media bias to the extent is interpreted equal to the word support, that is, because of existent of background and minding and believing form, glance to reality is together with pre-judgment.
- Equity: Equitable broadcast of news report and all events and daily and common news and suitable and equitable news covering of wing, governed on the state and other competitors.
- Balance: Balance in presenting different aspects of a subject and avoidance of any type of media bias is known balance.
- Accuracy: Journalists should be follow truth by severity and set forth the news correctly. This leads to enlightenment of public pioneer of justice. Duty of journalist is achieving these goals through seeking truth and response to incidents. Conscientious journalists use all media and related experts for reaching the truth to public who work honestly. Since, most of journalists try to take

seriously ethic principles in organization, therefore results of this research is explanatory of audience's perception of correct operation of television journalists.

- Media validity: This index pays asking individual and to inspect media in aspects of justice, authentication, and balance in covering of subject. With regard to public perception we can pay to three indices of justice, accuracy and balance, media and broadcaster. In this research by designing six assumptions we paid to measure the degree of media credibility from insight of groups (fundamentalists and reformist).

2. Influence of Media on Politics

Mass media are used for entertainment, clearing and to induce knowledge in public. Since birth of people, media were grown gradually and were used as economic power and an instrument for giving information to voters and forming views and general work order. May be in any time and conditions such as time of elections, the role of media is not outstanding and with ardor. So that, main part of elections process both in the case of hard ware aspect and utilization of operation and its publicity board and in the case of software aspect for characterization election behavior and leading public thoughts is due to media. These powerful tools are effect to the extent that each candidate which has more media facility, have more chance for winning in election to his competitors.

Among media, cinema and television because of facilities and visual attractiveness, are more considered by public thoughts and are influenced on them. Ratio among these two political medium could be understood in making publicity films and television debates. Cinema because of art and visual attractiveness and television because of expansion and high acceptance of addressee always have been considered by diplomats, especially in elections uproar. Among this, candidates television debates also is one of the attractive and most popular talkbased programs, which is representative of another part of media and elections and represents specification of a candidate in a more complete form to addressees and voter, that is voice and image together with thoughts and consideration and manner of explain and representing them. Role of media in elections not only is not limited to process of holding and manner it, but also facilitate its global reflex and their effect is continued a long after elections. Really, medium in news coverage, increasing people participation, political search and supervision, are effective on authentication of presence elections and manifest the part of reality of contemporary world of media.

Purists see the role of the media as one that can have positive effects on the levels of political information flow in the nation. Consider this call to action: First, journalists are important, indeed crucial providers of certain categories of political communication; second, the public needs the political communication services of journalists, who will not only educate them politically, but will guard against politicians and government officials who might threaten democracy or act in their own interests instead of those of the public (Dooley 1997, p.127).

3. Media Bias

Base of study of Mc quile is bias in content of news which exactly knows it, opposite point of sameness in news. For each of these two conceptions, considers characteristics. Specification of sameness in his point of view is: to be careful, give importance, relevance, impartiality and showing reality of news events. He in his book under title "Introduction to Communications Theory" writes: "Impartiality in more events which are tension creating, like political events and to the extent athletic which are under various analyzing and interpretation, is brought up. Generally, impartiality (sameness) necessitates balance in selection and utilization of news resources in a manner that is reflected in different theories. In impartial representation of news reality would be separated of ideas and value judgment and print of excitement pictures be avoided.

M quile in explanation of meaning and conception of sameness (impartiality) has counted six features:

Balance in representing different aspects of a subject, observing accuracy and reality in providing report, providing all main points relative to subject, separating realities from insights and private views and minimization effect of desires, votes and intervention of writer in representing report, observance of impartial and avoidance of bias and grudge. He refers that from communication science insight, impartiality and informing on the basis of realities, is duty of a journalist. In this insight, partiality is counted a negative and indecent phenomena and brings it up by four characteristics of outstanding positive points of friends, outstanding positive point relative to ourselves and friends and fainting negative points and enemies and positive points of enemies.

Partiality may be implicit or explicit. Interpretive parts of mass media usually, by specificity show their partiality which is realized through using positive or negative value terms. In many cases implicit partiality could be recognized from "highlighting" of title, application of picture, to

repeat subject, allocation more time or space and more suitable to news of special events.

Edward G. Epstein 1973 in investigation issue of impartiality and television news in his famous book under title of "News from nowhere" refers to the point that news can show its partiality in different aspects: Focus or exclusion of providing and broadcasting a news which is near some few news organization in the world (in Iran nearly from Tehran) and the second bias is sought by Epstein all inside official ideology of television organization.

4. Media Creditability

Medium for continuation of their activity need to validity and without it would be lack of any effectiveness and utilization. Validity for legislators and law mediators is important. High validity of television news directly communicates with ability of influence of public views about president and for journalists high validity has financial benefits. Journalists are focused on prestige and empowerment and give this opportunity to employers (Liebes, Tamar, 2001). Views and typical inspection of lack of validity on behalf of public for acceptance what they receive of medium, shows that, negative aspect of this sense is a part of media skepticism is there among audiences. Cozzens and Contractor (1987) have brought this word in mass media as a degree that individuals are skeptic to medium. Critics believe that this skepticism is created during the time and through undervaluing realities. In addition, audiences of media know the audience of media having economic and political motivations and more are doubted to the truth. At the end conflict between their private experience and the experience we know about medium, makes a type of dissimilarity in structure of ideas which causes lack of trust to media. It is not exaggerating if we say that between media activities news programs more that other programs are the best index for realization of media bias. Trust of news program means compatibility of their content with realities and facts and to observe impartiality in publication of them. If these indices are not considered, the amount that they show deviation from reality, intellectuality replaces with similarity and news values and media trust would be crashed.

5. Medium as one of the Elements of Elections

Characters, groups and parties for enhancement and efficiency of political vital need to addresses and achievement to media, meets this important need. Since elections is together with expanded and planned propaganda and one the most basic factors of success or failure of individuals, parties or groups in flow of elections propaganda have close relation with manner, spread and forms of media covering,

specially television in sending the sound of individual or its party to ear and view of addressees. Certainly, manner, rate and broad of achievement of these individuals, parties or groups to television has key role in winning or failure of them. In another side, presence and activity of political characters with thoughts and political and social programs in television, day to day has exceeded and expanded sensitivity and authorities' attention to this important and effective video and audio instruments. Because of successful and unique results which utilize of this media has gained, thirsty of others for utilizing of it has increased, so that just know achievement co-efficient to this media are considered equal to success co-efficient in field of political, social and national economic. Therefore, placement and role of the greatest and most influencing media instrument of elections, specially, during late years, i.e. television has caused that most of people held their base of final making decision in talk, introduce or debates of candidates or other propagandize opportunities, which prepare the ground for providing message directly to units of society. According to expert's statement, one of the most important news program was debates among candidates which for the first time was occurred upon suggestion of television and media directly broadcasted it through across channel by coverage of more than 98% of whole country.

Time of each debates was about 1.5 hours divided equally between two attender candidates. Of course debate laws before celebration of program was declared to candidates and representatives of each candidate attended in a draw to determine priority or recency of debates. Each debate for candidate was divided to four times in this time candidate should state his declaration during the debate. Again through draw it was determined that which candidate should begin the debate and who terminates debate. During the talking each of them, the other one shouldn't enter into discussion of other one and should talk at himself time. It should not be any talk about the candidate who is not present. Otherwise equal to time has been talked about absent candidate(s) in another productive program individually the same time was given to absence person to defense. Of course, because these debates were the first experience of television and Iran society in this field, there the possibility that these programs will hold in a better manner in future. In 10th Period of Presidency Elections four candidates took part, according to political dividing we can say that one candidate of fundamentalist part and three other candidates in opposite side of him (it should be mentioned that upon total dividing, on political view in Iran society there two groups of fundamentalist and reformist, the

rest of sides are close to main group and are a part of them).

In research three debates were selected (debate of fundamentalist person with each competitor of another group). Fundamentalist person who was candidate for second time, was president in the time of holding elections and after holding also with decisive superiority became the winner of this campaign field. Some people, groups and journalists mainly were supporters of the reformer group, charged television with supporting during holding elections.

In 10th period of President Election of I.R.I before elections, television debates were held in which candidates of presidency Messrs Mehdi Karrobi, Mahmoud Ahmadinezhad, Moshen Rezaei and Mirhossein Mousavi participated, introduced their plans and asked to answers of reporters and audiences. In these debates Mr. Ahmadinezhad was giving the promise of continuing present trend in administration of Sate, meanwhile three other candidates all declared that they would make change and reforming in present trend of administration of the State. In this research we emphasized on fundamentalism opinion in Mahmoud Ahmadinezhad himself, but the view of reformers was not far from our vision.

6. Media Trust Index

Just as they collect demographic information with which we can better understand the voting and policy preferences citizens develop, large studies in political behavior often collect information about subject attitudes toward the media. The questions ask subjects to rate the media in terms of their fairness, their accuracy, and their balance in covering the issues. Some ask specifically about political issues, some ask the questions in a more general sense. It is possible, through the combination of the data generated by the major polling organization's media questions, to develop an overall barometer of the attitudes of the public toward the news media. This "media trust index" is useful in measuring changes in attitudes toward the media over time-including an experimental interval. Regarding public perceptions of media fairness, the surveys conducted for the National Election Studies at the University of Michigan have included a media question on the presidential election year questionnaires since 1996. Subjects respond to the question "How much of the time do you think you can trust the media to report the news fairly?"

7. Subjects Perceptions of Media Fairness, Accuracy, and Balance

The concepts of fairness, accuracy, and balance in the media have become standards by which media organizations believe they should be judged. But more importantly, it now appears some members of the public have gone from a position of general trust to begin to use the same criteria to determine which members of the media are doing a good job, and which are not. There appears to be no universal agreement on which media organizations do a fair, accurate, and balanced job of gathering and reporting the news. The differences in perception are visible in national surveys on the issue, as well as in comparisons with the local subjects used for this research. In fact, just what makes up a fair, accurate, and balanced approach to the news is a matter of some dispute. Differences in perceptions by media audience members stem from ideological differences, varying abilities to process mediated data, and the type of media consumed. If this research is to shed light on how media practices influence the perceptions of fairness, accuracy, and balance as judged by the general public, then it is necessary to begin the examination of the experimental data with a comparison of the local subjects views to the national views on media. The local subjects' ideological views, as well as their demographic characteristics will serve as comparison points for their respective positions on media. To serve that purpose, this chapter will analyze the subjects' pretest perceptions of media performance, looking for outlying positions that might be particular, to TEHRAN and its residents. The analysis will look specifically for the representativeness of the local audience to serve as test subjects for the entire nation. Clearly, in a study of perceptions on political new coverage, the subjects' ideological positions will be an important comparison point. That analysis will utilize the subjects' self-defined ideological position, along with corroboration of other ideological measuring sticks, to determine if ideology plays a role locally in media trust. Additionally, subjects' ideological differences in sex, race, age, income, and educational level will serve as factors of comparison to determine if those differences play a part in media trust evaluations. Understanding the differences subjects bring to their evaluations of the media as defined by their sociological differences will help isolate the effects of the research.

8. Research background

"Model questionnaire study and search is based on research studies, pew research Center America in 2002 and 2005years." The Pew Research Center for the People and the Press asked subjects across the country about what they believe that they see and hear in the news. The most negative answer—that

they believe nothing they see or hear-has risen dramatically. Cozzens and Contractor (1987) define the term as "the degree to which individuals are skeptical toward the reality presented in the mass media". Those authors see this skepticism building over time through the maturation of the individual, and a tendency to take on the ability to discount all they see as reality. In addition, as audience members learn the economic and political motives of the media, they become more skeptical of the reality of what is presented versus what could be gained by altering that reality. Finally, conflicts between their own personal experiences and the experiences they see related in the media cause dissonance in their belief structure (Cozzens and Contractor 1987, p. 439). That last factor bears directly on the credibility of the media when reporting political stories. If an audience member's personal experience with a candidate or issue differs from the way that candidate or issue is portrayed in the media, the dissonance is not likely to lead to opinion change in the audience members. Instead, it adds to the skepticism that audience member has about the mediator of the information. Gunther (1988) suggested that strong feelings about an issue might increase interest and lower credibility even further, but Stamm and Dube (1994) discounted that contention. Still, Gunter suggests that even a discounted media could have some bearing on public opinion. He depicts an audience member who has discounted media credibility, yet still see reports done there as either having a persuasive third-person effect on others, or mirroring public opinion of the others around her(Gunter 1998, p. 499).

The pressure is on for the traditional news media to maintain credibility and reduce media skepticism to a bare minimum. New media information sources are gaining in credibility as they reach more audience members and provide less dissonance with regards to their political points of view. Tsfati and Cappella (2003) suggest the trust is gone from mainstream news and that many who consume it do so only because the new media is not available in the style or quantity they require (Tsfati and Cappella 2003, p. 519). The Pew Internet and American Life Project (2002) asked people if they were watching television for their news. It shows that young people are increasingly not interested in television as a news source. But the styles are multiplying, as is the quantity of alternatives available, meaning the mainstream media needs to address its crisis of credibility before it becomes the second choice for most audiences. Kurtz (2005) sees the arrival of the "blog" (short for web log, an online diary often focused on politics), as a replacement for traditional political reporting. And Sutter (2001) likens the liberal media to a cartel—successful in part because its members are limited in number by the costs of entering the business.

Should the cost go down, as they are with new media possibilities, then the cartel may cease to exist (Sutter 2001, p. 449). The crisis of credibility holds the key to the future for the journalist model developed a century ago. Conservatives predict a "meltdown" of a media that is too liberal to provide the information the public needs (Bozell 2004, p. 259). Liberals fear a return to the partisan press of old. The words, images, and actions of today's media will decide which comes to pass. The Pew Research Center for the People and the Press has asked subjects about opinions on media bias since 1985. The three surveys closest in time to those previously used were in 1999, 2001, and 2002. Subjects were asked if they believed the media are biased in their reporting or careful not to be biased.

9. Experimental Design:

The use of a controlled, cross-sectional experiment of descriptive proved to be an efficient way to produce generalizable results for comparison. The approach allowed the identification of any relationship between the variables and helped measure for correlation or cause—if any (Rosenthal & Rosnow 1991, p. 17). Through the use of controlled exposure of simulated television news content to a series of small experimental groups made up of a representative sample of television news viewers, it was possible to test for the effects of the cues sent by newscasters to their audiences—whether intentional or unintentional. The classic experimental design consisted of apretest to determine a baseline for the dependent variable to be studied, an experimental exposure of randomly-selected subjects to a treatment, a randomly-selected control group not exposed to the treatment, and a posttest of all subjects to determine any effect on thedependent variable (deVaus 2001, pp. 47-50). A modified pretest-posttest experimental design with two levels of control groups was used for this research. This approach allowed for the most accurate measurement of both treatment effects and experimentally-introduced effects(Smith 1991, pp.187-90). This approach allowed more rapid collection of data than individual questionnaire interviews, while keeping the subjects focused on the research subject and limiting the amount of time necessary to conduct the experiments (Morgan 2002, p. 147). Experimental groups of about twenty people (or multiple small groups totaling about 20) were assembled for the experiments. Phone callers from the Center for Advanced Social Research at the group made phone calls to recruit participants. All selected were adults, eighteen years of age or older, residing

in Tehran. During the recruiting process, the subjects answered a short slate of questions to measure the political orientation and existing view of the media of the group member. The questions were used to qualify the subject for the experiments, but to paint a picture of the subject taken significantly prior to the experimental exposure so as to minimize any measurement effects. Subjects then assembled in twelve experimental groups, each exposed to a different experimental treatment. Nine of the twelve groups watched a short videotape to begin the experiment. Realism is key to external validity of the research, so subjects were lead to believe what they were viewing actual television news and other programs(Aronson & Carlsmith 1968, p. 25). To give the experimental treatment that realism, the tape viewed consisted of half of a segment from the IRIB News program . Variation in the contents of the tapes came in the use of the independent variables of various newscast .content representing a particular stand on one of the three test issues. Three different levels or styles of presentation for each issue were used. The first presentation style was the "soft" presentation, consisting of a subtle visual clue in the form of an anchor lapel symbol. The second presentation style was the "moderate" presentation, consisting of story content that is written in a biased fashion toward a position on the issue. The final presentation style was the "hard" presentation, consisting of a visual reference to actual anchor participation on one side of the issue. This same series of presentations were presented to additional groups for each of the other two issues studied. Then, for each issue set, a group acted as a control saw a video presentation that consists of

the same elements as the other groups. Following viewing the video, each group member was asked to complete another questionnaire. The standard questionnaire format is a valuable way to measure the attitudes of subjects in a uniform, consistent fashion. A successful questionnaire gathers the information needed to verify the study's compels respondents to hypotheses, truthfully, and minimizes the risk of error (Malhotra 1999, p. 32). Successful questionnaires must gather the empirical evidence sought, without confusing or boring the subjects (Folz 1996, pp. 79-80). The questionnaire for this research, with approximately 21 multichotomous questions, was designed to measure any change in attitude toward the media based on the tape the group had just seen. The questions were attitude scale measurements, best suited for measure consistent subject opinions about the reviewed material (Oskamp 1977, pp. 54-55). The questions did not require great recall on the part of the subjects, which can lead to subject fatigue and

disinterest in the process(Bradburn, Rips, & Shevell 1987, p. 157). Instead, the questions focused on subject opinions easily recalled and addressable by the answer scale. Analysis used the Likert scale model of interval measurement, which allows statistical analysis of the attitudes measures by the questionnaires (O'Sullivan & Rassel 1995, p. 274). Different questionnaires were presented to subjects based on the particular ideological subject the tape had addressed, and measured subject feelings toward the dependent variables of balance, truthfulness, and trustworthiness on the part of the media. The order of the questions took the subject through a logical review of what he/she just viewed, without confusing or boring the subject(Bradburn & Sudman 1988, pp. 153-4). Questionnaire results were then subjected to an analysis of variance statistical test, looking for significant differences in the effects of various treatments on viewer perceptions of news media bias, so as to test the hypotheses. Internal validity of the experiment is crucial if it is to reveal correlation or causal relationships. This validity will be maintained by guarding against testing, instrumentation, and selection effects, among others (Cook & Campbell 1979, pp. 51-68). Members of the control group for each issue category who saw the videotape presentations without the local news break answered the same questionnaires as the other subjects in the same issue experiment treatment. Beyond those subjects who assembled to watch the videotapes, an additional control group of subjects was asked the recruiting questions by phone, but not asked to come to the experiment. Instead, those same subjects received a call at the time the experiments were taking place, asking the same post questionnaires. Table describes the entire experiment.

Table 1: Experimental Group Schematic

- word - r p					
1	Γreatment A	 Treatment ! 	B - Treatment C -	Treatment D	
Message (Control)	Soft Message	e Moderate	Hard Message	No Message	
Issue 1(Conservative)	- Anchor-	Anchor reads	- Anchor leading -	No video	
Issue 2 (Reformist) -	Anchor -	Anchor reads -	Anchor leading	No video	
Issue 3 (Control) -	No video -	No video –	No video –	No Video	
	calls only	calls only	calls only	No Video	

10. Research Methods and Hypotheses:

The goals of the research have been to measure the effect of the use of imbedded messages on audience perceptions of newscaster objectivity, trustworthiness, and balance. Messages in news reports come primarily from the words the newscasters speak. But there are other messages in the form of visual symbols. This research combines written and spoken words to measure subject response to each of those message carriers. The simplest of those embedded messages, presented in the form of a lapel button or pin, makes up the "soft" or least persuasive of the treatments. The addition of

the use of biased language in the verbal portion of the newscasts example produces a "moderate" form of the treatment. Finally, the further addition of biased video to the lapel pin and verbal biases yields a "hard" treatment approach for subject exposures. All treatments manipulate the symbols—verbal or visual—that television news viewers encounter whenever they view the medium. And it is through the power those symbols carry that bias can be introduced into the messages. At the completion of the experiments, questionnaire results were subjected to a multivariate analysis of variance statistical test. These tests described the statistical strength of any change in the dependent variables based on the various treatments (Tacq 1997, p. 38). The tests revealed any significant differences in the effects of various treatments on viewer perceptions of news media bias to test the hypotheses.

Hypotheses of the Study For the research, the tests attempted to prove series hypotheses, as each hypothesis will be supported by a movement in one direction away from the null hypothesis (Montgomery 1984, p. 21). Hypotheses tested are:

Hypothesis 1: newscasters displaying the "soft" message on any issue will be perceived as the most accurate.

Hypothesis 2: newscasters displaying the "soft" message on any issue will be perceived as the most balanced.

Hypothesis 3: newscasters displaying the "hard" message on any issue will be perceived as the least accurate.

Hypothesis 4: newscasters displaying the "hard" message on any issue will be perceived as the least balanced.

Hypothesis 5: Subjects viewing any of the Conservative treatments will find newscaster to be more loyal to the IRAN government.

Hypothesis 6: Subjects viewing the "hard" Conservative treatment will find newscaster to be the most loyal to the IRAN government.

The literature suggests the more potent the symbols used in the experimental newscast, the greater the effect viewing those symbols will have on the viewer. Symbols can transmit more complex or higher-level messages simply (Bennett 1983, p. 41), so the simple symbols used in the earliest part of each experiment have the power to transmit messages about the newscaster. Viewed spatially, voters do notice the difference between themselves and their perceptions of media outlet placement on the ideological axis—particularly conservative viewers (Ognianova & Endersby 1996, pp. 17-20). The ultimate goal of the research is to find the levels of actual bias inserted into news content and presentation that generate a perception of bias within

audience members. Those with different demographic background and political ideologies, as well as varying levels of media trust, will react differently to the bias stimulus. Finding the threshold of bias perception for each of these groups will be enlightening for political scientists and journalists alike.

11. Ideology Differences:

With regard to the matter that in each experimental group there is difference ideology in persons, It is important us to know, if reformer or fundamentalism define equity, accuracy and balance in a same method? If two groups define these worlds alike, the collection will have alike perception. Therefore at the beginning persons' ideology is surveyed by three questionnaire, first we ask persons held themselves in a seven part scale begins from ultra fundamentalist to ultra reformist. Then there were asked to give their views about responsibility of government into providing services to people. People preferred the less services to present services or more services. The persons who selected the less services were known as fundamentalists and the persons who were followed more services were named reformers. At the end the persons were asked to show reaction about two different roles of government and choose fair role. One of these answers says: "Whatever the government is less, it is better". The persons who selected this governmental role, were known as fundamentalists. Another answer was on the basis that: "There are many cases which government should do it". The persons who selected this response, were held in reformer section. Results of above three questions resulted in identification of ideology level of persons in all groups, this identification resulted in similar classification in groups.

12. Results

For measurement of organization creditability index, different of changes in view of four groups before performance of test and after that about three indices of balance, accuracy and equity was calculated which is presented in table below:

	Equality	Accuracy	Balance
Witness	+.030	+.085	+.010
Soft	+.060	+.070	+.058
Average	+.010	030	.000
Hard	+.017	+.57	095

At first we pay to comparison results of conception of equity. It considers that negative perception of newscaster results in increasing of bias in media. Results show that soft experimental group

know newscaster more equitable to witness group, but hard and average groups know newscaster less equitable. Experimental group of soft, hard and witness almost have the same evaluation in accuracy of newscaster, while, average experimental group were seeing less accuracy in newscaster.

Balance conceptions are very interesting, because this collection show the foreseeable model of considered persons' reactions. Only average of soft experimental group was applicable. In average and witness group results was close to applicable average level and in hard experimental group results is the least limit into three other groups. These results restrict us in measurement the factors effective on supporting from insight of audience. May be if the bigger sample was tested, it would shown the better and more clear results or repetition of tests with the same group in longer time would helped us identify effective factors in supporting from insight of audiences.

In this basis, theory of single-behavior in soft groups is indicator of most accuracy limit in messages is confirmed. Meanwhile, the other achieved interesting result was that hard group also confirmed the most amount of accuracy limit n messages on behalf of newscaster. Therefore, the third hypothesis (newscaster treatment displaying the "hard message o any issue will be perceive as the least accurate) is not confirmed. So, the second hypothesis

(newscasters treatments displaying the "soft" message on any issue will be perceived as the most balanced) also is confirmed. The fourth hypothesis (newscasters displaying the "hard" message on any issue will be perceived as the least balance).

Soft Group has more decreasing in conception into other groups. But average groups indeed, have the least decreasing in conception of equity to soft groups and other groups.

However, soft group had less decrease in conception of equity in changes of media test before the film and newscaster test after the film to witness group. But each of these three test group displayed a type of decrease in equity conceptions, which explains increase of bias. As it was anticipated, hard group displayed the most decrease in perception of conception of equity. In all measured variables in individuals of hard group the more negative conception is seen. This continuity among hard groups gives more credibility to hypothesis for more exact evaluation. But may be the best question here is that, whether all persons of hard level know the media inequitable? It considers that in hard group individuals for failing equity in newscaster have more agreement, of course this is because of newscaster treatment.

13. Three Side Analyzing of Ideology Influences:

In interaction with gap of fundamentality and reforming, for this analyze we face to analyzing fundamentalist and moderate and reformer. At the beginning we began to separate individuals on the basis of ideology, from severely fundamentalist, equated or reformer. Most important of all is increasing of "Moderate" group which facilitate us to separate these individuals for seeing influence. Position of individuals through ideology test which is made of all individuals before beginning the practice is identified. Hypothesis of this analysis was in the form that reformers more would like consider negative the media operation, fundamentalists consider media in less negative degree and moderates also consider average limit, but indeed data achieve more different results.

	Equity	Accuracy	Equity
Fundamentalist	.561	.602	.434
Moderate	.655	.661	.521
Reformer	.594	.606	.466

Why these moderate individuals consider nicer image of issue after watching this film? And why fundamentalists and reformers grade the media alike. Considered answer for second question helps to first question. The individuals are held in both sides of ideology scope, lie on media history which media interactions is filtered through their political view. Moderate group indeed are inclined to the side that have less interest to ideological difference in mediate operation. Ideological bias has less important for them and individuals take less critical condition to themselves in providing subject on behalf of media. This subject holds moderates in a position that displays their positive orientation in results. Results of this group display that they have had positive views about media and newscaster. Then, the fifth hypothesis (reformer group after viewing has found newscasters to be more loval to Iran Government) is not confirmed.

With regard to these results, it is specified that reformer group before viewing the film has known the media biased and had point to media less than average limit. After viewing the film their insight has changed and is reached to the level over average limit, which displays this group has reformed the biased insight that at first they had into media and have changed it to positive insight (over than average limit). Indeed, comparison of media test after viewing the film with newscaster test after viewing the film refers to this fine and hidden point that trust of reformers to newscaster is more than their trust to media. Then, by this result, sixth hypothesis (reformer group after viewing the film has found

news caster to be more loyal to Iran Government) is not confirmed. But finally it is necessary, I mention the issue that, when I planned the result with some reformers in society and brought them up scientific results of research which has made by accurate and scientific measurement, in scientific researches was proved, in flow of elections trust to media and newscaster is confirmed on behalf of reformer group (higher than average), was astonishment for them. On this basis, it is necessary to inspect other aspects of indices effective on media bias including activity of western media or political activities in society which this subject is out of scope of this research.

Equity Index: Individual bias analysis is measured in three middle of fundamentalist, moderate and reformer and displays details more than difference of ideology in individuals and their practice. Different between individuals and equity, accuracy, balance conceptions in debates films enjoys of special important. These changes in more individuals resulted in change of ideas and finally shift them to media operation. If there will be negative changes in media indices, then individual more believe to media bias. By changes in views of individuals about equity in media there will be considerable decrease about individuals without considering ideology in amounts of indices before viewing film to after viewing film.

All people in perception equity conception achieved considerable decrease, but indices are enough similar to each other, so that there is generally, little difference among ideological group and changes in views before viewing film to the after viewing film in media. But existent changes in newscaster test are very interest. Fundamentalists and reformers both had decrease in trust to newscaster. But moderates didn't feel so important changes.

Accuracy Index: As, it was said before, conception of accuracy in media before viewing the film in to after viewing the film displays advanced conditions. This trend in the case of individuals under experiment without considering ideological insight have similar trend. Fundamentalists and reformers both increased their views. But, generally moderates were kinder than other two groups into the newscaster and media. All three groups similarly were changed conceptions relative to accuracy after viewing the film.

Balance Index: Final analysis of individual of existent elements in media supported of this conception, moderates have less criticizing views into bias in media. As it was said in evaluation of accuracy conceptions in this study, all individuals found media and newscaster balanced.

Reformers and fundamentalists almost display similar changes in views of others. Evaluation of average of accuracy in each group is increased up to 10% before viewing the film to after viewing the film. Newscaster had similar increase in positive conceptions by individuals in each group. But again moderates had the most increase in negative evaluation of media and newscaster. Generally, mediate group almost had two time increase to other ideological groups.

After ideological differences, also there were differences in media conceptions on the basis of education level. Individuals, who had non-university education level had positive points in operation of media before experiment. Development of critical thought skill which is generated in university, causes graduates have more criticism to exit programs of media. Individuals who has not critical thought more accept media to take it under question. The persons who have university education, more are inclined to medium bias and because of critical look less pay to analyzing content of equity, accuracy and balance conceptions about newscaster and media. The persons who have not very complex critical thought skills, the less see this bias in media.

Since, by increasing the age and education, individuals' anticipations also increase, influence of these two factors will be in analyzing of influence in results. Individuals who use of news resources and media for a long time, have accelerate evaluation to what they see and hear. Reversely, individuals with less experience, are whom generally have less critic to the practice of media. Individuals who are in average experience group should locate in are position between up and down groups. For test of this hypothesis we add new variable which is a combination of age and education. Adults who their age is below 35 and had no academic diploma, there are in a group with low experience. Individuals who are 55 year old or upper and have higher academic diploma enter into the groups with higher experience. The rest all entered into average experience group. The only important difference is in evaluation of media balance.

		Equity	Accuracy	Equity
Low	.554		.584	.448
experience				
Average	.628		.648	.538
experience				
High	.608		.621	.412
experience				

Here average experience only in mediate evaluation relative to other individuals is positive and was the only group which gave positive point. Low experience group, gave more point relative to high group experience to conception of balance, while, in perception of equity, accuracy conceptions average experience group had given the most point. But given point of high experience group relative to given point to low experience group in two mentioned conceptions was more.

14. Conclusion:

This dispute (media bias) was upon 10th Presidency Elections Period which began in Iran Country. Some of journalists such as researcher of this thesis were annoyed about partiality of media and newscaster, who flow high sign of biasing towards audiences. These critics wanted media practice without bias, but addressees did not observed any sign upon biasing on behalf of newscaster. Journalists believed that audiences were paid by extreme accurate to observance of debates and focused on each type of details whether verbal, written and visual. Audiences of television news have different method in viewing news. They pay to watching television by conception of what they want to see. Some accused medium to support of fundamentalist. Some other saw media in a manner that before was administered by people who had trust to them. Therefore, some journalists protest and number of politics insist, this research in showing difference in manner of perception of media and type of its validity investigated and research is shown that experience of viewers in media is considered as part of continuation and improvement of operation of media. Practice of sitting in front of television and to attract attention to news broadcasting is as sitting against parents or a holy person is a normal issue, which has been a part of our daily living an in addition of awareness of the world around us have a type of making culture and its special suggestions.

But sometimes media by displaying some messages disappear the subject which are not similar to idea structure and or provide subject as filtered conditions. If we want to speak politically, political programs for supporting of people trust is used from politics and keeps away each message which denies this support. Newscaster in medium can be as other politics, but should consider that newscasters are held in center of validity and trust of people. Long term experiences they have as newscaster causes firm ideas about equity, accuracy and its balance and what they are telling to viewers.

Special newscasters have a high chance for preserve of viewers through challenge of election competitors. Circle of providing, collection and issuing news by newscaster is not a single circle and in addition of newscaster each of them are a human and are directed by a team of human cooperation, the can also make mistake and sometimes intervene their

private or party biasing in news. Investigations have shown that newscasters consider to this issue that if a viewer feels bias in news broadcasting, distrust during a long time is generated. In these researches complex discussions which show bias usually is failed. While with regard to results of 10th Period of Elections who fundamentalists were winner of this field (by about 63% of votes), in all cities votes of reformers was less than their rivals, except city of Tehran, where in this city reformers had superiority of 60%. Television on behalf of this group was accused to support of rival. Then we can conclude that when media on the basis of this research in city of Tehran has been exempted of partiality, then if field of research was performed beyond of Tehran city (whole of country), the best results of television related to what here gained, would be resulted. Easily we can anticipate that individuals having related experiences related to investigation, change they predetermined views about practice media do and only some individuals consider this bias apparently. These results show that, bias create less weight in mind of viewer. "Correct" image of each viewer in output of media which is used in daily activity, is a mobile picture. The first frame when is recorded that viewer is encounter to viewing news for awareness of happens on the world. These initial effects have a lot of meaning and show expectable model during the time.

15. Suggestions:

Political and social characters exit from center of program and instead of it considered subject of them (their personal ideas) focused by program and considered character provide his speech around discussion of subject. Newscaster remembers relation of mentioned news with economic benefits of addressee (Important of elections subject in fate of people). Thus attract the view of addressee for attention to news, but by this practice really held program beyond the politics (at least in addressee mind). Newscaster by this practice in deed, give nondialogue, non-political, party and wing dimension to news. He shows program in side of benefits of the middle class which are considered nation. By this practice newscaster is introduced as reflector of voice of balance beyond the political grouping and group small benefits and thus he is reflector of national benefits and finally in the best form becomes awake conscience of benefits of people and this has been achieved to his mail goal which is gaining trust for himself and media.

Media should know threat issues for himself which the most important of which is lack of trust of people to media. Media continuously should remember news ethic principles to personnel of news department to avoid partiality operation of them and use of trusted resources of news. If the media considers this matter that viewers by positive vision to media can change in a short time by undesired operation of media change their insight from positive to negative and after a while media should be incredible, has made a big help to media trust near people and finally its credibility.

Through these studies which has made done in trust index of media, media can percept that their viewers really what a view have about television. Also, media can by deep, serious and sympatric and impartiality critic to follow operation of parts and different groups loyal to system in the field of fighting against poverty, corruption and prejudice, execution of justice and the rate of acting to given promises to people and give trust to viewers and himself that impartiality has performed his duties and people also are witnessed of issuing their disturbances and worries in television, which of course this issue can by establishment of round table and challenging interviews by using of newscaster, dominant and brave expert and also serious debates be in work order. Also, using of credible and trustworthy news resources, especially in news and programs related to elections is main condition of ensuring and increasing efficiency of television and from another side, avoidance of centralization of activities upon broadcasting of daily news in the case of issues and normal and executive involvement of elections, informing about the last situation of list of elections of parties and groups and some border news and familiarization of addressees with programs of parties and group elections in order to solve political, economic, social and cultural problems. But the important point here is message engineer (designer of message) in accurate adjustment of content and bias of news and news report in a type that finally addressee reaches to analyzing about necessity of active and expanded participation in elections, is very important. Therefore, it is necessary we avoid of paying to interviews and stereotype round table which may make ambiguity to addressee in receiving of message. Reflection of operation of authorities and administrators of elections issue in television before elections and during elections and in phase of counting votes makes trust in people and in all phases of elections and debates and interviews by providing everyday reports and point by point referendum which by help of new technologies (sending message through mobile or internet, etc.) is possible. People and addressees moment by moment are in the real current of elections and cause trust of viewers of television. Observatory of propaganda destructive activities and alien media interactions that every day try with an excuse doubted health and democratic

process of election in Iran, is an important issue. Television program makers by awareness of propaganda lines of enemy and identification of them in different programs should response to these doubts as indirect.

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Effect of Ultrafiltration Permeate on the Quality of Chocolate Milk

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Abstract: The present study provides a new version of chocolate milk from a dairy liquid originated from skim milk and ultrafiltration (UF) milk permeate. The mixtures of chocolate milk containing milk permeate at different levels, were manufactured and stored at 4° C for 2 weeks. Chemical, color characteristics, viscosity and sensory properties of various formulations were evaluated. Most of chemical analysis did not change before and after storage of chocolate milk with milk permeates. Results showed that the highest score of color was recorded for the (B4-B6) sample followed by (C7-C9) then (A1-A3) samples. The highest score of appearance was recorded for the (B4-B6) followed by (C7-C9) then (A1-A3) samples. Also, the highest score of viscosity were recorded for the (B4-B6) followed by (C7-C9) then (A1-A3) samples. From the previous results, it is obvious that results showed a decrease at the following order B6 > B5 > C9 > C8 > C7 > B4 > A3 > A2 > A1 regarding to L*, a*, b*, C*, H*, BI-values, chemical, viscosity and sensory evaluation. Finally, using milk permeate was able to produce a good quality chocolate milk. However, using the permeate has economic important because it considers valuable substitute to skim milk as partial or Whole replacement. Also, the added sugar can be reduced during manufacture as economic and healthy trend through reducing sugar in chocolate milk.

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Key words: Skim milk, Chocolate milk, milk permeate, ultrafiltration, viscosity and color.

1. Introduction:

Membrane separation technique is simple in operation and compatible with existing equipment and technology. Sample collection and concentration efficiency up to 100% can be achieved. Membrane technology has the potential for not only producing a superior product, but for considerable savings in capital and operating costs, by eliminating filter processes, cartridge filters and centrifuge. At present, membrane separation processes in general and ultrafiltration (UF) in particular has become more effective, in the separation of molecular solutions. The main reason for the emergence of UF as an industrial process is the breakthrough in polymer manipulation through blending of polymers (Vijayalakshmi et al., 2008). Due to these advantages the ultrafiltration technique is followed in this study. However, milk permeate, which penetrate the membrane during UF process of milk has been regarded as waste product, although it contains high level of lactose, soluble proteins, vitamins and minerals. However, because of its high nutrient content and its disposal can pose environmental problems, there is interest in finding a calue-added utilization for it. Chocolate milk has the same 15 essential nutrients as white milk, including the six bonebuilding nutrients of calcium, vitamin D, vitamin A, protein, magnesium and phosphorous. Other nutrients include: thiamine, riboflavin, niacin,

vitamin B6, pantothenic acid, and zinc, vitamin B12 (cobalamin, carbohydrate and energy (calories). Here is a breakdown of each nutrients function. Chocolate milk is an excellent sports recovery beverage. Studies show that chocolate milk has the right combination of protein, electrolytes and carbohydrates to repair and recover after a workout. However, many studies have been shown that adding protein to the mix fit hasten recovery, accelerate of glycogen synthesis and improve endurance performance over carbohydrate ingestion alone(Saunders et al., 2004 and Valentine et al., 2006). Studies showed also that athletes ideally need a carbohydrate-to-protein ratio of 4:1[Ivy et al., 2003 and Romano et al., 2004]. With the recent growth in flavored milk sold, attention is needed to improve existing chocolate milks and guide new product introductions focusing on reduced calorie formulations (Boor, 2001). Chocolate milk has a great amount of carbohydrates more than that of plain milk, along with protein, electrolytes and other key nutrients, in quantities that commercial carbohydrate replacement drinks cannot match. Recently, some controversy has arisen over the efficiency of chocolate milk in recovery when taken after intense athletic workouts. Karp et al (2006) reported that chocolate milk is as good as or better than commercial sports drinks at helping athletes recover from strenuous exercise. The authors suggested that chocolate milk contains carbohydrates-to-protein ratio, which is ideal for helping refuel tired muscles after exercise at a high intensity during subsequent workouts. However, nutritionists have been criticized chocolate milk for its high fat and sugar content. The high fat content of chocolate milk may be delayed glycogen re-synthesis and decreased time to exhaustion due to a decreased gastric emptying rate and a consequent decreased carbohydrate absorption rate. Moreover, lactose in chocolate milk cannot be tolerated by lactose-intolerant and malabsorbers athletes, particularly if their gastrointestinal system grows more sensitive with exercise (Dehkordi et al., 1995). Also, chocolate milk contains oxalic acid, a compound occurring naturally in cocoa beans. Because of oxalic acid can combine with calcium in the intestine forming calcium oxalate, which is fairly insoluble, calcium absorption from chocolate milk has been questioned. Therefore, the object of the present intention was to study the effect of permeate by ultrafiltration of Cow's milk and storage at refrigerator on the chemical, color characteristics, viscosity and sensory evaluations of chocolate milk compared with those of conventional chocolate milk by skim milk. However, using the permeate has economic important because it considers valuable substitute to skim milk as partial or Whole replacement. Also, the added sugar can be reduced during manufacture as economic and healthy trend through reducing sugar in chocolate milk.

2. Material and Methods Dry Ingredients:

Cocoa powder produced by Hintz Foodstuff Production GmbH Bremen, Germany. Sucrose and kcarrageenan were locally purchased. Vanilla produced by Dream Co., New Borg El-Arab City, Alexandria, Egypt.

Dairy Ingredients:

Fresh skim cow's milk (8.8% T.S) and milk permeate (5.5% T.S) were used.

Formulations:

Fresh skim Cow's milk 8.8 % T.S or mixtures of fresh skim milk and milk permeate (5.5% T.S). The dry ingredients of cocoa powder (1g/100 g mix), sucrose 5,6 and 7g/100 g mix). The mix was then homogenized using a double stage homogenizer (Rannie, Copenhagen, Denmark), with pressures of 1500 and 500 psi. After thorough mixing, formulations were heat treated at 72°C for 30 min and cooled. Finally, vanilla (0.05g/100 g mix) and (0.3g/100g mix) k-carrageenan were added. The final products were then filled into 250-mL glass bottles, and stored at 4°C for 2 weeks until analysis. Chocolate milk formulations are summarized in Table (1). Two sets of each batch were formulated.

Table 1: Chocolate milk formulation

Ingredients		Formulations							
%	A1	A2	A3	B4	B5	B6	C7	C8	C9
Skim milk	93.65	92.65	91.65	46.83	46.33	45.83	-	-	-
Permeate	-	-	-	46.83	46.33	45.83	93.65	92.65	91.65
Sucrose	5	6	7	5	6	7	5	6	7
Cocoa	1	1	1	1	1	1	1	1	1
K.carragenan	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Vanilla	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total	100	100	100	100	100	100	100	100	100

Chemical analysis:

Chocolate milk mixtures samples were analyzed for moisture as given by A.O.A.C.(1990) and total nitrogen as described in IDF Standard (1986). Lactose was determined according to Barnett and Abdel-Tawab (1957). Carbohydrates content were calculated according to Abd El-Aziz et al. (2004). pH value was measured using a laboratory pH meter with glass electrode.

Determination of Chocolate milk viscosity:

Chocolate milk viscosity was measured using a coxial cylihder viscometer (Bohlin V88, Sweeden) attached to a workststion loaded with V88 viscosity program. Viscosity was measured at 32° C at

shear rate N° (40) 5.75 E+2 1/s 1 minutes intervals. A total of 8 measurements were carried out.

Colour:

Color was assessed using spectro-colorimeter (Tristimulus Color Machine) with the CIE lab color scale. This color assessment system is based on the Hunter L*-, a*- and b*- coordinates. L*-representing lightness and darkness, + a*- redness, - a*- greenness, + b*- yellowness and - b*- blueness (Hunter, LabScan XE – Reston VA, USA) in the reflection mode. The instrument was standardized each time with white tile of Hunter Lab Color Standard (LX No.16379): X= 72.26, Y= 81.94 and Z= 88.14 (L*= 92.46; a*= -0.86; b*= -0.16) (Sapers

and Douglas, 1987). The Hue (H)*, Chroma (C)* and browning index (BI) was calculated according to the method of Palou et al, (1999).

Sensory Evaluation:

Chocolate milk formulations were sensory evaluated by seven member panel. Panelists ranked the samples using a 9-point hedonic scale, where 1 = extremely dislike, 5 = neither like nor dislike and 9 = extremely like. The sensory attributes included appearance, chocolate flavor, color, chocolate sweetness, sedimentation and viscous. Panelists were instructed to shake the bottles before the evaluation to suspend any settled cocoa particles in the bottom.

Statistical Analysis:

Results were statistically analyzed using the one way ANOVA, the GLM procedure (SAS Institute Inc., Cary, NC, USA). Duncan's Multiple Range Test was applied for comparison of the best formulation

and control. The level of significance was set at P < 0.05. All data presented are means of three replicates.

3. Results and Discussion

Effect of storage at refrigerator and permeate UF on chemical analysis of Chocolate milk:

Data presented in Tables (2) showed that the pH in all chocolate permeate and / or skim milk were not changes, but it increased after process to 6.62-6.69 after tow weeks stored samples.

The total solids were the Lowest content in all chocolate produced by permeate milk (C7-C9) compared with chocolate produced by permeate milk and / or skim milk (A1-A3 and B4-B6). Also, total sugars lactose were the lowest content of chocolate produced by permeate milk (C8, C9) after 2 weeks storage. It could be considered as a source of protein, where, the percentage of protein was light changes in all samples after storage samples, as seen in table 2.

Table (2): Effect of permeate UF and storage on chemical analysis of Chocolate milk:

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	рН	Total solids	Total protein	Total sugar		
A1	6.57	16.9	2.86	12		
A2	6.56	17.21	3.22	12.5		
A3	6.58	18.76	3.39	13		
B4	6.59	14.57	2.80	9.5		
B5	6.58	15.1	3.20	11		
B6	6.56	16.88	3.22	11.5		
C7	6.57	11.52	2.68	8.0		
C8	6.59	12.02	2.74	8.5		
C9	6.58	13.93	2.86	10		

Effect of storage at refrigerator and permeate UF on color characteristics of Chocolate milk:

Colour is usually defined by three coordination. There are various colour scales that can used to characterize colour: CIE-X,Y,Z; the L*,a*,b*; and the Rd, a, b scales. Similarly, colour indexes and differences can be calculated from these values. The L*,a*,b* scale is recognized to show a better discrimination between small colour differences in the darker region of the colour space, providing good discrimination for saturated colours, as in the case of chocolate milk. For these reasons this scale is one of the most frequently used for food products (Francis 1989), however it is not so useful for light coloured samples (Anon., 1976).

The L* value represents a nonlinear mathematical approximation of the white – black response of the eye, ranging from 100 for a perfect white to 0 for a perfect black, and measures the luminosity of the sample. A positive value of a* indicates redness, and a negative value greenness. A

plus value for b* indicates yellowness and a minus value blueness. There are other parameters derived from the Hunter-L*,a*,b* scale; the saturation index or chroma that indicates colour saturation and is proportional to its intensity, a/b ratio and the Hue angle among others (Anon., 1976; Francis, 1989 and Barreiro et al., 1997). The a/b ratio has been used as a quality specification for chocolate milk. The hue angle (tan -1 b/a) is another parameter frequently used to characterize colour in food products. An angle of 0 or 360 represent red Hue, while angles of 90, 180 and 270 represent yellow, green and blue Hue, respectively. It has been extensively used in the evaluation of colour parameters in green vegetables, fruits and meats (Barreiro et al., 1997).

Color characteristics measurement directly in the Chocolate with permeates milk or with skim milk samples with a Hunter Lab Ultra Scan revealed that color did not change over different samples addition and after storage at refrigeratore 4 °C (Table 3). In this case (L*-values) brightness decreased, (a*-

values) redness increased and (b*-values) yellowness decreased. Color is only part of the overall appearance, but is probably a major quality factor in Chocolate product. According to our results, the main color change in Chocolate was due to increase in different skim milk or permeate milk addition, which was in high correlation to browning measurement. The effects of different skim milk or permeate milk addition and storage of chocolate at refrigerator 4 °C in the inhibition of the browning reaction is showed in Table 3. It is obvious that different skim milk or permeate milk addition of chocolate increased the development of red colour a*. The browning index (BI) was calculated using the pre-mentioned equation (eqn.3), for chocolate produced by skim milk or

permeate milk addition A1, A2, A3, B4, B5, B6, C7, C8 and C9 samples and the results represented in Table 3. It is clear that chocolate produced by permeate milk C7-C9 samples markedly highest the BI. But had a BI equivalent to 200.5, 231 and 194 respectively compared to 158, 182 and 200 in case of the chocolate produced by skim milk sample, as seen in Table 2. These results are in good agreement with those of Palou et al., (1999) and Genovese et al, (1997) All chocolate samples were also tested for the Hue angle (H*) as well as the Chromaticity (C*). Table 4, lists the values of H* and C* as well as a*-values for chocolate which has been produced by permeate milk higher than chocolate produced by skim milk, as seen in Table 3.

Table (3): Effect of permeate by UF and storage on colour characteristics in chocolate milk.

	L*	a*	b*	H*	C*	BI
A1	28	10	13	78.96	16.40122	158.3397
A2	24	10.9	12	47.75	16.21142	182.1109
A3	22.3	11	12	47.49	16.27882	200.0114
B4	28	10	11.2	48.24	15.01466	138.5359
B5	26	10.1	12.2	50.38	15.83824	163.8623
В6	21	10.3	12.6	50.74	16.27421	222.5869
C7	21.3	9	12	53.13	15	200.545
C8	21	10.5	13	51.07	16.71077	231.175
C9	23	11.9	11.8	44.76	16.75858	194.1233

Table (3) shows that permeate chocolate milk formulations were slightly more dark, more brownish and less brightness than skim milk chocolate. A wide brightness range going from too

light to dark was also observed by Yanes et al., 2002 for commercial chocolate milk beverages.

Sensory evaluation:

Table (4): Effect of permeate UF and storage on sensory evaluation of chocolate milk

able (4): Effect of permeate of and storage on sensory evaluation of chocolate mink										
Sensory	Final		Formulations							
Properties	Remarks	A1	A2	A3	B4	B5	B6	C7	C8	C9
Appearance	10	7 ^D	7.25 ^C	7.5 ^C	8.75 ^B	9.25 ^A	9.5 ^A	8^{B}	8.5 ^B	8.75 ^B
Color	15	10.5 ^C	10.75 ^C	10.75 ^C	14.25 ^A	14.25 ^A	14.25 ^A	11.25 ^B	11.5 ^B	11.75 ^B
Viscous	15	11.75 ^D	12.25 ^C	12.5 ^C	13.75 ^B	14 ^A	14 ^A	13 ^B	13.75 ^B	13.75 ^B
Flavor sweet	20	13.75 ^D	16.25 ^C	18.25 ^A	16 ^C	17.5 ^B	18 ^A	16.25 ^C	18 ^A	17.5 ^B
Flavor choc	25	21 ^D	21 ^D	21 ^D	23.25 ^A	22.75 ^B	22.75^{B}	22 ^C	22 ^C	22.25^{B}
Sediment	10	8.75^{B}	8.75 ^B	8.75 ^B	9.5 ^A					

The organoleptic characteristics of the Chocolate with permeate milk or with skim milk samples (A, B and C) and storage for 2 weeks at refrigerator were evaluated as presented in the following Table 4. Results in Table (4) showed that the highest score of color was recorded for the (B4-B6) sample followed by (C7-C9) then (A1-A3) samples. The highest score of appearance was recorded for the (B4-B6) followed by (C7-C9) then (A1-A3) samples. Also, the highest score of viscosity were recorded for the (B4-B6) followed by (C7-C9)

then (A1-A3) samples. Furthermore, chocolate produced by skim and permeate milk (B4-B6) followed by (C7-C9) then (A1-A3) samples was similar in gaining the best score for flavor sweet and flavor chocolate. Also, results in table (4) showed that the highest score of sediment was recorded for the (B4-B6 and C7-C9) sample followed by (A1-A3) samples, which all chocolate produced by permeate contents. Statistical analysis indicate that there were no-significant difference (P<0.05) between different concentration of sucrose (5, 6 and 7%) in chocolate

produced by skim milk and / or permeate milk. Sugar content can be reduced from 7% to 5% in order to good out come the lactose that present in the permeate, consequently the using of permeate is valuable during the production regarding to lactose content. Also, minimize the west during cheese manufactures.

Table (4) showed that the formulation made without permeate added had a very low chocolate flavour. For all sensory attributes, formulations made with permeate UF had higher mean ratings compared to that prepared without permeate or with skim milk. Studies showed that, commercial chocolate milks vary widely in their sensory properties. Thompson et al., (2004) showed that consumer perception of chocolate flavor, sweet taste, and color intensities were not correlated to overall liking of chocolate milk, suggested that strong chocolate flavor, high sweetness, or dark color do not necessarily drive consumer liking. A wide variability was also observed in consumer acceptability of chocolate milks. Oliveira et al., (2004) evaluated the acceptance of commercial chocolate milk desserts. The results identified two main groups of consumers; one that preferred the products of a specific brand and another that preferred dietetic puddings.

Effect of storage at refrigerator on viscosity of Chocolate with permeates milk:

The viscosity (cP) was selected as a measure of chocolate produced by skim milk and / or permeates milk quality. However, the viscosity in all samples (A1, A2, A3, B4, B5, B6, C7, C8 and C9) was not change as long as time measurements until 460 seconds before and after storage, the results represented in Figures (1 and 2). It is clear that chocolate produced by permeate milk C1-C3 samples markedly highest the Viscosity, followed by chocolate produced by permeate milk and skim milk (B4-B6) then chocolate produced by skim milk (A1-A3) samples , as seen in Figures (1 and 2). However, chocolate produced by permeate milk C7-C9 causes such an increase in viscosity due to increasing of evaporating of water content.

Viscosity: The viscosity profiles of chocolate milk formulations (figures 1 and 2) showed a similar pattern although clear differences can be observed among them, as a result of a complexity of

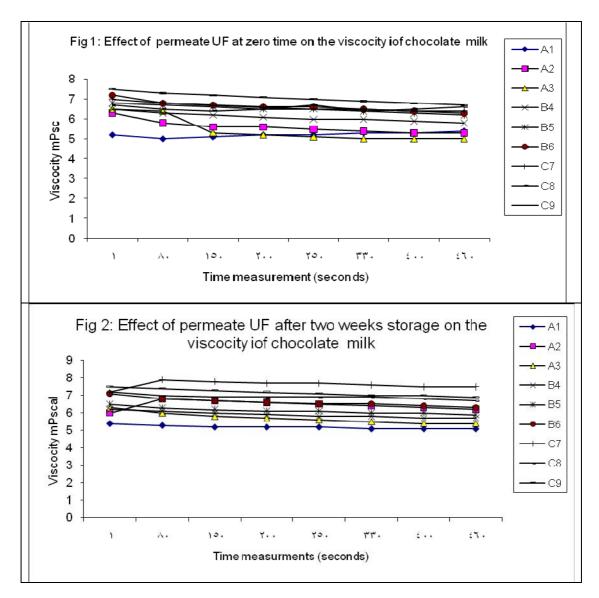
their flow behaviour depending on the fat content, the level of permeate added and both concentration and physical state of dispersed phase. The viscosity values were higher as permeate level increased. Chocolate milk formulation with high permeate was more viscous than others; while formulation with low permeate followed a viscosity pattern more closely to chocolate whole milk. The viscosity value of nonpermeate or skim milk added formulation was the lowest compared to permeate added formulations. This formulation, exhibited a fluid-like behaviour. A similar trend was given by Yanes et al., (2002) for commercial chocolate milk beverages. Chocolate milk is complex suspension system, which comprises milk or dairy fluid as dispersion phase and several solid ingredients (cocoa particles, sugar, stabilizers, etc.) as dispersed phases. The rheological properties of chocolate milk are based on the flow behaviour of the dispersion phase and the dispersed solid ingredients interacting with the dispersion phase and with each other. This interaction which gives raises the complicated rheological properties. k-carrageenan is the most common stabilizer used in chocolate milk formulations Langendorff et al., 2000 and Spagnuolo et al., 2005. However, permeate by UF also exhibited a great potential in stabilizing the dispersion of cocoa particles in experimental formulations. This may be due to the ability of permeate by UF to bind water molecules and form a particle gel.

Conclusion:

From the previous results, it is obvious that results showed a decrease at the following order B6 > B5 > C9 > C8 > C7 > B4 > A3 > A2 > A1 regarding to L*, a*, b*, C*, H*, BI-values, chemical, viscosity and sensory evaluation. Finally, using permeates milk without or with skim milk was able to produce chocolate good quality.

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Utilization of Goats Milk in Manufacture of Processed Cheese

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Abstract: Two Formulas Of Different Blends Are Used For Manufacture Processed Cheesed. First Formula, F₁; (Cow. Processed Cheese) Consist Of 38.44% Ras Cheese, 12.80% Cheddar Cheese, 10.26% Butter, 5.12% Skim Milk Powder, 2.50% Emulsifying Salts And 30.88% Water. Second Formula; F₂ (Goats Processed Cheese) Consist Of Goats Cheese Base 66.40%, 19.92% Butter, 6.64% Skim Milk Powder, 2.00% Emulsifying Salts And 5.04% Water. Both Processed Cheeses Were Storage At 7°C For 3 Months. Organoleptical, Chemical And Physical Properties Were Studied. Obtained Results Showed That Processed Cheese That Made From Goats Base (F₂) Had Gained A Higher Scores For The Breakdown Properties, Spreading Quality And Free From Gumminess Than Control (F₁) And Had Lower Soluble Nitrogen As Well As TVFA Than Control Either Fresh Or During Storage. Also F₂ Had A Higher Values In Penterometer Reading And Meltability While Lower In Oil Separation. The Colour Of Treatment (F₂) Is Prefer Than F₁.

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Keywords: Cheese; Milk; Powder; Salt; Water; Nitrogen; Storage.

1. Introduction:

Goat milk differs in its composition and characteristics than that of cow's milk Goats milk is richer in fat, smaller in fat globules, higher in short chain fatty acids, more easily digested and do not tend to form clusters, higher in casein as a percent of total protein. Goats dairy products are growing in Egypt by leaps and boundes(Riel 1985). Number of investigations were carried out to produce various goats dairy products such as soft cheese (Youssef, 1989; Emara, 1990), hard cheese (Youssef, 1989), Roquefort cheese (Enab 1993), yoghurt and beverage (Hassan, 1992).

Processed cheese spread (PCS) is a product obtained by blending cheeses of different types and maturity, with melting salts (Chambre & Daurelles, 2000) certain processed cheeses are aromatized by a supply of aroma ingredients of animal or plant origin (Meyer, 1973).

In Egypt the consumption of Processed cheese spread PCS increased markedly during the last decade. PCs represented about one quarter of the total cheese imports in 1997, the production reached about 10 thousand ton either in spreadble or block form (Awad, 2003). The PCs mainly manufactured from blends containing imported cheddar and Gouda cheeses as well as locally produced Ras cheese. The locally produced Ras cheese requires ripening period of about 4 months to develop the desired flavour and body characteristics which in sum increase the total capital costs of production (El Neshany et al., 1987). Also, biogenic amines may be formed and steady increased during the maturation of cheese (El-

Sonbaty et al., 1998). Biogenic amines content in cheddar, Gouda and Ras cheese have been determined in several studies. Matured cheeses rich in biogenic amines for production of PCs can give vise to food intoxication.

Processed cheese is an attractive product that enjoys great popularity. It is produced by heating and stirring blends of various natural cheese and other ingredients in the presence of emulsifying salts (Uhlman, 1985). Also many unconventional ingredients are currently used for production of processed cheese analogue (Caric and Kalab, 1993). The properties of processed cheese and cheese spread are greatly influenced by the composition of blend and emulsifying salt used and other ingredients. Therefore the aim of this research is studying the feasibility of using Gouts milk in production of cheese-base to prepare processed cheese and study the properties of resultant processed cheese.

2. Material and Methods

Materials:

Raw materials for preparing processed cheese (PCs)

Ras cheese (one month old) was obtained from Arabic food Industrial co. (Domety) 6th October City, Egypt. Also matured cheddar cheese (8 months old) and Kasomel emulsifying salt K2394 (Rhone-Poulenc Chimic- France) were obtained from International Dairy and Foods Co. (Milkyland), 10th Ramadan City, Egypt. Low heat skin milk powder and butter were procured from Irish Dairy Board, Grattan House, lower Mountst, Dublin Ireland Goate

milk obtained from a herd (20-30heants) of private farm in Gizadistrict. Chemical composition of the Ingredients used in manufacturing processed cheese spread are presented in table (1).

Methods:

Manufacture of processed cheese:

Processed cheese were manufactured according to the method of Meyer (1973), from goats milk, young Ras and matured cheddar cheese, emulsifying salt (2.5%), butter, skim milk powder and water were placed into the processing batch type kettle of 10 kg capacities, a pilot machine locally made in Egypt (Mohamed, 2004) in National Research Center processed cheese manufactured from cows milk (F_1) and from Goats milk (F_2) .

Analysis of processed cheese spread PCs I chemical analysis:

The PCs samples were analyzed for fat content, total nitrogen, soluble nitrogen (SN) content and pH values (using pH meter model cole-Amer Instrument Co., USA) as described in Ling (1963). Total volatile fatty acids (TVFA) were determined according to Kosikowski (1970) and values were expressed as ml 0.1 N NaOH / 100g. Ash was determined according to AOAC (1990).

Lactose content according to the method of Barrnett and Abdel-Tawab (1957). Relative casein by Arithmetic operations S.N/T.N. – 100.

Table (1) reflect the chemical composition (%) of the ingredients which used in manufacture of processed cheese spread.

Table (1): Chemical composition (%) of the ingredients used in manufacture of processed cheese

Composition	Ingredients							
Composition	Ras cheese	Cheddar cheese	Goats chees. Bus.	Cow butter	Skim milk powder			
T.S	54.96	65.40	29.98	84.00	96.00			
Fat	24.88	34.70	10.5	82.00	0.99			
Total protein	22.24	25.38	13.5	N.D.	37.13			
Soluble Nitrogen	0.66	1.20	N.D.	N.D.	0.83			
Lactose	1.60	0.10	3.0	N.D	47.50			
Ash	5.70	5.41	2.1	N.D	7.89			

Physical analysis

The PCs penetrometer was measured using a penetrometer (Kochler Instrument Co. Inc., USA) as described by Gupta and Reuter (1993). The penetration depth was recorded in units of 0.1mm, oil separation in mm was determined according to the method outlined by Thomas (1973). Meltability in millimeters (mm) of the PCs samples was measured as described by Olsen and Price (1958) with the slightly modification by Savello et al., (1989) colour parameters using a Hunter Lab. Colorimeter Model b25 A-2 (Hunter Assoc. Lab. Inc. Va, USA) and the instruction of user manual. The instrument was first standardizing using a reference with white surface. As in the Hunter L, a and b scale describe lightness {back (O) to white (100)}, redness (+) to greenness (-) and yellowness (+) to blueness (-), respectively were measured.

Organoleptic properties:

Processed cheese samples were sensory evaluated organoloptically for the different sensory properties using a hedonic scale of 1-5, which was designed based on the hedonic scales provided by Ottawa (1977). The scoring panel consisted for 20 experienced staff members of the Department. Statistical analysis:

The experimental data were analyzed using the general linear models procedure of the Statistical Analysis System (SAS, 1996). Significance of differences was defined at p < 0.05.

3. Results and Discussions

Table (2) illustrated the formulations of the different blends used for manufacture of processed cheese. Control (F_1) composed of (38.88%) Ras cheese, (12.80%) cheddar cheese, (10.26%) butter, (5.12%) skim milk powder, (2.50%) emulsifying salts and (30.88%) water. On the other hand F_2 (Goats processed cheese) had (66.40%) Goats cheese, (19.92%) butter, (6.64%) skim milk powder, (2.00%) Emulsifying salts and (5.04%) water. The F_2 had a higher content of butter, skim milk powder and lower content of emulsifying salts and water than F_1 .

Table (3) show the chemical composition of resultant cheese ($F_1\&F_2$) Two processed cheeses spread satisfy the legal standard (Es organization 2002). It is clear that F_2 had slight a higher content of T.S. (44.99%) and lactose (5.95%) than F_1 . On the other hand F_1 had slight higher content of Fat/ DM (50.13%), protein (14.22%), Ash (3.96%), pH (5.78) and total volatile fatty acids (27.80%) than F_2 . These may be due to the formula of the two types (F1, F2). Statistical analysis at P<0.05 showed that there is a

significantly different between (F1,F2) for Lactose, Ash and Total Volatile fatty acids.

Table (2): Formulations of the different blends used for manufacture of processed cheese

Ingredients	Cow. P.C.	Goats P.C
Ras cheese	38.44	_
Cheddar	12.80	_
Goats cheese bas	_	66.40
Butter	10.26	19.92
S.M.P	5.12	6.64
Emulsifying salts	2.50	2.00
Water	30.88	5.04
Total	100.00	100.00

Table (3) Chemical Composition of the different blends used for manufacture of processed cheese

Ingredients	F_1	F_2
T.S	44.88	44.99
Fat/P.M	50.13	50.00
Protein	14.22	14.10
Lactose	2.85 ^b	5.95 ^a
Ash	3.96 a	2.98 ^b
pН	5.78	5.75
Tv.F	27.80 a	22.70 b

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F_1 : Cow. processed cheese F_2 : Goats processed cheese

Table (4) indicate the Nitrogen fractions of both cow and Goats processed cheese. It shows that Goats processed cheese had a higher content of relative cosein (90.21%) than cow processed cheese. This result is agreement to (*Riel 1985*) whereas cows processed cheese had slight a higher content of T.N (total nitrogen), soluble nitrogen (SN) and S.N/ T.N than Goats processed spread cheese this may be due to the using of cheddar and Ras cheese which they are ripening. Statistical analysis at P<0.05 showed that there is a significantly different between (F1,F2) for Soluble nitrogen, Soluble nitrogen/Total nitrogen and relative casein fresh and during storage at P<0.05.

Table(4): Nitrogen fractions of cow processed cheese and Goats processed cheese

eneese and Goats processed eneese						
Ingredients	$\mathbf{F_1}$	\mathbf{F}_2				
T.S %	2.2296	2.2100				
S.N %	0.3999 a	0.2163 ^b				
S.N / T.N	17.936 a	9.787 ^b				
Relative casein	82.06 b	90.21 a				

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F_1 : Cow. processed cheese F_2 : Goats processed cheese

Table (5) illustrate the physical properties of cows processed cheese and Goats processed cheese. The penetrometer reading (mm) of F_2 is a higher (192 mm) than F_1 (160 mm). This may be due to the composition of F_2 it had a higher content of TS as shown in Table (3). From Table (5) It clear that oil separation (%) is higher at F_1 (33.33%) than F_2 . Melting index (mm) is higher (177 mm) in F_2 than F_1 Pecrease in pH values may lead to weak of protein bonds and demulsify of fat (Shime, 1985). These change due to the type of milk from previous Table (3) F_2 had lower pH than F_1 . Statistical analysis at P<0.05 showed that there is a significantly different for penterometer reading and Melting index between (F1, F2).

Table (5): Physical properties of cows processed spread cheese and Goats processed spread cheese

Ingredients	$\mathbf{F_1}$	$\mathbf{F_2}$
Penterometer	160 ^b	192 ^a
reading (mm)		
Oil separation (%)	33.33	25.00
Melting index	95 b	177 ^a

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F_1 : Cow. processed cheese F_2 : Goats processed cheese

Table (6) shows that the whiteness (- value) of processed cheese is higher in F_2 than F_1 while the intensity of green (a-value) higher in F_1 than F_2 . On the other hand yellow (b-values) is higher in control than treatment these due to the kind of ingredients in control and treatment. Therefore (F2) is prefer than (F1). There is a significantly difference at P<0.05 for L,a and b between (F1, F2).

Table (6): Colour properties of cow processed spread cheese and Goats processed spread cheese:

Ingredients	$\mathbf{F_1}$	\mathbf{F}_{2}
L (whiteness)	85.98 b	89.89 a
a (green)	- 1.59 ^b	- 1.85 a
b (yellow)	25.35 a	23.36 b

- Different superscript (a, b,...) at the same raw are significantly different (P $\!<\!0.05)$
- F_1 : Cow. processed cheese F_2 : Goats processed cheese

Table (7) indicate the change of some physical properties during storage (7°C) it show that F_2 had a high penterometer reading (192 mm) than F_1 (160mm) and gradually decreased till 3 months in both F_1 and F_2 . This mean that the curd of F_2 is softer than F_1 and this due to the type of ingredients (Goat's). the differences in the penentration values

during storage could be related to the interaction between emulsifying salts and state of protein network as well as the changes in chemical composition during storage (Younis et al., 1991) and Azzam (2007). However, during processing whey protein are subjected to denaturation, which can bind more water (Abd El-Salam et al., 1997) and increase the emulsification of the fat globules in penetration cheese spread which also increase viscosity. From the

same table we notice that oil separation is higher in control (33.33%) than treatment (25.00%) and increased gradually during storage 7°C, till three month in both control and treatment. This result is agreement to (Azzam, 2007) and (Hussein, 2008). There is a significantly different for penterometer reading, Oil separation and Melting index between (F1, F2).

Table (7): Change in physical properties during storage at (7 °C)

Storage period	Pemterometer reading		Oil separation %		Melting index	
(Month)	$\mathbf{F_1}$	\mathbf{F}_2	$\mathbf{F_1}$	$\mathbf{F_2}$	$\mathbf{F_1}$	\mathbf{F}_2
0	160 a	192 ^a	33.33°	25.00 °	95 ^a	177 ^a
1	156 b	190 ^a	35.00^{b}	30.33 b	94 ^a	170 ^b
2	155 b	179 ^b	36.33 ^b	31.66 b	91 ^b	166 ^c
3	149 ^c	171 °	38.00 ^a	33.33 ^a	90 b	150 ^d

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F₁: Cow. processed cheese F₂: Goats processed cheese

Table (7) indicated melting index it is higher in F_2 than F_1 it reaches to 95, 177 (mm) for control and treatment respectively during storage (7°C) for 3 month the melt ability/ mm) decreased till 3 month ethier F_1 or F_2 . These results are in agreement to (Hussein, 2008).

Colour parameters of PCs for F_1 and F_2 during storage at 7° for 3 months are shown in Table (8). We observed that there is difference between F_1 and F_2 . The lightness (L-values) of treated sample

had a higher value than control. During storage the values slight decreased till 3 months either control or treatment whereas control had higher than F_2 and increased gradually during storage till 3 months in both F_1 and F_2 (yellow) higher in F_1 than F_2 and increased during storage till 3 months for F_1 and F_2 . The results agree with those of Khader et al. (1997) and Guinee (2003), they reported that during storage, PCs gradually become darker due to occurred the millard browning reactions.

Table (8): Change in color during storage (7°C)

Storage period (Month)	Pemterometer reading (mm)		Oil separation %		Melting index	
	$\mathbf{F_1}$	$\mathbf{F_2}$	$\mathbf{F_1}$	\mathbf{F}_{2}	$\mathbf{F_1}$	$\mathbf{F_2}$
0	85.98	89.89	-1.59 ^a	-1.85 ^a	25.35 °	23.36
1	85.90	89.66	-1.70^{b}	-1.93 ^b	26.17 ^b	23.50
2	85.74	89.54	-1.78 ^b	-1.99 ^b	26.79^{b}	23.79
3	85.11	89.06	-1.93°	-2.23 °	27.93 ^a	23.88

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F₁: Cow. processed cheese F₂: Goats processed cheese

Table (9) illustrate the change in nitrogen fractions and total volatile fatty acids during storage. It is clear that F_2 is lower content of soluble nitrogen than F_1 and slightly increased during storage in both F_1 and F_2 . This may be due to the ingredients of cheese formula. The change occurred in soluble nitrogen. TVFA took the same trend fresh and during storage. This due to the hydrolysis of fat contents during storage which may be due to the enzymatic activity of heat resistant proteinase or psychrotrophic spore forming bacteria present in the product (Tamime et al., 1990, Younis et al., 1991, Aly et al., 1995). There is a significantly different at P<0.05 between (F1, F2) for soluble nitrogen fresh and

during storage, while there is no significantly different at P<0.05 between (F1, F2) for total volatile fatty acids fresh and during storage.

Data presented in Table (10) show that processed cheese made with Goat's milk different in most sensory compared with control. Treatment gained higher scores for the breakdown properties and spreading Guality and free from gummines. The storage of processed cheese spread not effect on the organoleptic properties. These results are in agreement to Abd Rabo, et al. (2005). There is a significantly different at P<0.05 between (F1, F2) for firmness of body, spreading quality stickness,

smoothness of texture, breakdown properties, chewiness, flavor and a overall preference.

Table (9): Change in nitrogen fractions and volatile F.A. during storage

Storage period	Soluble Nitrogen		TV FN		
(Month)	$\mathbf{F_1}$	$\mathbf{F_2}$	$\mathbf{F_1}$	\mathbf{F}_{2}	
0	0.3999 b	0.2163 °	27.80 b	22.70 b	
1	0.4005 a	0.2188 a	28.00 ^b	-22.85 b	
2	0.4011 a	0.2195 b	28.18 ab	-23.15 a	
3	0.4019 a	0.2206 a	28.46 a	-23.35 a	

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)
- F_1 : Cow. processed cheese F_2 : Goats processed cheese

Table (10): Sensory evaluation of first and second fermula of processed cheese

Sensory attribute (5 point)	$\mathbf{F_1}$	$\mathbf{F_2}$		
Surface appearance	4.66	4.50	1 _{dull very much}	5 _{shiny very much}
Firmness of body	1.91 ^a	1.00 ^b	1 _{very soft}	5 _{very firm}
Spreading quality	3.41 ^b	4.66 a	1 _{diffult to spread}	5 _{easy to spread}
Stickiness	1.83 ^a	1.00 ^b	1 _{not sticky}	5 _{very sticky}
Smoothness of texture	1.91 ^a	1.00 ^b	1 _{very smooth}	5 _{not smooth}
Break down properties	2.83 ^b	4.83 ^a	1 _{descont dissolve}	5 _{dissolve very well}
Chewiness	3.41 ^b	5.00 ^a	1 _{very showing}	5 _{not showing}
Gumminess	1.00	1.00	1 _{absent}	5 _{very pronounced}
Oil separation	1.00	1.00	1 _{absent}	5 _{very pronounced}
Flavour	4.5 ^a	4.00 ^b	1 _{very weak}	5 _{very strong}
Overall preference	4.1 ^b	4.66 a	1 _{dislike very much}	5 _{like very much}

⁻ Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)

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⁻ F_1 : Cow. processed cheese - F_2 : Goats processed cheese

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Utilization Of Microcrystalline Cellulose Prepared From Rice Straw In Manufacture Of Low Fat Soft White Cheese.

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Abstract: Micro crystalline cellulose was prepared from rice straw. Different concentration of resultant Micro crystalline cellulose (% 0.1, 0.2, 0.3, 0.4, 0.5, 1) were used in manufacture of low fat soft white cheese. Organo lepticall and chemical properties of resultant cheese were studied fresh and during storage $5^{\circ}c\pm 1^{\circ}$ for 45 days .Results showed that low soft cheese manufactured by using 0.1 % microcrystalline cellulose had a good flavour , body and texture and appearance than control and gained higher score fresh and during storage $5^{\circ}c\pm 1^{\circ}$ than control . Treatment had a higher content of tyrosine and tryptophan and total volatile fatty acids and total carbonyl compounds than control. Treatment had a higher content of alanine acid whereas control had a higher content of aspartic acid. Glutamic acid recorded a high percentage either control or treatment than other acids. Microcrystalline cellulose at 0.1 % lead to increase cheese yield, improving body, texture, appearance and flavor.

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Key words: Cheese, Stabilizer, Microcrystalline cellulose.

1. Introduction

Microcrystalline cellulose is highly crystalline particulate cellulose by removing amorphous (fibrous cellulose) regions of a purify typically with a strong mineral acid such as hydrogen chloride. Microcrystalline cellulose is a naturally derived stabilizer, texture, reduced - fat salad dressings, numerous dairy products and bakery products. Several micro crystals are hinged together cellulose- micro fibril. Microcrystalline cellulose molecules is made up of a chain of (about 250 glucose molecules). Thus, microcrystalline cellulose was prepared via bio-chemical processing of rice straw according to [Galal et al., 2008]. Then, the obtained unbleached pulp was bleached and converted to its corresponding microcrystalline cellulose accordance to [Galal and Mohamed, 2009]. The aim of this work is utilization studying the feasibility of microcrystalline cellulose extracted from straw rice in manufacture of low soft white cheese and study the effect of microcrystalline cellulose on yield, organoleptically, chemically properties of resultant soft white cheese fresh and during cold storage at 5 ± 1 °C.

2. Materials and Methods

Milk: fresh buffalo's milk was obtained from the herd of faculty of Agriculture, Cairo University. The milk was skimmed by using a mechanical separator to 1.5%. Chymosin derived by fermentation (CDF) was obtained from dairy

ingredients division, Pfizer Inc. Cairo, Egypt (3gm/100kg milk).

Preparation of Microcrystalline cellulose:

Via bio chemical processing of rice straw was done according to [Galal etal, 2008] then the obtained unbleached pulp was bleached and converted to its corresponding microcrystalline cellulose according to [Galal and Mohamed, 2009].

Experimental procedure: Preliminary Experiments

The low soft white cheese was manufacture according to Fahmi and Sharara [1950] by using different concentrations of micro crystalline cellulose (0.1, 0.2, 0.3, 0.4, 0.5, and 1%) and the resultant cheese was analyzed for organoleptic properties. Results showed that 0.1% microcrystalline cellulose had gained a highest score for appearance, body and texture and flavor. So, 0.1% concentration was used in the manufacture of the cheese. The resultant cheese was analyzed chemically and organoleptically when fresh, 15, 30 and 45 days of storage at $5 \pm 1^{\circ}$ C. Also the yield of resultant cheese was recorded.

Sensory evaluation

The organoleptic properties of low fat soft white cheese were evaluated by a regular scoring including the staff members about (20 persons) of Food and Dairy Department at the National Research Centre according to El-Koussy et al. [1966]. Statistical analyses: Statistical analyses were performed using

the GLM procedure with SAS (2004) software. LSD comparison procedure was used to compare the means. A probability to P < 0.5 was used establish the statistical significance.

Methods of analysis:

Milk: Total solids determined according to JDF method [1982], fat content by Ling [1963], Total protein as described in IDF standard [1986], and titratable acidity as AOAC [1985] while pH value was determined using pH meter, type (Digital Meter M 41150) equipped with a combined glass electrode. Cheese: Total solid determined according to IDF method (1982), fat content by Ling [1963]. Total protein and soluble nitrogen as described in IDF stander [1986], titratable acidity as described in AOAC [1985]. Total volatile fatty acid was assessed according to Kos i Kowski [1966] and soluble tvrosine and tryptophan were measure spectroscopically according to Vakaleris and Price [1959]. Organoleptic properties of low fat soft cheese quality were evaluated by scoring panel from the staff members 20 persons) at the national research centre according to El-Koussy [1966].

3. Results & Discussion:

Table (1) show chemical composition of law soft white cheese made from skim buffaloes' milk and 0.1% microcrystalline cellulose during cold storage (5°±1°C) for 45 days. It was clear that total solids increased gradually during cold storage in both control and treatment. On the other hand treatment had high total solids than control either fresh or during cold storage (5°±1°C). This may be due to the effect of treatment; similar results were reported by Kebary et al [1998]. Moisture content of control and treatment decreased as storage period progressed which might be due to the loss of cheese water. Also fat had the same trend. Acidity was higher in control than treatment either fresh or during cold storage at (5°±1°C). Acidity gradually increased either control or treatment during cold storage (5°±1°C) till 45 days. Whereas pH took an opposite trend.

Table (2) indicated the tyrosine and tryptophan in soft white cheese made from skim buffalo's milk and 0.1% microcrystalline cellulose during cold storage (5°C±1°C). The soft white cheese which made from skim milk and 0.1% microcrystalline cellulose had higher content of tyrosine than control either fresh or during cold storage (5°±1°C) also tyrosine content was increased gradually until 45 days in both control and treatment. From the same table we notice that tryptophan took the same trend of tyrosine. It is higher in treatment than control and increased gradually during cold storage (5°±1°C)

until 45 days. These result are in agreement to (Abd El-Gawad and Hassan)(2000)

Table (3) show the total volatile fatty acid in soft white cheese made from skim milk and 0.1% microcrystalline cellulose fresh and during cold storage (5°±1°C). It is clear that total volatile fatty acids in treatment are higher than control either fresh or during cold storage. Total volatile fatty acids increased gradually during cold storage until 45 days. The increase of total volatile fatty acids may be due to the hydrolysis of fat during storage.

The TVFA increased in all cheeses control and treatment as storage period progressed. These results are in agreement with (Badawi and Kebary, 1998).

Table (4) show organoleptic properties of soft white cheese made from skim milk (control) and from skim milk and 0.1% microcrystalline cellulose. It is clear that treatment had gained a highest score for flavor, body and texture and appearance. Control had gained 83 score while treatment had gained 91 score. On the other hand total scores of flavor, body & texture and appearance decrease during storage (5°±1°C) until 45 days as by [El-Koussy, 1966].

Table (5) illustrates the flavour development in white cheese made from low fat milk during storage. It is clear that treated sample which manufacture by using 0.1% microcrystalline cellulose had a highest content of free amino nitrogen (mg/ml of valine) fresh and after storage at (5°±1°C) for 45 days. On the other hand treated sample had a highest content of both total volatile fatty acids and total carbonyl compounds (μ mol/Kg cheese) either fresh or after storage at (5°±1°C) for 45 days. This may be due to the effect of microcrystalline cellulose. These results are in agreement [Badawi and Kebary 1998].

Table (6) show the free amino acids of white cheese made from low fat milk during storage. From this table we notice that aspartic acid had a highest content than other acids either fresh or after storage for 45 days whereas alanine had a highest content in fresh treatment sample and then decreased from 14.8% to 13.5% after storage at $(5 \pm 1^{\circ}\text{C})$ for 45 days. α amino –butyric acid is the lowest content either fresh or after 45 days of storage $(5 \pm 1^{\circ}\text{C})$. On the other hand this acid did not find in treated sample while valine, therionine, glycine, leucine had intermediate content. Glutamic acid recorded a high percentage either control or treatment fresh and after storage for 45 days, these results with agreement to Abd El-Gawad and Hassan F.A. M. [2000].

Conclusion

Using 0.1%Microcristaline cellulose is the best conclusion for preparing cheese. It is lead to increase cheese yield, improving the body, texture, appearance and flavour.

Table 1. Chemical composition of low fat soft white cheese manufactuer by using 0.1 % microcrystalline cellulose during cold storage $(5\pm1^{\circ}C)$.

	8		-)-							
Storage										
/days	TS		fat		lactose		Ph		Acidity	
	С	T	С	T	С	T	С	T	С	T
0	39^{Bab}	43^{Ab}	3^{Bd}	3.9^{Ad}	12^{Ba}	13 ^{Aa}	5.68^{Ba}	5.73 ^{Aa}	0.35^{Ad}	0.33 ^{Ad}
15	40.6^{Bab}	44.1 ^{Ab}	3.6^{Bc}	4.2 ^{Ac}	11.2^{Bb}	11.7 ^{Ab}	5.6^{Aab}	5.68 ^{Ab}	0.41^{Ac}	0.39^{Ac}
30	41.7^{Ba}	44.9^{Aab}	4.1^{Bb}	4.8^{Ad}	9.8 ^{Ac}	10.1 ^{Ac}	5.45 ^{Abc}	5.61 ^{Ab}	0.53^{Ab}	0.45^{Bb}
45	42.1^{Ba}	45.7 ^{Aa}	4.8^{Ba}	5.5 ^{Aa}	7.1 ^{Ad}	6.8^{Ad}	5.2 ^{Ac}	$5.3c^{Ac}$	0.58^{Aa}	0.51^{Ba}

C: control, T: treatment.

Table 2. Tyrosine and Tryptophan in low fat soft white cheese manufactuer by using with 0.1 % microcrystalline cellulose during cold storage ($5\pm1^{\circ}$ C).

	0 \				
Storage/days	Tyrosine		T	Tryptophan	
	С	T	С	T	
0	55.9 ^{Ad}	58.2 Ad	45.8 ^{Ad}	46.1 Ad	
15	88.9 ^{Ac}	90.7^{Ac}	$70.8^{\mathrm{\ Bc}}$	86.9 Ac	
30	117.5 ^{Ab}	120.3 Ab	90.5^{Bb}	131.0 Ab	
45	180.0^{Aa}	223.7 ^{Aa}	117.3 ^{Ba}	244.0 ^{Aa}	

- Different superscript (a, b,...) at the same raw are significantly different (P < 0.05)

Table 3. Total volatile Fatty acids (TVFA) in low fat soft white cheese manufacture by using 0.1 % microcrystalline cellulose during cold storage ($5\pm1^{\circ}$ C).

Storage/days	TVFA			
	С	T		
0	14.5	15.6		
15	17.3	18.5		
30	21.8	22.2		
45	33.7	44.7		

Table 4. Organoleptic properties of low fat soft white cheese manufactuer by using 0.1 % microcrystalline cellulose during cold storage ($5\pm1^{\circ}$ C).

	С	T
Flavor (50)	40 ^b	46 ^a
Body & Texture (40)	35 ^a	37 ^a
Appearance (10)	8 ^a	8 ^a
Total	83 ^b	91 ^a

Table 5.Flavor development in low fat soft white cheese control and treatment with 0.1 % microcrystalline cellulose during cold storage(5±1°C).

Storage days	C	Т
	FAN TVFA T.Carbonyl	FAN TVFA T.Carbonyl
0	54.03 ^{Bb} 14.5 ^{Ab} 67.7 ^{Bb}	69.7 Ab 15.6 Ab 88.3 Ab
45	89.0^{Aa} 33.7^{Ba} 211.4^{Ba}	90.5^{Ba} 44.7^{Aa} 301.0^{Aa}

FAN: Free Amino Nitrogen (mg/ml of value).

TVFA:Total Volatile fatty acids (ml of 0.1 N NaoH / 10 g cheese).

T.Carbonyl:Total carbonyl (µ mol / Kg cheese).

Table 6.Free amino acids of low fat soft white cheese control and treatment with 0.1 % microcrystalline cellulose during cold storage($5\pm1^{\circ}$ C).

Amino acids	C		T		
Storage days	0	45	0	45	
Alanine	13.9	11.0	14.8	13.5	
Valine	5.1	2.07	6.3	6.0	
Therionin.	3.51	2.97	2.7	2.83	
Clycin	5.82	4.2	12.78	6.50	
Leucin.	7.11	7.20	12.9	7.8	
Serin.	7.5	00.00	4.88	7.79	
Gysteine	11.2	9.0	9.3	14.5	
Aspartic.	14.2	17.3	12.6	16.19	
Phenylalanin.	13.99	10.81	10.3	13.75	
α amino-buytric acid	3.4	0.9	00	00	
Glutamic	14.3	9.7	13.5	10.9	

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Modeling Underground Water Reservoir

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Abstract: In this paper a simple model for underground water is constructed. The supply to the reservoir is from one side with variable water level from rain and flood, in the meantime water escapes outside from the other side. The soil forming the reservoir is porous and water movement inside is according to Darcy's flow. The bottom of the reservoir is impermeable to water, whereas, the top of the rectangular reservoir is exposed to a steady pressure depending on the atmospheric pressure. The differential equation of the flow in the model is solved by the method of Green's function. Inlet and exit velocity distribution is obtained and is integrated to give the capacity as a function of time.

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Keywords: water reservoir, pressure gradient, porosity, compressibility, green function, Darcy's law

1. Introduction

Water is necessary for human consumption agricultural and industrial purposes. It can be found in underground reservoirs in layers mixed with soil. Typically, underground is formed of solid rock or porous soil. Walls are dug to extract, the capacity of the reservoir is essential to determine whether or not digging is economic. This model is suggested to describe the mathematical analysis employed. Empirical evidence show that flow in the porous soil is according to Darcy's law; which will be stated later. Extensive literature can be found for the flow in porous media, of this work we mention the paper by [1] on fluid flow through porous metals and the work by [2] who studied fluid flow through packed columns. More recently, [3] discussed inertial effects on fluid flow through disordered porous media. Also, [4] handled the problem of permeability of unidirectional fibrous media; this problem is also discussed by [5]. The nonlinear correction to Darcy's law at low Reynolds numbers are made by [6]. Non-Darcy flow in porous media is studied by [7]. The relative permeability coefficients in two phase flow in porous media are studied by [8-9], the multiphase flow in porous media with phase change is discussed by [10] and [11-16] handled several aspects of multiphase flow in porous media.[17] handled multiphase flow and transport processes in subsurface. Also, [18] discussed thermodynamically constrained averaging theory for flow in porous For a review of underground water media. mechanics, we refer the reader to the text by [19] and the historical perspective by [20]. Also, classic ground water simulations are given by [21].

2. The Basic Theory

The basic theory in the flow of porous media is due to Darcy's law which is suitable for low velocity and viscosity. The theory is linear and nonlinear corrections are required of which we mention the empirical formula due to Forchheimer. Also Koch and Ladd obtained similar results with perturbation methods. The work presented in this paper is exclusively based on Darcy's flow which enables exact mathematical formulation.

Two basic assumptions are involved in Darcy's flow. The first is the existence of a linear relationship between the flow velocity and the hydrostatic head gradient, the constant of proportionality is the permeability of soil. If \underline{u} is the velocity vector of the

fluid, h is the hydrostatic head and $\frac{p}{\rho}$ is the

equivalent head due to pressure p where ρ is the specific weight of the fluid

$$\underline{u} = k \, \underline{\nabla} \left(h + \frac{p}{\rho} \right) \tag{1}$$

k is the permeability of soil.

The second assumption is due to the compressibility of the porous soil such that the continuity equation for incompressible water flowing in such soil is given by

$$\underline{\nabla} \cdot \underline{u} = \upsilon \frac{\partial}{\partial t} \left(h + \frac{p}{\rho} \right) \tag{2}$$

 υ is the packing constant of the soil. Denoting $\varphi\!=\!h\!+\!\frac{p}{\rho}\quad , \ {\rm eqs}\ (1)\ {\rm and}\ (2)\ {\rm give}\ {\rm the}\ {\rm diffusion}$ equation

$$\frac{\partial \varphi}{\partial t} = \frac{k}{\nu} \nabla^2 \varphi \tag{3}$$

which is the governing equation of the problem.

3. The Suggested Model

To render the mathematical analysis tractable, a simple model is suggested in Cartesian space. The water flow is in the x-y plane and the analysis will be made for one depth unit normal to the flow plane. Of course, the flow is time dependent in the model considered. The inlet to the model reservoir is at x=0 along the y axis and the

outlet is at x=L also along the y axis. The bottom of the reservoir is composed of horizontal solid rock along the x axis at y=0 and is impermeable to water i. e. of zero vertical velocity

component
$$\frac{\partial \varphi}{\partial y}\Big|_{y=0} = 0.$$

The top of the reservoir is at y = B and is also horizontal and is exposed to a fraction of the atmosphere pressure and is uniform along the top. A low hydrostatic head of a magnitude H_0 is uniformly distributed along the bottom. While a variable time dependent head αt exists on the entrance at x = 0 along the y axis. This variable head is due to rain or flood. The fig. 1 shows a schematic of the model.

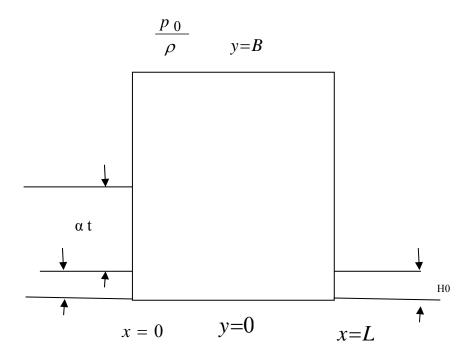


Fig. 1. Schematic of the reservoir

4. Analytical Solution

To obtain the storage capacity of the reservoir; the velocity must be obtained along the entrance and the exit and the capacity C at any instant of time T

less than
$$\frac{B-H_0}{\alpha}$$
 is given by

$$C(T) = k \int_{0}^{T} \int_{0}^{B} \left[\frac{\partial \varphi}{\partial x} \Big|_{x=0} - \frac{\partial \varphi}{\partial x} \Big|_{x=L} \right] dy dt \quad (4)$$

The required x derivatives of φ can only be found from the distribution of φ in the whole domain of the solution which is obtained from solving equation (3) subject to the prescribed boundary conditions as given below:

$$\varphi(0, y, t) = H_0 + \frac{P_0}{\rho} + \alpha t$$
 (5) $\varphi(L, y, t) = H_0 + \frac{P_0}{\rho}$

$$\varphi(x,B,t) = \frac{P_0}{\rho} \tag{7}$$

and

$$\frac{\partial \varphi}{\partial y}\Big|_{y=0} = 0 \tag{8}$$

The integration of this time dependent boundary value problem can be obtained analytically by the method of Green's function at the typical point (x_0, y_0, t_0) [22] by the integrals:

$$\varphi(x_0, y_0, t_0) = \left(H_0 + \frac{P_0}{\rho}\right) \int_0^B \int_0^L G|_{t=0} dx dy - \frac{k}{\nu} \int_0^{TB} \left(H_0 + \frac{P_0}{\rho} + \alpha t\right) \frac{\partial G}{\partial x}|_{x=0} dy dt$$

$$-\frac{k}{\nu} \int_0^{TB} \left(H_0 + \frac{P_0}{\rho}\right) \frac{\partial G}{\partial x}|_{x=L} dy dt - \frac{k}{\nu} \int_0^{T} \int_0^T \frac{\partial G}{\partial y}|_{y=B} dx dt$$
(9)

Here G is the Green's function of the problem and is given by solution of

$$\frac{\partial G}{\partial t} + \frac{k}{\nu} \nabla^2 G = \delta(x - x_0) \delta(y - y_0) \delta(z - z_0)$$
(10)

Subject to

$$G=0$$
 on $x=0$, $x=L$, $y=B$ and $\frac{\partial G}{\partial y}\Big|_{y=0} = 0$ (11)

The solution of eqs. (6) and (7) is obtained as

$$G(x, y, t, x_0, y_0, t_0) = \frac{4}{LB} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\sin \frac{n\pi x_0}{L} \cos \frac{\pi}{2} (2m+1) \frac{y_0}{B}}{L} \cdot \frac{-\frac{k}{v} \left(\frac{n^2 \pi^2}{L^2} + \pi^2 \frac{(2m+1)^2}{4B^2}\right) \left(t_0 - t\right)}{\sin \frac{n\pi x}{L} \cos \frac{\pi}{2} (2m+1) \frac{y}{B}}$$
(12)

The distribution of φ can be obtained by substitution of equation (12) in equation (9), then we have

$$\varphi(x_0, y_0, t_0) = \left(H_0 + \frac{P_0}{\rho}\right) \frac{8}{\pi^2} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{(-1)^m (1 + (-1)^{n+1}) e^{-\xi_{nm} t_0}}{n(2m+1)} \sin \frac{n\pi x_0}{L} \cos \frac{\pi}{2} (2m+1) \frac{y_0}{B}$$

$$-\frac{k}{\upsilon} \frac{8}{L^{2}} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{n}{(2m+1)} \sin \frac{n \pi x_{0}}{L} \cos \frac{\pi}{2} (2m+1) \frac{y_{0}}{B} \cdot \left[\left(H_{0} + \frac{P_{0}}{\rho} \right) \times \frac{1}{\xi_{nm}} \left(e^{-\xi_{nm} t_{0}} - e^{-\xi_{nm} |t-t_{0}|} \right) + \alpha \left\{ \frac{-t e^{-\xi_{nm} |t-t_{0}|}}{\xi_{nm}} - \frac{1}{\xi_{nm}^{2}} \left(e^{-\xi_{nm} t_{0}} - e^{-\xi_{nm} |t-t_{0}|} \right) \right\} \right]$$

$$+ \frac{k}{\upsilon} \frac{8}{L^{2}} \left(H_{0} + \frac{P_{0}}{\rho} \right) \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{(-1)^{m+n+1} n}{(2m+1)\xi_{nm}} \sin \frac{n \pi x_{0}}{L} \cos \frac{\pi}{2} (2m+1) \frac{y_{0}}{B} \left(e^{-\xi_{nm} t_{0}} - e^{-\xi_{nm} |t-t_{0}|} \right)$$

$$+ \frac{k}{\upsilon} \frac{4}{B^{2}} \frac{P_{0}}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{(-1)^{m} (2m+1) (1 + (-1)^{n+1})}{n \xi_{nm}} \sin \frac{n \pi x_{0}}{L} \cos \frac{\pi}{2} (2m+1) \frac{y_{0}}{B} \left(e^{-\xi_{mn} t_{0}} - e^{-\xi_{mn} |t-t_{0}|} \right)$$

$$(13)$$

where
$$\xi_{nm} = \frac{k \pi^2}{v} \left(\frac{n^2}{L^2} + \frac{(2m+1)^2}{4B^2} \right)$$

The capacity is given by

$$c(t) = k \left(H_0 + \frac{P_0}{\rho} \right) \frac{32LB}{\pi^2} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{(2m+1)^2 \xi_{nm}} \left(1 - e^{-\xi_{nm} t} \right)$$

$$- \frac{k^2}{\upsilon} \frac{16B}{L^3} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{n^2}{(2m+1)^2} \frac{\left(1 + \left(-1 \right)^{n+1} \right) \left(1 - e^{-\xi_{nm} t} \right)}{\xi_{nm}^2} \times \left[2 \left(H_0 + \frac{P_0}{\rho} \right) + \alpha t + \frac{2}{\xi_{nm}} \right]$$

$$+ \frac{k^2}{\upsilon} \frac{B^3}{L} \left(H_0 + \frac{P_0}{\rho} \right) \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(-1 \right)^n n^2}{(2m+1)^2 \xi_{nm}^2} \left(1 + \left(-1 \right)^{n+1} \right) \left(1 - e^{-\xi_{nm} t} \right)$$

$$+ \frac{k^2}{\upsilon} \frac{32}{BL} \frac{P_0}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{\xi_{nm}^2} \left(1 - e^{-\xi_{nm} t} \right)$$

$$+ \frac{k^2}{\upsilon} \frac{32}{BL} \frac{P_0}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{\xi_{nm}^2} \left(1 - e^{-\xi_{nm} t} \right)$$

$$+ \frac{k^2}{\upsilon} \frac{32}{BL} \frac{P_0}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{\xi_{nm}^2} \left(1 - e^{-\xi_{nm} t} \right)$$

$$+ \frac{k^2}{\upsilon} \frac{32}{BL} \frac{P_0}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{\xi_{nm}^2} \left(1 - e^{-\xi_{nm} t} \right)$$

$$+ \frac{k^2}{\upsilon} \frac{32}{BL} \frac{P_0}{\rho} \sum_{n=0}^{\infty} \sum_{m=0}^{\infty} \frac{\left(1 + \left(-1 \right)^{n+1} \right)}{\xi_{nm}^2} \left(1 - e^{-\xi_{nm} t} \right)$$

5. Numerical Results

For a typical example the following numerical values are assumed:

$$L=1000~m$$
 , $B=100m$, $h_0=0$ and
$$\frac{p_0}{\rho}=10m$$
 . ; we assume also that the physical

constants k=0.01m/hr, $\upsilon=0.1m^{-1}$ and $\alpha=0.1m/hr$. The storage capacity c(t) is calculated and plotted versus the time t as shown in figure. Units of storage capacity is in cubic kilometer and time is measured in hours.

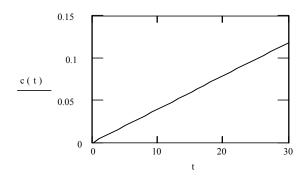


Figure 2: storage capacity

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Processed Cheese Spreads Fortified With Oat

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Abstract: Processed cheese spreads (PCSs) were prepared by fortification with different ratios of oat (0, 2.5, 5, and 7.5%). Three batches were produced. Control and tested PCSc were freshly analyzed for TS, protein, fat, total carbohydrate contents and pH values. Potassium, Sodium, Zinc, Iron and Selenium were also determined. Penetrometer reading, oiling off and melting index were estimated as well as color properties (L, A and B). Another batch from each treatment was stored at room temperature (20-22°C) for 3 months to study the changes in penetrometer reading, oil separation, melting index and color properties as a result of oat fortification. Sensory evaluation of all batches was also performed. Processed cheese produced by adding oat had slightly high content of TS, protein contents and pH value, while it had a pronounced high content of total carbohydrates, K⁺, zinc, Iron and Selenium. Oat fortification improved the physical properties of the cheese spreads as well as their organoleptic properties. During storage, oat enhanced the physical properties of cheese spreads, especially their color properties.

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Keywords: cheese; spread; oat; protein; fat; carbohydrate; Potassium; Sodium; Zinc; Iron; Selenium

1. Introduction:

The nutritional and potential therapeutic value of food is a key characteristic in the development of new value added products that are manufactured for health conscious consumers (Fernandez *et al.*, 1998).

Oat (Avena Sativa) is a type of caryopsis cereals which also called a groat, kernel or grain (Lapvetelainen *et al.*, 1995). Oats are widely cultivated in temperate climate regions with a total world production of 23,952 MT in 2010 (www.fas.usda.gov.). However, only a very small production is utilized for human food use and as little as 5% of the oat crop enters world commerce (Meixue *et al.*, 1998). Nevertheless, human consumption of oats is increasing by time, and this trend can be expected to continue as consumer demand for healthy nutritious products increases, and as processors respond to this demand by producing new varieties of Oat-derived products.

Oat is one of the most and valuable functional crops having numerous nutritional, industrial and healthy benefits. From the nutritional view and healthy effect; Oats are rich in fructans (which considers polymers of fructose contain no or one terminal or internal glucose unit). Fructans play an important role in the protection of tissues under a biotic stress conditions (Gates and Dobraszczyk, 2004). Oat endosperm is rich in soluble fiber especially

Beta-glucan as well as protein and pentosans (Hincha et al., 2007). On the other hand, oat dietary fiber is nutritionally special due to the high content of soluble, mixed linked, B-glucan which compresses 2-7% of the total kernel weight (Tuula et al., 2008). Oats have received considerable for their high content of both soluble and insoluble fibers due to; among other reason, the well documented; positive effects of oat on blood cholesterol and reduce bile acids from the intestine (Martensson, Furthermore, oats are rich in important mineral especially phosphorus, potassium, calcium and zinc (Ahmed et al., 2010).

From the industrial benefit; the higher content of gums especially B-glucans in wetmilled oat bran has a marked effect on the viscosity of heat and α -amylas-treated bran slurry (Jaskeri $\it et~al.,~1995$). Gates & Dobraszczyk (2004) reported that oat germ rich in lipid and hydrolytic enzymes, so it is important in storage stability of the final products.

Rarely researches were dealt with fortification of dairy products with oat (Gepta *et al.*, 2010), (Gopal *et al.*, 2008). Processed cheese spreads (PCSs) are common, delicious and popular dairy product which easily eating in any place and by any ages especially children. In Egypt they are produced in a large scale and with different forms. Production of processed

cheese and factors influencing its characteristics have been described in many publications {Abd-Rabou et al., (2005), Ekbol et al., (2010), Fathi et al., (2005), Guinee (2004), Kristensen et al., (2001), Krumov et al., (2010) Nour El-Diam et al., (2006), Nour El-Diam et al., (2010)}. So, fortification with oat is a new trend to produce healthy and functional product and study the effect of oat fortification on the physical properties of cheese spreads especially during storage.

The mainly target of this study is preparing a processed cheese spreads PCSs with different levels of oats to produce a functional food with proper physical, chemical quality & accepted by consumers.

2. Materials and Methods

Materials:

Ras cheese (one month old) was obtained from Arabic Food Industrial Co. (Domety), 6th October City, Egypt. Matured Cheddar cheese (8 months old) as well as Kasomel emulsifying (K-2394-Rhone-Poulenc Chimie, France) were obtained from International Dairy & Food Co. (Milky Land), 10th Ramadan City, Egypt. Low heat skim milk powder and butter (procured from Irish Dairy Board, Grattow Howse, Ireland) were obtained from market. Powder edible white oats (quick from cooking) was obtained **CHAHNE** Muhlenwerke GmbH& Co., Germany. chemical composition of the ingredients which used in manufacturing processed cheese spreads is presented in Table (1).

Table (1): Chemical composition of the ingredients used in manufacture of processed cheese spread.

Composition 9/	Ingredients %						
Composition %	Ras cheese	Cheddar cheese	Skim milk powder	Butter	Oats		
T. S.	54.61	65.97	93.44	84.00	95.00		
Fat	24.77	34.80	0.99	81.99	2.00		
Total protein	22.26	25.47	37.13	N.D.	5.00		
Soluble nitrogen	0.67	1.20	0.83	N.D.	N.D.		
Total carbohydrates	1.64	0.10	48.56	N.D.	26.0		
Fiber	N.D.	N.D.	N.D.	N.D.	4.00		
Ash	5.76	5.42	7.89	N.D.			

Experimental procedure: Oats emulsion preparation:

Oats flakes were soaked in boiled water for 6 hrs, and then emulsifying salt (2-5%) was added and stirred for 3 min. to complete solvening. The emulsion was filtrate using muslin cloth.

Oats was added to the blend at four levels of 2.5, 5, 7.5 & 10 % addition as well as control treatment. Preliminary experiments showed that fortification of

10% oat, resulted in more viscous and hard consistency so, led to refuse this ratio. Composition (kg/100kg) of accepted blends (formula) used in manufacture of PCSs is presented in Table (2).

Processed cheese spreads (PCSs) preparation:

PCSs were prepared as described by Meyer (1973). Three replicates of each treatment were prepared.

Table (2): Composition of different blends used in manufacture of processed cheese spreads (Kg/100 kg).

In and diants	Ratios of oats (%)					
Ingredients	Control (0)	2.5	5	7.5		
Ras cheese	38.44	38.44	38.44	38.44		
Cheddar cheese	12.80	12.80	12.80	12.80		
Skim milk powder	5.12	5.12	5.12	5.12		
Butter	10.26	10.26	10.26	10.26		
Emulsifying salts	2.5	2.5	2.5	2.5		
Oats	-	2.5	5.0	7.5		
Water	30.88	28.38	25.88	23.38		
Total	100	100	100	100		

Methods of analysis:

The resulting PCSs were freshly analyzed for their Total Solids (TS) according to (AOAC) 1984, Fat according to Ling (1963), Total Carbohydrate, & Ash as mentioned by IDF (1964). pH value was determined using a pH meter model "Cole-armer Instrument Company" (IL, USA). Mineral profile of fresh PCSs was assayed for determined K⁺, Na⁺, Zinc, Iron and Selenium contents using atomic absorption spectrophotometer (Model 2380, Perkin El mer Instrument, USA) for Zinc, Iron and Selenium, while potassium and sodium were determined by a flame photometer (Corning 410, Corning Medical and Scientific Instrument, Modified, MA, USA).

Penetrometer readings, oiling off and melting index were also determined to reflect the physical properties of PCSs. Penetration was determined using penetrometer (Koehler Instrument Company Inc, USA), Oil separation was determined according to the method of Thomas (1973). Melting index was calculated according the method of Savello *et al.*, (1989). Color parameter of PCSs (L, A, B values) were also determined using Hunter colorimeter model D2s A-2 (Hunter Assoc. Lab Inc. Va, USA).

Organoleptic assessment of PCSs was conducted by 10 regular test panels of staff members of Dairy

Department, N R C, Giza, Egypt, according to the scheme of Meyer (1973).

Statistical analysis was done using the general linear models procedure of SAS, 2004.

3. Results and Discussion

1- Chemical composition of resultant cheese spreads:

Preliminary experiments were carried to obtain the best ratio of oats fortification. However, results showed that addition of 10% oats emulsion was rejected.

Table (3) reveals TS, protein, fat, total carbohydrate, ash contents and pH values of processed cheese spreads (PCSs). It could be observed that there were slight increases in TS, total protein as well as pH values; while there were considerable increases in total carbohydrate and ash. The average value was in the normal range of processed cheese spreads (PSCs) {Fathi et al., (2005); Krumov et al.,(2010)}. Fernandez et al (1998) mentioned that incorporation of oat increased pH values and decreased the acidity of plain yoghurt.

Table (3): Chemical composition of processed cheese spreads made with different ratios of oats.

Composition		Ratios of Oats (%)					
Composition	Control	2.5	5.0	7.5			
T.S.%	44.19 ^a	44.97 °	45.60 b	46.07 a			
Protein	13.84 b	13.85 b	13.89 ab	13.95 ^a			
F/DM %	50.41 ^a	50.03 a	49.34 b	48.84 °			
Total carbohydrate %	2.96 °	3.43 b	3.88 b	4.31 ^a			
Ash %	5.01 °	5.22 °	5.49 b	5.80 ^a			
pН	5.78 b	5.79 b	5.80 ab	5.82 a			

Different superscript of the same raw are significantly different (p<0.05)

2- Mineral profile:

Data presented in table (4) showed that fortification with oats increased K content of PCSs, consequently. The ratio of Na/ K was decreased. Control sample has 102 mg K⁺/100g PCSs while increased to 112 mg K⁺/100g in

cheese fortified with 7.5 % oats 12.4 Na/K. The same trend was observed for zinc, iron and selenium ratios. It is clear that gradual increase was observed with increasing oats ratios. The obtained data were confirmed by those obtained by Abd-Rabou *et al.*, (2005).

Table (4): Mineral profile of processed cheese spreads made with different ratios of oats.

Minoral profile	Ratios of oats (%)				
Mineral profile	Control	2.5	5.0	7.5	
K (mg/100g)	102	105	108	112	
Na (mg/100g)	1389	1388	1386	1380	
Na/K	13.6	13.2	12.9	12.4	
Zinc (ppm)	9.90	18.9	42.5	38.2	
Iron (ppm)	N.D.	0.03	0.07	0.12	
Selenium (ppm)	N.D.	0.05	1.1	1.4	

3- Physical properties:

Data presented in table (5) reflected penetrometer reading, oil separation and melting index of PCSs. It could be observed that the value of penetrometer reading was decreased with increase of oat fortification ratio where the average reading was 172mm for control reached to 154mm in 7.5% oat-cheese spread. It is related inversely to the firmness of processed cheese spreads and lead to softening body. This may be due to increase the water binding capacity of B-glucan presents in oat (Ahmed *et al.*, 2010) which led to increase water holding capacity and result in soft body. Fernandez *et*

al., (1998) reported that oat increased the apparent viscosity of yoghurt, while Ahmed et al., (2010) mentioned that water binding capacity of B-glucan products increased than control products.

The same trend was observed for melting index where average index was 130 for control cheese reached to 110 for 7.5% oat-fortified cheese. So meltability of fortified cheese was decreased and the spreadability properties were improved. For oil separation; it could be observed that average values were slightly increased from 27.66 to 30.88 for control and 7.5% oat-fortified cheese respectively.

Table (5): Physical properties of processed cheese spreads sample made with different ratios of oats.

Physical properties	Ratios of oat (%)				
	Control	2.5	5.0	7.5	
Penterometer reading (mm)	172 ª	170 ^a	165 ^a	154 ^b	
Oil separation (oiling off)%	27.66 ^a	28.11 ^a	29.00 a	30.88 ^a	
Melting index (mm)	130 a	129 ^a	125 ^a	110 b	

Different superscript of the same raw are significantly different (p<0.05)

4- Colour parameters:

From data listed in table (6), it could be noticed that L value (which reflect the whiteness of samples) was slightly decrease with increase the ratio of oat. It took 86.40, 86.37, 86.18 and 86.11 for 0, 2.5, 5 and 7.5% oat. The same trend was observed of A value (which reflect the blue and red colour) and B value (which reflect the

yellowish colour). It could be concluded that the whiteness of fresh sample was slightly decrease while yellowish was slightly increase with increase of oat ratio fortification. Ahmed *et al.*, (2010) reported that the colour analysis of B-glucan (the main component of oat) showed L value ranged between 72.18 and 83.54.

Table (6): Colour properties of processed cheese spreads samples made with different ratios of oats.

	Ratios of oats (%)					
	Control	2.5	5.0	7.5		
L	86.40 ab	86.37 ^a	86.18 bc	86.11 °		
A	-1.60 a	-1.64 ^a	-1.67 a	-1.74 a		
В	25.14 °	25.45 b	25.56 ab	25.74 ^a		

Different superscript of the same raw are significantly different (p<0.05)

5- Sensory evaluation of spread processed cheese:

Data presented in table (7) reflected the sensory properties of PCSs fortified with different ratios of oat.

The obtained degrees recorded that surface appearance was improved with fortification of oat. Control sample gained 3.2 points while fortified samples gained 3.4, 3.6 and 3.8 for 2.5, 5 and 7.5% oat respectively.

The results presented in table (7) clearly indicated that fortification of oat increased the firmness of body and improved the spreading quality as the ratio of fortification increased.

The same table show no clearly differences in the texture of samples as a result of fortification of oat.

On the other hand, no considerable differences were observed in the flavor of

cheese spreads where all samples gained 4.5-4.6 points and had strong flavor.

Any oil separation was observed in all samples either in control or in tested samples. Over all preference obtained data reflected an overall acceptability of 7.5% oat-fortified

samples equal 5 points while 5% oat-fortified samples gained 4.5 against 3.9 point for control samples.

So the panel test indicated that fortification of 7.5% oat was the most produce processed spread cheese with favorite properties.

Table (7): Sensory evaluation of processed spread cheese fortified with oat.

Character	Ratio of Oat %					
	Control	2.5	5	7.5		
surface appearance	3.2 b	3.4 b	3.6 a	3.6 a	1 dull very much 5 shiny very much	
Firmness of body	4.4 a	3.9 b	2.8 b	2.1 °	1 very soft 5 very frim	
Spreading quality	2.9°	3.2 b	4.1 b	4.9 a	1 difficult 5 easy to spread	
Smoothes of texture	2.5	2.5	2.6	2.6	1 not smooth 5 very smooth	
Flavour	4.5	4.6	4.5	4.6	1 very weak 5 very strong	
Oil separation	1	1	1	1	1 absent 5 very pronunced	
Over all preference	3.9°	4.1 °	4.5 b	5 a	1 dislike very much 5 like very much	

Different superscript of the same raw are significantly different (p<0.05)

6- Change in physical properties of cheese spread sample during storage for 3 months:

Change in penterometer reading (mm) during storage for 3 months at room temperature of cheese spread sample was also determined. The value were decreased from 172 to 158 for control for 7.5% oat samples, it decrease from 154 to 150 through the three months. This means that the rate of decrease was markedly observed during storage of control while the change in treated sample was not remarkable (Table 8). The obtained data were confirmed by those obtained by Abd-Rabou *et al.*, (2005).

Table (8): Change in penterometer reading (mm) cheese spread during storage for 3 months.

Ratios of	Storage period (month)				
oats (%)	0	1	2	3	
Control	172 a	169 a	161 b	158 b	
2.5	170 a	169 ^a	160 b	158 b	
5.0	165 a	162 b	159 b	155°	
7.5	154 a	153 b	152 b	150 b	

Different superscript of the same raw are significantly different (p<0.05)

Table (9) shows the change in oil separation of PCSs during storage for 3 months at room temperature. Control cheese sample had 27.66% at zero time reached to 30.77% after 3 months; while sample fortified with 2.5% oat possessed 28.11% at zero time reached to 31.22% after 3 months. 7.5% oat-fortified cheese spread had 30.88% at zero time reached to 35.66% after 3 months. The rate of increase

was more remarkable in sample fortified with oat.

Table (9): Change in oil separation of cheese spread sample (%) during storage for 3 months.

Ratios of	Storage period (month)					
oat (%)	0	1	2	3		
Control	27.66°	27.88°	28.10 b	30.77 a		
2.5	129 a	125 b	118 °	95 ^d		
5.0	29.00 °	30.33 b	31.10 b	34.55 a		
7.5	30.88 °	31.22 ^b	32.55 b	35.66 a		

Different superscript of the same raw are significantly different (p<0.05)

The same trend was observed for melting index (mm) table (10). The value was 130 mm for control sample decreased to 99 mm after 3 months. Samples fortified with 7.5% oat had 110 mm at zero time reached to 90 mm after 3 months. The rate of decreasing was larger than in control one.

Table (10): Change in melting index (mm) of cheese spread sample during storage for 3 months.

energe spream sample waring storage for a months.					
Ratios of	Storage period (month)				
oat (%)	0	1	2	3	
Control	130 a	124 a	120 b	99°	
2.5	129 a	125 a	118 b	95 °	
5.0	125 a	121 ^a	103 b	94 °	
7.5	110 a	108 a	99 b	90°	

Different superscript of the same raw are significantly different (p<0.05)

Table (11) showed that the whiteness (L-value) of PCSs gradually decreased during storage either for control or for tested samples and no detectable differences would observed.

Data presented in Table (11) reflected the change in A-value during storage. It could be noticed a remarkable increase of coulor intensity. Control sample had -1.60 at zero time reached to -1.95 after 3 months; while 7.5% oatfortified samples had -1.75 reached to -2.22 after three months.

For B-value (yellowish), control samples had 25.14 at zero time and the value become 26.73 after 3 months; while 7.5 % oat-fortified samples had 25.74 at zero time and become 27.72 after 3 months. So the rate of increase was more remarkable in treated samples as effect of oat fortification.

Table (11): Change in L of cheese spread sample

during storage for 3 months.

Ratios of	Storage period (month)					
oats (%)	0 1 2 3					
Control	86.40 a	86.09 b	85.94°	85.52 d		
2.5	86.37 a	86.10 a	85.74 b	85.47 b		
5.0	86.18 a	86.06 a	85.60 b	85.20°		
7.5	86.11 a	86.00 a	85.52 b	85.16°		

Different superscript of the same raw are significantly different (p<0.05)

Table (12): Change in A of cheese spread sample during storage for 3 months.

Ratios of	Storage period (month)				
oat (%)	0	1	2	3	
Control	-1.60 a	-1.67 b	-1.74 °	-1.95 ^d	
2.5	-1.64 a	-1.69 b	-1.90°	-1.99 ^d	
5.0	-1.67 a	-1.73 b	-2.00 °	-2.14 ^d	
7.5	-1.74 a	-1.88 b	-2.05 °	-2.22 d	

Different superscript of the same raw are significantly different (p<0.05)

Table (13): Change in B of cheese spread sample during storage for 3 months.

Ratios of	Storage period (month)					
oat (%)	0	1	2	3		
Control	25.14 a	25.50 b	25.79°	26.73 ^d		
2.5	25.45 a	26.00 b	26.61 °	27.31 ^d		
5.0	25.56 a	26.41 b	26.81 °	27.60 d		
7.5	25.74 a	25.90 b	27.15°	27.72 ^d		

Different superscript of the same raw are significantly different (p<0.05)

The results of coulor parameters changes were in accordance with those reported by Abd-Rabou *et al.*, (2005).

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Investigating the Ghaznavid Relations with Abbasian's Succession (Caliphate)

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Abstract: Ghaznavides (582-351 A.H.) were the first Turk Race Government who appeared in eastern part of Iran and for a period had ruled in greater part of Iran. They were pioneer of Turk families who about next thousand years more and less ruled on Iran. In the time of existence of this government, in the scope of their changeable territory historical, historical fait making events in process of their relation with adjacent governments and system of Abbasi Caliphate appeared. Ghaznavides in their governance period in eastern part of Islam World specially first periods of this government since 351 up to 431 A.H. they had very effort for making close relation with Abbasi's Caliphate System. These efforts also in second period of this government (since 431 up to 582 A.H.) were continued. This article intend by research relation between institute of monarchy (Ghaznavian and Abbassi Caliphate) pay to cause and factors of making this relations and investigate about manner of process of these relations in between connection clear role of these relations in continuation of Ghaznavides life and Abbasian.

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1. Introduction

At the beginning of 3rd A.H century, significant evolutions in history of Iran occurred, however, because of relative independent, under protection of Caliphate was figured. By establishment of independent dynasties in ran, Abbasside Caliphates were forced to determine some influential and trustworthy men to inheritable government of considered area. These types of rulings gradually changed to independent governments and sometimes influential of area by lying on their military force willfully without appointing on behalf of Caliphate or issuing any order of him, took hand local government. First type of government was confirmed by Caliphate system famed to appointed rule and second type governments famed to predominance rule. Founders of appointed rule knew Abbasside Caliphate by the name of Amir-al-Momenin (the chief of the faithful) and was read oration in the name of him and follow Caliphate religion. Such as: Samanid, Ghaznavides, Saljoghid. But claimant of predominance rules didn't accept holly supremacy of Caliphates and sometimes had a religion except official religion of Caliphs. Such as: Allavid of Tabarestan, Al Boyeh and Saffarid. Of course appointed rules to the time that court of Abbasside Caliphate had power and respect, were adherent to them, but when Caliphate encountered weakness, stand straight it. Turk race Ghaznavides because of lack of public base in Iran, entered through religion and chose policy of following the Abbasides caliphate court.

In this article manner of Ghaznavides relations with Abbasides Caliphate court from the formation of Ghaznavides government to its overthrown in surveyed and referred to ups and downs of these relations and factors influenced on it.

2. Ghaznavides and Abbassides Relations

In the period of Abbasside's Caliphate rule, most Iranian and foreign dynasties from rulers (emirs) appointed by Calipha such as Taherian and Samanides to imposed rulers ¹ (Ebn-e-Asir, (1994/1995 A.H.)) since Saffarides and Boyehides rulers followed close relation with Abbassides Caliphate to in this was receive Caliphate's agreement and flag, since, receiving agreement and flag, because receiving agreement and flag on behalf of Caliphate system was considered as signing the religious legitimate. In this time, Sultans of western governments who were independent in practice, in any case knew themselves loyal followers of Calipha, leader of Muslims.² (Ebn-e-Khaldoon. Abdolrahman Ebn-e- Mohammad (1980)) But interiorly this issue was apparent so that Ebn-e-Khaldoon has declared that: Situation of kings in east was upon the approach that they only in respect of gift and prosperity believed to obedience of Khalipha, but monarchy

Syrous Izadi, Tehran, Amirkabir, 1358, p. 22

¹ About duties of appointed and imposed rulers in Abbasside Caliphate period refer to: Abolhassan Ali-ebne-Mohammad-al-mavardi "Sultan's verdicts" Ghahereh (Ghom offset), Islamic Sciences School, 2nd edition, 1406 A.H., pp 33-34.
² Vassili Veladmier Barthold, "Kalipha and Sultan" translated by:

affairs by all titles and nicknames and establishment and its characteristics allocated the themselves and for Khaliph there was not benefit of it.³ (Ebn-e-Khalkan, 2002) Of course there are a lot of witnesses that show Ghalifate system has not been satisfied with this pure legitimization to governments of this rulers and resigning of political authority and while having religious leadership, were fond of political position and world leadership of Islam world. History of Caliphate has shown that in some periods each of Caliphas have enjoyed of enough military forces have paced for expansion of their political power and for achieving to this goal. ⁴ (Barthold, Wasillie veladimier, 1980)

But general situation and frame was the same was referred, i.e., unstable and non-robust joint establishment between two political power Sultan and Calipha's religious legitimate which continued through sending agreement and flag on behalf of Calipha for Sultan and against reading sermon and coining money in the name of Caliph and tax present and gifts to Caliphate was continued. ⁵ (Barthold, Wasillie Veladimier, 1987)

By foundation of Ghaznavids we are witness of close relation of this dynasty with Caliphate system. especially in the first period of this government. Requirement of without backing sovereignty of Ghaznavides Turks to legitimization of Caliphate system in one side and weakness of Caliphate system and requirement of supporting monarch system in another side created close and multilateral relations between them. Ghaznavid had slave origin. Initiate founders of this government educated in Sassanides government. Aleptakin slave of Turk commander-inchief one of the great Samanide's heads, after disputes in Samanide's government was created between him and Mansour-ebne Nouh, dispatched to Ghaznein and founded Ghaznavide government. 6 (Basorth Cliford Edmond, 2002) If in this time Aleptakin intended to battle with former rulers (Samanides) likely he would encountered with many problems. Because Samanides in Transoxiana were counted legitimate rulers and representative of Abbasside Caliphate System and Aleptakin had no relation with Calipha, and didn't enjoy of national legitimate and people support force for confronting to Samanides. For this purpose, after settlement in Ghaznein for preventing exhausting of their forces in confronting to Samanides, set forth crusade type battles in India. (Badaoni, Abd-ol-ghader, 2001)

Aleptakin by this action intended to gain a suitable base between governments of east of Islam world.

As it was explained in the case of relations between Ghaznavides and Sassanides, the first rulers to Sultan Mahmoud Ghaznavi, were accounted of local rulers and were under dependence of Samanides. Therefore in their period Sassanides were ruled, there was not so relation between Ghaznavid with Abbasside Caliphate.

Ghaznavid rulers to death of Saboktakin death in 387 A.H. generally engraved name of Samanides ruler on their coins. (Beihaghi, Abolfazl, 2007) But apparently at the same time of weakness of Samanides after Saboktakin, communication of Ghaznavian with Sassanides has begun. So that Esmaeil, successor of Saboktakin in its 7 month rules by reciting Sermon in the name of Abbasid Calipha declared his dependence to him. (Tatavi, Ghazi Ahmad and Asef khan Ghazvini, 2004)

Direct and close relation between Ghaznavid and Abbasside Caliphate begins since Mahmoud Ghaznavi period. Mahmoud Ghaznavi after suppression of Fayegh Khasseh and Baktozon under the pretext of revenge of deposed ruler Mansourebne-Nouh Samani, in Khorassan read oration in the name of Ghalipha Alghader and removed name of Samanid of Khorassan government in 389 A.H. Apparently to this time in Khorassan no orate wasn't read in the name of Alghader Bellah and in oration of Altale bellah was named. (Jouzjani, Menhaj-al-din Seraj, 1984)

It should be mentioned that Samanides in this time knew Altaea Bellah who dismissed of Caliphate by Bahaoldoleh Deylami as Calipha. ¹¹ (Ravandi, Mohammad Ebn-e- Ali Ebn-e- Soleiman, 1984) But Mahmoud Ghaznavi who for attracting Calipha's point of view who was successor of Altaea i.e. Alghader read an oration in his name ¹² (Saade Salman, Masoud, 1995). Calipha Alghader also against it sent him titles of Yamin-ol-dolleh and Aminolmelleh and command of rule of captured

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³ Abdolrahman-ebne- mohammad-ebne-Khaldoon "Ebne Khaldoon Introduction", 1st volume, Mohammad Parvin Gonabadi, Tehran,

Translation and book publishing enterprise, 1359, P. 400

⁴ Barthold, the same, P. 26

⁵ The same, pp. 19-20

⁶ Ref to: Shabankarei "Majmaolansab"(descents association), pp.

⁷ Ref to: Shabankarei, the same, page 29.

⁸ Fery and et al " Histoory of Iran from Islam to Saljoghides" 4th volume, p. 144

⁹ Ebne Asir "Completely in history (al-kamel-fel-tarikh" , 5th volume, P. 525

¹⁰ The same, p. 525.

¹¹ Ref to: Gardizi, " Zeinolakhbar", p. 304.

¹² Ref. to Anbi "translation of Yamini history" p. 304

states. 13 (Shabankarei, Mohammad ebn-e-Ali ebn-e-Mohammad, 1984) By sending this titles and command of government, typically Mahmoud government which was established by force of sword was legitimated by order of Calipha. Against it, Calipha also by confirming Mahmoud Ghaznavi formally as ruler of Khorassan and Eastern area, was also found a firm track in western lands of Caliphate.

Mahmoud Ghaznavi for carrying out his expansionist goals in east of Islam world and using of Motavae and Ghazian in his battles ¹⁴ (Atabi, Mohammad-ebne-Abdoljabbar, 2003) needed to communication with Calipha. Mahmoud Ghaznavi also after victories in India, in addition of written statement he sent for Calipha, and from war spoils send presents to Caliphate court.

Thus he reputed as Ghazi ruler and defendant of Caliphate system. Against Calipha also added titles for him by sending orders. As, after capture of Bahimnegar in India Calipha Alghader sent firman of captured areas rule in India together with robe of honor and flag and drum to him and bestowed the title of Nezameldin on him. 15 (Onsor-al-maali, Keykavous ebn-e-Eskandar ebn-e- Ghabous, 1999) Next time, in 417 A.H. after his capture in India. Calipha Alghader renewed his agreement and flag and gave him Khorassan and Inida and Nimrooz (Sistan) and Kharazm to him and titled him Kahafoldoleh-val-Islam and also bestowed titles on his children and brothers. ¹⁶ (Fery, Richard Nelson and et.al, 1984) In one side, Mahmould also sometimes gave report of his works to Kalipha. He after capture of Rey and Hamedan in 420 A.H. and overthrowing Buyid Dynasty of those areas, in explanation of his practice, by correspond a letter to Calipha Alghader introduced them Bateni. May be by this correspondence Mahmoud has intended that declare his victory in Rey, victory of Sunnite religion and help to Caliphat's family.

It could be said that friendliness of Mahmoud Ghaznavi and Calipha to each other has been related to time circumstances and when benefits of parties were in conflict to each other the rate of this friendliness was reduced. In references it has been referred to some cases of dispute between Abbasside Calipha and Mahmoud Ghaznavi, including request of Transoxiana (Mavaraolnahr) rule firman from

Calipha and Calipha's biting response to Mahmoud and non-acceptance of it ¹⁷ (Gordizi, Abdol Hayy, 1984) or insist of Mahmoud Ghaznavi to take more titles into Khan of Turkistan and refrain of Calipha from this issue, ¹⁸ (Al-Mavardi, Hassan ebn-e-Ali ebn-e-Mohammad, 1406 A.H) and Calipha's requesting of Mahmoud for punishment of Hassanak Vizier on the basis of that he was Garamtic and Mahmoud Ghaznavi's response to Calipha and non-execution of Calipha's order. ¹⁹ (Mostofi, Hamdollah, 2002)

These referred dispute cases is showing this case that relation of Mahmoud Ghaznavi and Calipha to each other has not been purely and has been made upon requirement of parties.

However, Sultan Mahmoud under influence of fourth century governments accepted Calipha as religious leader of Islam and tried always in keeping close and respectfully relation with Clipha. His operation during reign proves this. In this case, the biggest services of Ghaznavid and Sultan Mahmoud to Abbasside's Caliphate was their campaign for propaganda of Fatemidd claimers, rivals of Abbasside Caliphate. Fatemidds of Egypt on the basis of their beliefs, they were following establishment a comprehensive Caliphate. On the basis of their idea, Imam Fatemide had mission of union of Islam world under government of Fatemids. They in their propaganda emphasized on role of Imam Fatemid as preserver of Islam²⁰ (Moskouyeh, Abou Ali, 1997)

Therefore, achieving to their goal they intended to attract view of Ghaznavid and their acceptance as united in east of Islam world to, through them accelerate to confront with Abbassides. Fatemiyan for achieving their purpose made some actions. They by sending their claimers to east of Islam world by propaganda of Esmaeilid's custom and attraction of followers, established a government in Sand and Moltan and statesman of this government severely were followed orders of Fatemid Caliphate in Egypt. ²¹ (Moghaddasi, Abou-Abdollah Mohammad ebn-e-Ahmad, 1982) In one side Moltan was located in rich region of North West of Inida and this issue

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¹³ Ref. to Abdolghader Badaeini "Montakhab-ol-tavarikh" volume 1, by correction of Molavi, Ahmadali Saheb, Tehran, institution of works and cultural honors, 1st edition, 1380 (2001) P. 8 and also to: Ghazi Ahmad Tatori and Ghazvini "Tarikolfi" 3rd volume, pp. 1966-1967 and also Hamdollah Mostophi "tarikh-e- Gozidhe" P.

³⁹ and also: Hindoshah Estarabadi "History of angel" 1^{st} volume, p. 78

¹⁴ In this field ref. to Atbi, the same 377

¹⁵ Shabankarehei, the same, P. 51

¹⁶ Gardizi, Zein-ol-Akhbar, P. 414

¹⁷ Ref. to: Onsorolmaali Keikavoos-ebn-e- Eskandar ebene Ghaboos "Ghabousnameh" by effort and correction of: Dr. Gholamhossein Yousefi, Tehran, scientific and cultural, 9th edit, 1378, pp. 208-209

¹⁸ Ref to Nezamolmolk, the same, pp. 201-202.

¹⁹ Ref, ti: Abolfazl Beihaghi "Beihaghi history" 1st volume, pp. 186-187

²⁰ Ref. to Abolmoskoyeh, "nation's experiences (Tajareb-olomam)", translation: Alinaghi Monzavi, Volume 6, Tehran, Tous Publication, 1376 (2007), PP. 438

²¹ Ref. to Aboabdollha Moghadassi, "The best dividing in knowledge of realms (Ahasanoltaghasim fe Maarefatelaghalim)" translated by: Alinaghi Monzavi, 2nd volume, Tehran, Iran Authors and translators, 1361 (1982, P. 77).

could create necessary motivation for attack of Mahmoud Ghaznavi to it and its capture. In another side, Mahmoud Ghaznavi by capturing Moltan could achieve his political goals i.e. close to Abbaside Calipha and hereby stabilize his government in East. Therefore, it was for this goal that Mahmoud Ghaznavi during a number of battles captured Moltan. in 401 A.H. ²² (Nezam-ol-Molk, Abou Ali Hasan ebn-e- Ali Eshagh Tousi, 1985) Capture of Moltan and rigor and harm of Isameilid by Mahmoud Ghaznavi caused that Fatemidds in direction of expansion of their invitation in east of Islam world in 403 A.H. send an ambassador called Taherti for opening gate of friendship near Mahmoud Ghaznavi.

But Mahmoud Ghaznavi for showing off and pleasant of Abbasside Caliphate, delivered Taherti to a court which administered by Abubakr Mohammad, son of Abu-Yaaghob Ishagh Mohammadshad of Karamieh faction and there they sentenced him to death ²³ (Hendooshah Estarabadi, Mohammad Ghasem, 2008) Taherti's murder not only didn't disappear Fatemids of relation with Mahmoud Ghaznavi but also by corresponding and sending letter were seeking relation with him. In 416 A.H. by giving grave-cloths and cordial letter to Hassan-ebne- Mohammad Michal (Hassanak Vizier) in dispatching of pilgrimage, wished attract Mahmoud Ghaznavi to themselves. But because each type of relation among Ghaznavid and Fatemids was an alarm bell for Abbassides, when Calipha Alghader informed of story of grave-clothes and letter by Hasanak, was angered and called Hassanak Caramathian. Mahmoud Ghaznavi also didn't accept this accuse of his minister and told: About this stupid Calipha should write that: I for value of Abbassides I have fingered to all over the world and am seeking Caramthian and whatever found and corrected and will hang it. If he is Caramthian, I also be Caramthian. 24 However, Mahmoud Ghaznavi sent grave-clothes and presents to near Calipha Abbassides.²⁵

Mahmoud Ghaznavi need to achieve legitimacy of Abbassides Caliphate had been main barrier of making relation among Ghaznavid and Fatemidds. Since Sultan Mahmoud knew his survive in dependence to Sunnite and Abbassides Caliphas, under any condition was not satisfied with making relation with Fatemidds that were counted Abbasian's enemies and in vengeance and hostility went to

where that wished capture of Egypt and save of that land from dominance of Ismaeilides. ²⁶

Pursuance and harm of Ismaeilian in Mahmoud Ghaznavi period according to want and desire of Abbasides Calipha and Ghaznavides politically utilized of this issue. Following battles and captures by Mahmoud Ghaznavi in Inida and other areas had bi-lateral benefit for both Mahmould Ghaznavi and Caliphate system. Because Mahmoud's victories in India and other areas caused increasing his influence and fear in view of his political rivals in Baghdad (i.e. Ale Boyeh). In one side Mahmoud Ghaznavi repeatedly gave news of his victories together with presents and obeying of him to Calipha. This, itself caused increasing of influence and validity of Calipha. Because, in this time Caliphas were under dominance of Buyid dynasty, therefore, Sultan Mahmoud by doing these works was encouraged Abbassides Calipha. Even it is considered that Mahmoud at the end of his monarchy decided to go to Baghdad and to end Caliphate of Buyid dynasty whose life finished.²⁷

Mahmoud Ghaznavi who in the name of Islam and campaign with infidels had vowed to do a war per year in India,²⁸ by doing this practice in addition of using Ghazian or Motavaeh in his army gained title of being Ghazi and defender of Caliphate system together with gaining wealth and spoil which was his main goal.

Some Mahmoud's actions and operations against Calipha Alghader is showing, Mahmoud utilization of Kaliphate system for benefit in interior and exterior field. So that Mahmoud Ghaznavi wants Calipha Alghader, if the Calipha is willing relation with Gharakhanides, should this relation be through Mahmoud Ghaznavi and Kalipha without his mediate don't make relation with Gharakhanian.²⁹ May be this issue has been for strengthen of his role as official representative of Caliphate in west of Islam which had been considered by Mahmould. Another case was using of Calipha roles in interior field for fulfillment of his benefits, i.e. succession of Mohammad. Since Masould has been bigger than him and at first he was father's successor. But then mahmoud was annoyed of him and wanted make Mohammad his successor. Thus he wanted Calipha in administration correspondences, priorates the name of mohammad to Masould and he also did this. 30 However, finally Masould became successor of his father and Calipha sent him firman of government.

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²² Ref. to Gardizi, pp. 388-391 and Atbi, pp. 278-280

²³ Ref. to : Atbi, the same, p. 373 and Gardizi, the same, p. 394 and refer to: Abdolghader Badaoni "Chosen Histories (Montakhab-oltavarikh)", Volume 1, p. 9.

²⁴ Abolfazl Beihaghi, History of Beihaghi, 1st volume, pp. 186-187

²⁵ The same, same

²⁶ Ref. to Shabankarei, Collection of descent..

²⁷ Josjani "Nazarene Classes", 1st volume, p. 231.

²⁸ Atbi, the same, p. 182

²⁹ Ref. to: Barthold "Turkistan Nameh" 1st volume, pp. 604-606

³⁰ Ref. to: Josjani, "Nazarene Class", 1st volume, p. 232

Period of reign of Masoud really is following religious policy of his father Mahmoud Ghaznavi. He also made support of Sunnit relition and campaign with Caramthian a tool for surviving of his reign. Grave-clothes and title that Masoud Ghaznavi in flow of dispute of succession with his borther Mohammad received of Caliphah Alghader caused that position of Masoud enhanced against Mohammad. Mansour who had received letter and firman of Caliphah went towards Khorassan and order to send copies of Calipha's firman to Sepahan (old name of Isfahan) and areas of Jebal and Tabarestan and cities of Khorrasan to prove the people of there that representative of Abbasside Calipha and successor of his father. Masour Masour Period Perio

The long time after entrance of Mahmoud Ghaznavi to Korassan and Neishabour, messenger of Calipha Alghader among sensational reception of rulers and people of that city, entered there. He gave Calipha's firman to Masoud. 33 Calipha in this letter while giving titles such as Nassereddinallah, Hafez Ebadollah, Almontaghem men Aadellah, Zhir Khalifatallah Amirealmomenin, to Masoud awarded him government of lands where were under dominance of her father, in addition of Rey, Jebal and Sepahan and Tarem and other regions he would gained in east and west then gave him. By oration name of these cities in the name of Masoud, his position in Khorrasan was increased and Sultan reign was firmed. 34

After death of Calipha Alghader in 422 A.H. and seating Alghaem on Caliphate seat, to swear allegiance with him from domicile of Caliphate messengers were sent for renewal of allegiance to various areas including near Masoud Ghaznavi. 35 Masoud Ghaznavi against some conditions swears allegiance with representation of Calipha. These conditions were that a new firman be seng to command of rule of Korrassan, Kharazm, Nimrooz (Sistan) and Zabolestan, India, Sand, Choghanian and Khatlan and Ghobadian and Tarmaz and Ghasdar, Makran, Valshatan, Kikanan, Rey and Jebal, Sepahan all to Aghabeh, Halvan and Gorgan and Tabarestan be in it and other that relation of Abbassian with Gharakhanian be through Ghaznavid and Sulta Masoud and wants Calipha give him permission of Caramthian surpression in eastern area of Caliphate including Makran and Oman to thim. ³⁶

Masoud Ghaznavi tried in his relation with Caliphate court, preserve power and glory of Sultan Mahmoud. He benefited from title of Caliphate and Calipha as a tool for removing his rivals such as Hasanak Vizier who was hanged in accuse of caramthian.³⁷ In that condition when Saljoghides had thrived against Sultan Mahmoud, he also had preserved his relation with Calipha. When Sultan Masoud had came to suppress of Saljoghides rebellion, to Khorassan, on behalf of Alghaem, Abbassid Calipha, Massoud received a letter that in it he was noticed to preserve Khorassan of Turkmans' sedition and to come in western regions such as Rey and Jamal and safe those regions. Sultan Masoud also during declaration of obedience of Calipha's orders emphasized that he itself has such a thought.³⁸ Soon after, Sultan Massoud defeated of Saljoghids' army in Dandanghan and by death of Sultan Masoud, the first period of Ghaznavid's government came to an end and power of their government held in night and their strong rival, Saljoghids were in power.

In the first period of Ghaznavid government, Sultans such as Mahmoud and Masoud by creating bilateral relations and close to Caliphate system, empowered influence and personality of Calipha again in Islam world. Because type of their relation with Caliphas caused that strengthen position of Caliphate system against Buyid dynasty and Fatemides of Egypt. It should be said that Sultan Mahmoud and Sultan Masoud by hard campaign with Ismaeilids, had a good services to Abbassid Caliphate for preventing of strengthening of Fatemides in Eastern parts. They by advancing in India and some areas, while gaining a lot of spoils, caused influence of Islam and spiritual influence of Abbassids Caliphate there. Ghaznavid after Dandanghan battle gave up all parts of Mavarolnahr (Transoxiana) and Khorassan which had captured. They during the next wars deposited most of their possessions to Saljoghides. Then second period of Ghaznavides government begins which is lasted since 431 A.H. up to 582 A.H. in second period of Ghaznavid government, Ghaznavids as local government and came under dependence of Saljoghides and then Ghourides. But about relations of Ghaznavid government in second period with Abbasides Caliphate there is not mentioned many information in these resources. Only briefly about title of some these kings and on the basis of coins and poet works has

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³¹ Ref. to Ebne Khalkan (Ahmad-ebne-Mohammad Ibrahim Abolabbas Shamseddin Barmaki Arbali) "Manzarolensan (Human Appearance)", 3rd volume, Translation: Ahmad-ebne-Mohammadebne-Ali-ebne-Ahmadolshojaolsanjari, correction: Fatemeh Moddarressi, Uromiehn, Uromieh University, 1st edition, 1381 (2002), p. 244

³² Ref. to: Abolfazl Beihaghi, "history of Beihaghi" 1st volume, p. 16

³³ The same, pp. 41-44

³⁴ Ref. to the same, p. 45

³⁵ Ref. to: same, pp. 310-311

³⁶ Ref. to the same, pp. 190

³⁷ Re. to the same, pp. 190

³⁸ Ref. to Beihaghi, the same, pp. 667-668

gained. And on some of Modoud coins titles of Jamalodoleh, Fakhrolomeh is figured, because Modoud in coining recognized officially high supremacy of Alghaem, Abbasside's Calipha, therefore we can suppose that these titles were taken from Baghdad. 39 Witness of these communications and relations among Modoud with Abbassides is a sentence of Beihaghi. He has mentioned that Khajoeh Bou Saad Abdolfakha Fakherin Sharif in Modoud period had been sent to Baghdad Embassy. "Sent him to Baghdad as messenger, in a hard job (full) and famous and he went and performed it in a manner that wises and time see and attained his aim." 40 Beihaghi postpones this position of Ambassador to Modoud period.⁴¹ But his section is the disappeared part of History of Beihaghi that hasn't reach to us.

From the period of Ghaznavid also the coins with the name of Abbassid Caliphas have left. ⁴² But have not aware of relations among them. On coins of 3rd Massould also name of Almostahzar, Abbasside Calipha is appeared and indicates that Massoud observed traditional policy of Ghaznavides in acceptance of religious and ethical superiority of Baghdad Caliphate so. ⁴³ King Arsalan Ghaznavi also apparently has received firman of government. Masoud Saad Salman has brought about this:

- Flag and agreement oration of Baghdad Calipha
- The honored and glorified lord make it auspicious happy for king.
- Abolmalek Malek Arsalan ebne Masoud
- That thrown and land of heaven doesn't remember such him,
- Calipha has sent gifts unlimited and un-border
- Who, nobody has sent such a gift.
- All angles pray you
- Also agreement and also flag of Baghdad Calipha⁴⁴

Also, from the coins he has gained from King Arsalan, title and acceptance of supremacy of Al-Mostahzar, Abbasside Calipha is seen. ⁴⁵ On coins of King Bahram, the name of Calipha also is seen Almostarshed and Almoghtazi. ⁴⁶But we don't know anything about his relations with Abbasside Calipha. In second period of Ghaznavid reign, however they were sometimes under dependence of Saljoghides

and had close geographical connection with Abbassid Caliphate, but kings of these times such as kings of first period in religiusrespect followed Abbasside Caliphate. Reminded coins of them which name of Caliphas has coined on them, proves this claim. They for legitimacy of their government tried use of these signs and symbols in their government to give formalization to their reign.

3. Conclusion

What is here certain is that Ghaznavides had foreign (non-Iranian) and Turk geographical origin and race. At the first of foundation of this government they considered this matter that their rule in Iranian because of lack of people support would not last. Therefore such as most of Iranian Government of their time, noticed to Baghdad to find a point of support for themselves and by inspiration of religious policy of them firm their government.

In this period, religious factor as an important and effective factor on form and type of relations. Important point is that all relations in Islamic lands was formed around axle of Abbassid Caliphate and type of relation was explained on the basis of Caliphas views. However in this time kings of western governments such as Ghaznavian were independent in Practice. But, in any case know themselves loyalty dependence of Caliphas as leader of Moslims. In this time Caliphas in political and military respect hadn't dominance on east areas of Islam world, use of religious and holy titles was a tool for them to hereby benefit of military and political strength of some easter governments in increasing of their political power. In Ghaznavid period requirements of their without support governance in one side to legitimating of Caliphate system and in another side weakness of Caliphate system and need t supporting of kingdom system of them created close and bilateral relations among them. We can confess that relations of Ghaznavid and Abbassides Caliphate to each other was related to circumstances of time and when benefits of parties was in conflict to each other their friendship to each other reduced and their relation was on the basis of their needs. In any way Ghaznavides under influence of suffering of time and Sunnite religion governments such as Samanides, accepted Abbassides Caliphates as religious leader of Islam world and always tried to preserve close and respectful with Abbassides. Needs of Ghaznavid to gaining religious legitimacy from Abbassides Caliphates was main barrier for creating relation between them and some governments such as Shiite religious Fatemides. Since this government saw its survive in dependent to Sunnite and Abbassides, in any condition were not ready to create

 $^{^{}m 39}$ Ref. to: Kilford Edmond Yasorth "Ghaznavid history", P. 313

⁴⁰ Beihaghi "Beihaghi history" 1st volume, p. 106

⁴¹ The saem, same page.

⁴² Basorth, the same, p. 378

⁴³ The same, p. 382

⁴⁴ Masoud Saad Salman "Poems work" by introduction of Rashid Yasemi, by effort of, Parviz

⁴⁵ Basorth, the same, p. 391

⁴⁶ The same, p. 399

close and friendship relation with Fatemides, who were counted enemy of Abbassides.

In any way, in first period of Ghaznavid government specially in period of kings such as Mahmoud and Masoud they by creating bilaterial and close relation with Caliphate system enhanced influence and personality of Caliphates in Islam world, because type of their relation with Caliphates caused that position of Caliphates system against Buyid dynasty and Fatemides of Egypt be enhanced. They by hard campaign with Ismaeilides, served greatly to Abbassides Caliphate for prevention of empowerment of Fatemides in Western part of Islam world and by advance in India and some areas while gaining a lot of spoils cause influence of Islam and spiritual influence of Abbassides Caliphate. In second period of Ghaznavid governmet however Saljoghid were considered main barrier in making relation between Ghaznavids and Abbassian, but this government in consideration of spirituality and religion such as first period followed Abbasside Caliphate to gain political and religious legitimacy for itself. Coins and reminded titles of Ghaznavid Sultans of this period prove our claim.

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The effects of applying different levels of nitrogen and the plant growth regulator Pix on the morphological features of the cotton cultivar Sahel

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Abstract: In order to study the effects of the application of various amounts of nitrogen fertilizers and Pix 35% growth regulator on the morphological features of the Sahel cultivar of cotton (Gossypium hirsutum L.), and on the unginned cotton yield of this cultivar, an experiment was carried out in the factorial design in the randomized complete block format with three replications at the Bayekola Agronomical Research Station in 2009. The factors studied included the amounts of nitrogen fertilizers and of the cotton growth regulator Pix 35% used in the experiment. Results obtained showed that the minimum plant height was obtained in the control treatment (72.93 cm), and that plant height increased with nitrogen application and reached its maximum (77.59 cm) when 225 Kg.h of nitrogen was used. The analysis of the variance of the data indicated that the effects of applying various levels of Pix were very significantly different, so that the greatest plant height was observed in the Pix control treatment (90.94 cm), and it significantly decreased by Pix application and reached 65 cm when 300 g.h of Pix was applied (which was an almost 40% reduction). Furthermore, when nitrogen fertilizers were applied, the unginned cotton yield significantly went up, and this increase in yield continued up to the level of using 150 Kg.h nitrogen; however, when the level of nitrogen application reached 225 Kg.h, the yield started to go down. As a whole, the lowest yield was obtained when nitrogen was not applied (which was the control with a yield of 1469 Kg of unginned cotton per hectare), and the maximum yield (2825 Kg.h of unginned cotton per hectare) was achieved when 150 Kg of nitrogen per hectare was used i.e., the unginned cotton yield went up by 14% when 150 Kg of nitrogen per hectare was applied. In our study, it was observed that Pix did not have much influence on increasing yield: the minimum yield (2529 Kg of unginned cotton per hectare) was observed in the treatment of applying 100 g.h of Pix, and the maximum yield (2669 K.g of unginned cotton per hectare) by using 200 g.h of Pix. Comparison of the interaction effects of the level of Pix and nitrogen application indicated that, among all the treatments, the maximum yield of unginned cotton (3010 K.h) was achieved when 150 Kg.h of nitrogen and 200 g.h Pix were applied. These results also showed that in the treatments of using 150 K.g. nitrogen per hectare, and applying 150 K.g. nitrogen plus 300 g Pix per hectare also, high yield potentials (close to 3 tons per hectare) were created. The minimum yield of unginned cotton (2230 Kg.h) belonged to the treatment of using 200 grams of Pix per hectare.

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Keywords: Cotton, Nitrogen, Pix, Morphological Features

1. Introduction

The crop plant cotton (Gossypiun hirsutum L.) which is one of the important crops used in industry is also called the white gold. Crop plants, including cotton, are faced with various limitations, such as limited plant nutrients in the soil. One of the most important plant nutrients needed for cotton to grow, and which greatly affects the yield of the cotton crop, is nitrogen. However, excessive application of nitrogen causes an increase in vegetative growth, and disturbs the balance between the vegetative and the reproductive growth; and thus decreases the yield of unginned cotton, or does not further raise yield. Therefore, determination of the suitable amount of nitrogen required by cotton in each region enjoys special priority. This is of special importance in the north of Iran, where harvesting cotton coincides with the rainy season in the fall. Excessive application of

nitrogen delays the maturity of the crop, and the coincidence of the harvest with rainy weather in the fall reduces the quality of cotton fibers, especially in the second and third picks. Therefore, finding a solution for having early maturing crops is worthy of consideration. Among the substances that have attracted the attention of scientists and researchers who are after finding such a solution are the growth regulators that have various and desirable effects on different crop plants, including cotton. One of these growth regulators, which is widely used in cotton, is Mepiguat chloride, which has the common name of Pix. Gerbin et al. (1996), in their study of the effects of using Pix on the growth of the roots and the aerial parts of cotton, found that Pix significantly increases the yield of cotton and also the ratio of cotton seed to the total dry matter produced. Pix can cause early maturity of the crop, so that there are more bolls in

the middle and lower parts of plants sprayed with Pix. As these bolls have access to more plant nutrients, they mature early; and in this way, crop yield goes up, especially in the first pick (Kerby et al., 1990). Pix also causes the plants to become smaller, and hence it becomes possible to have more plants per unit area, which can lead to an increase in yield per unit area (Stuart et al., 2004). This study was conducted with the purpose of finding the most suitable amounts of nitrogen and Pix to be applied to the cotton crop; so that a step is taken in getting to know the factors that can increase cotton yield, and improve the quality of its fibers, in the province of Mazandaran.

2. Material and Methods

In order to investigate the effects of applying different levels of nitrogen and the growth regulator Pix 35% on the unginned yield and the morphological features of the Sahel cultivar of cotton, an experiment was conducted in the Agronomical Research Station of Bayekola in 2009. The geographical, and the other, characteristics of Bayekola are as follows: longitude: 31.3° East, latitude: 36.42° East, altitude: -18 meters above sea level, average annual rainfall: 680 millimeters, soil: clayey, pH: 8. The study was conducted in the factorial design (4²) in the randomized complete block format with three replications. The factors included the amounts of nitrogen (N) and the growth regulator Pix 35% (P) applied to the crop plant. The levels of nitrogen in the experiment were as follows: no nitrogen applied (NO), as the control, 75 kilograms of pure nitrogen per hectare (N1), 150 kilograms of pure nitrogen per hectare (N2), and 225 kilograms of pure nitrogen per hectare (N3). Nitrogen was applied in the form of urea as top dressing at the stages of bud formation and at the start of stem elongation. The Pix factor included the control treatment (PO), in which no Pix was applied, and the treatments of using 100 grams (P1), 200 grams (P2), and 300 grams (P3) of Pix 35% per hectare at the start of flowering (it was sprayed when there were 10 white flowers in every meter of the planted lines). Pix 35% is the common name of a growth regulator with the name of Dimethyl – piperidium chloride, which is an odorless powder that readily dissolves in water.

3. Results

Height of the plants: Results obtained showed that the differences between the various levels of nitrogen applied, and also the interaction effects of using nitrogen plus applying Pix 35%, were not significant regarding plant height (Table 1). Nevertheless, the shortest plants (72.93 cm) were observed in the control, while with an increase in

nitrogen applied, plant height also went up; so that at 225 Kg.h of nitrogen, the tallest plants (77.59 cm were produced) (Table 2). The reason for this could be that nitrogen increased the internodal length -i.e., when more nitrogen became available, the vegetative growth increased and plants became taller. The analysis of the variance indicated that the differences between the various levels of Pix on the feature of plant height were very significant (Table 1). Comparison of the means of different levels of Pix applied showed that the tallest plants (90.94 cm) belonged to the control treatment of Pix, while by applying Pix the height of plants significantly decreased, and was reduced to 65 cm (which was about 40% less than the height of plants in the control) when 300 g.h Pix was used. The reason for the decrease in height caused by applying Pix could be that Pix inhibits the production of gibberellic acid. Gibberellic acid is responsible for longitudinal growth and it increases plant growth; and Pix in fact reduces the longitudinal growth of the cotton plants by preventing the synthesis of gibberellic acid. These results are consistent with the findings of Carualho et al. (2005). Comparison of the interaction effects of application of nitrogen and Pix indicated that maximum plant height (94 cm) was obtained by using 225 Kg.h nitrogen, and the minimum plant height (61 cm) was observed when 300 grams of Pix per hectare was applied (Fig 1).

Number of nodes on the main stem: The analysis of the variance showed that there was no significant difference among the various levels of nitrogen regarding the number of nodes on the main stem (Table 1). However, the difference among the various levels of Pix concerning the number of nodes on the main stem was very significant. Comparison of the means indicated that, in the Pix treatments, the greatest number of nodes on the main stem was achieved in the control, and that the number of nodes decreased when higher levels of Pix was applied, so that when 300 grams of Pix per hectare was used the lowest of nodes on the main stem was observed (Table 2). This decrease in the number of nodes is due to the inhibitory effects of Pix – Pix inhibits the synthesis of gibberellic acid and thus prevents the increase in the number of nodes and the elongation of stems. Therefore, one of the reasons for the shortening of the main stem resulting from the application of Pix could probably be this reduction in the number of nodes. Comparison of the interaction effects of the application of Pix and nitrogen indicated that the maximum number of nodes on the main stem (14.5) was achieved when 150 Kg.h of nitrogen was used, and the minimum (10.8) when 300 grams of Pix plus 225 Kg of nitrogen per hectare were applied (Fig 2).

Internodal length on the main stem: The length of the internodes on the main stem was also one of the features very significantly influenced by the application of Pix (Table 1). Comparison of the means indicated that use of Pix significantly decreased the length of the internodes, although changing the rate of applying Pix from 100 up to 300 g.h caused no significant change in the length of the internodes; however, the differences among the Pix control and the three levels of Pix application were very significant (Table 2). Therefore, another reason for the reduction in the height of the main stem, resulting from the application of Pix, is the reduction in the length of the internodes on the main stem. The effects of the various levels of using nitrogen were not significant regarding the length of the internodes on the main stem. The interaction effects of nitrogen plus Pix on the length of the internodes were not statistically significant either, but comparison of the means of the interaction effects indicated that there were significant differences between the interaction effects of these two factors. The two factors of nitrogen and Pix had various and different effects on the length of the internodes on the main stem: the longest internodes were seen in the treatment of urea control and Pix control, and the shortest (4.9 cm) in the treatment of urea control plus the application of 300 grams of Pix. In the treatment of applying 100 grams of Pix, there was not much difference in the length of the internodes when more urea was used. In the treatment of using 200 g of Pix, the length of the internodes increased when 150 Kg of urea was applied; however, when urea was increased to 225 Kg, the length of the internodes decreased again. In the treatment of applying 300 g of Pix, the shortest internodes were observed at the level of urea control; and by increasing urea to 75 Kg there was a rather big jump in the length of the internodes (but when urea was increased to 150 Kg, the length of the internodes declined again) (Fig 3).

Number of reproductive branches: The differences among the various levels of nitrogen were not significant concerning the feature of the number of reproductive branches. However, the differences among the various levels of Pix, regarding the number of reproductive branches, were significant at the 5% probability level (Table 1). These results suggest that with an increase in the amount of Pix applied, the number of reproductive branches significantly declined; so that the greatest number of reproductive branches was achieved in the treatment of Pix control; and, with an increase in the amount of Pix, this number went down and reached the minimum of 6 branches per plant when 300 g of Pix was applied (Table 2). Comparison of the interaction

effects of nitrogen and Pix showed that the maximum number of reproductive branches (7.5) was observed in the control, and the minimum number of nodes on the main stem (5.4) was obtained when 100 g of Pix was applied (Fig. 4).

The length of the third reproductive branch: The differences among the various levels of nitrogen were not significant regarding the length of reproductive branches, but the differences among the various levels of Pix were very significant (Table 1). Comparison of the means indicated that when Pix was used, the length of the productive branches significantly decreased - i.e., in the Pix control the longest productive branches (22.54 cm) were achieved, while the treatment of applying 300 g of Pix had the shortest branches (17.72 cm) (Table 2). Comparison of the interaction effects of nitrogen and Pix showed that the maximum number of productive branches (7.5) belonged to the control, while the smallest number of nodes on the main stem (5.4) was observed in the treatment of using 100 grams of Pix (Fig 5).

Unginned cotton yield: Results of the analysis of the variance indicated that the effects of using different levels of nitrogen on the yield of unginned cotton were very significant (at the one percent probability level), but that the effects of various levels of using Pix and the interaction effects of nitrogen and Pix on unginned cotton yield were not significant (Table 1). Comparison of the means indicated that with an increase in nitrogen applied, the yield of unginned cotton very significantly went up; and this increase in the yield of unginned cotton continued up to the level of using 150 Kg.h, after which (i.e., when 225 Kg of nitrogen per hectare was used) the unginned cotton yield started to go down. In general, the minimum yield (1469 Kg of unginned cotton per hectare) was observed in the treatment of not applying nitrogen (the control), and the maximum (2825 Kg of unginned cotton per hectare) when 150 Kg of nitrogen per hectare was used; that is, when 150 Kg.h of nitrogen was applied, the yield of unginned cotton went up by 14% (Table 2). These results are consistent with the findings of Abdolahi fard and Hemati (2003). Prokofev et al. (2007) reported that, in their research, with an increase in the levels of applied Pix, the yield of unginned cotton went up, while Armstrong et al. (2002) found that Pix reduced unginned cotton yield. In our study, Pix did not have much effect on increasing yield: the minimum unginned cotton yield (2529 Kg.h) was obtained in the treatment of using 100 g Pix per hectare, and the maximum (2669 Kg.h) was achieved in the treatment of applying 200 g of Pix per hectare (Table 2).

Table 1. Analysis of Variation of the studied traits

Source of	MS								
Variation	Plant Height	No. Node on main stem	Internodal length	Number of reproductive branches	Length of 3 rd reproductive Branch	Cotton yield			
Replication	48.1450ns	3.2758 ns	0.1732 ns	0.035 ns	14.1705 ns	67592.6 ns			
N	55.41 ns	1.1996 ns	0.0901 ns	0.59 ns	24.7566 ns	290584.694 **			
P	1499.976**	10.1476 **	2.94 **	4.1823 **	61.83 **	45528.25 ns			
N*P	13418 ns	1.0219 ns	0.2812 ns	0.8532 ns	24.3411 ns	94113.528 ns			
Error	23.896	0.991	0.1641	1.133	11.5	57535.201			
CV (%)	6.52	7.75	6.94	16.84	17.71	9.18			

* and ** show the least differences at 1 and 5 level of probability respectively and ns shows none significant difference

Table 2. Effects of nitrogen and pix application on cotton different features

Treatment	Plant Height	No. Node on main	Internodal length	Number of reproductive	Length of 3 rd reproductive	Cotton yield
		stem		branches	Branch	
Nitrogen (K	g.h)				,	
0	72.93 b	12.75 b	5.71 b	6.01 b	18.68 b	1469 d
75	73.47 b	13.19 ab	5.85 b	6.58 b	21.27 b	2532 b
150	75.71 b	12.94 b	5.89 b	6.14 b	18.54 b	2825 a
225	77.59 b	14.44 a	5.95 b	6.54 b	18.11 b	2829 a
Pix (g.h)			ı			
0	90.94 a	13.86 a	6.57 a	7.2 a	22.54 a	2449 ab
100	72.72 b	13.22 ab	5.52 b	6.05 b	18.14 b	2529 b
200	71.04 b	12.52 bc	5.68 b	6.02 b	18.20 b	2669 ab
300	65 c	11.72 c	5.57 b	6 b	17.72 b	2609 ab

Numbers having common letters in each column are not significantly different at the probability level of 5 percent.

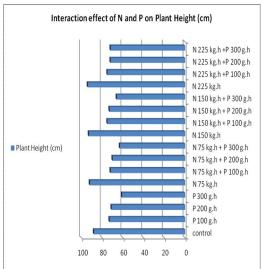


Figure 1. Interaction effects of different levels of nitrogen and pix on plant height.

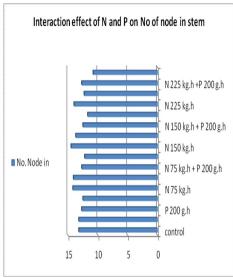


Figure 2. Interaction effects of different levels of nitrogen and pix on number of nod in stem.

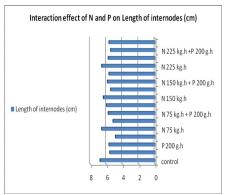


Figure 3. Interaction effects of different levels of nitrogen and pix on intermodal length.

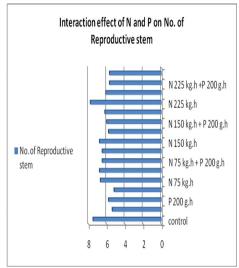


Figure 4. Interaction effects of different levels of nitrogen and pix on reproductive branches.

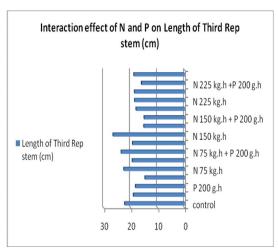


Figure 5. Interaction effects of different levels of nitrogen and pix on length of 3rd reproductive branch.

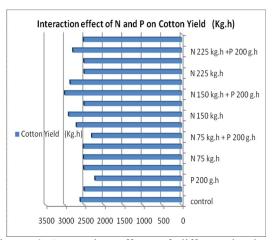


Figure 6. Interaction effects of different levels of nitrogen and pix on cotton un-ginned yield.

Comparison of the interaction effects of applying Pix and nitrogen indicated that the maximum unginned cotton yield among all the treatments (3010 Kg.h) was observed in the treatment of using 150 Kg of nitrogen plus applying 200 g of Pix. These results also showed that the treatment of 150 Kg of nitrogen, and that of 150 Kg of nitrogen plus 300 g of Pix, also created the potential of producing high yields (close to 3 tons per hectare). The lowest yield (2230 Kg.h) was obtained in the treatment of 200 g of Pix (Fig 6).

4. Discussion

It can be concluded from this research that with an increase in (the level of) nitrogen used, there was an increase in plant height, although this increase was not statistically significant. Furthermore, with an increase in the level of applied Pix, plant height very significantly decreased, the reason for which could be the inhibitory effect of Pix on the synthesis of gibberellic acid and on the elongation of the main stem. Increase in the level of applied Pix caused a reduction in the length of the internodes, and also a reduction in the number of nodes on the main stem. The reasons for the reduction in plant height resulting from the application of Pix could be attributed to the reduction in the length of the internodes and also to the reduction in the number of the nodes on the main stem. Pix reduced the number and the length of reproductive branches, so that these two features significantly decreased when Pix was applied.

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Operational planning Role in Organizations Based on Strategy (Case Study: Saipa Co.)

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Abstract: Mission-driven organizations plan and implement the projects in order to achieve strategic objectives. Thus the effectiveness of project implementation in different levels should be reviewed. This research intends to evaluate the effectiveness of implementing operational planning system which is one of the strategic projects in Saipa Co. by evaluating two strategic goals of achieving production plan and cost reduction. In this context regarding the aim of achieving production plan, the impacts of this system on the total volume and production models and also in cost reduction target, the costs due to stopping route, late delivery penalties and cost of product warehousing will be investigated and the accuracy of assumptions by using organization documentary / real data - descriptive inferential analysis and statistics will be tested. The findings suggest the significant effect of implementing the system on production plan increase and cost reduction achievement, so in mission- based organizations which are acting based on customer needs and flexible mass production system, the implementation of this system will have significant impact on achieving strategic objectives.

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Keywords: Operational planning; strategic objectives; production management; delays

1. Introduction

Today in productive or non productive organization the strategic vision of major goals failure to the lowest layers of the firm has been into the consideration of the senior managers. So after developing strategic goals and outlooks of organizations, the management and how to achieve goals and measure their performances has been a daily challenge of organization managers. Thus, different systems and methods are applied in case of converting the objectives and programs from strategic to operational and tactical levels, or in other words coordinating the operational plans with the strategic plans (Amiri, 1387, page1). Mission-based organizations define several concrete goals in their strategic plan and for achieving any of these strategic objectives they suggest solutions.

Operational planning system is categorized in a system which operational organizations for achieving their strategic goals are mostly in need of it.

In Saipa Co. regarding the complex and logistics manufacturing processes and also the product diversity in recent years, the necessity for product diversity with cost reduction in case of responsibility to customer needs more than ever has been considered and with preparation for hardware and software in late 87 this system has been implemented.

In this study, we try to study the impact of the system performance in achieving production plan as well as cost reduction which both are the strategic objectives of Saipa Co.

Though, operational planning with different methods and functions according to the various nature of activities in many manufacturing and service companies including Saipa, Iran Khodro, Fars medical university, Tehran municipality, port of Amsterdam... has been implemented, but any research on the effectiveness of implementing operational planning on the organization's strategic goals has not been done so far.

Product operational plan consists of determining how to produce the type, number of production, beginning of production and production sequences in the context defined as a weekly program in such a manner that deviation from the minimum weekly program is minimized.

The purpose of this study is to measure the effectiveness of performed operational planning models on some strategic goals of Saipa including production and cost reduction

2. Literature study

Strategy:

Organizations for their survival and more affectivity should be sensitive to environmental changes and they should have an appropriate reaction. There are many factors which constantly necessitate the changes in organizations.

Therefore, the organizations should recognize the environment and feel the changes occurred and should run the essential practices in organization efficiency according to the developments (Aysw saka, 2003). Those organizations will be successful that in doing business with new technology have all the abilities and win more market share, better prices and newer design in run fast (D Noblius, 2004). Ellie Sjef has expressed that the strategy is the clarification of objectives and activities within an organization. David Hunger and Thomas L Villain have described the strategy as a comprehensive plan of organization which through it achieves its mission and goals (Atefi, 1387, p. 2).

If a good strategy is not related to operational processes and proper handling, it can not be implemented and vice versa, although operational developing may lead to cost reduction, quality improving and time process reduction, but a company will not be able to achieve permanent success just with operational improvements and lack of perspective and strategy (Atefi, 1387, p. 2).

Tony Hayward, new senior BP (British Petroleum) announced in October 2007: the problem is not related to their strategy, but to its implementation. The survey conducted by BSCOL in 1996, shows that most organizations are in lack of formal system for their strategies implementation (Atefi, 1386, p. 1). For many years, the planning strategy and organization's major goals have been considered as a key to the success of firms.

The emphasis on strategy and perspective led to the forming of a wrong notion that "All which is necessary for success is a correct strategy" but only 10 percent of formulated strategies acted well successfully in practice. In fact we can say more important issue in the strategic management process, is the implementation and performance of strategy and organizational goals and 70 percent of senior managers failure in the U.S. was not because of their weakness in formulating the strategy but due to their failure in performing their strategies (Bakhtiari, 1383).

Mission-based Organization:

The results from a group consisting of 275 managers show that the ability of implementing the strategy is far more important than its quality, two key principles in implementing the organization's strategies and missions are strategy formulation and implementation.

These managers have stated that the most important factor in evaluating the company and the management is strategy implementation. When asking about how these organizations have achieved the successful results, managers frequently mention two words: alignment and focus (Bakhtiari, 1383). Although, both strategic and executive management tools have had tremendous growth, but there is no

progress in tools which link these 2 skills together (Atefi, 1386).

Strategic Goals:

Strategic goals are described within the company; the goals determine what to do for successful implementation of strategies (Pahlevanyan, 1387). Strategic objectives are a connector between strategy as a major priorities and quantities as a tool for measuring the success rate. Objectives, organization perspective, mission, values and strategic priorities which are often general and vague are translated as direct expression and activity based of the implement strategies obligations (2003, Niven). Relations between strategic goals and strategic projects were drawn in Fig. 2.

Planning:

Although a comprehensive definition of planning can be provided but in brief can be stated that the planning is the determination of effective activities to achieve the targets.

In fact, the objectives of plans, is the moving between the ideal situation and available one (Haghpanah, 1386).

Acouf describes the nature of plan as a decision making system and believes that when planning is needed which our desired future conditions is involved in a series of dependent decisions such as decision system (V. Shiner, 2007).

Planning levels:

Planning is strategic or tactical/operational one. Strategic plan contains decisions about the organization long-term objectives and strategies. Tactical planning converts strategic objectives and plans into specific goals and programs which are associated with particular area of the organization. Operational planning shall specify the procedures and processes required in particular low levels of the organization (Shabani, 1388).

Operational planning consists of determination the product type, number of production, beginning of production and the sequence of production defined in a weekly program context which the deviation of a weekly program will be minimized (Sarlak, 1388).

Implementation of practical planning has some needs that noted in Fig. 1.

Saipa strategic goals:

Saipa Automotive Group as one of the country's biggest automotive industries has defined its strategic plan based on balanced scorecard and has clarified strategic objectives according to the movement toward the mission. Saipa main strategic goals are production plan accomplishment and cost reduction.

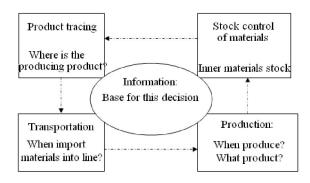


Fig 1: Operational Planning Requirements (Sarlak, 1388, logistics production lines)

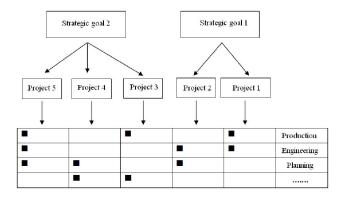


Fig 2: General research model (Saipa Co. strategic planning site)

Product operational planning in Saipa:

Regarding the strategic objectives achievement Saipa Company has designed and implemented the various projects that one of these projects is designing and implementation of operational planning system, which is defined in achieving production and cost reduction program. This project has been implemented in Saipa new site since late 87.

Since one of Saipa strategic plans is flexible production and rooted in customer need therefore we require the access of presentation and implementation of appropriate operational planning models which can coordinate different elements of relevant production which the customer's need may be fulfilled and as timely product delivery, the customer satisfaction is also achieved. But the important is the influential effect of this program in accessing the strategic goals and organization growth based on defined indicators in Saipa strategy map through BSC. In order to strengthen, support or remove and reform this system it is essential to evaluate its impact on company's strategic objectives.

Research hypotheses: First hypothesis:

Implementation of Operational planning system has a significant impact on production plan which is one of Saipa strategic goals.

Second hypothesis:

Implementation of Operational planning system has a significant impact on reducing costs which is one of Saipa strategic goals.

3. Research method

Since in current study we intend to review the effect of operational planning system on Saipa strategic goals, our study will be operational type because the practical application of research achievements is considered. In this study a systematic and regular collection of data based on variables from library studies, documentation, instructions and available information in Saipa Co. are collected. So, our research is based on analytical data, descriptive and using library methods.

According to research topic as "evaluating the impact of operational planning system in Saipa strategic objectives" the statistical community of this study is located in Saipa Co.

Since 2 strategic goals of this research, operational planning and cost reduction are considered, therefore product plan rate and production are reviewed in Saipa new site.

The production volume of Saipa new site with products of Saipa Pride and Saipa 132 in 11 models is nearly 365,000 vehicles which during 3000 weekly program during 87-88 (before and after implementation of the system) have been investigated.

Considering population large size, according to the central limit theorem the community has been normal and also all members of the statistical population (total production of Saipa new site) were analyzed.

This study discusses the evaluation of operational planning on Saipa strategic objectives. In other words, we want to know whether if the implementation of operational planning system has significant impact on Saipa strategic objectives or not?

So two strategic goals, planning and cost reduction are considered and to examine these two goals, information about the following topics is reviewed.

Fulfillment the production plan includes the following models:

Normal Pride - Hydraulic Pride -Pride with ABS Brake - Hydraulic Pride with ABS Brake -Hybrid Pride - Hydraulic Hybrid Pride - Normal Saipa 132 Hybrid Saipa 132 - Hydraulic Saipa 132 - Saipa 132 ABS -Hydraulic Saipa 132 with ABS Brake.

Delays in production lines

Penalties resulting from late delivery of vehicles due to lower production than initial program (Negative deviation).

Warehousing costs due to higher production than initial program (positive deviation).

Initially, in this study by using descriptive statistics and its indicators, and using the frequency tables, numbers, central index, mean, median, standard deviation, minimum and maximum of obtained data will be analyzed. Then by using analyzed with inferential statistics, the hypotheses are tested. T tests and Chi square according to the subject and data in testing the hypothesis are used. This analysis is occurred by zero and one test by using index number, mean, standard deviation, error criterion, calculated t, the degree of freedom, significance level, Levine test (homogeneity of variances).

4. Results

Descriptive statistics:

The table 1 shows the statistical indicators of program variable rate, production and percentage deviation from the plan, distinctively before and after the implementation of operational planning systems. Deviation is defined as the absolute value of production and program difference divided by program multiplied by 100. The cases which the program was zero in the calculation of deviations are Excluded, therefore the number of cases where deviations have been reported are about 2789 cases and less than the total number of data reported. Average percentage deviation in total is 59.4 SD 400.2. Prior to implementing operational planning system mean deviation is 85.9 SD 551.7. Also after the implementation of operational planning system the average percentage deviation is 30.7 and SD 45.3. Table 2 shows produced types based on quantity and percentage.

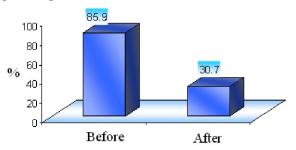


Fig 3: Deviation from plan (%)

Table 1: Descriptive statistics indicators before and after the implementation of operational planning system distinctively

system distinctively							
Variable	Indicator Practical plan	Number	Mean	Middle	Deviation	Minimum	Maximum
Plan	Before	1742	105.0	47.0	173.2	0	1336
	After	1848	103.4	47.0	180.5	0	1347
	Sum	3590	104.2	47.0	177.0	0	1347
	Before	1742	101.7	40.0	167.5	0	1366
Production	After	1848	101.3	37.5	174.6	0	1366
	Sum	3590	101.5	38.0	171.2	0	1366
	Before	1452	85.9	24.0	551.7	0	14600.0
Deviation (%)	After	1337	30.7	12.9	45.3	0	604.0
	Sum	2789	59.4	18.7	400.2	0	14600.0

Table 2: Percentage distribution of different models

Model	Mode code	l Abbreviated name	Quantity	<i>y</i> %
Normal Saipa 132	0000	S132-SIM,IM	92543	25.4
Hybrid Saipa 132	0001	S132 – SIM,NoMixer Hybrid	18574	5.1
Saipa 132 ABS	0010	S132i – SIM, ABS	8659	2.4
Hydraulic Saipa 132	0100	S132 H – SIM, IM	7354	2.0
Hydraulic Saipa 132 with ABS Brak	e 0110	S132i H – SIM, ABS	245	0.1
Normal pride	1000	GTXi – SIM, IM, MP3	93756	25.7
Hybrid pride	1001	GTXi – SIM, IM,NoMixer,MP3 Hybrid	1 104874	28.8
Pride with ABS brake	1010	GTXi – SIM, IM, ABS,MP3	13877	3.8
Hydraulic pride	1100	GTXi H – SIM, IM, MP3	18046	5.0
Hybrid & Hydraulic pride	1101	GTXi H-SIM,NoMixer,MP3 Hybrid	5651	1.6
Hydraulic pride with ABS brake	1110	GTXi H-SIM, IM, ABS,MP3	796	0.2
Sum			364375	100.0

In table 2, number indicates the cases that a certain number of machine was scheduled for production and the average percentages indicates average deviation from the plan (For example, during certain years 431 times was scheduled for producing normal Saipa 132 that in this 431 times the average deviation from the plan is equal to 65.4 percent).

As the figure 4 shows the deviation from the plan in all models prior to the implementation of operational planning system was more than the deviations after the implementation of the operational planning system.

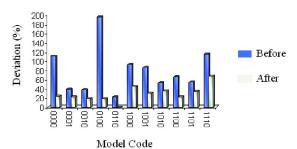


Fig 4: Deviation (%) from plan in different models

The significant difference before and after implementation system will be determined in the inferential statistics.

Table 3 and figure 5 show the distribution of stopping time in different years. These figures show that in year 88 (after implementation of operational planning system) the whole product stopping time has been decreased significantly compared to previous years. Table 4 shows the statistical indicators of stopping times based on various causes and in different years.

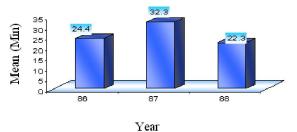


Fig 5: Mean stopping time

Table 3: Statistical indicators of product stopping time (per minute in different years)

Indicator	Year Case Qua	ntity Mear	Devia	ation Sum
86	640	24.4	29.2	15591
87	506	32.3	46.1	16358
88	580	22.3	36.2	12922
Sum	1726	26.0	37.3	44871

Table 4: Statistical indicators of product stopping time (minute) in different years due to the cause of stop distinctively

Stop	aistinctiv	Cry						
Year	Problem Indicator	Dis-Receiving body form color line (1)	Distortion of Instruments (2)	Problem in production process (3)	Delay in sending pieces into line edge (4)	Absence of pieces in firm (5)	Dis-qualification (6)	Others (0)
	Mean	23.20	12.48	10.13	11.24	40.97	19.05	22.69
86	Quantity	282	92	15	25	132	20	74
80	Deviation	25.53	11.12	6.978	11.34	40.57	18.24	29.89
	Sum	6542	1148	152	281	5408	381	1679
	Mean	21.94	12.06	13.48	9.65	54.29	30.20	36.74
87	Quantity	143	51	21	54	180	10	47
67	Deviation	24.24	15.00	8.32	10.12	63.85	34.80	39.26
	Sum	3137	615	283	521	9773	302	1727
	Mean	24.41	8.41	12.60	9.28	50.20	21.89	17.73
88	Quantity	156	82	15	94	100	9	120
00	Deviation	39.14	7.49	4.35	7.72	56.90	26.40	24.07
	Sum	3808	690	189	872	5020	197	2128
	Mean	23.21	10.90	12.24	9.68	49.03	22.56	22.96
Sum	Quantity	581	225	51	173	412	39	241
Sulli	Deviation	29.49	11.15	6.97	9.06	55.80	24.94	30.09
	Sum	13487	2453	624	1674	20201	880	5534

The longest time for the delay resulted from two factors of part absence in company (code 5) and staying in car paint hall (code 1).

Statistical inference:

Hypothesis 1: implementation of the operational planning system on product accomplishment as one of Saipa strategic objectives has a significant impact.

As showed in table 5, as likely as 99 percent, there is significant difference between the mean deviation from the plan before and after implementing operational planning system.

Comparing the means in two groups (before and after) shows that the average deviation from the plan before implementing operational planning system is higher than average deviation from the program after implementing operational planning system.

Implementation of operational planning system has a significant impact on production accomplishment in different models.

As can be seen in table 6, T tests and Levine test were taken for 11 manufactured models distinctively, which rejected or accepted test result of the research are described in the following table briefly.

Table 5: SD t-test for comparing the deviation of program before and after application of operational planning system

Indicator Qu Group	Quantity	Mean Deviation	Criterion Mea					Levin's test (Variances coherence)		
	X ,			Епог	diffraction	t	level	level	F	Meaning level
Before	1452	85.92	551.7	14.47	-55.24	3.801	1472	0.000	24.62	0.000
After	1337	30.68	45.3	1.23	-55.24	3.801	14/2	0.000	24.62	0.000

Table 6: T tests results for considering the effect of practical planning on achieving product planning goals; based on different models

Model	Zero Hypothesis	Research Hypothesis
Normal Saipa 132	Accept	Reject
Hybrid Saipa 132	Accept	Reject
Saipa 132 with ABS brake	Accept	Reject
Hydraulic Saipa 132	Accept	Reject
Hydraulic Saipa 132 with ABS brake	Accept	Reject
Normal pride	Accept	Reject
Hybrid pride	Reject	Accept
Pride with ABS brake	Reject	Accept
Hydraulic pride	Reject	Accept
Hydraulic and Hybrid pride	Accept	Reject
Hydraulic pride with ABS brake	Accept	Reject

Table 7: Chi-square test for comparing product stopping times in years 86-88

I I	0		<i>J</i>			
Indicator Year	Watched stopping time (Min)	Wanted stopping time (Min)	Difference	Calculated Chi-2	Freedom level	Meaning level
86	15591	14957.0	634.0			
87	16358	14957.0	1401.0			
88	12922	14957.0	-2035.0	435	2	0.000
Sum	44871	44871				

Hypothesis 2: implementation of operational planning system has a significant impact on reducing costs as one of Saipa strategic objectives. As can be seen in table 7, Comparison of stopping times in different years shows that the total stoppage time during the year of 1388 after the implementation of operational planning system are significantly less than observed stopping times in years of 1387 and 1386.

So it can be concluded that the implementation of operational planning system reduces the stop time and consequently will reduce the costs as well. Implementation of operational planning system has a significant impact on stopping time resulted from various causes.

Table 8 shows the distribution of stopping times among various causes between 86-88. So we can conclude that there is significant difference between stopping time due to different causes in different years.

The comparison of stopping times about two major causes of part absence in the company and staying in paint room for different years made in previous table shows that after implementation of operational planning system the stoppage time resulted from both causes and a percentage share of these two causes have been decreased in year 88.

Implementation of operational planning has a significant impact on reducing negative diversion from the program.

As can be seen in table 9, according to calculated Chi square (11.597) which is larger than critical Chi square of Table (6.63) at 0.01 infallible, and 1 degree of freedom (or in other words the level is significantly smaller than 0.01, 0.01 < 0.001p =), zero is rejected and hypothesis will be confirmed.

So we can conclude that there are significant difference in rate of negative deviation from the program between years of 87 and 88.

Comparing the negative deviation from the program in years of 87 and 88 shows that, the rate of negative deviation observed during year of 1388 which is after the implementation of operational planning system is significantly less than the rate of negative deviation observed in year of 1387.

So it can be concluded that the implementation of operational planning system reduces the negative deviation from the program and in other words reduce penalties due to the late delivery of vehicles. Implementation of operational planning has significant impact on reducing positive deviation from the program.

As can be seen in table 10, according to calculated Chi square (134.9) which is larger than critical Chi square of Table (6.63) at 0:01 infallible, and 1 degree of freedom (or in other words the level

is significantly smaller than 0.01, 0.01 <0.000p =), zero is rejected and hypothesis will be confirmed.

Therefore, we can conclude that there is significant difference in the rate of positive deviation from the program between years 87 and 88. Comparing the positive deviation from the program in years 87 and 88 shows that the rate of positive deviations observed during the year 1388 after the implementation of the operational planning system is significantly less than the rate of positive deviation observed in 1387. So we can conclude that implementation of operational planning system has reduced the positive deviation from the plan and in other words it has reduced the carrying costs.

Table 8: Table of Stopping time according to causes and years distinctively

and years distinctively				
Year Problem		86	87	88
Dis-Receiving body form color line	Time (Min)	6542	3137	3808
g and g	%	42.0	19.2	29.5
Distortion of Instruments	Time (Min)	1148	615	690
Distortion of monuments	%	7.4	3.8	5.3
Problem in production process	Time (Min)	152	283	189
r	%	1.0	1.7	1.5
Delay in sending pieces into line edge	Time (Min)	281	521	872
or and the second	%	1.8	3.2	6.8
Absence of pieces in firm	Time (Min)	5408	9773	5020
i i i i i i i i i i i i i i i i i i i	%	34.7	59.7	38.9
Dis-qualification	Time (Min)	381	302	197
•	%	2.4	1.8	1.5
Others	Time (Min)	1679	1727	2128
Others	%	10.8	10.6	16.5
Sum	Time (Min)	15591	16358	12904
Suiii	%	100.0	100.0	100.0

Table 9: Chi-square test for comparing the negative deviation from the program in years 87 and 88

Indicator Year			Difference	Calculated Chi-2	Freedom level	Meaning level
87	22336	21979.0	357.0			
88	21622	21979.0	-357.0	11.597	1	1.000
Sum	43958					

Table 10: Chi-square test for comparing the positive deviation from the program in years 87 and 88

Indicaro Year	Watched deviation	Wanted Deviation	Difference	eCalculated	Chi-2Freedor	n levelMeaning level
87	28206	26860.0	1346.0			
88	25514	26860.0	-1346.0	134.9	1	0.000
Sum	53720			_		

5. Conclusion

Operational planning and implement of production plan:

Analyzing the descriptive statistics about the variables of plan, product, and percentage of deviation before and after the implementation of operational planning system reveals the operational planning system has significant impact on reducing the percentage deviation or increasing implementation of production plan that has been the first hypothesis of the study so that the percentage deviation from the program has decreased from 86% to 30%. In other words we can say Saipa Co. before running the operational planning system has the capability of doing its compromises just less than 1/3 of car delivery according to customer desired model at usual time while after implementing operational planning system over the commitments has been done. The inferential statistics confirm this hypothesis as well. Therefore, the implementation of this system is strongly recommended to organizations which have various productions and a desire for production plan.

Operational planning and production plan in different models distinctively:

Regarding the impact of production system on different models produced in Saipa Co., despite the descriptive statistics which shows the system has achieved the success performance in production of 11 models, but inferential statistics on some models do not confirm this impact and with the review done, the reasons are as follows:

In respect of different models of Saipa 132 and considering that the bumper had the same color of the car body, so the production of each body is only possible due to the bumper availability and considering the lack of supply and delivery by the manufacturer (single source supply) in accordance with the program, and the lack of information about produced an d delivered cargo by the manufacturer, so the system operational planning had no significant effect on these car bodies. Therefore it is recommended for implementation of this system effectively; the companies should exit from the single source supply and have relationship with multiple suppliers to have the possibility of replacing parts in terms of crisis conditions. Also, the awareness of supplier about the products helps implementation of operational planning system. When there is a contrast between the production and the plan due to the various causes of other models such as hybrid, and Saipa 132.... Regular PRIDE is replaced subsequently with the other models to avoid program line stopping, the availability of parts and ease of production makes the regular pride the best

alternative that this causes deviation from the normal production of Pride from the program list.

Hydraulic hybrid Pride and hydraulic ABS Pride regarding that these two models are the latest products of the company, production rate has been very low and has allocated lowest frequencies so the little positive change had no significant impact which had been occurred after implementing the system. During last two years the lack of supply by some of manufacturers and regarding these 2 models as the latest one has made some deviations from the plan. In other models, including hybrid Pride, Hydraulic Pride and ABS Pride, descriptive and inferential statistics reveals significant and meaningful impact on the implementation of operational planning system in achieving the production plan.

Therefore, implementation of operational planning systems is suggested for organizations that have a volume of mass production and product variety.

Operational planning and reducing costs: In order to evaluate the impact of operational planning system on reducing costs, 3 variations of route stopping, the late delivery vehicle costs due to low-production from the initial plan and product storage costs resulting from more production has been reviewed. Descriptive statistics compared to previous years shows that (after the implementation of operational planning system) during the year 88 the whole stopping time considerably has been decreased, so it has resulted in costs reduction.

Also the effect of this system on stopping route through different causes was determined that the most delays created among seven available factors was related to the two existing factors of parts absence and staying too long in paint hall which it shows that after implementation of operational planning system the stopping time resulting from these two causes and a percentage share of these 2 factors have been decreased. Therefore, organizations with continuous production line and the significance role of stopping route for them can use this system in order to reduce the stopping route and consequently costs reduction and increase in revenue.

Also the inferential analysis of lower production than normal plan variation (delayed penalty) and increase in production (warehousing costs of produced car out of the program) shows the implementation of this system has reduced both types of deviation in manufacturing and consequently has resulted in organization cost reduction. Therefore, organizations which are planning based on customer request the implementation of this system will reduce their costs. The lack of essential statistics and

information based on concentrated and identical format spent much more time on collecting and harmonizing the information and statistics and in this study it was the most important limitation that we faced with. Also, another obstacle for this study was the lack of similar research for modeling.

Evaluating the impact of operational planning implemented on other strategic objectives such as customer's time of delivery and also the possibility of all the operational processes to be mechanized and generalizing the operational planning system within organization internally and to the suppliers externally can be a good resumption for this current study.

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Viability model and effect of two drying procedures on seed longevity of Secale montanum seeds

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Abstract: This experiment was conducted to evaluate the ability of the Ellis and Roberts seed deterioration model to predict the longevity of *Secale montanum* seeds under different storage conditions. Seed lots used in this investigation were dried in two different methods including sun and shade drying, immediately after harvest. The seed moisture content of both seed lots was adjusted to 11, 13 and 15% by humidification above water in a closed container at 20°C. After equilibrium had been achieved for 3 days at 5 °C in a sealed container, seed moisture content was determined. In each seed lot and moisture level, sub samples of about 200 seeds were sealed hermetically in aluminum packets. Storage temperatures were 25, 35 and 45. The interval of sampling depended on the storage conditions. Seed survival curves were then fitted to the observations by probit analysis. In each seed lot dried seed survival curves conformed to cumulative negative normal distributions and the results showed that survival curves could be constrained to a common origin. The results of this research showed that the standard deviation of the subsequent survival curves was unaffected by drying treatments. Seed viability constants to predict seed longevity in this species was estimated.

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Keywords: drying, Secale montanum, seed longevity, seed viability constants, viability model

1- INTRODUCTION

The Ellis-Roberts deterioration model is based on the relationships of temperature and moisture effects on deterioration not influenced by genotype or seed lot, nor condition before storage. (When the storage temperature and moisture content is constant)(Ellis and et al 1982). The equation V=Ki $p/10^{K-C} \frac{C}{W} \frac{LOG10m-C}{H} \frac{t-C}{O} \frac{t^2}{O}$, where v is the probit percentage viability after p days of storage at m% moisture content (mc,f.wt.basis) and t(c°).ki is a constant which stands for the initial quality of each seed lot before storage. ke is a species constant, cw indicates the logarithmic response of seed longevity to moisture content. CH and CQ are the constants of a linear and quadratic temperature term, respectively (Ellis et al 1986, Krrak and voss1987). Slopes of survival curves were dependent solely upon the current storage temperature and moisture content (Hong et al 1999). Every year large volumes of high quality seed are lost for planting purpose because of excess moisture. A seed crop is often harvested when the seed moisture content is higher than desirable for safe storage .Safe seed moisture content varies with crop species, but generally 14% or less is considered satisfactory for short term storage (Kelly 1988). In most developing countries farmers are very poor, They produce their own seed crops for the next years sowing. After harvesting and threshing, traditionally they dry the seeds on floor. Perennial rye is a pasture plant that produces a lot of seeds and in Iran often seeds dry on floor in uncovered or covered room and is preserved for next year sowing. Maybe decrease in

viability during storage (in constant conditions)is different. The objective of this work was to determine whether or not two different drying methods can be different in the velocity of viability loss and determining seed viability constants for *Secale montanum* under certain storage conditions.

2- MATERIALS AND METHODS

Seeds of perennial rye (Secale montanum) were obtained from seed production station of Secale montanum in Arak, Markazi province, Iran. Seeds were dried on floor in two groups: one group in sun (uncovered floor) and another group in shade (covered floor) for 10 days. Initial germination percentages and moisture content were recorded as 76% and 5.8% for sun dried seeds and 74% and 7.3% for shade dried seeds, respectively. For each moisture content (11, 13, and 15%) Twelve grams of seeds were weighed for both sun and shade dried seeds. Seed moisture content (mc) were adjusted from their initial values by humidification above water in a closed container at 20°C and after certain times for each moisture content and seeds were weighed for desired moisture content levels. Then seeds were placed in laminated aluminum foil, pressed and placed in refrigerator for integrating moisture content among all seeds in the package for 3 days. Seed moisture content was detected by the high constant temperature oven method prescribed by the International Seed Testing Association (ISTA 2004), in which three 4-5 gr ground seed samples were dried in a mechanically ventilated oven at 130-133 C° for

two hours After that the sub samples containing a minimum of 200 seeds were sealed in laminated aluminum foil packets and stored in incubators maintaining at 25, 35, 45. Seeds were germinated at 20 °C for 7 days on two layers of filter paper moistened with 4.5 ml distilled water in 90 mm Petri dishes. Seed survival curves were then fitted to the observations by probit analysis. Also Seed viability constants to predict seed longevity in this species were estimated.

3- RESULTS

Table 1 displays the frequency distribution of seed death in time (sigma) at each moisture content and temperature, it shows that seeds with 13% moisture content and stored at 45 C° required 60.72 and 61.25 days for the germination to drop by one probit, for sun and shade dried seeds, respectively, while at 11% moisture content at 45 C°, those values were 92.85 and 93.05 days, respectively. These constants define the equation for the two seed lots (table 2).

Seed survival curves (probit scale) obtained at 25, 35 and 45 °C for shade and sun dried seed are depicted in Figures 1 and 2, showing the effect of moisture content and temperature on seed storability.

Figure 3 shows the comparison between sun and shade dried seeds in each environment (moisture content and temperature) in probit scale, (germination percentage data).

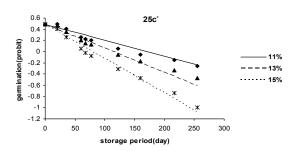
The F has been calculated by getting the difference between the common line model and the separate line model, the difference is not significant for all similar environment in sun and shade dried seeds (25 °C, F=1.71, 1.045, 0.64, for mc 11, 13, 15, 35 °C, F=2.3, 1.68, 0.35, for mc 11, 13, 15%, 45 °C, F=2.13, 2.45, for mc 11 and 13% respectively). It means that the declining slope of lines, in each environment is similar and the drying method before storage did not effect the slope of viability lines.

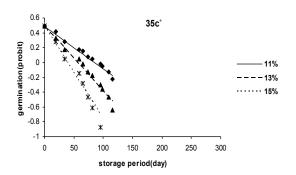
Table 1. Moisture content (mc%), temperature (c°) and sigma (number of days for the percentage of seed germination to be reduced by one probit) for *Secale*

топианит.					
Temperature(c°)	Mc (%)	Sigma (day)	Temperature(c°)	Mc (%)	Sigma (day)
25	11	359.99	25	11	354.014
25	13	235.42	25	13	233.061
25	15	163.63	25	15	162.911
35	11	172.2	35	11	174.048
35	13	112.61	35	13	114.58
35	15	78.27	35	15	80.094
45	11	92.85	45	11	93.051
45	13	60.72	45	13	61.25

Table 2. Seed viability constants and viability equation for *Secale montanum* seeds

	ke	cw	ch	cq
constants	6.1139	2.5771	0.03856	0.00013
equation	6.1139-2.5771	llog10m-0.	03856t-0.000	$013t^2$
	R^2 =0.9891			





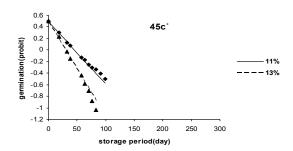
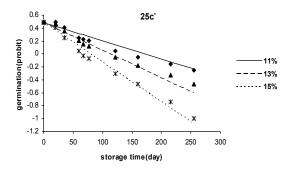
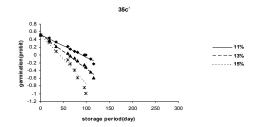


Figure 1. Probit survival curves for shade dried *Secale montanum* seeds stored at mc 11, 13 and 15%; lines and symbols mean predicted and observed germination percentages, respectively.





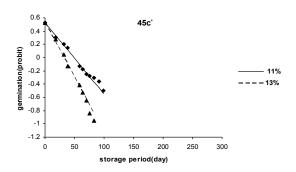
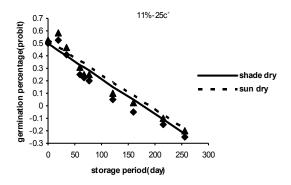
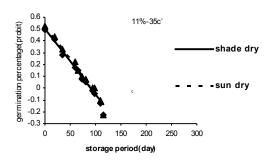
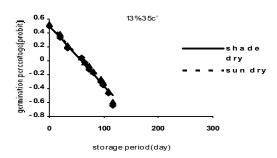
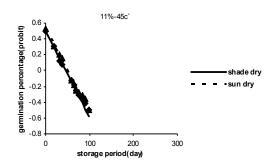


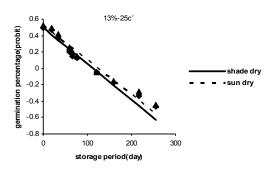
Figure 2. Probit survival curves for sun dried *Secale montanum* seeds stored at mc 11, 13 and 15%; lines and symbols mean predicted and observed germination percentages, respectively

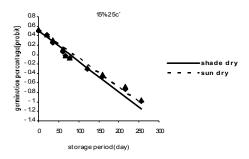


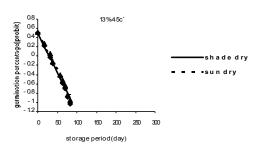












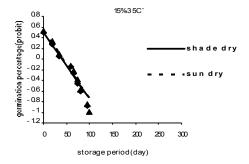


Figure 3. The comparison between sun and shade drying seeds of *Secale montanum* seeds in each environment (mc and temperature) in probit scale (germination percentage data)

Values for predicted and observed viability after storage were similar for the two seed lots and the correlation (R²) was 97% for two seed lot (figure 4 and 5).

Longevity curves obtained at 25, 35 and 45 $^{\circ}$ C for the two seed lots showed the effect of mc and temperature on seed storability (figure 6 and 7), the slopes of the fitted regression lines at the same storage temperature are similar for sun and shade drying themselves and are similar between two groups of seeds (-2.50, -2.54 for sun and shade dried seeds respectively), and corroborating the high precision of the results.

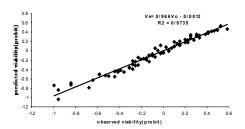


Figure 4. Observed and predicted perennial rye seed viability values by the viability equation

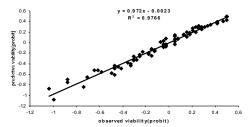


Figure 5. Observed and predicted perennial rye seed viability values by the viability equation for shade dried seeds

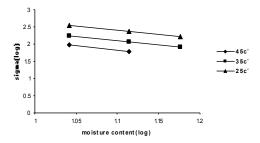


Figure 6. Relation ship between the logarithm of seed moisture content and the logarithm of sigma for sun dried *Secale montanum* seeds. Solid lines represent the regression lines for each storage temperature

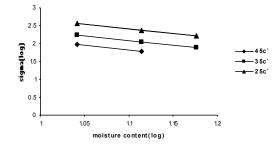


Figure 7. Relation ship between the logarithm of seed moisture content and the logarithm of sigma for shade dried <u>Secale montanum</u> seeds. Solid lines represent the regression lines for each storage temperature

For the best fit for viability equation at $45 \, \text{C}^\circ$ the mc 15% was deleted. The slopes show that in different temperatures, the rate of reduction is the same for each groups of seeds as well as between two groups of seeds.

As a conclusion the two seed lots (sun and shade dried seeds) were not different with respect to seed viability loss during storage in constant condition.

4- DISCCUSSION

Analyses showed that among temperatures 45 C° for 15% moisture content in sun and shade dried seeds by the use of X^2 distribution test the temperatures were deleted. The X^2 tests p=0.01 for those conditions and also the latest points of the data for germination percentage, were significant were 13% mc at 45 C° and 15% mc at 35 C°, for both seed lots. Usberti et al. (2006) showed that at 40 and 50 C° residual deviances significantly decreased after removal of results for 2.17mc and 3.74% mc of cotton seed lots. Fanttinati and Usberti (2007) showed that for 11.3% moisture content at 40 and 50 C° sigma (frequency distribution of seed death in time) were 17.3% and 5 days, respectively, *Eucaleptus grandis* seeds.

These constants (see table 2) are different from the constants for barley (Ellis 1981) or lettuce (Kraak and Vos 1987), but the value of Ke is similar to this value for Lupinus polyphyllus (6.21) (Ellis 1988) and onion (6.97) (Ellis and Roberts 1981).

The normal distribution in seed longevity and the survival curves obtained show a negative cumulative sigmoid format, confirming the observation made by Ellis (1984). When moisture content and temperature were reduced, predictable increasing in seed longevity was observed. Increasing temperature and moisture content resulted in seed longevity reduction, more pronounced at the highest moisture contents (11% and 15% at 45 C°). Similar results were obtained in groundnut (Usberti and Gomes 1998). Also it was showed the similarity between observed and predicted viability for cotton seeds (Usberti and et al. (2006).

This was in agreement with one assumption of the viability model, that all seeds regardless of initial quality have the same rate of deterioration in constant condition during storage (Ellis and Roberts1980).

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The role of tourist attractions on change of the traditional dwellings of mountain and mountainside villages (Dohezaar rural district, Tonekabon Township)

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Abstract: In this article, the researcher does her best to study the impacts and outcomes of this industry on the development of local and traditional dwellings from various dimensions and aspects, including form, architecture, function, etc. The data collected for this study are based on information, statistics, and also experts' opinions. The results of the present study can help us to evaluate, plan, and fulfill the development of rural tourism on the area under study, so it will provide a good background to reach the goals of tourism in the process of rural tourism development.

[Masoumeh Hasannezhad, Nasrollah Molaei Hashjin, Karine Danielyan. The role of tourist attractions on change of the traditional dwellings of mountain and mountainside villages (Dohezaar rural district, Tonekabon Township). Journal of American Science 2011;7(7):664-673]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Rural tourism; Dohezaar rural district; Traditional dwellings; Mountainous and mountainside villages; Sustainable development

1. Introduction

Today, tourism industry is among the main sources of income; at the same time, it is one the effective factors of cultural exchanges among countries worldwide. It has particular position as the most expanded industry that provides services to the public because the global growth of tourism has gifted a worldwide and economic wealth gotten by chance that will be at first stages of the plans and programs of nations and societies throughout the world (Gaan, 2002: 18).

Therefore, it is necessary that tourist plans will be equipped by constant tools and techniques in order to decrease its destructive impacts in addition to guarantee its permanent productivity.

Villages are one of the sources which have got the attention of planners more than before.

Rural world is broadly a valuable part of our cultural heritage, and local and unique architecture of an area reflects and supports its identity well (Deragouni, 2008: 3). It provides great potential for visitors and tourists who are far from and near to the area by having social, cultural, and natural factors and attractions. Therefore, rural tourism can be the best choice for developing villages in relation to the rural area's situation and the necessity for its developing in sustainable form (Sharifzadeh and Moradnezhad, 2002: 52).

Western part of Mazandaran province with great potentialities is geographically suitable for developing tourism because of having moderate climate and natural unique landscapes such as thick forests, paddy- fields, and Khazar (Caspian) sea sides. Because its area is very large, Dohezaar rural district, suburb of Tonekabon Township, will be in our consideration.

Since the income gained by tourism is definitely more than income of villagers gained through agricultural activities, this industry has been welcomed in many rural areas in spite of its negative impacts. Lack of tourism planning might mean that the crowds of visitors with different cultural values come to a village and this causes the culture of the village meltingdown, and also villagers will not have enough participation in the field of traditions and customs a lot (Fatahi Kanaani, 2005: 39). When tradition disappears, the whole figure of the society also changes; therefore, different structures are formed gradually, and the society is going to be structuralized. The new structure undertakes part of the functions of the tradition, and it itself is going to evolve following the changes in the society. The first trend is the appearance of new dwelling patterns (Saameti and shahnazi, 2005: 103).

The changes happened in Dohezaar dwelling patterns show that all the factors related to dwelling and development are also under change and development following the evolution in its shape and architecture. Therefore, the role of tourism in development of traditional dwellings (style and method of architecture, function, form, etc.) in Dohezar rural district has been taken into consideration, and we try more to bring into study and consideration these changes and their outcomes.

Geographical setting of the rural district under study

Dohezaar rural district, suburb of Tonekabon Township, is located in Mazandaran province. This province is located in the northernmost part of Iran in the south of Caspian Sea. Also, Tonekabon Township is located in the west of Mazandaran province and consists of three districts named central, Abbas Abad, and Khoram Abad. Its central district comprises one rural district called Goleyjan.

Khoram Abad comprises three rural districts called Baladeh, Sehezaar, and Dohezaar, and Abbas Abad comprises three rural districts called Nashta, Langaroud, and Kellar.

The rural district under study is part of the divisions of Khoram Abad district, and it is bounded to the north by Khoram Abad district, bounded to the east by Sehezaar rural district, bounded to the west by Golyjan rurual district and Ramsar Township, and bounded to the south by Moalem Kelayeh and Alamount regions in Qazvin province and the Alborz mountain range (Iran statistics center). In general, it is an area of land from which water flows into the Cheshmekilleh River. Dohezaar is the smallest rural district among the rural districts of Khoram Abad.

According to the last conducted general census in 2006, population of Dohezaar has been 1426 including 365 households. The number of villages has been estimated to be about 44, among which 16 villages are populated and 28 other villages are not populated (the office of budget and plan, 1986-2006). With regard to the geographical situation, this rural district is located in the geographical coordinates of 50 degrees and 35' minutes up to 50 degrees and 45' minutes of eastern longitude and 36 degrees and 30' minutes up to 36 degrees and 40' minutes of northern latitude (Iran statistics center, 2006; 4).

Heights and mountainous topographically comprise nearly ninety-five percent of the rural district under study. The highest point is the height of Siallan located in the west of Dohezaar being 4225 meters above sea level, and the lowest point is a place called Single Building Rush (Tak Sakhteman Rush) situated 300 meters above sea level. Dohezar villages are situated 300 up to 2000 meters above sea level, out of which about eighty percent are situated 1500 up to 1600 meters above sea level (Hassannezhad, 2002: 65). Therefore, they are located in mountainous and mountainside regions, and their climates are affected by different air masses with different sources including Siberian high at north- east, Azores and the northern Atlantic high (Ramsar weather station, 2009).

The existence of beautiful landscapes and pleasant weather can be considered as effective factors in attracting the attention of many tourists to visit the rural district.

Now the main point is that the presence of visitors has been increasing in recent years without considering substructures, local culture etc., and this causes rural dwellings become unsustainable from ecological, cultural, and economic aspects. Therefore, the main question of the research is what the role of rural tourism is in development of traditional dwellings of mountainous and mountainside villages in the west of Mazandaran province (Dohezaar rural district).

We must consider several goals for answering this question:

- 1. Preparing the fields of rural development in Dohezaar rural district together with preservation of traditional culture and earning a living for villagers.
- 2. Studying effective factors in the development of rural traditional dwellings and changing their functions.
- Studying and analyzing rural traditional dwellings with their methods of architecture and their functions.
- Decreasing rural migration by creating job and increasing income in the village by growing tourist activities.
- Recognizing advantages and disadvantages of rural tourism from different economic, cultural, social, and environmental aspects in Dohezaar rural district.
- Recognizing villages with high tourist potential for the preservation and revival of rural traditional culture and rural tourism development within them.

With regard to the goals of the research, the hypotheses will be raised as following:

- 1. Rural tourism brings about changes in traditional dwellings and in their functions in Dohezaar rural district.
- 2. Traditional dwellings of the rural district under study can be effective in gaining the attention of tourists and developing rural tourism by exploiting natural attractiveness hidden in their unique architecture.
- 3. By developing rural tourism, the previous job opportunities will disappear, and this may lead to increased migration.

In this research, the statistical population consists of the households living in the villages of the rural district, the officials and organs related to the villages, and the tourists coming into the rural district. There are sixteen populated villages with totally 365 households, out of which one- third of

villages were chosen randomly as the sample villages (Baraseh, HalouKaleh, Paien Oshtouj, Bala Oshtouj, Mian Kouh) through Cochran formula (Saroukhani, 2008: 135).

We prepared questionnaire for all officials because of their few numbers. Also, 187 households were chosen as sample by regular random sampling method and through Cochran formula (households' sample size). We had no information about the exact number of tourists; therefore, we chose 384 of them through following formula (tourists' sample size) (Saroukhani, 2008: 135).

Since the main goal of rural tourism development is sustainable economic, social, cultural, and bio-environmental development as well as reaching a long-term balanced growth and multilateral development in villages (Maghsoudi, 2004: 24), research methodology is based on documentary- library in statistics form provided by the general census of residence and population conducted in 1986-2006 and statistical annals of Mazandaran province, and also is based on field studies in observation, interview, and questionnaire form in addition to using descriptive- analytic method on the district under study which situates in the west of Mazandaran province.

2. Research findings

A structure can show the interaction among several factors and their complex relation, and one factor is not regarded only as an important one for forming the whole shape of dwelling (Zargar, 1999:30), so several factors and elements are needed for forming a rural dwelling and its architecture, and their effects will be observable when they are put together. We can mention the following factors which are effective and important in dwelling form and texture in this rural district:

The effects of natural and ecological surroundings on habitation texture:

Natural surroundings around villages and the phenomena that arise from it have caused an special form of dwelling. The climatic and geographical conditions of this rural district have caused villagers find a way to protect their rural dwellings against cold weather by applying different methods such as closing the narrow openings in the wall so that cold air and wind cannot get into a building, building thick walls, and building sloping roof in order to direct rain water to the ground. The falling and rising of the ground and also soil type have somehow an effect on dwellings. All the people in this cold region try to save energy from little amount of fuel and make the best use. Using much mortar in order to make compressed texture, building thick walls and ceiling,

and choosing appropriate building materials and the like are a series of actions taken for this purpose.

We can see a sloping (pitched) roof because of much rainfall. Also, the compression of building is the cause of weather coldness, so in this regard architectural volume with square plan is the best known because it suggests minimum outer surface versus maximum volume. In these villages, more concentration will be in closed and compressed forms of dwellings with two floors.

Because there is land shortage in the region, dwellings are built on steep slopes in order to use arable land more.

On the contrary, they make land smoothing by reducing the slopes especially gentle and slight slopes or shape it into terrace, and then it will be prepared for cultivation.

The slope of the ground is toward north- south in such a way that the height decreases from north to south. Soil type is also effective in forming dwelling and its architecture, and one of the actions taken in this direction is to choose hard ground in order to prevent consumption of extra energy and building materials. The other factors such as landscape and sight will also be in our consideration. Since Dohezaar rural district is a mountainous region covered in trees, we can see special form of dwelling there because of having cold winter, mild summer, and pleasant weather in spring and summer. With regard to this, there has been a distinction between dwelling land and agricultural land, and dwellings have been built on the places where beautiful views can be seen. The existence of these beautiful views and sights attracts the attention of many tourists to come to this region in various seasons especially in spring and summer.

The effects of built environment on habitation texture:

Basically, transport roads have become more important than before for villagers by developing communication means and gaining access to the areas like suburbs which are important economically, socially, and politically. By constructing asphalted roads which connect rural district to Tonekabon Township, villages' texture has taken different forms since 1986 for many reasons such as the location of communication routes, having traffic density, and/or in a simple word their economic importance.

The appearance of villages such as Haloukaleh and Paien Oshtouj has not been changed because they are far from the main road, so rural culture and customs have not been changed and being kept more, while nearness of villages like Baraseh, Miankouh, and Bala Oshtouj to the main road have caused them a situation more different from their previous ones both from demographic aspect, health and

educational services, and being impressed by tourism impacts (changes in traditional dwellings, rural culture and customs, rural environment, etc).

In general, the emphasis should e put on the point that there is a direct relation between the concentrations of dwellings (concentrated texture), economic conditions, and means of living by a series of observations taken from different rural habitations in Dohezaar rural district. There is enough water, and land ownership is in a good condition; also there are green and large fields over which livestock can graze, so farming has flourished in these villages.

The conducted censuses show that these villages have had large texture and have been more populated than now because of the reasons mentioned before.

Although water is vitally important and effective in improving work conditions and in flourishing cultivation, the relative shortage of even ground is quite noticeable in these villages. However, livelihood founded on farming and animal husbandry has brought about numerous concentrations through gaining few yields of such land and the income of animal husbandry. The arrival of tourists to the rural district especially in spring and summer increases its population, and sometimes the number of tourists is even more than local residents. This is an incentive factor for farmers to decrease agricultural activities and sell their lands and livestock to gain more interest.

Also, there have been green pastures in the above heights, and each village has a pasture for its livestock. Since villagers' means of living depends on farming, dwellings must be built in two floors in order to be more robust in comparison with common rural dwellings regarding this specific function. They have been built separately (apart from each other) in different directions, and there are no bounds among them. Therefore, we reach the village through several routes, not by specific ones. Also, they are located on the steep slopes of mountain; as a result, it is difficult for vehicles to go a long way from villages more. We can find these kinds of deconcentrated and irregular forms of villages in Germany and Turkey (Saiedi, 1994: 64), Macedonia (Alti Parma Kovska, 2008: 8), and Slovakia (Gekestad, 2008: 13) rural habitations.

The effects of built habitat on work conditions and livelihood have brought about long-term changes in dwellings. Indeed, there is no need to the places where farmers locate their products, animals, and tools, known as the centers of exploitation.

The current trend is toward more private life on the basis of new ways of earning a living and the effects of built environment. Hence, the new dwellings become smaller, and there are not places in which farmers locate their products, animals and tool the same as traditional dwellings. Also, more than one family is not seen in a single house. According to the table below, the changes in dwellings in villages like Baraseh, Miankouh, and Bala Oshtouj by having highest percent of people who have been hired as a laborer in public works are more remarkable than in villages like Haloukaleh and Paien Oshtouj.

Table 1: A comparison of the number of employed people of the sample villages with Dohezaar rural district in 2009

		Aged	The number	The percent
Name of village	Population	ten and	of employed	of employed
		above	people	people
Baraseh	252	228	58	25.4
Miankouh	93	123	28	23
Paien Oshtouj	53	86	21	24.4
Bala Oshtouj	119	119	25	21
Haloukaleh	69	93	14	15
The total number of sample villages	586	649	649	22.4
Dohezaar rural district	1497	1184	228	23.6

Source: Iran Statistics Center- General conducting census of residence and population-Tonekabon

Township.

A comparison between figures of recent years and those of previous years shows that the number of people who have dealt with animal husbandry and cultivation is decreasing in these three villages, and this can be effective in kinds of people's needs and demands regarding their jobs and way of earning income. In general, this caused the dwellings to become more isolated, enclosed, and confined with specific dimensions and almost not being changed.

The prominent types of mountain and mountainside dwellings in Dohezaar rural district

Not only dwellings meet the need of people to live and being protected, but also they include part of productive system and are known as a center of exploitation. Types of existing rural dwellings are accounted as the obvious examples of this feature (Sartipipour, 2005: 1).

Traditional and vernacular dwellings: There are two types of them classified into two groups called Darvarchin and Zigameh according to their ages.

New dwellings (dwellings that are built of concrete block):

These have been inspired by the style of urban housing, and their building materials are the same as it. Their ages are not so long and back to ten or fifteen years ago.

According to the rural household's questionnaire, the number and percent of all types of dwellings will be provided in the table 2.

Table 2: The number and percent of all types of rural dwellings of the sample villages in 2009

dwennigs of the sample vinages in 2007									
		Kinds o			percent				
Name of village	Darvarchin	Zigameh	New dwellings	Sum	Darvarchin	Zigameh	New dwellings	Sum	
Baraseh	8	30	21	59	16	51	33	100	
Miankouh	6	26	19	51	15	51	34	100	
Paien Oshtouj	3	15	6	24	12.5	62.5	25	100	
Bala Oshtouj	2	14	10	26	8	54	38	100	
Haloukaleh	4	19	4	27	15	70	15	100	
The total number of sample villages	23	104	60	187	14	56	14	100	

Source: Rural household's questionnaire

Concerning the effective factors for rural texture, some villages like Baraseh, Miankouh, and Bala Oshtouj attract the attention of visitors and tourists more than others by having better and appropriate telecommunications, services, and infrastructure, so in this regard changes taken place in these villages are more than in the other ones.

Classification of dwelling forms and their methods of building

Vernacular architecture that reveals the glory of art in unknown local buildings is an important part of cultural heritage of one land (Alti Parma Kouska, 2008: 9).

We will take into consideration different types of rural traditional dwellings and their methods of building in brief, concerning different dwelling forms on the villages under study.

Darvarchin dwelling: These are built in mountainous and mountainside regions and near to forest. The word "Darvarchin" is the combination of three words, i.e. dar which means tree, var which means side by side, and chin which means lay (to put in order). It is often a one – roomed dwelling with a roof called Latehsar.

It is constructed in such a way that they determine building site and wall places on the ground at first. Then, they dig the ground beneath them and fill it with rounded and big stones in order to prevent the damp rising from the ground reaches wood. The last row of stones run parallel, so timbers will be on horizontal and even form. Having laid the timbers, they ram the square sawn timbers made of thick trunks of tree, which are called sakat in local dialect, into the ground in such a way that they stand on each two sides of a wall in vertical form and in pairs. These are put at the end of timbers in order to support and join them together. Sometimes they shape one or two heads of timbers into notch and saddle before laying them in order to be joined together in the

corners, and sometimes they lay the timbers just on each other without doing it; hence, the only things that cause the walls to be firm and stand are sakats.

We should also note that there is a space for one timber between the timbers in this case. Having laid all of them, they build a wooden truss and cover it with local roof, called Takhtelat in local dialect. They rarely prepare a window, and sunlight and air come into the dwelling through entrance door and the cracks between the timbers. In cold seasons, they plaster a layer of clay and straw all over the walls or between the cracks of timbers in order to keep it warm. Darvarchin "dwellings" are the shelter and safe place for mountain- dwellers.

Roof Latehsar: It is a kind of roof in traditional dwellings. It is constructed through fastening long pieces of wood called zegal on wooden truss in parallel form at first, and there is a 30 cm distance between them. Then, square pieces of wood like small board called takhtelat are laid over zegals in orders from bottom up in such a way that the above rows will be over the below rows and cover more than half of them. Therefore, rainfall water is directed toward the lower part. It is about zero point five to one centimeter distance between takhtelats in order to prevent displacement when rainfall comes, and they become expanded. Of course, it should be noted that each takhtelat which is in higher place covers the line of junction of the one which is in lower place in order to prevent water from entering the building. The main point is that there is no junction between takhtelats and beneath zegals (long pieces of wood), and they often put a rounded stone over them in order to prevent displacement when wind blows. If a strong wind blows, those rounded stones will also be displaced, and in the case of earthquake they will fall down as well as rounded stones. Therefore, this kind of roof is not safe and stable, and it is dangerous. Takhtelat is often made of the wood of trees such as alder and oak by chopping them into square pieces or forming them into sheets.

Its size is not standard in Iran. Its thickness is about one or two centimeter(s), and its length and width are about 25 up to 40 centimeters. This kind of roof covering is not so durable against atmospheric factors, and it becomes dry and worn out in front of sun. Also, it is not strong against rainfall; as a result, the drops of water can leak into it. Also, the appearance of moss on it is the result of rainfall, and this helps its decomposition. Nonetheless, it is very popular in mountainside regions and even the roof of shrines as well as those of dwellings and barns is covered by this. We can see examples and method of building of this kind of dwelling (Darvarchin) in Turkey and its surroundings because of the existence of forest (Toloun, 1995: 125).

Zigameh dwelling (round-log construction): The second kind of traditional and vernacular dwellings is known as zigameh. Their age is less than Darvarchin dwellings and backs to thirty years ago. Indeed, they are complete shape of Darvarchin dwellings that changed after people came together in one place. Their method of building is in such a way that square- sawn timbers which are made of the wood from the oak tree are put on the base course. It is called chineh sardar in local dialect. The squaresawn timbers are stood on the base course in four corners, and other square- sawn timbers or (floor joists) called bamdar in local dialect are laid on the previous ones across: there is a 40 to 60 centimeter distance between them, and they carry the weight of ground floor and transfer it to the base course.

On the next step, other square- sewn timbers are stood on the joists parallel to chineh sardar. These are called nale paien in local dialect. Then, they nail kinds of woods with various thicknesses on the lower columns (nale paien) and upper columns (nale bala) diagonally and these are plastered with clay- straw mortar. These various thicknesses of woods are called zigameh in local dialect. Also, they create empty spaces as window when they fasten these woods to the column. For topping out, they lay pieces of timbers (floor joist) on the upper columns lengthwise and create a rectangle on the middle joist with dimension of 110 cm * 80cm. This is called sukesh in local dialect and it divides floor into four parts. They nail vertical and horizontal beams on them. They call vertical beams as sarchub and horizontal beams or bearers as zirlati. Parts of sukesh and sarchub have projected about 70 centimeters from the edge of the floor. They call it bargardan. There are two methods for roof covering. One is by using takhtelat, and another is by using tin-plates. If they use tine- plates, they nail them to the lower tinplates. Floor boards are made of woods from the beach, hornbeam, and maple trees. They are fastened to the floor joists. Sometimes, they are plastered with clay- straw mortar. The inside and outside walls of dwelling in which they use clay- plaster mortar are painted with yellow or violet clay.

According to Table 2, nearly fifty- one percent of dwellings are zigameh in Baraseh, and nearly fifty- one and fifty- four percent of them are also of this kind in Miankouh and Bala Oshtouj. The number of them is sixty- two point five and seventy percent in Paien Oshtouj and Haloukaleh.

New dwellings (They are built of block): These have been built following the design of non- natives. Their building materials would be new with expensive and competent foundations. Indeed, one of the effective aspects of the arrival of tourists is the changes in form and type of dwellings' construction.

Many tourists come to this region in various seasons, and none of them have a private dwelling, so they have to rent rural dwellings, and this is an incentive factor for villagers to demolish traditional dwellings and build new ones with urban style and materials because the desire of tourists for renting a house is often toward new dwellings with more amenities. This caused villagers to take a step toward building new dwellings with new building materials individually or in group called "Nima Korati" in local dialect.

To start its construction, the foundation of dwelling will be laid at first on an appropriate ground level by using stone. Then, they fill it with stone and cement mortar and make a concrete footing beam. Afterwards, building the walls will be conducted, and vertical bandage will be made in the middle of the walls and in the corners of building. These form an integral and solid (cubic) shape. The horizontal concrete bandage and rough grading will be conducted over the wall levels. For building floor, they use hollow- block floor which is made of round bar and cement. It depends on rural people to choose the kind of floor. It they want to use the empty spaces above the floor as storage, they choose hollow concrete block and floor joist (hollow- block floor); otherwise, they choose expanded metal. In general, new dwellings are built in concrete carcass form with hollow- block floor and with pitched roof in corrugated asbestos form.

- General characteristics of the west of Mazandaran mountain and mountainside traditional building form:
- A) Pitched roof
- B) Veranda and ambulatory around building
- C) Extroverted form
- D) Two floors (building height)
- E) The existence of base/ foundation course (bed of ground floor is higher than ground)
- F) Using two-sided ventilation (consulting engineers of cultural heritage, 2008: 7)

- Form and function of building:

Architectural culture has special and unique characteristics in Dohezaar region regarding natural environmental conditions and the other factors such as land shortage, the existence of steep slope, and special weather conditions, so there is a distinction between vernacular buildings and the buildings located in lower heights and/or in plains. In this region, most dwellings have rooms with low ceiling, and they are often located on a platform. This happens in order to equalize the slope of the ground and prevent the damp rising from the ground from going into rooms. The existence of high buildings and platforms beneath them would make a distinction between mountain and mountainside dwellings and

the dwellings located in plains. In the villages such as Paien Oshtouj, Miankouh and Haloukaleh, dwellings have not been extended in area because of land shortage. Economic factors and villagers' livelihood have a strong effect on the form of dwellings and their methods of architecture in the villages under study in addition to land shortage and the steep slope of the ground. As mentioned before, most villagers are farmers, and their dwellings have been affected by their activities. As a result, they have built them in two floors in order to keep their animals on the first floor and reside themselves on the second floor. The second floor which is residential includes rooms and veranda, and it must be built in such a way to have enough light and good ventilation.

This method of building has special functions. One of them is that it separates human living place from the place where animals are kept. Another is that the base of the second floor which is actually the ceiling of the first would be so warm because there is no direct connection to the ground, on the one hand, and because of the breathing and metabolism of the animals which are kept in the first floor, on the other hand. In fact, maximum use of the existing space of dwelling is the sign of its small and limited size and area and lack of its physical development in the region under study. Therefore, we can say that vernacular and traditional dwellings have three special functions in mountainous and mountainside region of the west of Mazandaran:

The place for keeping crops and the place as a tool shed:

The place where people live (human living place);

The place where animals and fodder are kept

These three functions are seen in traditional dwellings clearly, but they are replaced with two functions in new dwellings. They are as follows:

The place where crops and tools are kept, They are kept in the ground floor and also in the empty space existing between roofs and ceiling;

The place where people live, They live in the above floor.

We can find some examples of rural dwellings with these three specific functions in Mediterranean villages and also in some rural areas of France (Loubo, 1975: 77).

- Materials used in traditional and new dwellings Kinds of materials used in traditional dwellings are as following:

Soil: It is the main material for building dwellings such as Darvarchin and zigameh. It has been used in different forms in order to build a stable dwelling, to separate a space, and to cover a wall.

Wood: It is one of the most common materials used in traditional dwellings and has various

functions. It is mostly used because it is easily constructed, it requires no special skill, it is widespread in the region, and it needs no much labor force.

Stone: Stone is one of the most important materials available for villagers. It is useful for bedding (base course and foundation(s)) and useful for making steps. As time passes, changes have happened in development of rural dwellings, and building materials have been replaced by expensive and urban materials. We mention in following a number of them in brief:

Plaster: It has been used in different forms for building new dwellings for example as inside plastering decorative element and strong mortar.

Iron: Iron is not a local material and comes from outside of the region. It has become popular since it has various constructability, structural stability, and durability, and also for its simple usage. Nowadays, it is used in the sample villages despite the difficulties existing in its preparation. It is mostly used for making metal door and window, metal pillar in veranda, principal, and metal rail in new dwellings.

Brick: It has been used rarely for building new dwelling units because it is too expensive and is not much available in the region. It has been used only in one case in Bala Oshtouj and Baraseh.

Concrete block: The effects of the dwellings made by tourists and non- native people since 1986 caused villagers to use it for building dwelling despite the fact that it is expensive in comparison with local materials and conducts heat so fast. The percentage of dwellings in which they use concrete block is as following:

Baraseh 33 percent, Bala Oshjouj 38 percent, Miankouh 34 percent, Paien Oshtouj 25 percent, and Haloukaleh 15 percent.

Figures indicate that the second group of materials has been used more in the villages with high percentage of tourists. Also, changes in development of dwellings from traditional into new are occurr so fast.

As we can see, thirty percent of dwellings have been built of new materials in the twenty – three last few years. We can predict that villagers will give up their traditional dwellings and live in new ones in the future. Also, government will help them by granting bank loan, and this is a good motivation for them.

- Physical qualifications of rural dwellings (/the quality of dwelling)
- The age and lifetime of dwellings: Age is one of the important parameters in qualitative examination and evaluation of a building. In general, it shows the percentage of habitable buildings, and also it shows the number of buildings out of the range of the existing resources because their appropriate

length of life has come to their end (Farhangimanesh, 1995: 482).

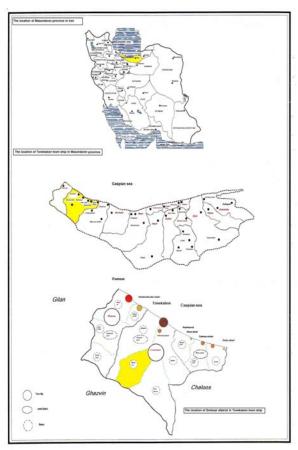


Fig 1: location of land studied in this paper.

Table 3: Kind of materials used in rural dwellings and its percent on the understudied villages in 2009

Name of village	Ma	terials		Pei		
	The first group (clay and wood)	The second group (Iron and concrete block)	Sum	The first group	The second group	sum
Baraseh	38	21	59	67	33	100
Miankouh	32	19	51	66	34	100
Paien Oshtouj	18	6	24	75	25	100
Bala Oshtouj	16	10	26	67	38	100
Haloukaleh	23	4	27	85	15	100
The total number of sample villages	127	60	187	70	30	100

Source: Rural household's questionnaire

Table 4: The age and lifetime of rural dwellings on the understudied villages in 2009

the understudied villages in 2009												
Name of village	Age less than 10	Age 10-20	Age 20-30	Age 30-40	Age 40 and above	sum	Age less than 10	Age 10-20	Age 20-30	Age 30-40	Age 40 and above	sum
Baraseh	17	13	9	8	12	59	29	22	15	13	20	100
Miankouh	16	12	10	7	6	51	31	23	20	14	12	100
Paien oshtouj	5	4	5	5	5	24	21	21	21	16	21	100
Bala oshtouj	7	4	5	5	5	26	19	19	19	15	27	100
Haloukaleh	4	8	5	6	4	27	15	22	18	30	15	100
The total number of sample villages	49	41	34	31	32	187	26	22	18	17	17	100

Source: Rural household's questionnaire

The history of habitation is not very old in the region under study, and this arises from villagers' livelihood and method of living. According to the table, dwellings called Darvarchin were the first ones and their formation and construction date back to the years before 1961, and their ages back to sixty or seventy years ago. After that, building dwellings called zigameh became popular, and number of them increased because of the wood sufficiency, the easiness of construction, environment compatibility, and nothing to do with special skill. As we can see, they include 57 percent of the whole.

By constructing asphalted roads since 1986, villagers have been impressed by the method of urban housing architecture which are constructed by non- natives in the region for temporary staying. This caused such dwellings to constitute a good percent of dwelling, i.e. about 30 percent during twenty- three years.

- The changes in dwelling and their role in the economy of household

Rural heritage includes architecture and its unique landscapes. Following on, they include dwellings and manufacturing units that have been formed during periods of time in order to mechanize industrial development (Sungiourgi, 2008: 5). One of the basic differences between traditional and new dwellings is in their functions. This is the result of the changes which have happened in pattern, the decrease of the ground area and floor area, and changes which have happened in rural texture. The main changes which have taken place in vernacular dwellings are divided into three groups:

- Changes in type and pattern of dwelling;
- Changes in building materials;
- Changes in size and cost of building a dwelling

Changes in type and pattern of dwelling: these which have a significant effect on the function of rural dwelling can naturally be observed in the size and number of rooms existing in the dwelling. The number of rooms inside is more in new dwellings in comparison with traditional ones, and sanitary service is situated inside. Also, number of windows and their size are more and bigger than those in traditional ones. Although new dwellings are formed in two floors, the first floor is regarded as a place for keeping crops and as a tool shed or as a place offered for tourists to rent. There is no room for keeping livestock in new dwellings, and if they are not sold, it will be kept away from dwelling. Although the appearance of dwellings changed. has transformations have not gone forward parallel to these changes. For example, the base course is high yet, roof is hipped, and veranda is located on the front of a building.

- Changes in building materials:

Using local material has been effective and correct because of its compatibility with environment and the experience of the past generations in several years. They used wood and clay in vernacular and traditional dwellings which are the best insulation to protect dwelling unit against heat and cold. New materials have created several changes in rural dwellings' texture. One of them to mention is roof covering in some dwellings.

The use of board sheathing has been replaced by sheet-tin roofing, and it has become popular by building round- log construction or so-called zigameh since 1971. Although it has some advantages for residents undoubtedly and does not need to get repaired yearly and also decreases the danger of fire, it makes so much noise when rainfall comes and has no desirable insulation to protect the dwellings against heat and cold in comparison with board sheeting. Also, we mention the changes happened in the materials which have been used for making walls, doors, and windows.

- Changes in size and cost of building a dwelling: Cost of building a dwelling would be considered as a criterion by which families gain access to acceptable and appropriate dwelling (Zanjani, 1995: 139). Cost of building is low in most villages because materials are available in the region, and it is a local tradition for villagers to participate in the process of construction and building and facilitates it to some extent. This is an important issue that, to what extent the income of each rural family that has been gained by economic and productive activities can be paid for dwelling. Also, villagers have to spend much money in order to build a shelter even in the villages where its building materials exist and have low cost. According to the field work taken from sample

villages, cost of building a traditional dwelling has been estimated to be from about 3.000.000 Rials up to 3.500.000, so this dwelling meets the need of villagers regarding their income and kind of economic activities. Also, there is no need to special skill and knowledge about how traditional and vernacular dwellings are built, and villagers have achieved them through the experience of the past generations.

But, building materials are imported from the outside for building new dwellings, and they involve freight cost. Also, payment of building is an extra cost because building new dwellings with new materials is an expert affair, so it involves hiring mason and foreman bricklayer from the same village or other villages and sometimes from city. Its building cost is estimated approximately 2500000 up to 3000000 Rials per square meter. Since its building cost is high, villagers have to sell their land and livestock in order to provide it. Size of dwelling has also changed. As we can see, it has been 40 up to 50 m2 (square meters) in area in traditional dwelling, but it reaches its maximum which is about 70 up to 80 square meters in new ones, and more than this size costs high and is too expensive for them as far as the provision of building materials will be out of the ability of residents and local tradesmen. All the changes and developments mentioned above bring about changes in the function of new dwellings. For example, all the places regarded for keeping domestic animals and products have disappeared or have been changed their location, so there are not multifunctions for a dwelling, and it is only the place where people live and take a rest.

3. Conclusion

There have been effective and remarkable factors on the way of the formation and location of mountain and mountainside rural habitations (Dohezaar rural district), among which tourism potentialities (natural views) are the main. This factor has an essential and determinative effect on the form and texture of the villages under study, and has got the attention of many tourists in recent years. Accordingly, developments and changes have occurred in the fields of economy, culture, and form around villages. Also, the ever- increasing presence of tourists without considering substructures and local culture in recent years not only has had economic and livelihood profits and advantages but also brought about the un-sustainability of rural habitations from ecological, economic, and cultural aspects. As we see, rural functions have been changed from producer factor into user force following the changes in agricultural land usage. One of them happened in rural traditional dwellings that changed their forms and architecture from traditional into urban style. We divide the dwellings of the area under study into two groups concerning form, outside decoration, and kind of building materials. They are called traditional and new dwellings. Traditional and vernacular dwellings are also divided into two groups called Darvarchin and Zigameh. The age of the first one dates back to more than forty years ago, and the second group has appeared 25 up to 30 years ago.

New dwellings have been built since 1986 by the construction of Tonekabon-Dohezaar asphalted and appropriate road and by the arrival of many tourists. The size and room of dwellings have also changed following the changes in rural dwellings. Materials used in traditional dwellings come from rural surroundings, and dwellings have been built with lowest cost. Furthermore, they have been built so as to be adjusted to the environment. The functions of dwelling in traditional form are in relation to villagers' livelihood and economy (as they are based on farming), but they have disappeared in new one or have been replaced by new functions according to the needs of residents. Villages such as Baraseh, Miankouh and Bala Oshtouj have attracted the attention of tourists more in comparison with Paien Oshtouj and Haloukaleh because they are near the main road and possess more amenities and services; as a result, people of these villages have been influenced by the culture of tourists and their buildings, and they tried to sell their land and livestock to pay cost of building new dwellings. Many functions have changed in new dwellings including the dimensions of the dwelling, the number of doors and windows, kind of building materials, roof top, the number of rooms and their area, etc. Although safety factor and structural integrity are very high against natural disasters in new dwellings in comparison with those in traditional ones, kind of livelihood and economic activity of the villagers are related and adjusted to vernacular and traditional ones. Therefore, we can say that the number and percent of new dwellings are increasing nowadays, and traditional and vernacular dwellings will be replaced with ones with new functions in the near future.

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Evaluating Competition of the *Phalaric minor* in Wheat

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Abstract: to competitive effects of wheat and *p minor* in densities and different use values of Nitrogen in plan frame of random blocks repeating 4 times perfectly. The test factorials included Nitrogen value in level (100,150 and 225 kg/ha) and *p minor* density in 5 levels (0, 20, 40, 80 and 160 bones per square meter). Results of the test showed that height of *p minor* per three values of Nitrogen was less in initial processes of growth and more than wheat in final processes of growth. Increasing Nitrogen value has caused to increase leaf and biomass of *p minor* and increasing *p minor* density causes area of leaf and biomass of wheat to decrease. Time of closing canopy in *p minor* is more rapidly than in wheat. The most value of decreasing operation of wheat seed was about 48 percent while was observed in density of 160 bones of *p minor* in 225 kg/ha of Nitrogen. Average relative growth velocities of wheat and *p minor* were 0.073 and 0.028 g/dag during growth cycle, respectively. Little use value of Nitrogen fertilizer, reason of more decrease of wheat operation was existence of *p minor* grass.

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Keywords: Wheat, p minor, Competition, Nitrogen, Density

1. INTRODUCTION

Phalaric minor exists in most of Iran provinces as a result of consistency with different conditions of biology and ecology; also, it is a most common species of grass. In modern management of grasses, emphasis is on management of grass societies instead of try to cancel them which needs modernized relations of grasses with agro plant to be known a curtsy. Understand relations of agro plant and grasses for management to be used in long-term needs competition in view of grasses to be considered (Mortimer et al. 1997). Competitive effects of grasses on a product would be affected with the both species (Carlson et al. 1985). Plants are in competition for resources like light, water and (mineral) nutrients. Such resources are distributed among plants that require them crucially.

As there is a linear relation between biomass generating and absorption of growth limiting resources, biomass is reflector plant of limited distributed among them. According to variable distribution of dry material in plants bodies with competition stresses, inter competition in plants throughout measuring total biomass. Competition is a complicated event that in under influencing by different biologic, environmental and vicinity factors. According to relation of operation, density and present resources, plant density is an important factor in study of competition. Effect value of grasses on wheat operation depends on different factors like kind and density of grass bone, agro type, and value and time period of used fertilizer, date and rows and other ecological conditions.

For example, wild oat and Brassica Kaber are better than wheat in receiving soil Nitrogen while in optimum conditions of agriculture; these two grasses are more effective in decreasing operation of this agro plant as a result of wider growth (Henson et al. 1982). In samples associated with wild oat, when its density was %106 green cover, increase of neither Nitrogen fertilizer nor cause to increase in wheat operation of course caused it to be decreased notably(Carlson et al. 1985). Agriculture with small type in compare with high type one increases Spike, seed product and dry weight of wild oat about 80-100 (Torner et al. 1986). Studies in Khuzestan showed when density of A. Ludoviciana was about 70 bones per square meter; wheat operation was decreased to %66. Competition of A.Ludoviciana and wheat is variously depending on product type and grass density (Attalian et al. 2003). According to this fact that competition of grass and agro plant differs influencing by ecological conditions. Among food materials, Nitrogen is the one that follows worry relating with competition of grasses; many researches about effect of Nitrogen on competition of agro plants with grasses. Increasing Nitrogen fertilizer in wheat associated with wild oat causes grass density to me increased and agro plant operation to be decreased (Carlson et al. 1986). Increasing Nitrogen value in rice was in favor of Cyprus rotundus and caused right absorption, leaf area index and rice operation to be decreased together (Okafor et al. Chenopodium album and polygonum convolvulus show better reaction in higher levels (Haas et al. 1982). Brassica kaber was increased

while increasing Nitrogen in soil from 20 to 120 mg/kg in soil and responded more than wheat (Iqbal et al. 1997). In spite of increasing operation of agro product due to fertilizer use without competition conditions, on the other hand causes density and biomass of grasses to be increased too which it may be followed with increasing seed product and since it can have had a positive correlation with biomass, so fertilizer uses such as Nitrogen will be affective on Fawcett et al. 1978). this research seed product (was done to consider competitive reaction of wheat with variation value of used fertilizer of Nitrogen and density of p minor to appoint competition effects on biological and economical operations of wheat; in fact wheat response to Nitrogen fertilizer ready for p minor competition for competitive effects of this grass.

2. materials and methods

This research was done in 2010 agro year in Islamic Azad University, Agriculture college, including two factors: Nitrogen use value in three levels (N1=100, N2=150 and N3=225 kg/ha) and density of *p minor* in five levels (0, 20, 40, 80and160bones per square meter).

This research was done in 4 random blocks plan frames of factorial type. Kind of used wheat name d CHAMRAN was applied with density of 450 bones per square meter by seed system distancing 17 cm of the considered one. Phosphorus fertilizer was used 150 kg/ha with seed. This agro operation was done associating with using 1/3 fertilizer in each processes of operation. Width of each field scene was considered as 3m and distance between each two scenes was considered as 2m canceling effects among different Treatments. Length of each scene was 6m with 2m distance between each two blocks (reputation). There were 5 bones per scene while past agro was vegetables type. Soil sampling showed existence of 21.6ppm mineral Nitrogen to 60cm depth in the field soil. Rows of p minor were between each two separate rows of wheat while each level had a distance 20cm of the other row and 10cm with the nearest wheat one. Break of rest (sleep) for p minor was done with making them wet for 20 hours in water and then compactness with Gibberellins acid (350 ppm). Other required watering was done according to plant needs in season. All of grasses except p minor were cancelled by 2, 4-D herbicide system and manually. Doing the research, there was no illness and death. To consider growth trend from the last of wheat preparing, measurements of height, leaf area and dry weight of each sample were done after random taking wheat plant and p minor from level of 0.2 square meters. After closing canopy, general distribution of level on samples was measured in 5 levels with 25cm in thickness (0-25, 25-50, 50-75, 75-100,100-125). Analysis of data and drawing diagrams needed were done by using sigma plot, MSTATC and Excel and to compare averages, Dankan multi domain test in probability level 5 percent was used.

3. Result and discussion

A. Wheat height and p minor

The height of species was influenced by value of Nitrogen fertilizer while varying used Nitrogen fertilizer from 100 to 150 kg/ha caused to increase the wheat height and increasing from 150 to 225 kg/ha caused it to increase height of p minor. Increasing density of p minor didn't affect on wheat height to 40 bones on p minor to 80 bones, so after densities of 40 and 80 bones of p minor a notably increasing in height. In seems that planting of p *minor* happens sooner that wheat and it limits space development for wheat has more capability to absorb Nitrogen around wheat bone through bones interacting (Martin et al. 1998). And as a result of being height due to desirable use of p minor, it takes 95 days after planting more rather than wheat that height increasing happen till the end of growth season. Height has an important role in competition process so that increasing Nitrogen from 100 to 225 kg/ha, height of wheat decreased from 103.18 to 105.8 cm (Table1). Often being higher the wheat, height of p minor was more improved than wheat so that its final height was 12-14 cm more than wheat (Cudney et al. 1989). Interaction of light absorption and photosynthesis in wheat is as a result of big height of p minor, that is shown using competition of p minor with wheat in the last of capability season of competition.

TABEL I. Compare of averages of main effects on different areas in competition of P. minor

1										
Timours	He	ight(cm)	Leaf Area Index							
N	wheat	p. minor	wheat	p. minor						
100	92.81 a	103.18 b	3.6a	0.35 b						
150	90.56	102.126	3.6 a	0.49 c						
225	88.37c	105.8a	3.46	0.62 a						
p. minor D(p/m2)										
0	88.6 c		3.8a							
20	89.1c	101.7Ъ	3.8a	0.15 d						
40	89.3c	102.1b	3.6b	0.26 c						
80	91.36	102.7b	3.3c	0.5 b						
160	94.7a	104a	3.09d	0.91 a						

In each column means followed by similar letters are not significantly different (p=%5)

B. Index of leaf area

This index was under influence of value of Nitrogen fertilizer used both species of wheat and *p*

minor. Considering data of the index showed that variation of value of Nitrogen fertilizer from 100 to 225 kg/ha has been caused the above index to be decreased from 3.6 to 3.4 for wheat (Table 1). On the other hand, density of p minor with increasing from 0 to 1610 bones per square meter caused the index of wheat to be decreased from 3.81 to 3.9(Table 1). Statistical analysis of the data in 145 days after planting having maximum of the leaf area showed that increasing the Nitrogen used would increase the index of leaf area of p minor (Table 1) and also density of p minor increased from 0.15 to 0.91 (Table 1). increase of density due to decrease of nutrient value particularly and increase of shadowing causes oldness and leaf falling particularly down of canopy which it will be followed in decreasing area of leaf of wheat (Igbal et al. 1997). Distribution of leaf area of the species showed that p minor grass has the most density of leaf area in 50-75 cm layer and wheat in 25-50 cm one(Hasanzade et al. 2000). Increasing p minor from 20 to 160 bones was associated with decrease in index of wheat leaf area and increase in index of p minor leaf area has known index of leaf area as the best criteria of expressing the capability of photosynthesis and authority for growth of each species (Potter et al. 1977). Considering relative share showed that percentage of leaf area of p minor was very little rather then wheat and was 26 percent of leaf area of canopy related to p minor in the highest level of the p minor of 160 bones per square meter. with and wheat in different values of used Nitrogen, index of leaf area for Wild oat is less than wheat, since that competition capability of pminor was reported more than wheat and it was said that further photosynthesis level of each species, there are other effective factors in competition capability like distributing leaves inter canopy (Cudney et al. 1989). So height, index of leaf area and vertical distribution of leaves inter canopy through competition process (Kropff et al. 1981). Expressed that the suitable criteria for evaluation of decrease value of agro plant operation is a close relation between decrease of plant operation and ratio of leaf area of grass. It was observed that the highest level of index of p minor leaf area in about through 145 days after field working and the most index of leaf area wheat CHAMRAN kind about 160 days of it expressing that p minor canopy is closed easier than wheat. It was expressed that time of closing the canopy of agro plant and grass is an important in competition process and plant which reaches this stage, has higher competition capability (Cousense et al. 1991). Comparing distribution of leaf area shows that wheat has the most index of leaf area in 25-50 cm layer and p minor in 50-75 cm layer. So use value of Nitrogen fertilizer is effective on distribution of

wheat leaf area. So that is concentrated in use value of 100kg Nitrogen per hare with maximum index of leaf area in 25-50 cm layer that increase of Nitrogen fertilizer, index of leaf area of wheat increases in 50-75 cm layer. On the other hand, general distribution of leaf area index in p minor is concentrated in middle of canopy rather than the other layers. The most of index of leaf area for *p minor* in dependent on environmental conditions is concentrated in upper half of canopy p minor having more index of leaf area to the upper layers, has more capability rather than wheat for reaction with high competition. The speed of being yellow for leaves of down layers of wheat was more than wild oat (Bevschlag et al. 1990). In p minor, Nitrogen consumption was increased from minimum value to maximum one in index of leaf area for the upper layers, that seems Nitrogen consumption causes index of leaf area transport to the upper layers through increasing height and inter nodes.

C. Speed of products growth

Increasing density of *p minor* and speed of *p minor* growth will be less with little value of Nitrogen rather than higher level and speed of *p minor* growth has been in ceased with increase to 225kg Nitrogen per hear (Figs. 1, 2). Increase of *p minor* density causes decrease of leaf area of wheat, so speed of wheat growth will decrease.

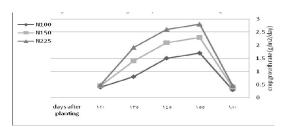


Figure 1. Variation of wheat growth speed in different nitrogen

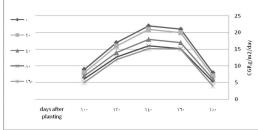


Figure 2. Wheat CGR changes in different P. minor density

D. Speed of relation growth

Speed of relative growth for is more than it for wheat. Speed of relative growth for *p minor* was very

low at first and it was less than it for wheat too. But as a result of suddenly increase of leaf area of p minor, speed of relative growth increased after a period of 95-115 days from harvesting. Speed of relative growth decreases for wheat and grass of p minor. Speed of relative growth was lees than wheat in growing season early but increased after that rather than wheat (Cousense et al. 1991). Nitrogen increase caused speed of relative growth of p minor to increase. Increase of p minor density affected on speed of relative growth for wheat. When height of p minor is less than it for wheat in growth early, but it will be more using Nitrogen fertilizer and better competition conditions, so p minor will shade on canopy of wheat and its speed of relative growth will effect on wheat.

E.Economic operation

Economic operation was effected by p minor density, Increase of density to 80 and 160 bones per square meter caused wheat operation to decrease. This value was 341 kg/ha for increase of density from 40 to 160 bones of *p minor*. That is, wheat operation decreases when increase of bones per square meter and this value will be 2.8 kg/ha. If p minor would not be controlled with 20 per square mater value till product season (Caussanel et al. 1993), decrease of wheat operation will be 8.7-21.8 percent. Decrease of wheat operation was 33.9 to 54.2 percent (Salimi et al. 1996). Economic operation comparison of wheat rather than Timor without p minor in the less and most values of Nitrogen use showed that wheat operation decreases when p minor density increases. So that in the less value of Nitrogen, decrease of operation was 29 percent when p minor density increased to 160 bones per square meter whiles it was 37 percent when increase value of Nitrogen was 160 bones per square meter in p minor density. This comparison showed that competition power of p minor increases when Nitrogen and p minor density increase. Have known wheat operation decrease in competing wild oat due to decrease of cluster number (Angonin et al. 1996). Competition of p minor decrease seed number of wheat in up levels of grass density and up levels of Nitrogen. Simultaneously of quick growth rate for p minor height and wheat sprayings, applied shading of leaves causes wheat seed number and economic operation to decrease. A given trend was observed for effect of p minor density and Nitrogen effect on harvest index. Nitrogen value affects on wheat index with up level density of grass. Increase of Nitrogen caused wheat index to decrease. So decrease of operation was more than before it when p minor density and Nitrogen increase.

4. CONCLUSION

species Wheat operation expresses inter competition of this grass in upper levels (Cousens et al. 1985). Application of upper values for Nitrogen fertilizer cause wheat product per area unit as a result of its given effect on biomass and created leaf area per area unit. Also it was recognized that lower densities of p minor with less values of Nitrogen causes economic operation to more values. According to growing ability and much shading with long height for *p minor* and seeds produce, managing this grass through less density and seeds bank per area unit causes this grass to decrease; unavoidable use of chemical fertilizers should be done in base of pollution values of *p minor* and gullibility of seeds bank when pollution of this grass reaches to up

At first, pollution was decreased using management affairs and then chemical fertilizer should be used with desired values.

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The effect of Urea fertilizer drilling on yield of sugar beet

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Abstract: To determine the optimum level of nitrogen intake, assessment methods and nitrogen fertilizer application partitioning, a randomized complete block design with three replications in Agricultural Research Center of Hamedan in 1999 for two years was carried out. Fertilizer levels were (0 kg) as control ,120 ,180 and 240 kg/ha N for fertilizer drilling method in both sides of seedlings , and 240 kg/ha for fertilizer drilling in rills and surface broadcasting of 240 kg/ha. All treatments had two partitioning of 3 and 4 which were used. In 2001 the method of fertilizer falling in rills and consumption rate of 204.07 kg Urea per ha created the highest income. Results of ANOVA and Duncan mean comparison method showed that during two years of project implementation, the effect of N fertilizer level on root yield, sugar and sugar can be obtained ,at 5 percent level were significant and levels of N application as non-linear increased These components. Effect of method of fertilizer application on the above components is significant and by using the equipment of fertilizer drilling machine nitrogen consumption can be reduced and that and by creasing levels of fertilizer, yield of sugar beet increased compared to broadcast method to the surface. Effect of number of fertilizing stages (3 and 4 times) on root yield, income, gross and white sugar is not significant..

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Keywords: optimization, nitrogen, economic evaluation, fertilizer drilling, sugar beet

1. Introduction

Routine application of nitrogen fertilizer by farmers is a surface spread method. Despite the simplicity and flexibility of this method with different conditions, large quantities of nitrogen that is consumed in this regard is inappropriate. This method as often by hand operation or with the help of centrifuge device is executed. Creating burn leaves, and on waste nitrogen through volatilization and deep percolation in this method compared with other methods of application is higher (Dahl, 2001 and Johnston, 2000).

In another study it was mentioned that seed yield of canola increase 38% with increasing nitrogen fertilizer amount which be drilled. Reaction of amount of product compared to a splitter device of fertilizer drilling varied. When the splitter by Flexi coil was used, amount of product was greeter than the other cases. In this study the difference in yield between treatments using four types Splitter did not observed. This shows the reaction of plants to the position of fertilizer inside the soil. Since the fertilizer drilling within the soil affects competing of plant and weeds, so taking place in the appropriate code has a large effect on plant yield (Johnston, 2000).

Bowen and colleagues in a study in Bangladesh reported that the deep fertilizer drilling with urea increased fertilizer use efficiency and with less use of fertilizer in fertilizer drilling method the rice yield was greeter compared to using surface spray (Bowen et al. 2004).

In a field experiment in 2007 in a silty clay soil in U.S.A, comparison of placement of nitrogen fertilizer in one side of plant row or two sides carried out. Corn was planted on ridges 40 inches wide and two levels of 150 and 240 pounds per acre. Fertilizer N in 2 inches depth and in steps 2 to 3 leaf with blades for fertilizer drilling in one row and two rows was planted. In that furrows which fertilizer drilling was made near the plant rows, the plant row close to fertilizer tape produced 42% greeter product. Fertilizer level effect on corn yield was not significant. Fertilizer drilling in one side of plant increased yield value of 9.6% compare to planting fertilizer in both sides. In stacks with two plant rows, planting fertilizer in both sides of plant rows made 4.9% yield increasing compared to planting fertilizer in one side .The amount of nitrogen absorbance showed the same trend. It seems blades negativly impact on plant in the case of bilateral fertilizer drilling caused yield reduction compared to fertilizer drilling in one side (Mascagni and Bubba, 2007).

Vyn and West (2007) reported that negative effects of fertilizer planting on strip according to the distance of the plant row from the fertilizer strip can be reduced by lowering the amount of fertilizer. Even it is possible planting on the fertilizer row and produce greeter yield.

In another study a significant difference in the number of grain in clusters according to different times of using fertilizer N was observed. Increasing nitrogen fertilizer in three times and equal amounts caused the most number of grains per clusters. Fertilizer drilling even with the less fertilizer use than the method of spraying fertilizer, caused the production of the largest number of grains per clusters (Saleem et al. 2009).

Research in response to the irrigation system and methods for corn fertilization was investigated. In this research it was found that furrow irrigation and fertilizer nitrogen drilling significantly related to leaf area per plant increase. Also the number of grains per cluster and thousand grains weight increased by using this irrigation and fertilization method . Fertilizer N drilling by amount of 6.72% compared to broadcasting increased corn grain yield. Fertilizer N drilling increased the speed of plant growth (the coefficient CGR) compared with broadcasting. Increasing of this factor in this method of fertilizing is due to increased leaf area and plant dry weight (Ahmad et al., 2002).

In another study on the effect of fertilizer placement and the the time of usage on accumulation of nitrogen, phosphorus and potassium in shoots of wheat plants in East Europe the highest concentration of these elements in plant tissues in the tillering stage was observed (Masaka, 2005).

Another conclusion was made that correlation coefficients that determine plant characteristics can help to estimate the various characteristics associated with plant fertilization technique that can predict the value for the product to be used on any plant (Burio, 2004).

To determine the optimum level of nitrogen intake, assessment methods and nitrogen fertilizer application partitioning this research was carried out in Ekbatan agricultural research center of Hamedan province of Iran.

2. Material and Methods

In1999 to 2000, field crops in the area about 8000 square meters located at the research station Ekbatan for the Project was considered. Land preparation operations conducted in the fall of 1998 with subsoiler in depth of 40 cm and a moldboard plow depth of 30 cm was performed. Before cultivation from different parts of the land, soil samples from depth of 0-30 cm for routine analysis

of soil and fertilizer recommendations prepared, and soil electrical conductivity and soil texture was determined. Supper phosphate fertilizer rate of 50 kg per hectare consumption was determined. N fertilizer was in source of Urea .An experiment with 15 treatments in a randomized complete block design with three replications carried out. Experimental treatments include:

1-240 kg N/ha with the method of falling in rills and four partitions (1/4 at planting, 1/4 after the tender and weeding, 1/4 at 20 days after the tender and weeding and the final 1/4 at 40 days after tender and weeding).

2 - 240 kg N/ha with the method of falling in rills and three partitions (1/3 at planting, 1/3 after the tender and weed and final 1/4 at 20 days after the tender and weeding). 3 - 180 kg N/ha with the method of fertilizer drilling into rills in three partitions. 4-180 kg N/ha with the method of fertilizer drilling into rills in four partitions. 5 - 120 kg N/ha with the method of fertilizer drilling three partitions. into rills in 6-120 kg N/ha with the method of fertilizer drilling into rills in four partitions. 7-240 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings in three partitions. 8-240 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings in four partitions. 9-180 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings in three partitions. 10 - 180 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings in four

11 - 120 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings on three partitions.

12 - 120 kg N/ha fertilizer with the drilling method laid out in both sides of the seedlings in four partitions.

13 - 240 kg N/ha surface broadcasting method in three partitions.

14 -240 kg N/ha surface broadcasting method in four partitions.

15 - The treatment without N application.

To determine the quantitative and qualitative characteristics of each experimental plot two samples on each plant row each of 4.8 m randomly selected and the number of roots counted and weighed after washing. Two samples pulp prepared to measure qualitative traits and were sent to the laboratory and the results were statistically analyzed.

3. Results and Discussions

- Results of the first year:

Table 1 shows the Effect of different treatments on the average root yield in the first year of implementation. As this table shows by 240 kg N/ha treatment and method of fertilizer drilling and four partitions (the treatment No. 8) by statistical analysis shows the highest yield. But this treatment and using 120 kg N/ha and method of fertilizer drilling and four partitions (treatment No. 12) have no significant difference. On the other hand between the amount of 120 kg of nitrogen fertilizer on three partitions (treatment No. 11) and four partitions (treatment No. 12) have no significant difference. Therefore the dosage of 120 kg N treatments in three partitions is superior to advise. This treatment in terms of yield with 240 kg dosage treatments to surface broadcast method 3 and 4 partitions (treatments 13 and 14) gives equal and is better due to lower operating fertilization of the nitrogen compared to treatment, 4 partitions. Probably better than being available nitrogen for the acts of the root causes of such advantages

Table No. 1:

1	10	9	7	8	Treat.No.
60.35	60.49	61.04	55.21	62.85	Mean root
					yield(T/ha)
ab	ab	ab	a	a	group

12	6	2	3	4	Treat.No.
52.64	55.21	55.76	57.22	58.20	Mean root
					yield(T/ha)
abc	abc	abc	abc	abc	group

15	14	5	13	11	Treat.No.
31.25	48.13	49.65	50.63	50.69	Mean root
					yield(T/ha)
d	c	bc	bc	bc	group

Means in each column with common letters has no statistically difference.

Table 2, shows the effect of different treatments on the average gross sugar in the first year implementation. According to this chart, number eight treatment (240 kg N/ha fertilizer drilling in four partitions) in terms of sugar production also has obtained the highest yield. This trend also observed for corn by Ahmad and co-workers (2002). Here treatment No. 12 (120 kg N fertilizer drilling in four partitions) has no difference with this treatment. On the other hand between treatments No. 11 (120k/ha fertilizer drilling in three partitions) and 12 (120kg/ha nitrogen by method of fertilizer drilling in four partitions) was not a significant difference. Therefore the reasons mentioned before (less fertilizer and agricultural operations and less frequency) treatment No. 11 (120 kg/ha fertilizer drilling in three partitions) as the best treatment can be recommended.

Table No. 2:

12	3	2	10	6	Treat.No.
9.71	9.88	9.89	1028	10.33	Mean root
					yield(T/ha)
ab	ab	ab	ab	ab	group

9	4	1	8	7	Treat.No.
10.5	10.7	10.8	10.8	11.51	Mean root
4	3	1	1		yield(T/ha)
ab	ab	ab	ab	a	group

15	5	14	13	11	Treat.No.
5.70	8.79	8.86	8.95	9.36	Mean root
					yield(T/ha)
С	b	b	b	b	group

Means in each column with common letters has no statistically difference.

Table 3 shows the Effect of different treatments on the mean white sugar production in the first year of implementation. As this table shows treatment No. 7 (240 kg/ha nitrogen by method of fertilizer drilling in three partitions) had the highest amount of white sugar production. This trend also observed by Davilrs and co-workers(2002),Masaka reported such s trend in 2005 for wheat also. The treatment, 11 (120 kg/ha nitrogen by the method of fertilizer drilling in three partitions) was not significantly different.

Table No. 3:

6	8	1	4	7	Treat.No.
9.19	9.25	9.41	9.57	10.17	Mean root yield(T/ha)
ab	ab	ab	ab	a	group

2	3	12	10	9	Treat.No.
8.26	8.64	8.69	8.84	9.14	Mean root
					yield(T/ha)
ab	ab	ab	ab	ab	group

15	5	13	14	11	Treat.No.
5.10	7.76	7.82	7.93	8.42	Mean root
					yield(T/ha)
c	b	ab	ab	ab	group

Means in each column with common letters has no statistically difference.

- Results of the second year:

Table 4 shows the effect of different treatments on the average root yield in the first year of implementation. According to this table, treatment No. 7 (240 kg N/ha by method of fertilizer drilling in three partitions) has obtained the highest yield. But

the treatment No. 12 (120 kg N/ha by method of fertilizer drilling in four partitions) in terms of root yield has no significant difference. Therefore, the implementation of experimental treatments in the second year shows the No. 12 the best treatment for recommendation. It should be mentioned that the effect of different treatments on percentage of sugar production is not significant

Table No. 4:

6	2	1	4	7	Treat.No.
58.13	58.51	60.76	61.15	68.05	Mean root yield(T/ha)
abc	abc	ab	ab	a	group

13	12	3	14	10	Treat.No.
51.35	55.31	57.43	57.64	58.25	Mean root yield(T/ha)
abcd	abc	abc	abc	abc	group

5	11	15	8	9	Treat.No.
39.03	42.84	43.33	48.75	50.45	Mean root yield(T/ha)
d	cd	cd	abcd	abcd	group

Means in each column with common letters has no statistically difference.

- Integrated two-year results:

Table 5 shows the effect of different treatments on the root mean yield performance in two years.

Table No. 5:

6	2	1	4	7	Treat.No.
9.19	58.51	9.41	9.57	10.17	Mean root yield(T/ha)
ab	abc	ab	ab	a	group

13	12	3	14	10	Treat.No.
50.15	54.91	57.23	56.74	57.35	Mean root yield(T/ha)
abcd	abc	abc	abc	abc	group

5	11	15	8	9	Treat.No.
38.83	42.44	42.93	48.55	51.05	Mean root yield(T/ha)
d	cd	cd	abcd	abcd	group

Means in each column with common letters has no statistically difference based on Duncan test at 5% level of probability.

As the table above shows the treatment No. 7 (240 kg/ha N by method of fertilizer drilling in three

partitions) in two years of experiment produced the highest root yield. This treatment whit the treatment No. 12 (120 kg/ha N by method of fertilizer drilling in four partitions) is not significantly different. This trend also observed by Azari and co-workers (2000). Maskagni in 2007 reported such a trend for corn also. Therefore the number 12 treatment as the top choice between the treatments can be recommended. The effect of different treatments on percentage of sugar production in two years, performing experiments is not significant.

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Improving the Wetability and Oxidation Resistance of Graphite by Coating

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Abstract: In this research, the graphite powders were coated with Al₂O₃ by hydrolysis of an Aluminum nitrate aqueous solution. The surface of the graphite particles coated with Al₂O₃ was investigated by XRD and the quality of Al₂O₃ coating on the surface of graphite was observed by SEM and investigated by EDS. For detail investigation on the surface of coated graphite TEM was used and then wetability and oxidation resistance were investigated. To compare the effect of coating and antioxidant on oxidation resistance of graphite, Al and SiC were used as antioxidant. The results showed that the surface of graphite flakes was successfully coated and modified so that wetability and oxidation resistance of graphite greatly improved and the amount of antioxidant needed for application of graphite in the refractory decreased.

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Keywords: coated graphite, wetability, oxidation resistance, aluminum-nitrate.

1. Introduction

About 65% of the refractories produced in the world are used in the steel making industry [1]. Considering the new steel making processes and the need for corrosion resistance refractories for elevated temperatures, use of pure oxide refractories is becoming more and more restricted [2]. The reason for this is the high wetability of oxides with molten metals and therefore the high rate of corrosion in these refractories, which in turn lowers thermal shock resistance. This problem, however, can be resolved by introducing graphite into the oxide systems, because graphite reduces wetability and thermal expansion coefficient, improves corrosion and thermal shock resistance resulting in increasing of the service life of the refractories [1,3].

Graphite, however, has some drawbacks. Firstly, its wetability is poor, a fact that limits its use in castables, because the amount of water required for the preparation of the castables containing graphite is far more than that of the other castables which deteriorate its physical and mechanical properties. Secondly, graphite is prone to oxidation at elevated temperatures [4].

To improve the oxidation resistance of carbon, metallic or none metallic additives such as Al, Si, Al/Mg alloy, SiC and B4C have been used, but problems such as Al hydration, formation of undesirable phases or decomposition of suitable phase will be occurred [5-8]. Furthermore, the negative role of some additives and the fact that there is no accurate method for determining the best antioxidant should be considered [9-10]. On the other hand, the application of these additives is limited, because of the high cost

of milling them to micron and nano-sizes [11]. Thus for effective use of graphite in castables, its poor wetability and oxidation resistance should be overcome. Some researches have tried to resolve these problems by Coating graphite. Zhang and Lee [12] heated a mixture of graphite and silicon in a reducing atmosphere and deposited a SiC layer on the graphite surface and hereby improved surface properties of graphite such as wetability. But the practical drawbacks of this method are the need for high temperature and reducing atmosphere. Sakamto et. al. [13] prepared a mixture of SiC and graphite by using a high energy mill to coat graphite with a SiC layer. The adherence between the two was, however, weak and easily broke during mixing with other ingredients. Zhang and lee [14-15] and Zhoufu et al [16] coated graphite with TiO₂ and Al₂O₃ and SiO₂ by sol- gel and solution method. The problem with this method is its high cost of raw materials. Sunwoo et. al. [17] coated graphite with ZrO₂ by the controlled hydrolysis of a zirconium oxychloride aqueous solution. By this method the graphite wetability and oxidation resistance were improved. This method is also relatively costly. Yu et. al. [18] coated graphite with TiO₂ by ethanol solutions containing various amounts of an organic titanate and improved the wetability, flowability and oxidation resistance of graphite. But the use of this method is restricted, because organic materials similar to surfactants often interfere with other additives such as deflocculants and also have very bad smell.

In this research, graphite powder was coated with Al₂O₃ by hydrolysis of an aluminum-nitrate aqueous solution. This method is cheaper and proved to be

effective in improving the wetability and oxidation resistance of graphite.

2. Experimental procedure

2.1. Raw Materials

The raw materials used in this experiment included natural flake graphite (purity <97%, grain size <200 μ m) supplied from Sinorth Minerals Group Ltd. (China), Aluminum-nitrate and NH₃ (Merck, Germany), Aluminum powder (Atomizer International Co. Iran), and SiC powder (grain size <10 μ m, purity <92%) purchased from Saint-Gobin, SIKA, China. Distilled water was used as solvent for the coating process.

2.2. Coating Process

Aluminum-nitrate was dissolved in distilled water to prepare a 500ml solution of 0.2M concentration. This solution was stirred and heated at 60°C. In order to maintain PH at a constant, a small amount of NH₃ was added to the suspension. 40g flake graphite was added and stirred for 3 hours. The coated graphite particles were separated by filtering and vacuum pumping and then washed with distilled water repeatedly until the filtered liquor showed the natural pH. The coated graphite was then dried at 110°C for 24 hours and calcined at 700°C for 1 hour.

2.3. Characterization

2.3.1. Investigating the Quality of Coatings

In this research, the coated graphite and the quality of the coatings in terms of adherence and uniformity of the coatings were examined by XRD, SEM and EDS. Finally, for detail investigations of the coating quality on the surface of graphite TEM images was taken.

2.3.2. Oxidation Resistance Investigation

To evaluate the oxidation Resistance of the coated graphite and effect of this coating, graphite pellets (as-received and coated) of 4cm diameter and 1cm thickness were prepared and fired at different temperatures (700, 850 and 1000°C) under oxidizing atmosphere and the weight loss was measured. In some of the pellets Al and SiC was used as antioxidant and the amount of antioxidant was 50 wt.% of the graphite.

2.3.3 Wetability of Graphite

Floating process was used to study the of wetability characteristics of graphite. In this process 10 grams as-received and coated graphite was added to 100ml distilled water and mixed for 2 h. Then the weight percent of the floated graphite over the suspension was measured as floating ratio (F.R) using the following equation [14,18].

$$(F.R)\% = \frac{\text{Weight of Floating Graphite}}{\text{Total Weight of Graphite}} \times 100$$

Lower F.R ratio shows a better wetability. The samples investigated for wetability and oxidation resistance are listed in Table 1.

Table 1. Coding of different graphites

Code	Composition of Graphite
G	as-received Graphite
GC	Coated Graphite
GS	as-received Graphite with SiC
GCS	Coated Graphite with SiC
GA	as-received Graphite with Al
GCA	Coated Graphite with Al

3. Results and discussion

3.1. Coating mechanism

During coating graphite by controlled hydrolysis of the aqueous aluminum nitrate solution, maximum amount of aluminum hydroxide should be formed without precipitation. Thus, in order to have a proper coating, the term of $[Al^{3+}].[OH^{-}]^3$ should have its maximum before k_{sp} (solubility limit) [19].

There are two ways to this aim:

- 1. Increasing the solution concentration to a level that prevents precipitation. This means increasing $[Al^{3+}]$ so that $[Al^{3+}]$. $[OH^{-}]^3$ is less than k_{sp} .
- 2. Increasing pH to a level that prevents precipitation. This means increasing [OH-] so that [Al³⁺].[OH-]³ is less than k_{sp}. Therefore, to reduce the amount of the main raw materials, i.e. aluminum nitrate, and to prevent precipitation, the concentration of the solution used was low (0.2M). To encourage the hydrolysis reaction and formation of aluminum hydroxide pH was increased by adding ammonia. The reason for using ammonia is that it does not introduce detrimental species such as Na. To encourage the reaction and increase the k_{sp} the reaction was conducted at 60°C. Continuous monitoring of pH during the coating process showed that pH was in the range of 2.41-2.65 before adding ammonia. By adding ammonia it was increased and during hydrolysis decreased and in the last 30 minutes become constant (3.8-4), showing that the hydrolysis was complete.

3.2. Phase and microstructure investigation

Fig. 1 shows XRD analysis of the coated graphite. Presence of Al₂O₃ in sample was confirmed. To make sure that the coating is uniform and no segregation occurred, SEM was used.

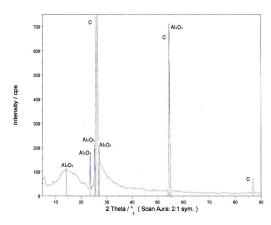


Figure 1. XRD pattern of the graphite particles with Al_2O_3 .

Fig. 2a shows the SEM micrograph of the coated graphite. It can be seen that the coating is almost uniform and no sign of segregation of alumina is observed. The EDS analysis of the sample (Fig. 2b) revealed the presence of Al_2O_3 on the graphite surface.

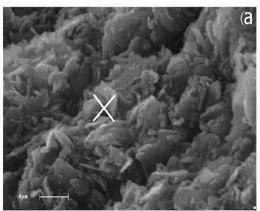


Figure 2a. SEM image of Al₂O₃ coated graphite

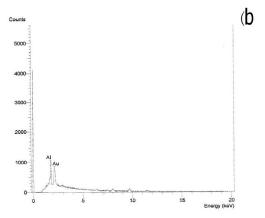


Figure 2b. EDS pattern of Al₂O₃ Coated Graphite.

Fig. 3 shows the coated graphite at a higher magnification and it is obvious that by coating operation, powders were not agglomerated.

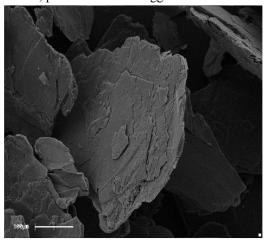
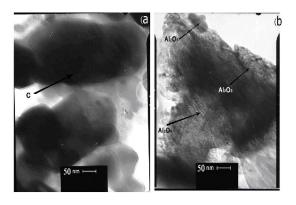


Figure 3. SEM image of Al₂O₃ coated graphite.

Fig. 4 shows the TEM image of the as-received and coated graphite showing the fluffy Al₂O₃ layer deposited on the surface of the graphite.



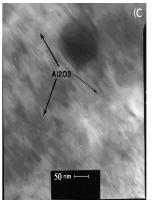


Figure 4. TEM images of (a) as-received and (b,c) Al₂O₃ Coated Graphite.

3.3. Wetability and oxidation resistance

The study of the wetability (Fig. 5 and 6) showed that the F.R ratio in the coated graphite was lower than that of the as-received graphite, therefore it can be concluded that the wetability of graphite was developed by coating. The reason for the development of wetability of graphite is attributed to the formation of active surface groups like –OH and Al-O on the surface of graphite [14,18].

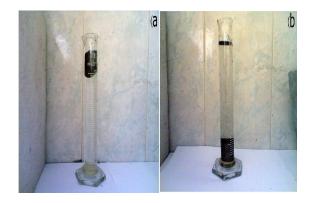


Figure 5. Photographs of the floating process for (a) as-received graphite and (b) coated Graphite.

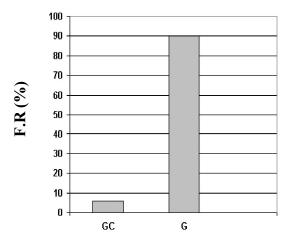


Figure 6. The Amount of F.R of as-received and Al₂O₃ Coated Graphite

The Al₂O₃ coating also increased the oxidation resistance of the graphite at all temperatures. The improvement in oxidation resistance of graphite powders was related to the change in the surface condition of the powders. On the surface of the graphite powders, there exist many effects such as cracks and edges which are usually occupied by hydrogen, oxygen and hydroxyl ions. Oxidation of the graphite powders occurs initially at these defects. During heating, the Al(OH)₃ on the surface of graphite powder reacts easily with the these ions on

the surface of the graphite powders. The reaction products mainly form chemical bonds with the surface of graphite powders. Thus, defects such as edges are covered and the H, OH, and O ions desorbed. On the other hand, the coating prevents oxygen to contact with the graphite. Fig. 7 reveals that the coating reduces the oxidation rate even more effectively at higher temperatures, perhaps because of the decrease in permeability of the alumina layer due to sintering at higher temperatures.

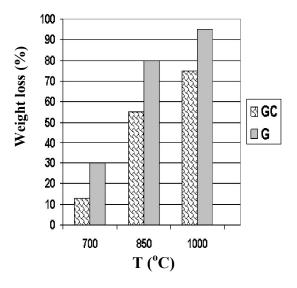


Figure 7. Loss of Weight of as-received and Al_2O_3 Coated Graphite.

Fig. 8 shows the effect of Al and SiC as antioxidant in as-received and coated graphite. It is obvious that introducing antioxidant in addition to coating improves the oxidation resistance. It seems that the reason for this behavior during heating is that, Al and SiC can be reduced by CO gas derived from oxidation of C and then changed to Al₂O₃ and SiO₂.

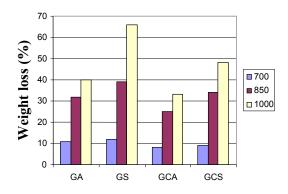


Figure 8. Effect of Al and SiC, as antioxidant in asreceived and coated graphite.

These products (Al_2O_3 and SiO_2) fill the areas on graphite surface having no coating or in regions where coating layer is thin and also fill surface coating micropores and prevent from graphite oxidation and overally reduce oxidation rate and prohibit oxidation. But Al is more efficient than SiC, because Al oxidation caused the formation of Al_2O_3 and Al_2O_3 on the graphite surface bonded with coating easily and filled micropores of coating, therefore led to homogenous coating. The other important result of Fig.8 is that with coating, antioxidant amount decreased remarkably.

4. Conclusion

The effect of Al₂O₃ coating on wetability and oxidation resistance of graphite was studied. The coated graphite by solution process did not introduce agglomeration. The effect of coatings on oxidation resistance of graphite show that by Al₂O₃ formation on the surface of graphite the oxidation of graphite was limited in different temperature, under oxidizing atmosphere. Using Al and SiC as antioxidant could effectively enhance the oxidation resistance of graphite, but Al is more efficient than SiC. Applying coatings resulted in a decrease in the amount of the antioxidant needed.

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Morphological and molecular characterization of various *Artemia* strains from tropical saltpans in South East Coast of India

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Abstract: The present study documents the morphological and molecular characteristics of Artemia strains in four main ecological regions from South East Coast of India. Samples from tropical saltpans such as Kelambakkam (KBM), Vedaranyam (VDM), Tuticorin (TCN) and Thamaraikulam (TKM) and reference samples from GSL strain (Great Salt Lake, Utah) were analysed. Biometry of cysts, furcal morphology and molecular genetic relatedness using the technique of random amplified polymorphic DNA (RAPD-PCR) finger printing analysis were done with four Artemia strains. The biometry results revealed that the KBM cyst diameter was similar to GSL cyst and compared to other strains. Scanning electron micrographs (SEM) of hydrated Artemia cysts showed a smooth outer membrane with granular surface topography without much variation. However, the SEM structures of fractured cysts showed variation in the inner architecture patterns of egg membranes. The discrimination on furcal fin shape and its numbers of setae were more evident to distinguish Artemia strains studied. The TKM strain showed wide furcal groove compared to other strains. RAPD-PCR analysis showed consistent genetic differences between the VDM and TKM strains. The DNA polymorphisms were evident in all the Artemia strains examined and the highest percentage of polymorphic bands was found in TKM and TCN Artemia strains. The obtained results obviously showed that, within the collection of South Indian Artemia cyst samples examined, two different groups seem to exist. The morphological and molecular analysis revealed a greatest genetic difference between the Artemia strains which provide the genetic relatedness and the specific status of Artemia strains confined to South India.

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1. INTRODUCTION

The genus *Artemia* comprises a complex of bisexual species defined by the criterion of reproductive isolation of a large number of parthenogenetic and bisexual strains under the binomen *A. parthenogenetica*, composed of diploid and polyploidy strains for taxonomic convenience (Sun *et al.*, 1999). They have been recorded in over 600 coastal and inland lakes worldwide (Van Stappen, 2002). In morphological studies, the specific challenge exists in the selection of morphological character useful for description of a population or species. Several authors have used different criteria of morphological traits for strain characterization (Gilchrist, 1960 and Amat, 1980).

Biometry of cysts has been reported to be one of the important characteristics to mark the different strains of *Artemia* (Tejeda, 1987). Variations in the cyst size and thickness of outer layer would correlate the strain characterization. Geographical and physical barriers between con-specific strains must exist for reproductive isolation to evolve as a byproduct of the genetic differences (Gajardo *et al.*, 1998). Triantaphyllidis *et al.* (1997) conducted a scanning

electron microscopic study of bisexual Artemia populations, which revealed that populations representing the species A. franciscana, A. persimilis, A. urmiana and A. sinica. Besides recently described species from Kazakhstan have a pair of spine-like outgrowths at the basal parts of their penis, whereas populations from southern Europe and North Africa (Mediterranean populations) lack these spine-like outgrowths. Characterization of various strains of brine shrimp Artemia is essential to enhance its potential in aquaculture (Abatzopoulos et al., 1986). However. knowledge of their morphological characteristics, biochemical variation and molecular differentiation (both genotypic and phenotypic) of a particular batch of cysts and nauplii can greatly increase the effectiveness of their usage in fish or shrimp hatchery (Browne and Bown, 1991; Pilla and Breadmore, 1994).

In recent years the use of molecular markers has gained popularity. *Artemia* inter and intra-specific biodiversity have been studied using a variety of techniques (Restriction Fragment Length Polymorphism (RFLP), Random Amplified Polymorphic DNA (RAPD) using either strains or

pooled samples for analysis. The description of the species A. tibetiana, the increasing availability of samples from Central and Eastern Asia have intensified the study of the phylogeny of the genus Artemia. Within this general framework, ample attention has been given to unravel the genetic relationships between the bisexual species from continental Asia and from the Americas (A. franciscana and A. persimilis), last but not least their link with the parthenogenetic lineage in the genus (Sun et al., 1999). One of the molecular tools early employed to answer a wide range of questions regarding speciation processes has been mtDNA sequencing and RAPD-PCR analysis. Considering the pronounced tendency of the development of local adaptations, genetic and molecular surveys have been highly informative for the genus (Bossier et al., 2004 and Qiu et al., 2006).

Therefore, the present paper describes the biometry of cyst, furcal morphology and molecular genetic characteristics of four *Artemia* strains confined to four main ecological regions in South East Coast of India. Although information on the distribution and biometry of *Artemia* strain from South India is limited, studies on the genetic relatedness of the *Artemia* strains are lacking. Hence, the present study investigated the cyst characteristics, furcal morphology and molecular genetic variation of South Indian *Artemia* strains.

2. MATERIALS AND METHODS

2.1 Sample collections

Sample of adult *Artemia* and cysts were collected from Kelambakkam (KBM; 10° 01' N–79° 07' E), Vedaranyam (VDM; 08° 59' N–78° 50' E), Tuticorin (TCN; 08° 50' N–78° 08' E) and Thamaraikulam (TKM; 08° 04' N–77° 68' E). Both adult brine shrimp and cysts were collected and transported to the laboratory in plastic containers with habitat water. For molecular studies, the adults as well as cysts were washed with double distilled water and stored at –20°C until use.

2.2 Biometry of cysts

The cyst diameter of each strain was done using the microscope (Leica, DM2500, Germany) equipped with pre-calibrated software. The cyst diameter of each strain was measured in dried as well as hydrated cysts. As many as 100 cysts were taken randomly and used for measurements to have valid statistical inference

2.3 Scanning Electron Microscopy

Scanning electron microscopic studies were carried out on cysts of different *Artemia* strains as described by Gilchrist (1978). For scanning electron microscopic studies, the cysts were then immersed in

10% formaldehyde for 30 minutes to remove the micro organisms and debris attached on the surface of the shell. The cysts were then fixed in 2.5% glutaraldehyde prepared in cacodylate (sodium phosphate) buffer adjusted to pH 7.4 for several hours. Then the cysts were post-fixed in 2% osmium tetroxide for 12 hours at 4°C. After post-fixation, cysts were rinsed in distilled water for few minutes and dehydrated in graded alcohol series. Then the cysts were subjected to critical point drying and glued on to standard mica squares (1cm²), mounted on metal stubs. Whole cysts and fractured cysts were gold sputter, coated (Denton sputter Coater Desk II), viewed under scanning electron microscope (Leica Cambridge, UK) and photomicrographs were taken at various magnifications.

2.4 Assessment of furcal morphology

Furcal morphology of different *Artemia* strains were analysed using a microscope (Leica, DM2500, Germany). Furca of each strain was removed carefully and mounted on microscopic the glass slide. The furcal characters such as furcal shape, number of setae on furca, furcal groove and furcal length of each strain were scored.

2.5 Molecular methods

2.5.1 Extraction of genomic DNA

The adult Artemia genomic DNA was extracted and used for genetic analysis as described by Bossier et al. (2004) with slight modifications. Frozen tissues of adult Artemia (100 mg) was kept at room temperature for 2 minutes to be slightly softened without thawing the tissue completely. The samples were then pulverized on ice with a sterile pestle directly into a 1.5 ml eppendorf tube. To this, 600 µl of 2X CTAB buffer (Tris-HCl 100 mM, pH 8.0, NaCl 1.4 M, EDTA 20 mM, CTAB 2 % and 0.1 mg/ml proteinase K) was added and the mixture was incubated for 30 minutes at 60°C and then centrifuged at $14000 \times g$ for 15 minutes. The supernatants were extracted with phenol/chloroform (1:1), centrifuged at $14000 \times g$ for 5 minutes. Extracted again with chloroform-isoamyl alcohol (24:1), and centrifuged at $14000 \times g$ for 5 minutes and then the supernatant was collected using sterilized 200 µl micropipette tips. To this, 650 µl of water and 1300 µl of ice-cold isopropanol were added. The precipitated DNA was centrifuged at $14,000 \times g$ for 15 minutes and resuspended in double distilled water. The pelletized DNA samples were used to remove the RNA, and then it was centrifuged at $15,000 \times g$ for 5 minutes. The collected supernatants were incubated with RNAse (0.2 mg/ml) at 37°C for 15 minutes it was added with 1.5 ml of 100 % ethanol and the DNA was allowed to precipitate for two hours at -20°C. This was centrifuged again at

 $14000 \times g$ for 15 minutes. The DNA pellet was washed with 70 % ethanol and left to air dry at room temperature. The dried DNA pellets were resuspended in TE buffer and stored at -80°C for further analysis.

2.5.2 RAPD-PCR analysis

The polymerase chain reaction was performed in a Thermal Cycler (ASTECTM, PC-818 Programmable Thermal Controller) to produce multiple copies of DNA. The genomic DNA extracted for the different strains such as KBM, VDM, TCN, TKM and GSL reference strain were subjected to RAPD-PCR analysis. A total of twenty random primers (RAPD kit: OPK-01 to OPK-20) were tested for RAPD-PCR analysis. The sequences of the primers (Sigma, Bangalore) used are given in Table 1.

Table 1. RAPD primer sequences

Primers	Sequence 5' to 3'	Sequence 5' to 3'
OPK-01	CATTCGAGCC	AATGCCCCAG
OPK-02	GTCTCCGCAA	TGGCCCTCAC
OPK-03	CCAGCTTAGG	GGTTGTACCC
OPK-04	CCGCCCAAAC	CCCGCTACAC
OPK-05	TCTGTCGAGG	CTCCTGCCAA
OPK-06	CACCTTTCCC	GAGCGTCGAA
OPK-07	AGCGAGCAAG	CCCAGCTGTG
OPK-08	GAACACTGGG	CCTAGTCGAG
OPK-09	CCCTACCGAC	CACAGGCGGA
OPK-10	GTGCAACGTG	GTGTCGCGAG

The RAPD-PCR reaction was performed with twenty primers (OPK-01 to OPK-20). The RAPD-PCR was carried out with each primer in a total reaction volume of 50 µl containing 5.0 µl of PCR buffer (10 mM Tris-HCl at pH.8.3, 50 mM KCl, 2.5 mM MgCl₂), 0.5 µl of each dATP, dGTP, dTTP and dNTP, 0.5 pmoles of primers and 2.0 U of Taq-DNA polymerase. All the above components were made up to 50 µl in a 100 µl PCR tubes. The thermal cycling amplification conditions were as follows: the initial denaturation at 94°C for 5 minutes, final denaturation at 94°C 1 minute, annealing at 35°C for 1 minute and primer extension at 72°C for 2 minutes and final extension at 72°C for 7 minutes. Amplified products were resolved by 2 % agarose gel electrophoresis performed in 1X TAE buffer and stained with ethidium bromide. The agarose gel profiles were photographed using the gel documentation system (Gel DocTM, BIO-RAD).

2.6 Data analysis

Results obtained in cysts biometry data were analyzed using SPSS (Version 17.0) for analysis of variance. The phylogenetic analysis was conducted using in PHYLIP 3.6. Phylogenetic relationships

were estimated using neighbor-joining (NJ) analysis. NJ analysis was performed using Jukes-Cantor and pair-wise deletion options. Trees based on genetic distances were constructed by the NJ method and cluster analyses on DNA banding patterns between the strains were calculated.

3. RESULTS

3.1 Biometry of Artemia cysts

Dry cyst of KBM strain measured around 228.43 \pm 9.82 μ m in diameter comparable to reference strain of GSL (225.93 \pm 2.78 μ m) (Table 2).

Table 2. Biometry of Artemia cysts

	Cyst diam	neter (µm)	F-		
Strains	Dry cysts	Hydrated cysts	ratio	Sig.	
KBM	228.43±9.82	256.30±4.32	10.994	(P<0.005)	
VDM	247.73±5.77	267.16±3.69	12.847	(P < 0.003)	
TCN	245.02±6.67	276.48±3.99	14.936	(P < 0.003)	
TKM	256.20±5.35	285.80±3.28	14.590	(P < 0.003)	
GSL	225.93±2.78	243.28±4.39	14.220	(P < 0.003)	

The dried cysts of VDM, TCN and TKM strains measured to 247.73 \pm 5.77 µm, 245.02 \pm 6.67 µm and 256.20 \pm 5.35 µm in diameter respectively. After hydration, the cyst diameter of GSL increased to 243.28 \pm 4.39 µm, whereas the KBM, VDM, TCN and TKM cysts measured to 256.30 \pm 4.32 µm, 267.16 \pm 3.69 µm, 276.48 \pm 3.99 µm and 285.80 \pm 3.28 µm respectively. Interestingly, the biometry results revealed that the KBM cyst diameter was similar to GSL reference cyst. The diameter of different *Artemia* cysts varied significantly among the *Artemia* strains studied (P<0.005).

3.2 Morphology of cysts

Scanning electron micrographs of hydrated Artemia cysts showed smooth outer membrane with granular surface. There is no specialized area interpreted as a micropylar region seen on the outer surface of the cyst. Before hydration, the cyst resembles a hardened structure. After hydration in seawater (35 g L⁻¹), the spherical cysts assume a much larger size. This transformation is the result of rapid water absorption of the cyst. Scanning electron micrographs of cysts of four different Artemia strains clearly indicated that the surface topography is smooth and without any ornamentation. An indepth study on the egg membranes clearly indicated the subtle variation in architecture of alveolar layer and thickness of the egg membranes of the four strains studied. The cross section of the cyst shows the presence of outer tertiary layer and an innermost cuticular layer. The tertiary layer consists of an outer cortex and an inner alveolar layer (Figure 1).

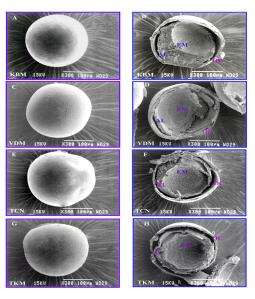


Figure 1. Scanning electron micrographs of cysts

All the cysts showed an outer thick cortex membrane and an inner alveolar layer which both constitute the tertiary layers. The embryonic mass is seen covered by membrane within the embryonic cuticle. The innermost membrane is the embryonic cuticle which encircles the embryonic mass.

3.3 Furcal morphology Artemia strains

The furca of each strain showed that natatory setae of 6 to 11 on each side of the distal exite and its setules were very lengthy in nature. Furca of KBM strain showed as many as 8 to 11 setae on its distal exite and it was interrelated to TCN strain (Figure 2).

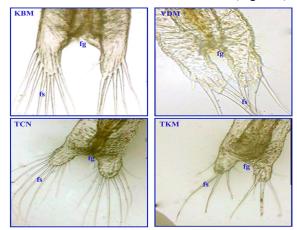


Figure 2. Furcal morphology of Artemia strains

In comparison, the TCN strain had the much wider and deeper furcal groove. However, the TKM strain showed wide furcal groove when compared to KBM strain. At the same time, the end part of the telson segment showed considerable variation between KBM and VDM strains.

3.4 RAPD-PCR profiles

The extracted genomic DNA from different Artemia strains was screened using random primers by polymerase chain reaction. A total of twenty RAPD primers (OPK-01 to OPK-20) were tested for their ability to provide scorable DNA banding patterns. Of the various primers used, OPK-07, OPK-08 and OPK-20 yielded a clear and consistent DNA banding pattern. Among the twenty RAPD primers screened, three primers showed clear and distinct DNA banding pattern. Of which, the primer OPK-20 generated an enhanced degree of polymorphism over the other than two primers. The RAPD-PCR results of all genomic DNA isolated from different Artemia strains were compared with each other strains and the presence of common bands were also scored.

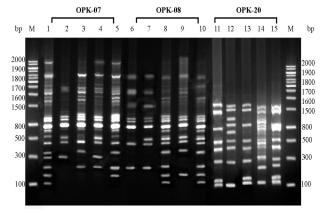


Figure 3. RAPD-PCR amplification products using primers OPK-07 (1–5), OPK-08 (6–10) and OPK-20 (11–15) for the five *Artemia* strains, Great Salt Lake (GSL), Kelambakkam (KBM), Vedaranyam (VDM), Tuticorin (TCN) and Thamaraikulam (TKM).

As many as 13 bands were scored for GSL reference strain. In KBM strain, out of 5 bands scored (RAPD-PCR profile generated by using primers OPK-07 and OPK-08), 3 bands were found to be monomorphic and 2 bands as polymorphic (Figure 3). In VDM strain, among the 11 bands scored, 7 bands were monomorphic and remaining 4 bands were polymorphic. Out of 9 bands generated in TCN strain, 6 bands were monomorphic and the 3 bands were polymorphic. The TKM strain generated 16 bands, of which 10 bands were monomorphic and the remaining 6 bands were polymorphic. The phylograms derived from the RAPD-PCR profiles of different Artemia strains (primer OPK-07) generated maximum of four clusters than the other primer OPK-20. In the KBM strain of 12 bands (RAPD-PCR profile generated by primer OPK-20), 6 bands were monomorphic and the 6 bands were also polymorphic. In the VDM strain, of 8 bands scored, 4

bands were monomorphic and remaining 4 bands were polymorphic. The TCN strain scored 9 bands and of which 6 bands were monomorphic and remaining 3 bands were polymorphic. The TKM strain generated 7 bands, out of which 6 bands were monomorphic and remaining 1 band was polymorphic.

Furthermore, the similarity index based on the RAPD-PCR profiles was calculated. The VDM *Artemia* strain indicated the similarity index value of 0.83 to 0.97. Similarly, the RAPD-PCR profile of the *Artemia* strains such as GSL, KBM, VDM, TCN and TKM were subjected to phylogram analysis. The primer OPK-07 generated a maximum number of clusters compared to other primers. The DNA banding pattern obtained from the OPK-07 and OPK-08 primers confirmed the clustering patterns.

3.5 DISCUSSION

In India, the bisexual Artemia strains are found in coastal saltworks along the Southeast coast of India. Although studies have been made on the distribution and biology of Artemia not much information is available on genetic characterization of the Artemia strains confined to Southeast coast of India. Preliminary characterization of various Artemia strains has been attempted by choosing a cyst diameter as one of the parameters (Tejeda, 1987). For cyst biometrics four Artemia strains were analyzed, and the results obtained display wide divergence. Interestingly, the biometry cysts revealed that the KBM cyst size is greatly related to GSL reference cyst compared to other cysts. These relatively large cyst sizes are comparable to values reported for parthenogenetic populations elsewhere in the world, which tend to produce larger cysts than bisexual populations (Lavens and Sorgeloos, 1996).

Scanning electron microscopic studies on cysts of each strain showed a smooth surface topography of the cyst without any specific ornamentation. Hydrated cyst clearly showed an absence of any specialized micropylar region. The cross section of the cyst shows the presence of outer tertiary layer and an innermost cuticular layer. The tertiary layer consists of an outer cortex and an inner alveolar layer. The alveolar layer is characterized by alveolar mesh, followed by cuticular layer, which encircles the embryo (Gilchrist, 1978). Of all the egg membranes, the alveolar layer showed subtle variations in the alveolar mesh of the strains studied.

The furcal morphological characteristics significantly contribute to the discrimination among the four *Artemia* strains. Further, variation of furcal fin shape and its numbers of setae are more evident to differentiate the strain characterization. The presence of definite and elaborate furcal morphology of the

KBM strain is characterized and compared with other strains. In comparison, the TCN strain had the much wider and deeper furcal groove. However, the TKM strain showed wide furcal groove when compared to KBM strain. At the same time, the end part of the telson segment showed substantial variation between KBM and VDM strains.

A variety of DNA fingerprinting techniques have been used for describing the diversity within the genus Artemia, namely RAPD (Random Amplified Polymorphic DNA) (Badaracco et al., 1995; Sun et al., 1999), Amplified fragment length polymorphism (AFLP) (Triantaphyllidis et al. 1997 and Sun et al., 1999). Molecular characterization studies, random amplified polymorphic DNA polymerase chain reaction (RAPD-PCR) showed variations among the Artemia strains. The results further supported by biometric and RAPD data of the different Artemia strains. Doubtless considerable genetic differentiation exists between the KBM and VDM Artemia strains. The primer OPK-07 produced a maximum number of clusters than the other primers. The similarity index values recorded a maximum of 0.97 and the minimum of 0.83 based on the RAPD profiles generated for the reference GSL strain.

Morphological data can be substantially reinforced by genetic evidence (Abreu-Grobois and Beardmore, 1991; Triantaphyllidis et al., 1997; Sun et al., 1999; Bossier et al., 2004 and Qiu et al., 2006). A genetic study of Artemia strains in Southeast Asia using genetic marker shows relatively high genetic diversity within both local and wild strains, but wild strains tended to have higher (within strain) genetic diversity than local strains. Using these techniques, the level of mitochondrial DNA variation documented within the strains of cultured and wild strains. Genetic differences can be studied by a of techniques. Random amplified polymorphic DNA (RAPD-PCR) is one of the widely used molecular methods for strain genetic diversity studies. Some of the tools have also served for the characterization of anostracans and the genus Artemia using the cysts. The mitochondrial DNA analysis of bisexual and parthenogenetic brine shrimp (Perez et al., 1994) by using different molecular approaches has been used to study speciation in Artemia. The highly repetitive DNA sequence in parthenogenetic has been investigated by Badaracco et al. (1991). Interestingly, recent researches based on molecular markers were also carried out on the phylogeny, speciation and evolution of Artemia. Similarly, in the present study biometry, morphological characteristics and DNA pattern in KBM bisexual Artemia strain seemed to be similar to GSL strain. Amat et al, (2005) reported that A. franciscana is an exotic invasive species and there is

being extended that distribution to Portugal, Spain, France, South Asian countries as well as north of Morocco. Neither the intra and inter-strain genetic variability at a given time is known for all tested samples or its temporal stability. Given the fact that mitochondrial rDNA polymorphism is normally found at the genus or species level and due to allopatric distribution of *Artemia*, it was anticipated that this marker would be able to differentiate samples at the species or sub-species level (Palumbi, 1996).

Apart from purely fundamental research goals such as phylogeny and species description, molecular tools have been important and used in applied research fields like the authentication of commercial cyst samples. Besides, it is essential to trace back their geographic background and to assess their purity in terms of strain composition. The technique proved sufficient to identify most Artemia species down to the species level, but discrimination between parthenogenetic strains, A. urmiana and A. tibetiana based on the use of this molecular marker remained problematic altogether, given the current resolution of the technique and the current status of reference samples being analysed. The dendrogram suggests that the strains in these two clusters are not identical and that some genetic dissimilarity between them might exist. The South Indian Artemia strains. although these samples were collected from different prevailing environmental conditions. This suggests high genetic dissimilarities between these samples.

According to the present investigation, considerable morphological differences observed in bisexual strains of South India. On the divergent, RAPD results indicated a close relationship between VDM and TKM Artemia strains, which has been confirmed by many other studies using different approaches (Beardmore and Abreu-Grobois, 1983; Abreu-Grobois and Beardmore 1991; Browne et al., 1991; Abatzopoulos et al., 1997; Triantaphyllidis et al., 1997; Sun et al., 1999; Bossier et al., 2004 and Qiu et al., 2006). The present study documents that despite these small genetic differences between these Artemia strains, detected with the RAPD markers, sufficient isolation may have happened in other genes allowing the establishment of morphological differences. Accordingly, it would be interesting to carry out more specialized genetic examinations in order to exhibit the basis for the morphological deviations with among the bisexual Artemia strains. Genetic diversity data will be useful for management strategies that maintain genetic diversity, such as the wild collection as well as cultured Artemia strain.

CONCLUSIONS

A detailed survey of the tropical solar saltpan locations of Kelambakkam (KBM), Vedaranyam (VDM), Tuticorin (TCN) and Thamaraikulam (TKM) was made to document and catalogue the occurrence of Artemia strains in four main ecological regions along the South East Coast of India. From the observations, the variations have been noted with respect to the furcal shape, fin and cyst biometric characters of different strains of Artemia. In conclusion, the biometry results revealed that KBM cyst diameter was similar to GSL reference cyst. The TKM strain showed wide furcal groove compared to other strains. Therefore, the genetic relatedness of Artemia strains were analysed using RAPD-PCR fingerprinting technique. Three random primers were produced a clear and distinct banding pattern. The primer OPK-20 was generated an enhanced degree of polymorphism compared to other primers. The RAPD-PCR profiles clearly indicated genetic dissimilarity between the KBM and TKM strains. The RAPD-PCR finger printing analysis revealed that the greatest genetic differences among the Artemia strains in order to provide the genetic evidence and specific status of Artemia strains confined to South India.

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Application of Protein Engineering Strategies in Structural Biology for Enhancing Protein Crystallization

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Abstract: Structural biology is one of the most important areas in biological sciences since detailed 3-D atomic protein structure not only gives direct information on protein function, but also provides useful knowledge on protein engineering and drug design. X-ray crystallography is one of the most powerful tools for high-resolution protein structure determination. It requires growth of protein crystals, which is extremely challenging for some proteins and usually pose it the most rate-limiting step for protein structure determination. However, protein engineering methods improving the entropy of crystallization sometimes enhance protein crystallization. In this review, we summarized the most commonly used protein engineering strategies for improve the chance of protein crystallization.

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Keywords: Protein engineering, crystallization, X-ray crystallography, limited proteolysis, MBP, surface entropy reduction

Introduction

X-ray crystallography and NMR are two most powerful approaches for studying high resolution protein structure. NMR does not require protein crystals, but sometimes is difficult to solve structure of protein with large size. X-ray crystallography does not have a size limitation, but needs diffractable protein crystals. For some protein, growing crystals are extremely challenging. However, modification of protein or crystallization conditions sometimes may improve the chance of protein crystallization. One common way of crystallizing proteins is to cocrystallize proteins in complex with cofactors, inhibitors or antibody fragments. The conformational change induced by such ligand bindings may be favorable to the crystallization by exposing new crystal contacts or by ordering the protein structure. For instance, for a GTPase, crystallizing the apo form protein and co-crystallizing the GTPase with GDP should be attempted. Co-crystallizing the GTPase with GTP analogs such as GppNHp and GTP-yS is also helpful. If a protein is membrane related or interacts with membrane components, crystallizing the protein with lipid analogs such as detergents and the head group of lipids will be necessary.

Recent studies have shown that the protein itself should be modified during protein crystallization [1]. Besides altering precipitating agents, the protein should be considered as an important variable in the crystallization screen. Strategies of modifications of

target proteins via protein engineering tools in order to improve the chance of protein crystallization are summarized below.

Limited proteolysis to determine protein domain boundaries

Proteins, especially from eukaryotes, are usually complicate and contain several domains. The flexibility caused by connections between domains generates high conformational heterogeneity and usually is one of the most important factors to be considered for crystallization [2]. To solve this problem, it is useful to identify crystallizable functional domains of such proteins for X-ray crystallographic study. One challenging aspect of this study is to identify the domain boundaries. Multiple protein sequence alignments combined with secondary structure prediction is one of the methods to identify the domain boundaries. However, a more promising method is limited proteolysis followed by mass spectrometry protein sequence determination. The rationale for limited proteolysis is that the connections between domains are structural flexible and therefore sensitive to protease digestion. contrast, bulk protein domains are compact and are less accessible by proteases [2]. Therefore, limited proteolysis is applicable to multi-domain proteins if full-length proteins fail to crystallize.

The fastest way to perform limited proteolysis is in-drop proteolysis [3,4]. Different kinds of

proteases such as trypsin, chymotrypsin, papain, and proteinase K will be added to the solution containing the full-length protein just before the crystallization screening is carried out. Crystals grown in the drops will be resolubilized and subjected to mass spectrometry for mass determination and sequence analysis [3]. The in-drop method is easy to manipulate, however, its disadvantage is the heterogeneity resulted from other digested fragments that may cause failure of the compact digested domains to crystallize. If there is no crystal grown using the in-drop method, the regular limited proteolysis will be performed.

To perform regular limited proteolysis, the partial digestion patterns of full-length target proteins using the proteases listed above will be compared. The digestion will be applied to SDS-PAGE and the products will be characterized either by electroblotting to PVDF followed by N-terminal sequencing or by mass spectrometry. Based on the obtained sequences, the protease-resistant regions of the target proteins will be cloned into expression vectors. The expressed recombination proteins will be used for crystallization trials.

Surface-entropy reduction approach to enhance protein crystallizability

The basis of the surface-entropy reduction is to reduce the entropic cost of protein crystallization by modifying the target protein using protein engineering methods. Typically, residues with large flexible side chains in solvent-exposed loops cost more entropy to crystallize and should be mutated to small amino acids [5]. Sometimes, instead of single amino-acids, entire flexible regions of a protein generating conformational heterogeneity may also cause difficulty in crystallization. Thus, deleting or replacing the flexible regions may be helpful in the crystallization by reducing the interfering effects from the heterogeneity [1,6,7].

For example, surface-energy prediction of a GTPase protein revealed that the high ratio of charged and flexible residues of a domain in the middle of the protein causes high surface entropy Secondary structure predictions and (Figure 1). protein disorder prediction showed that this domain does not have stable secondary structure and probably forms a large solvent-exposed loop (Figure 2). Comparison of domain topology of the target protein with crystallized homologues from other organisms indicated that the domain is not present in the crystallized homologues. These analyses indicate that the domain may be highly flexible causing an energy barrier for crystal formation. Therefore, replacement of this domain with a shorter but less

mobile linker by protein engineering may be a way to enhance the likelihood of protein crystallization.

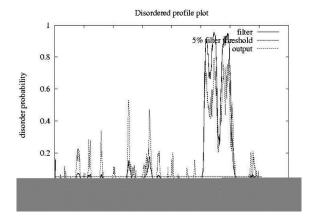


Figure 1: Prediction of disordered region of a GTPase by the server DISOPRED. Residues from 500 to 600 were indicated as the disordered region.

Some candidates for the linkers are FLAG or *Strep* II and the protein expression level in *E. coli*, protein solubility and the GTPase activity can be used as indicators of protein folding of the target protein.

Large fusion tags as crystallization partner

Large fusion tags such as maltose binding protein (MBP) and glutathione-S-transferase (GST) have been commonly used to enhance the expression. improve the yield and stability, and facilitate purification of the protein to which they are fused [8-10]. Recently, several protein crystal structures have been reported by fusion with E. coli MBP [11-14]. With a modified linker between the MBP and the protein of interest, the presence of the MBP does not seem to interfere with the native structure of the target protein, as indicated by the crystal structures. Several advantages of co-crystallizing a protein with fusion partner have been recognized. First, large fusion tags may enhance solubility and stability of target proteins by avoiding formation of inclusion bodies in E. coli during expression. Second, since the crystal contacts are dominated by MBP/MBP or MBP/protein interactions, the fusion partner could facilitate crystallization by increasing those contacts. Third, the conditions used to crystallize the tag and the crystal contacts found in the tag crystal may be used to guide the crystallization of the fusion protein. Last but not least, the three-dimensional structure of tags can be used as a search model to solve the crystallographic phase problem by molecular replacement.

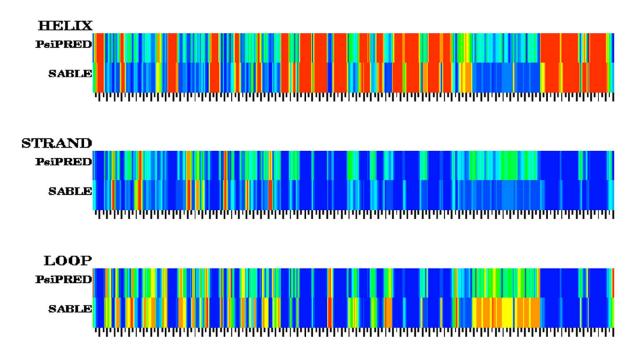


Figure 2: An example of comparison of secondary structure predictions of a GTPase from different servers (PsiPRED and SABLE) by visualizing the predictions. Red, high possibility of being an indicated secondary structure; blue, low possibility of being an indicated secondary structure; yellow and green, possibility between the red and blue.

One challenging aspect of co-crystallizing fusion proteins is the modification of the linker between the tag and the target protein. The characteristic shared by most successfully crystallized fusion proteins is a short rigid connection such as three alanines instead of a long flexible linker. Shorter linkers may help avoid the conformational heterogeneity introduced by flexible linkers. Therefore, the linker region should be short but allows flexibilities for the target protein. Meanwhile, besides E. coli MBP, the Pyrococcus furiosus (Pfu) MBP is also a good choice as a fusion partner since the Pfu MBP has been proven to be a more potent solubilizing agent than *E.coli* MBP [15].

An alternative large fusion tag is the DsRed Monomer (Invitrogen), which is an engineered mutant of a red fluorescent protein from *Discosoma* sp. reef coral. The tetrameric form of native DsRed is not a suitable crystallization carrier because fusion with an oligomeric tag may result in a chimera protein with a non-native quaternary structure of the target protein. However, monomeric form of engineered DsRed Monomer is unlikely to affect the native structure of the target protein. A significant advantage of DsRed Monomer is that the red color of the fusion protein can be visualized directly by the naked eye, so that the protein expression and purification process can easily be monitored.

Moreover, the red color can also be used as an indicator to differentiate the protein crystals from those of salts, which is a common problem associated with crystallization using microbatch evaporation methods.

Lipidic cubic phase

membrane proteins, an alternative crystallization method is to use a lipidic cubic phase, also called the in meso method. Several membrane proteins have been crystallized for high-resolution structure determination using this method [16-19]. In the cubic phase, the lipidic compartments are interpenetrated by a freely communicating system of aqueous channels [20]. Although the exact mechanism of the in meso crystallization remains unclear, the cubic phase may provide a lipid bilayer that is an environment similar to the biological membranes. The membrane protein may reconstitute into the bilayer and crystals nucleate and grow upon addition of precipitants [21].

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Taxonomic Diversity of Understorey Vegetation in Kumaun Himalayan Forests

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Abstract: Taxonomic diversity of understorey vegetation (herb species) was studied in two evergreen forests, viz. oak and pine in the Kumaun Himalaya. In terms of taxonomic diversity, Asteraceae and Lamiaceae were the two dominant families in the sampling forest types. Maximum number of species was found at hill base and minimum at hill top in both the forests. The number of families, genera and species ratio observed for pine forest was of course higher with compared to the oak forest showed about the higher taxonomic diversity. Perennials form had higher contribution as compared to annuals forms indicated better ability to store up soil. Very few species (9 species) were found to be common indicates higher dissimilarity in both type of forests. Species richness (per m2) was higher in the pine forest than the oak forest. A high value of beta-diversity in the oak forest point out that the species composition varied from one stand to another. However, low concentration of dominance value in the pine forest with compare to the oak forest point towards the dominance, which is shared by many species.

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Keywords: Species richness; beta-diversity; taxonomic diversity; forest

1. Introduction

The pattern and relationships between species diversity and ecosystem functioning are the current areas of great ecological interest throughout the world. Species diversity incorporates two components (Stirling and Wilsey, 2001); evenness (how evenly abundance or biomass is distributed among species) and richness (number of species per unit area). High evenness can increase invasion resistance, below-ground productivity and reduce total extinction rates (Smith et al., 2004). The spatial variations in biodiversity generally include species diversity in relation to size of the area, relationship between local and regional species diversity and diversity along gradients across space, and environmental factors such as latitude, altitude, depth, isolation, moisture and productivity (Gaston, 2000). In addition, species richness of a taxon is not only sufficient to express diversity but the equitability is also an important factor because communities however vary in properties of the total importance of the species and share their functional contribution (Tilman, 2000).

A fundamental characteristic of mountain ecosystems is to the drastic change in vegetation as well as in climatic conditions from the base to the summit of the mountain. Elevation gradients create varied climates, along with resultant soil differentiation; promote the diversification of plant species (Brown, 2001). Many studies have investigated on species richness along elevation gradient across habit and taxa (Sanders et al., 2003),

as part efforts to understand ecosystem effects on biodiversity and maintenance of biodiversity (Gytnes and Vetaas, 2002). Furthermore, the observation relations between species distribution and elevation bands may also help to understand the possible effects of climate change, e.g. by providing baseline information to measure the effect of climate change and anthropogenic changes on vegetation.

The forest herbs, which play important role for rural communities for example, the livestock totally dependent on them for fodder and as traditional medicines, have been hardly studied from diversity standpoint (Singh and Singh 1987). Quantitative information on the forest floor species of the Central Himalaya region is generally lacking except for studies done by Rawat and Singh (1989), and Singh and Singh (1992). Interestingly, most of the recent major field experiments addressed questions relating to species diversity which has been carried out in grasslands. But forest herbs of the Himalayan region remain poorly studied.

In the present study we investigate herb species richness (spermatophyte) in terms of taxonomical diversity and species composition in relation to oak and pine forests in Central Himalayan forests.

2. Material and Methods

The study area is located between 29°21′ and 29°24′ N latitudes, and between 79°25′ and 79°29′E longitudes, in the elevational belt of 1600-1950 m asl around Nainital town in Kumaun region

of Central Himalaya. The two major forest types, viz., Quercus leucotrichophora (oak) and Pinus roxburghii (pine) were selected for this study. The climate is monsoon temperate. The mean monthly temperature ranged from 11.5°C (January) to 18.4°C (June). The rocks of study area belongs to krol series which is a sequence of limestone, grey and greenish grey and purple slates, siltstones (Valdia, 1980). Soil texture is sandy clay and it is acidic in nature. The sites having minimal biotic disturbances in terms of grazing or herbage removal were selected. The site variations due to the canopy changes are presented in Table 1. For detailed studies of plant biodiversity and other vegetational parameters, selected sites were divided into three stands, viz., hill base, hill slop and hill top (HB, HS and HT, respectively).

Table 1. Certain characteristic of study sites

Characters	Forest	
	Close	Open
Elevation (m)	1950	1600
Mean annual temperature (°C)	16	15.8
Total rainfall (cm)	216	200
рН	6.8	5.6
Nitrogen (%)	33	26
Organic carbon (%)	3.5	3.7
C: N ratio	10.6	14.2
Moisture content (%)	42	35

Phytosociological analysis of the herb species in each forest site was carried out by randomly placed 20, 1×1 m² quadrats during the peak growth month (September). Diversity was calculated by using Shannon-Wiener index (1963) as:

$$H' = \sum_{n=1}^{l} Ni/N \log 2 Ni/N$$

where, Ni is the total number of species i and N is the number of individuals of all species in that site. Concentration of dominance was measured by Simpson's Index (1949) as: $C = \Sigma$ (Ni/N)2 where Ni and N are the same as for the Shannon-Weiner information function. Beta-diversity was calculated following Whittaker (1975) as: $\beta = Sc/s$ where, Sc is the total number of species encountered in all quadrats and s is the average number of species per quadrat. Equitability or Evenness was calculated to represent the distribution of individuals among the species (Whittaker, 1972) as: E = S / (log Ni - log Ns)where, S is the total number of species, Ni is the number of individuals of most important species, Ns is the number of individuals of least important species and E is the evenness index.

3. Results

The forest herbs species in the oak and pine forests belongs to 21 families. The total number of species present in the oak forest and pine forest was 32 and 41, respectively.

Table 2. Taxonomic distribution of species (G, Genus; S, Species)

Family	Oak		Pine	:
	G	S	G	S
Asteraceae	4	4	9	9
Acanthaceae	1	1	1	1
Apiaceae	2	2	2	2
Amaranthaceae	1	1	-	=
Bornginaceae	-	-	1	1
Brassicaceae	-	-	1	1
Commelinaceae	1	1	1	1
Companulaceae	-	-	1	1
Cyperaceae	1	1	2	2
Fabaceae	2	2	2	2
Geraniaceae	1	2	-	-
Gentiaceae	1	1	1	1
Liliaceae	1	1	-	-
Lamiaceae	3	3	7	7
Orchidaceae	2	2	1	1
Oxalidaceae	1	1	-	-
Poaceae	1	1	2	2
Polygonaceae	1	1	1	1
Ranunculaceae	1	1	1	1
Rosaceae	1	1	1	1
Rubiaceae	1	1	2	3
Violaceae	1	1	-	-
Utricaceae	2	2	1	1
Zingiberaceae	2	2	1	1
Caryophyllaceae	-	-	1	1
Crassulaceae	-	-	1	1

Table 2 depicts diversity of the Angiosperm family in both forest sites. In the oak forest, Asteraceae was represented by four species, followed by Lamiaceae (3 spp.), Fabaceae, Orchidaceae, Utricaceae, Zingiberaceae, Apiaceae and Geraniaceae (2 spp. each) and remaining 13 families were represented by one species each. Taxonomically, Asteraceae was the dominant family (with 4 genera), followed by Lamiaceae (with 3 genera), Apiaceae, Fabaceae, Orchidaceae, Utricaceae and Zingiberaceae (with 2 genera each) and remaining 14 families were represented by single genus only.

In the pine forest, Asteraceae was represented by nine species followed by Lamiaceae

(7 spp.), Rubiaceae, (3 spp.), Fabaceae, Poaceae, Apiaceae, and Cyperaceae (2 spp. each) and remaining 14 families were represented by single species. Taxonomically, Asteraceae (with 9 genera) was the most diverse family followed by Lamiaceae, (with 7 genera), Apiaceae, Poaceae, Rubiaceae and Cyperaceae (with 2 genera each) and remaining 13 families were each represented by a single genus (Table 2).

The number of species varied spatially in both forests. In oak forest it varied from 15 (HT) to 30 (HB) and in pine forest from 12 (HT) to 23 (HB). Across the forests, maximum species were present in oak forest (at HB, 30) as compared to pine forest (at HB, 23). Species richness was higher (7.4) at HB and lower at HT (5.0) in oak forest. Similar pattern was found in pine forest, i.e., maximum species richness was at HB (10.5) and minimum at HT (4.7).

Table 3. Comparison of diversity indices (Sp, species number; Sr, species richness; Bd, beta-diversity; H', diversity; Cd, concentration of dominance; E,

Indices	Oak fo	orest		Pine f	Pine forest		
	HB	HS	HT	HB	HS	HT	
Sp	30	23	15	23	17	12	
Sr	7.4	6.9	5.0	10.5	6.5	4.7	
Bd	4.5	4.6	4.6	2.8	2.9	2.8	
Η'	4.2	4.2	3.5	4.4	4.0	3.4	
Cd	1.4	0.1	0.1	0.1	0.2	0.1	
E	31.7	27.1	17	27.3	27.4	31.4	

Among the both forest site, species richness value was maximum in pine forest at HB (10.5) and minimum in oak forest at HB (7.4). Beta diversity showed pronounced effect at both sites. The value for oak forest varied marginally from 4.5 (HB) to 4.6 (HS), respectively. While for pine forest, it remained approximately same at all sub-sites. Between the forests, the value was higher in oak forest than pine forest. The lowest value of beta-diversity in oak forest was observed at HB (4.5) and for pine forest at HS (2.8). Equitability/evenness value ranged from 17.0 (HT) to 31.7 (HB) in the oak forest. A reverse pattern was observed in the pine forest (31.4 at HT and 27.3 at HB).

Table 4. Forest wise ratio of species, genera and family (F, Family; G, Genus; S, Species)

Forest	F:G	E. C	G: S
1 Olest	U.1	г. э	U. S
Oak	1.2	1.3	1.0
Pine	1.4	1.5	1.1

The concentration of dominance fluctuated from 0.1 to 1.4 in oak and from 0.1 to 0.2 in pine forest (Table 3). It was comparatively higher in the oak forest. The low value of concentration of dominance indicates that the dominance is shared by many species. The ratio of family to species, family to genera and genera to species for the both forests indicated higher taxonomic diversity in pine forest than that in the oak forest (Table 4). Percent contribution of perennial herbs is maximum in oak forest than the pine forest (Figure 1).

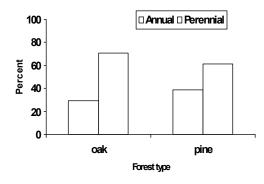


Figure 1. Percent contribution by life forms in oak and pine forests

4. Discussions

The changes in topography, altitude, precipitation, temperature and soil conditions contribute to the diverse bioclimate that results in a mosaic of biotic communities at various spatial and organizational levels. Diversity represents the number of species, their relative abundance, composition, interaction among species and temporal and spatial variation in their properties. Where richness and evenness coincide, i.e., a high proportion of plant species in the vegetation are restricted, community of that area is supposed to have evolved through a long period of environmental stability.

The observation in the present study showed that the oak forest was typically moister than the pine forest which is consistent with the study of Saxena and Singh (1982). Pine forest was about 25% more diverse (40 spp.) in comparison to the oak forest (32 spp.).

Asteraceae was the dominant family in pine forest because most of the species of the family are primary successionals and have different types of growth forms. This family showed basal as well as erect forms in which basal forms emerged near the ground-level with well-developed petioles and formed a short-umbrella (Mehrotra, 1998). They can tolerate cool temperatures to high irradiances with

low density of herb cover. However, erect forms are less able to capitalize on the spring window of light than any other form. This showed that the different growth forms reflect a mixed type of forest response (harsh dry to mesic). Moreover, basal forms of Violaceae showed affinity to mesic and cold conditions under the oak forest. Few species are able to tolerate the entire spectrum of environment and range throughout the gradient (Brown, 2001).

Our study showed that perennials gained dominance over annuals in oak forest as well as pine forest (Figure 1). Perennial have ability to conserve soil and with their extensive root systems of perennial grasses they also add more organic matter to the soil than annuals which can be more favourable for plant growth. Singh and Singh (1987) observed that annuals colonize and dominate the early stages of succession. Annuals to perennials species ratio are higher at primary successional site than climax stage. Species richness generally increases during secondary succession when environmental and edaphic conditions are favourable with low fluctuations.

The above results indicate that the oak forest makes climax stage for succession. The evenness and β -diversity showed similar values in sub-sites of oak as well as pine forests. The high values of beta-diversity indicate that the species composition varied from one stand to another.

Equitability/evenness varied in pine forest with respect to sub-site from 27.3 (HB) to 31.4 (HT) (Table 3). This was because of the conditional presence or absence of functional relationship of species. Comparatively higher value of equitability in pine forest with respect to oak forest indicated that the individual herb species distribution is higher. This may perhaps due to intermediate level of disturbance.

The allocation of species in the Kumaun Central Himalaya is mainly governed by moisture and temperature gradients that incorporate the effect of many physical factors. Moustafa (1990) found that the association of community types is the result of the performance of the species in response to the environmental conditions that prevail in a particular forest type. Tewari (1982) assumed that the temperature gradient is the net product of elevation and aspect; while moisture gradient is a function of slope degree, soil texture and nature of soil surface. In addition to that, hierarchical diversity concerns taxonomic differences at other than the species level. Pielou (1975) and Magurran (1998) suggested that hierarchical (taxonomic) diversity would be higher in an area in which the species are divided amongst many genera as opposed to one in which most species belong to the same genus, and still higher as these genera are divided amongst many families as

opposed to few. The families, genera and species ratio was observed maximum in the pine forest as compared to the oak forest in the present study (Table 4), indicating diverse taxonomic vegetation in the pine forest.

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THE INFLUENCE OF DIFFERENT SURFACE PRETREATMENTS ON THE SHEAR BOND STRENGTH OF REPAIRED COMPOSITE

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ABSTRACT: The purpose of this study was to investigate the effect of surface pretreatment protocols and different aging periods on the shear bond strength of the repaired composite. One hundred and fifty specimens were prepared from Silorane Filtek P90 (3M, USA) resin composite material. The specimens were divided into five main groups (thirty each) according to the followed surface pretreatment protocols. The surface of the first group was pretreated with acid etching by 37% phosphoric acid etching, in the second group the surface was pretreated with carbide finishing bur, while in the third group the surface was pretreated with air abrasion of Al₂O₃ powder. A thin of Silorane Filtek P90 bond (3M, USA) was applied over the treated surface then the repaired composite resin material was packed. The remaining two groups were considered as two different control groups, either cohesive or incremental control. Both of the control groups were prepared without addition of the bonding agent. Each of the previously mentioned groups was divided into three subgroups, ten each, according to the aging period (24 hours, one month and three months). All the specimens were subjected to shear bond strength using a universal testing machine at a cross head speed of 0.5 mm/min. The data were analyzed with three-way ANOVA and the means were compared by Tukey's post-hoc test and the significance level was set at P≤0.05 (=0.05). The results showed air abrasion provided higher composite-composite repair bond strength followed by adhesive resin applications while acid etching of the substrate Silorane composite resin material failed to improve the repaired shear bond strength; meanwhile it had a cleansing effect. Aging the repaired composite for three months significantly reduced the shear bond strength.

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Key words: Silorane Filtek P90 composite, air abrasion, acid etching, carbide bur, bonding agent

1. INTRODUCTION

The use of composite resin for dental restorations has increased with the improvement of the bonding systems, curing systems, and mechanical-physical properties of the resin systems. The recently developed resin composites are superior to the earlier versions in regard to wear resistance and color stability, Gordan et al.,(2009). Moreover composites are less stable in fluids and their degradation rate is higher in saliva simulating conditions, depending on the chemical nature of the monomers, amount of dimers and oligomers, the degree of cross-linking in the polymerized matrix. In addition, fatigue can accelerate the wear process in composite materials.

All these factors result in discoloration, degradation, microleakage, wear, ditching at the margins, delamination or simply fracture being often experienced in clinical situations, which in turn, may require repair or replacement of the restoration⁽²⁾. In light of the operative philosophy, repair as an alternative to complete removal would preserve the tooth as it is often difficult to remove an adhesive

restoration without removing an integral part of the tooth, Frankenberger et al., (2003); Furuse et al., (2008). Various methods have been suggested to establish adequate bond strength between the existing composite and the new composite. These methods include surface treatments and the use of intermediate bonding agents to enhance repair bond strength Ilie et al., (2007); Jorden et al., (2006).

Air abrasion is a surface treatment that causes "micro" retentive features. When it was followed by using bonding agents a better surface wetting occurs as the adhesive resin infiltrates into the composite microscopic surfaces, Ilie et al.,(2007); Jorden et al.,(2006) .The use of phosphoric acid in fact does not necessitate the purchase of additional armamentarium in dental practice such as chairside air abrasion devices making repairs cost-effective for the practitioners when repaired composites were treated with 37% phosphoric acid, it can be suggested that the mild acidic primer of the self etching system was able to promote an adequate surface cleansing

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(Jorden *et al.*,2006). Another minimally invasive repair preparation is roughening with a carbide bur which is an easy and appropriate method for bonding of resin composite repair restorations (Ilie *et al.*,2007).

While surface roughness promotes mechanical interlocking, the bonding agent improves surface wetting and chemical bonding with the new composite(Frankenberger *et al.*,2003; Jorden *et al.*,2006; Gordan *et al.*,2006; Ilie *et al.*,2007; Furuse *et al.*,2008). It could also be expected that utilization of intermediate adhesive monomers would increase the repair bond strength as reported earlier. Adhesive promoters allow penetration of monomers into the roughened composite surface, creating a nonpolymerized layer by inhibition of oxygen that would eventually aid adhesion of new composite layers, (Nikkola *et al.*,2004; Papacchini *et al.*,2007).

The effect of aging was relevant, the bond strength of aged composites decreased as the storage period increased, therefore, lower bond strengths were obtained after aging for three months in water or ethanol, Malmstrom *et al.*, (2005)

Repair protocols have shown widely variable repair bond strengths, which are in the range of 25 to 80% of the cohesive strength of the substrate material. However, there is no consensus on what protocol would be more successful for composite repair, Papacchini *et al.*,(2007).

2. MATERIAL AND METHODS

2.1. Materials:

2.1.1. Discs

Ninety discs of Silorane based resin composite material were prepared using a prefabricated split teflon mold of 6mm diameter and 2mm height. First a clean glass slap was used to ensure a flat smooth surface and the split mold was put over it. Then Filtek Silorane composite material was packed inside the mold. Another glass slap was placed on the top surface of the mould to extrude the excess material and maintain a flat top surface. Then a mylar strip was placed over the top surface of it to prevent air inhibited layer (Papacchini et al., (2007). The upper surface of Filtek Silorane samples was cured for 40 seconds as recommended by manufactures'. Curing of all samples was done with Degulux (halogen curing, Degussa, Germany) light curing unit. All the prepared specimens were finished and polished.

2.2. Subjects:

Two different control groups (30 each) were prepared. The first control was incremental and the

second was cohesive. the incremental control group was cured by incremental technique in the same way the other specimens were prepared. However, the cohesive control group was cured by bulk curing in another prefabricated split teflon mold of 6mm diameter and 4mm height. The specimens were cured from the top and the bottom for 40 seconds each. The prepared substrate specimens were stored for one month time lapse in deionized water. Then they were divided into three main groups (30 each) according to the followed surface

2.2. Methods:

2.2.1. Pretreatment protocol.

In the first group (T_1) acid etching with 37%phosphoric acid etching was done for 15 seconds then rinsing for 10 seconds and dryness for five seconds.

In the second group (T₂) carbide finishing bur (4507370, Maillefer, Dentsply, Switzerland) was used.

In the third group (T_3) air abrasion with Al_2O_3 powder was carried at 3 bars pressure for ten seconds. Each group of the five groups was further subdivided into three subgroups (10 each) according to the aging period after surface treatment, whether 24 hours, one month and three months.

After surface pretreatment protocols were carried, Silorane bond (3M,USA) was applied over the upper treated surface with a microbrush and lightly air dried to insure having thin coat of the bonding agent. Curing of the bonding agent was done for 20 seconds according to manufacturer instructions. Filtek Silorane was packed over the bonding agent in the prefabricated split teflon mold of (6x4 mm).

All the specimens were stored at room temperature at $23^{\circ}C \pm 2^{\circ}C$ in deionized water while water was changed every 48 hours.

2.2.2.Shear bond strength testing:

After different storage periods, shear bond strength test was done using a universal testing machine at a cross head speed of 0.5 mm/min.

The load at failure was divided by bonding area to express the bond strength in MP. $\sigma = P/ \pi r^2$

Where; σ = shear bond strength (MP)

 $P=load\ at\ failure\ (N)$

 $\pi = 22/7 = 3.14285$

 r^2 =radius of Silorane disc=6mm/2=3mm

The load-deflection curves were recorded using computer software (Nexygen-MT; Lloyd Instruments).

2.2.3. Scanning electron microscope (SEM) evaluation:

Extra four discs of Silorane based resin composite material were prepared in the same way as the other samples were prepared.

Three of these samples were subjected to the previous three surface treatment protocols (etching with phosphoric acid, finishing with carbide bur and air abrasion). The fourth sample received no treatment. Each of the four specimens was mounted separately in aluminium stubs, sputter coated with gold. Then these specimens were observed using scanning electron microscope (JXA-840A, Jeol, Japan). Micrographs were taken at standard magnification

(500X) in order to document the surface texture created by different mechanical or chemical treatments performed in each group.

2.2.4. Statistical analysis:

Data were presented as means and standard deviation (SD) values. Regression analysis using two way analysis of variance (ANOVA) was used for studying the effect of surface pretreatment, aging and their interaction on mean shear bond strength. Tukey's post-hoc test was used for pair wise comparison between the means when ANOVA test is significant.

The significant level was set at $P \le 0.05$. Statistical analysis was performed with SPSS $16.0^{\$}$ (Statistical Package For Scientific Studies) for windows.

Table 1- Materials used in study

Material brand name	composition	Manufacturers	Batch no
Filtek p 90 composite	Hydrophobic siloxane and	3M-ESPE,	4762TK
	The low shrinkage oxirane polymers	Dental products St. Paul,	
	Filler: silanized fine quartz particles and	MN,USA	
	radiopaque yttrium fluoride.		
	Hydrophobic bifunctional monomer, acidic	3M-ESPE, Dental	
Filtek p 90 bond	monomers and silane-treated silica filler	products St. Paul, MN,	8AY
		USA	
Scotchbond Etchant	37%phosphoric acid gel	3M-ESPE, Dental products St. Paul,MN,USA	N121326
KOTOX®. Aluminum Oxide powder.	50um Aluminum Oxide powder without silicosis	BEGO, Germany	46044

3. RESULTS

Both surface pretreatment and aging period had a highly significant effect on the shear bond strength. Also the interaction between the two variables had a statistically highly significant effect on mean shear bond strength. Table (2) showed that Cohesive Control groups showed the statistically significant extremely high mean shear bond strength 59.82 MPa. This was followed by air abrasion which showed about 55% of the cohesive bond strength. It had high mean bond strength values 35.21MPa. However, Carbide bur showed significantly low shear bond strength which was about 25% of the cohesive bond strength (16.32 MPa).

Table (3) showed that, the statistically significantly highest mean shear bond strength was found in group stored for 24 hours. A significant decrease in mean shear bond strength was found in group stored for one month. Also there was a significant decrease in mean shear bond strength was

found in group stored for three months. However for both groups stored for one month and for three months, there was no statistically significant difference in the mean shear bond strength.

Table (2):Effect of surface pretreatment of the repaired Silorane- Silorane resin composite specimens on the shear bond strength

Cohesive control		Incremen tal control		Etching		Carbide bur		Air abrasion		<i>P</i> -value
Me an	S D	Me an	S D	Mea n	S D	Mea n	SD	Me an	SD	- 1
59. 83a	8. 9	10. 33 ^d	4. 6	10. 54 d	2.5	16.3 2 °	5. 3	35. 21 ^b	9.3	<0.0 01*

*: Significant at $P \le 0.05$, Means with different letters are statistically significantly different according to Tukey's test

Table (3):Effect of aging the repaired Silorane-Silorane resin composite specimens on the mean shear bond strength

24 hours		1 month		3 months		<i>P</i> -value
Mean	SD	Mean	SD	Mean	SD	
28.13	11.6	25.44 ^b	10.1	24.41	18.3	<0.001*

^{*:} Significant at $P \le 0.05$, Means with different letters are statistically significantly different according to Tukey's test

Table (4) showed that there were no statistically significant difference between (Control Cohesive x 24 hours=65.32 MPa), (Control Cohesive x 1 month=60.71 MPa) and (Control Cohesive x 3 months=54.63 MPa) which showed the statistically significantly highest mean shear bond strength values.

Table (4):Comparison between the interaction of surface pretreatment protocols and different aging periods of the repaired Silorane-Silorane resin composite specimens

Surface pretreatment x Aging	Mean	SD	Rank	P- value
Cohesive x 24 hours	65.3 2	6.8	A	
Cohesive x 1 month	60.71	5.9	A	
Cohesive x 3 months	54.63	10.5	A	
Incremental x 24 hours	11.83	6.5	D	
Incremental x 1 month	8.83	3.2	D	
Incremental x 3 months	10.10	3.1	D	
Etching x 24 hours	10.55	2.3	D	
Etching x 1 month	10.95	2.6	D	0.002*
Etching x 3 months	10	2.7	D	
Carbide bur x 24 hours	17	5.4	С	
Carbide bur x 1 month	15.73	4.2	С	
Carbide bur x 3 months	16.31	6.5	С	
Air abrasion x 24 hours	43.51	6.6	В	
Air abrasion x 1 month	30.90	8.1	В	
Air abrasion x 3 months	31.21	7.3	В	

Scanning Electron Microscope observation (SEM):

S.E.M analysis revealed a significant morphological changes of air abraded sample. Air abrasion with Al_2O_3 with a mean particle size of 50 μ m produced a roughened, highly irregular surface topography with numerous microretentive pores as shown in figure(1).However, figure (2) showed that

using carbide finishing bur resulted in formation of superficial scratches and grooves on the surface of composite sample. On the other hand, figure (3) showed etching with 37% phosphoric acid didn't cause any morphological change in the composite surface, apart from producing a Cleaning effect. However, figure (4) showed no changes in the surface texture in sample with no surface treatment.

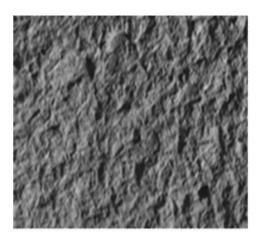


Figure (1): Scanning electron micrograph of air abraded composite sample at 500X showed roughened, highly irregular surface topograph

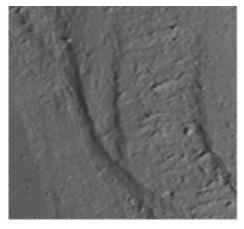


Figure (2): Scanning electron micrograph of carbide bur treated composite sample at 500X showed superficial scratches and grooves.

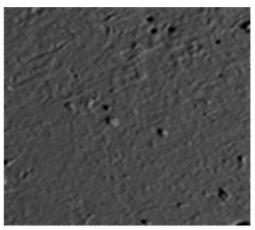


Figure (3): Scanning electron micrograph of acid etched composite sample at 500X showed no changes in the surface topography

DISCUSSION

Clinically intraoral surface pretreatment of an aged resin composite has two purposes: to remove the superficial layer altered by the saliva exposing a clean, higher energy composite surface and to increase the surface area through creation of surface irregularities (Jounior etal, 2009). According to Brosh et al in (1997) the union between the old and the new composite in a repair situation may occur by three distinct mechanisms: (1) through a chemical bonding with the organic matrix; (2) through a chemical bonding with the exposed filler particles, and (3) through micromechanical retention to the treated surface. Bonding to the resin matrix relies on the unconverted C=C double bonds remaining in the surface of the aged composite. Three different surface treatment strategies were employed in the current study. Two different types of mechanical treatments were done for the surface roughening (air abrasion and carbide bur) and one chemical treatment (acid etching). However two different control groups (cohesive and incremental) were prepared with no surface treatment.

As the bond strength of composite to the etched enamel has been extensively investigated and reported to be about 15-30 MPa, hence the repair bond strength of composite resin restoration shouldn't be decreased than this value. It is well known that composites seldom fail mechanically at the junction with etched enamel and it can therefore be surmised that a repair bond strength that is similar to that of composite to etched enamel would be clinically adequate. On the basis of this fact the results of this study would suggest that any of the

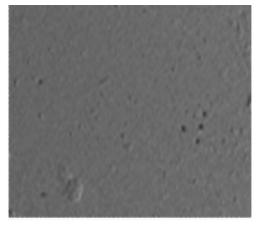


Figure (4): Scanning electron micrograph of composite sample with no treatment at 500X showed no changes in the surface topography

repair protocols would produce adequate repair bond strength Tabatabaei etal in (2004).

In the current study two different control groups were prepared. The first group was the cohesive control group which wasn't subjected to any surface treatment. This group represented the cohesive bond strength of the material used in the study Silorane based composite resin. Fawzy et al in (2008) recommended using the cohesive bond strength of the intact non repaired material as a control in the evaluation of the repair bond strength. Thus varied repair protocols can be compared in reference to the high value of cohesive control.

However several studies used the non treated samples as a control group (Bonstein et al., in (2005); Cavalcanti et al., in (2007), D'arcangelo and Vanini in (2007), Costa et al in (2009). Their explanation was to obtain the lowest value upon which the repaired composite resin restoration shouldn't decrease. So the second control group was the non treated Silorane based composite samples which weren't subjected to any surface treatment. This group represented the incremental bond strength of Silorane based composite resin material. Tezvergil et al .,in (2008)stated that the shear bond strength between successive layers of Silorane composites showed a decreased values and increase in the percent of adhesive failure when the time of placement between the successive layers increased. This was in accordance with this study which slowed low shear bond strength of incremental control groups.

Based on these investigations, in this study The cohesive control groups had the highest mean shear bond strength values 59.83 MPa, however the incremental control groups had the lowest mean shear bond strength values 10.33MPa.

The result of the current study showed that surface pretreatment protocols and aging periods had a statistically significant effect on the mean shear bond strength.

The current study revealed that air abrasion yielded the highest repair shear bond strength compared to other selected surface treatments. As shown in scanning electron micrographs numerous microretentive pores were observed at 500x magnification. The microretentive pores increased the surface area available for wetting and bonding by the adhesive resin.

Several studies (Shadad and Kennedy in (1998); Cavalcanti *et al.*, in (2007) and Junior *et al.*, in (2009) who found that surface treatment with AL_2O_3 powder yielded the highest repair shear bond strength that nearly the cohesive bond strength of the original composite.

On the contrary, Bonstein *et al.*, in (2005) found that surface treatment with diamond bur yielded the highest repair shear bond strength 27 MPa. These finding was explained due to the presence of grooves and crevices produced by diamond bur which caused a micromechanical retention that increased the bond strength. As shown in scanning electron micrographs superficial grooves and scratches were observed at both 500x magnification.

The results of the current study revealed that chemical treatment of the surface by 37% phosphoric acid etching yielded insignificant increase in the bond strength as it showed virtually no increase in bond strength when compared to the control group (10.54 Mpa vs 59.83Mpa respectively). Acid pretreatment didn't significantly change the morphological pattern of the aged composite surface and its action was limited to superficial cleaning effect of composite surface as repoted by (Martin et al., in (2001); Bonstein et al., in (2005) and Fawzy et al., in (2008). These results was proved by scanning electron micrographs which showed no morphological changes in the pattern of the resin matrix as confirmed by similar bond strengths in comparison to the untreated sample.

For the effect of aging period after repair procedure. In the current study there is a significant decrease in the shear bond strength after different aging periods 24 hours, one moth and three months; however there is no significant difference between aging for one month and three months.

This result was in accordance with Brendeke and Ozcan in (2007) as they found that aging the composite through water storage for two months produced significantly lower bond strengths than those stored for one week. They attributed their results to the fact that water is absorbed by diffusion controlled process and causes leaching of unreacted monomers and swelling of the matrix. Water act as a plasitsizer and therby weakens the polymer structure. Also Furuse et al., in (2007) and Fawzy et al., in (2008) stated that during clinical service or aging, resin based composite materials surface, resin degradation, debonding of the filler/matrix surface and leaching out of some constituents. Changes in the surface layer of the aged resin based composite could affect its bonding quality to receive the newly added material during repair.

On the contrary, water storage for two months explained due to two phenomena: either the aging effect was not dramatic and therefore the surface free radicals were not affected within the storage period and were sufficient for good adhesion, or the surface softening through water led to better penetration of the silica particles upon the impact of the particles (Perriard *et al.*, in (2009) and Ozcan *et al.*, in (2009).

Conclusion:

Within the limitations of this in vitro study the following conclusions were suggested:

1-Air abrasion provided higher repair bond strength followed by adhesive resin applications.

2-Acid etching of the substrate Silorane composite resin material failed to improve the repaired shear bond strength; meanwhile it had a cleansing effect.

3-Aging the repaired composite for three months significantly reduce the shear bond strength.

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Effect of Inoculant Composition on Grain Refining Process in Aluminum Casting Alloys

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Abstract. Grain refinement plays a crucial role in improving characteristics and properties of cast and wrought aluminum alloys. Generally Al–Ti and Al–Ti–B master alloys are added to the aluminum alloys to grain refine the solidified product. The mechanism of grain refinement is of considerable controversy in the scientific literatures and has been the subject of intensive research. There is common question for all producer of aluminum castings that how they can be sure about the quality of nucleation. Thermal analysis is an important tool to answer this question. In this research, different types of inoculants were used to investigation of nucleation in A356 aluminum alloy. The cooling curve of each sample was recorded and by using a special computer program, the first derivative was calculated. By calculating zero curve and analyzing the cooling curve, it is possible to predict the quality of nucleation and calculation fraction of solids, latent heat and other information. The result of this research have shown that if maximum undercooling of nucleation was approximately 3.8 C, the quality of nucleation process will be more reliable.

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Key words: Thermal Analysis, Grain Refining, Nucleation, A-356 Aluminum.

1. Introduction

Among aluminum allovs with high mechanical properties the various grades of Al-Si7Mg (A-356) occupy a position of growing importance. The alloy in fact has interesting technological characteristics. satisfactory castability, low tendency to hot tear, good corrosion resistance, and no susceptibility to stress corrosion [Centre Technique1989]. Grain refinement plays a vital role in aluminum alloys. It improves the casting quality by reducing shrinkage and gas porosities, uniform distribution of intermetllic phases, improvement of mechanical properties and pressure tightness [Shivakumar, Wang, Apelian, 1991], [Apelian, Sighworth, Wahler 1984]. Interest in the grain refinement of aluminum dates back with the work of Rosenhain et al [1930] Sicha and Bohem [1948] were the first to show that grain refinement improve markedly tensile strength and elongation in an Al- 4.5% Cu alloy casting. During the past 70 years, there are hundreds of academic and industrial researches who try to describe the mechanisms and technologies of grain refinement in aluminum alloys.

Titanium and Boron are main grain refiners in aluminum industry which may be added to molten metal in the form of salt fluxes, such as K_2 Ti F_6 and K B F_4 , or in the form of master alloys such as Al- Ti or Al – Ti – B or Al – B . Salt fluxes, react with molten metal and reduce efficiency of refiners and produce corrosive fume , increase hydrogen content and inclusions in the melt and not recommended for production of engineering parts

[Sighworth, G.K.1986], [Sighworth, Guzowski, 1985]

2. Mechanisms of grain refinement

There are various theories who describe the mechanism of grain refinement in aluminum alloys. Peritectic theory proposed by Crossley and Mondolfo [1951], and Marcantonio, Mondolfo, [1970] and Davis, Dennis, Hellawell [1970] found particles of TiAl₃ at the center of aluminum grains and orientation relationships between these particles and the surrounding aluminum.

The Carbide theory assumed by Cibula [1950] established that the Titanium Carbide (Ti C) nuclies are main nucleant particles in aluminum alloys. Recent researches by Mohanty et al [1994] have demonstrated that TiC particles are not effective nucleants due to their thermodynamic instability, and also there are not enough atomic carbons in molten aluminum to produce enough TiC nucleation sites. Boride theory [Cibula 1952], Peritectic Hulk theory [1991], metastable phase of (AL – Ti) B₂, which is formed by a range of solid solutions of ALB2 and TiB₂ and Hyper nucleation theory assumed by Jones [1976] and Pearson [1987] are part of studies to describe the mechanisms of nucleation, but neither of these have been proven conclusively. Table 1 present summary of the mechanisms of grain refinement in aluminum with the main observations for each of the different master alloys.

3. Grain refinement in Al – Si casting alloys

Most of researches on grain refinement in Al casting alloys, concentrate on the mechanism of nucleation by adding Ti, Ti - B or B content master alloys or fluxes. There are limited studies about the effect of chemical composition of aluminum alloy on grain refinement. Backerud, Yidong, [1991] and Bakerud, Johnson [1996] established that the alloying element such as Zn, Mg and Si added constitutional undercooling causes dendritic tips to become finer and coarser grains result. St John et al [1999] have shown of two nucleation mechanisms in Al - Si alloys. One involves at the mold wall nucleation, while the other impiles the activation of substrates in melt by constitutional under cooling resulting from Si content. Figure 1 show grain sizes relating to Si content of molten metal. Presence of Si is accompaniment with constitutional under cooling in Al - Si systems, which leading to reducing in grain size, followed by an increase associated with a change in the growth mode of the interface. [Ibarra, 1999]

Table1: Summary of grain refinement mechanisms in Al-Si casting alloys.

	Al-Si (Casting Alloys
Master Alloy	Effect	Mechanism
		Drop in Peritectic formation of
Al-Ti	Poor	$Ti_{x}Si_{y}Al_{t-(x+y)}$
		to below liquidus of alloy
		α (Al) nucleates of
Al-Ti-B	Reasonable	$Ti_{x}Si_{y}Al_{t-(x+y)}$
Ti/B > 2.2		Which forms peritectically on TiB2
		Eutectic
Al-B	Excellent	Formation of α (Al)
		$L \rightarrow \alpha$ (Al)+AlB2
	Good,	Eutectic
Al-Ti-B	Better than if	Formation of α (Al)
AI- I I-D	Ti/B > 2.2	At TiB2 interface due
> 0 11 1		to solute B

Refinement limited by drop in peritectic temperature by Si.

4. Experimental procedure

A-356 aluminum primary ingots with following chemical composition used as casting alloy:

% Si	% Mg	%Cu	
6.8–7.3	0.25-0.3	<0/1	
%Sn	% Zn	%Fe	%Al
<0/1	<0/1	<0/15	Reminder

Tower shaft melting and holding furnace with 2 tones per hour melting rate and 6 tons holding capacity, was used as melting and holding unit.

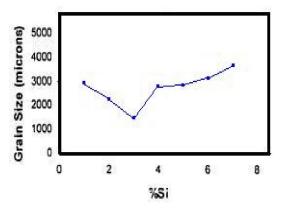


Figure 1- Effect of Si addition on refinement of aluminum alloys [Ibarra, 1999].

Cylindrical steel mold with 50 mm diameter and 75 mm height, preheated to 250°C and coated with zircon base diecoat, was used to casting the samples. To recording temperature changed versus time cooling curves, a k type thermocouple (Chromel – Alumel) was adjusted in center of mold. The molten metal at 760°C was poured in a 500 kg capacity ladle. Rotary degassing system was used to degassing and inclusion removal of molten aluminum with argon neutral gas, for 6 minutes.

To inoculation of molten aluminum, the 10 kg capacity crucible was used which preheated to 500°c. The required amount of each inoculant was placed in crucible and molten metal from 500 kg ladle poured on it. 4 samples from each type of inoculants and totally 20 samples were poured in cylindrical steel dies with 100 grams capacity at 705°C. In the case of salt flux, it is added by a plunger to molten metal. To recording the cooling curve, it is necessary to record the several thousands measurements for each test. A measurement rate of 60-80 per second by a thermo analyzer type MW- 100 which connected to P5 personal computer was used to ensure stabilization of measurements and provide the require accuracy for analysis of the solidification curve. The Tac-Plote 10 Computer Program was used to plot the cooling curves from experimental data. To measuring the grain size of castings, computer aided image analyzer system was used. For metallographic study of samples, the etchant solution with (60%HCL, 30%HNO₃, 5%HF, 5%H₂O) was used. To measuring the Ti and B content in cast specimens, spectrometery analysis was done on all samples. To analysis cooling curves and calculation its first derivative, solid percent, latent heat, and nucleation efficiency, a

computer program in Turbo C++ language was written.

5. Cooling curve and thermal analysis

A precise recording of the solidification and the differential analysis, i.e. determination of all influences involved, is the fundamental condition for proper assessment of grain refinement. Thermal analysis monitors the temperature changes in a sample as it solidify, and resulting plot is a curve of temperature versus time, Figure 2.

The grain size of castings has been related to differences in temperatures between a minimum. T_U occurring immediately after the beginning of solidification and the maximum temperature, T_R , reached due to recalescence of the sample. This quantity has been called recalescence undercooling ΔT_{R-U} [Tuttle,1984]. This parameter has been used to monitor the grain refinement of castings. By adding the grain refiners to the molten aluminum alloy the amount of the recalescence would be change. By monitoring these changes in casting, it is possible to predict the nucleation phenomena in castings [Tuttle,1984].

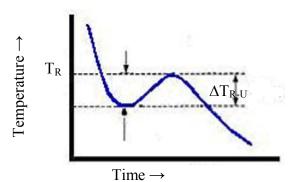


Figure 3- Cooling curve parameters.

6. Calculation of zero curve

Zero curve is the first derivative of cooling curve. To calculation of zero curve, it is assuming that there is no transformation or reaction in molten metal during solidification. Fourier and Newtonian methods could be use to analysis, and description the cooling curve once the zero curve is calculated. But the Fourier Method analysis is more reliable than Newtonian method [Emadi, et al. 2005] [Ihsan et al. 2004]. If the thermocouple was off-center in die. In this research the thermocouple fixed in center of die and Newtonian method selected to calculation of Zero Curve. In Newtonian method, thermal gradients across the sample can be considered to be zero and heat transfer take places by convection to the die at a constant temperature T_o. As the enthalpy decrease in metal is equal to the heat transferred to the die, the mathematical form of the Newtonian analysis is given as [Ihsan et. al. 2004]

$$L\rho V \frac{dfs}{dt} - V\rho C_P \frac{dT}{dt} = hA(T - T_0)$$

or

$$\left(\frac{dT}{dt}\right)_{CC} = \frac{1}{V\rho C_{p}} \left[L\rho V \frac{dfs}{dt} - hA(T-T_{0}) \right]$$

In which ρ is density, V is the volume of sample, and $C\rho$ is the specific heat. If there was no phase transformation, and by integration from equation, [D. Emadi, et. al. 2005]:

$$L = C_F \int_0^{t\sigma} \left[\left(\frac{dT}{dt} \right)_{GG} - \left(\frac{dT}{dt} \right)_{EG} \right] dt$$

This equation was used to calculation of Zero Curve.

7. Results and discussion

Figure 4 illustrates undercooling curves, first derivations and zero curves for sample no. 4. Variations of solid fraction with solidification time is illustrates in figures 5. Figures 6 and figures 7 illustrates grain structures for samples no.1 and 4 respectively.

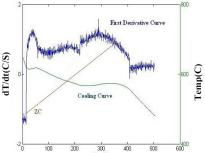


Figure 4- Cooling curve, first derivation and zero curve for sample no 4.

As the temperature decrease to eutectic, the nucleation of eutectic cells of Al-Si take place in molten metal. Latent heat release by nucleation, increase undercooling temperature to $T_{\rm U}$. Hunt [1984] shows that the nucleation rate at a given undercooling can be calculate as:

$$\frac{dN}{----} = K_1 (N_S - N) \exp \left(\frac{K_2}{-----} \right)
dt (\Delta T_{R-U})^2$$
(6)

N_S: Density of initial nucleation sites

K₁: Collision frequency of atoms of the melt with Nucleation sites of the heterogeneous particles

K₂: Interfacial energy balance between the nucleus, liquid and the foreign substrates on which nucleation occurs.

 ΔT_{R-U} : Nucleation Undercooling

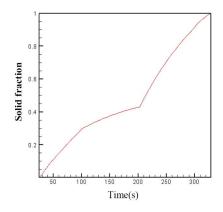


Figure 5- Solid fraction for sample no

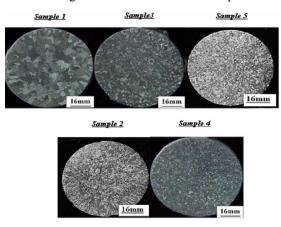


Figure 6- Macrostructure of Al–Si (A-356) alloy

Sample 1- Without grain refiner

Sample 2 - Al-5%Ti-1B grain refiner

Sample 3- Pressed powder Nucleant 2

Sample 4- Al-1.6%Ti-1.4%B grain refiner

Sample 5 - Al-10%Ti grain refiner

Table 2- Thermal analysis results

	Thermal Analysis Parameters								
Al Allo y A356	Type of Inocul ant	Amou nt of inocul ant added to molten metal	Ti and B conte nt of molte n metal	Solidifica tion Start Temperat ure (C)	Eutectic Solidifica tion start time (S)	Eutec tic Start Temp (°C)	Eutec tic Finali ze time(S)	Maximu m Eutectic Undercoo ling (°C)	Late nt Heat (J/gr)
Sam ple 1		0	-	615.7	18	568.8	216	7.9	215
Sam ple 2	Al- 5Ti-1B	200 gr	0.2% Ti .038 % B	615.8	25	565.6	330	3.125	352
Sam ple 3	Presse d Powde r Nuclea nt 2	20 gr	0.15 % Ti 0.035 % B	614.8	26	568.4	327	2.69	387
Sam ple 4	Al- 1.6%T i- 1.4%B	320 gr	0.1% Ti 0.08 % B	614	17	556.7	338	3.8	350
Sam ple 5	Al- 10Ti	100 gr	0.18 % Ti	603	16	548	337	2.8	373

Addition of inoculants base on producer recommendation

The nucleation rate may be affected by density of nucleation sites and maximum undercooling. Table 2 Summaries the results of thermal analysis. In samples without inoculant. the maximum undercooling is 7.9 °C. Concerning equation (6), the nucleation rate is high and it is expected to have reduced grain size and well grain refinement in castings. But metallography test of casting in figure 6 show coarse grain structure in samples without inoculants addition. This is attributed to recalescence where, at high nucleation rates, evolution of latent heat of crystallization is enough to re-melt nucleation sites and increase grain sizes.

Adding the inoculants to molten metal, is accompanied by increasing the nucleation sites but decrease in eutectic undercooling and decrease of nucleation rate according to equation (6). But Influence of inoculants to increase of nucleation sites is more than its effect on reducing eutectic undercooling. In fact, there is a competitive behavior between nucleation sites and rate of nucleation [25]. Both factors affect grain refining process, and for maximum refining, it is necessary to use both effects. In inoculated samples, the maximum undercooling was less than 3.8°C. Metallography tests of samples indicate maximum grain refinement in sample no. 4 by Al-1.6%Ti-1.4%B inoculant with 3.8°C maximum undercooling. The second powerful inoculant is Al-5%Ti-1%B with 3.1°C maximum undercooling. Nucleant 2 with 2.7°C undercooling is the less efficient inoculant in this research. Metallography tests of samples confirm these results Standard test method ASTM A247 was used to determine grain size in samples. The results of measurements are shown in table 3.

Table 3 – Grain size measurment

sample No.	grain size(μm)
1	2095
2	483
3	950
4	327
5	680

These results indicate that inoculation process increase nucleation sites in molten metal but reduce maximum undercooling and nucleation rate. Among the different inoculants, each one with less effect on maximum undercooling, will have more effect on grain refining process. Concerning the results in tables 2 and 3, the TiBloy inoculant with maximum undercooling 3.8 °C have the most effect on grain refining process in comparison with others.

8. Conclusion

- 1- In samples without inoculation, the maximum under cooling is high resulting coarse grain structures. Adding inoculant to molten metal is accompanied by increasing nucleation sites, but decrease maximum undercooling. Both items, appointment the efficiency of grain refining process. This mechanism described by Arab, Varahram, and Davami [1997].
- 2- Inoculation of molten aluminum, decrease maximum undercooling to 3.8°C or less. Whatever the undercooling was near to 3.8°C, the grain structure will be finer and whatever less than 3.8°C, the grain structure will be coarser.
- 3- The results of this research indicate that Al-1.6%Ti-1.4%B have greatest effect on grain refining process than the others. Afterwards, Al-5%Ti-1%B, and Al-10% Ti are effective inoculants respectively. At last, there is Nucleant 2.
- 4- It is interesting that the best grain refining will be available on 3.8°C maximum undercooling. The mechanism of grain refining in this condition will be an interesting research course for researchers.

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Effect of Magnesium and Nickel on the Wear and Mechanical Properties of Casting Bronzes

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Abstract: Investigation on tribological properties of cast metals is a most attractive research subject in recent years. Aluminum-Bronze cast alloys demonstrate proper mechanical and wear properties for this application. In this research, the effects of magnesium and nickel on tribological properties of cast Aluminum-Bronzes have been investigated. After the casting, the samples were heat treated, quenching and aging. The wear test conducted by pinon-disk apparatus and wear mechanisms and microstructure of the specimens were studied by a scanning electron microscopy. It was shown that addition of magnesium and nickel reduces the size of α and β' phases. Increasing the amount of magnesium and nickel to 10%, improves the mechanical and tribological properties of the alloys. When the alloying elements are low, the wear mechanism are lamination and abrasive. Increase alloying elements decrease these wear mechanisms.

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Keywords: Aluminum-Bronze alloy, Tribology, Wear test, Wear mechanisms, Mechanical properties.

1. Introduction

Aluminum-bronze alloys are copper base alloys containing aluminum as the main alloying element. Other alloying elements such as Ni, Fe, Mn, Si improves other properties such as strength, toughness, resistant to corrosion, and magnetic behaviors (Meigh, 2000).

Aluminum-bronze alloys containing nickel (NAB) including 9-12% Al, 6% Fe and lot of Ni are important commercial aluminum bronze alloys. Presence of aluminum increase the mechanical properties of the alloy by the establishment a FCC phase , which could improve the casting and hot working properties of the alloy (G. Kear et al,2007). Other alloying elements improve the mechanical properties and modify the microstructure. Ni improves the corrosion resistance, whereas Fe is a grain refiner (J. A. Wharton et al, 2005).

Mechanical properties of bronze alloys are depend on their chemical composition, microstructure, production conditions and can be improve significantly by heat treatment. For example the tensile strength can be increase to 700 MPa by heat treatment. Improvement of mechanical properties in aluminum-bronze alloys containing 8-9.5% Al, when the amount of other alloying elements less than 2% is possible by heat treatment. (E. Derek et al1985). However, heat treatment is applicable on

aluminum-bronze alloy containing 9.5-11% Al, but, Ni, Fe and Mn can be added if it is not necessary (Z. Han et al,2002,C. Arthur,1991).

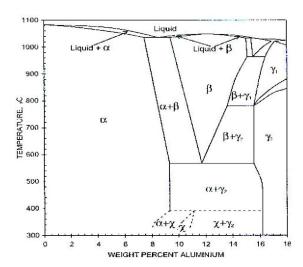


Figure 1. Equilibrium phase diagram of Cu-Al.

Aluminum-bronze alloys are proper selection for making gears at high stress conditions. Nevertheless, these alloys are also use in easier conditions, such as wear bands, bushes, valve ends, etc. When two surfaces are in contact and move against each other in loading, wear occurs. In the most applications, one of the surfaces is not moveable. Based on the application of Bronzes, there are several types of wear conditions:

- A sliding action as in the case of plain rotary bearing or of various type of liner reciprocating machinery.
- A rolling action as in the case of wheels running along a track or of ball or roller bearing.
- c) A combination of both, as in gears (Meigh, 2000).

The equilibrium diagram of aluminum-bronze alloys is shown in Fig. 1. Depending on heat treatment process, alloys that contain 9.5-11% Al including α , α , γ_2 phases, forms with other phases. It is important to know that accelerate cooling could result in the formation of β' rather than $\alpha+\gamma_2$ phases. This phase is similar to martensite phase in steels (Meigh,2000, R.Thomson et al,1978).

Shi, study the Rotation-Sliding wear process in nickel aluminum bronzes alloys (Cu-10Al-5Ni-4Fe) without using lubricant agent in comparison with hardened EN19 steel and report adhesive wear and laminated wear mechanisms in these alloys (Shi et al, 1996).

2. Experimental

The aim of this work is to investigate the effect of adding 0, 2, 4, 6, 8, 10 % magnesium and nickel to the aluminum-bronze alloys, and research on their effects on mechanical and wear properties.

Commercially pure copper 99.99 wt, pure aluminum 99.7 wt, pure nickel 99.9 wt, ferromanganese (25-75, 90-10), pure manganese, and iron sheets were used as raw materials for melting process. In order to decrease gas absorption and porosity formation crucible gas fired furnace were calculated amount of Cu, Ni, ferromanganese, and Fe were melted at 1200 °C and then the proper amount of pure Al was added to melt. In order to prevent segregation of elements, the melt was cast as billet in permanent molds. The chemical composition of specimens done are shown in Table 1. The tensile test samples were prepared according to the ASTM E8-03 standard, and wear test samples with the 5 cm length and 5 mm thickness were prepared. All the specimens were heated at 870 °C for 20 min, and quenched in water. Tempering treatment was conducted at 600 °C for 2 hours.

The alcoholic cloroferric etchant was used for etching the samples. Microscopic observations were done by scanning electron microscope (SEM) and tensile and hardness tests were done by standard procedures.

As shown in Fig. 2, pin-on-disk tests were used for wear tests using 52400 standard steel as the pin for 500 m. Specimens weight loss due to wear were measured by digital scale for the distances of 10, 20, 50, 100, 300, 500 m.

Table 1. Chemical composition of cast specimens.

EL	Cu%	Al%	Fe%	Mn%	Ni%
Alloy					
A	88.9	9.73	1.24	< 0.050	< 0.050
В	85.13	9.86	0.998	2.1	1.91
С	81.13	9.89	0.947	3.91	4.12
D	77.1	9.65	1.4	5.87	5.95
Е	73	9.46	1.35	7.99	8.13
F	69.2	9.93	1.02	9.75	10.09

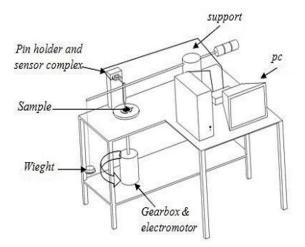


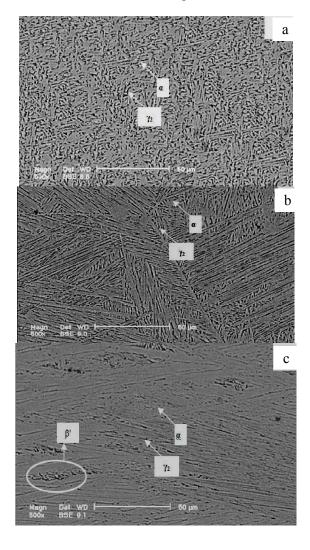
Figure 2. Schematic design of Pin-on-disk wear test

3- Results and Discussion 3-1- Microstructural

As can be seen in Fig. 3, β' phase (tempered β') is formed in adjacent of α phase, in all specimens. According the phase diagram it's expected to get β phase in the microstructure by heat treatment at 870 °C. Also, it's expected that by accelerate cooling, the

 β to α phase transformation is prevented and β phase is formed.

By tempering on 600 °C, β ' is transformed to tempered β ' and α . The growth of α phase in specimen A is accelerated due to absent of Ni and Mn elements. In this specimen, α grains are observed as a circle phases in the microstructure (Fig 3-a). In the presence of manganese and nickel, the formation of α phase in the specimens is prevented and finer α and β ' phases are formed. This trend was continued by increasing alloying elements in the composition. That's why in the D, E, F specimens, the detailed microstructure is not observable in low magnifications. So, higher magnifications of these microstructures are shown in Fig. 3.



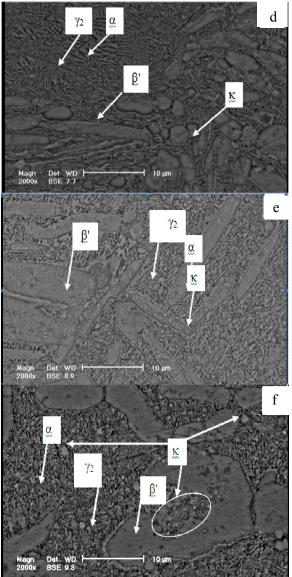


Figure 3. SEM microstructure images of the specimens contain different amount of Mn and Ni, (a) Specimen A, (b) Specimen B, (c) Specimen C. (d) Specimen D, (e) Specimen E, (f) Specimen F.

In specimens D, E, F, due to increasing in alloying elements and further changes in the equilibrium diagram, a little amount of α phase is remained in the casting microstructure. This phase is one of the adequate places for nucleation and growth of α phase during tempering treatment. Therefore by tempering, the microstructure is composed of combined α and β' phases. As a result, by increasing the alloying elements, due to their grain

refinement effects, the mechanical properties will be improve.

2.3 Investigation on mechanical properties

Figure 4 shows variations in hardness values of specimens before and after the heat treatment, as a function of Ni and Mn content of alloys. Fig. 5 shows the same conditions for tensile strength.

Concerning the figure 4, the alloy hardness increased after heat treatment. The reason for this behavior can be expressed as followings:

- a) In casting specimens, because of low cooling rates, in comparison of heat treatment specimens, the β phase is transformed to $\alpha+\gamma_2$ by eutectoid transformation, whereas, this transformation is prevented in heat treated specimens and β phase is present in adjacent of α phase in the microstructure. The γ_2 phase is harder than β phase and causes the hardness to increase (M. H. Sabzevar et al, 1990).
- b) In casting specimens, residual stresses are relatively high (due to casting and solidification conditions), whereas heat treatment caused these stresses to be released or decreased and consequently the hardness values decreased.

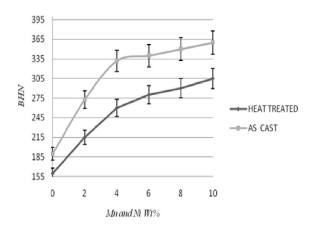


Figure 4. Effects of magnesium and nickel on the Hardness of samples

It can be seen in figure. 4 that the hardness increased by increasing alloying elements. Grain refinement effect of alloying element is responsible for micro structural changes (see also Figures. 1 and 3). The tensile strength of specimens also increased

by increasing alloying elements (figure. 5) caused the alloys in heat treated conditions have lower hardness values, better elongation, tensile and yield strengths in comparison with the cast condition.

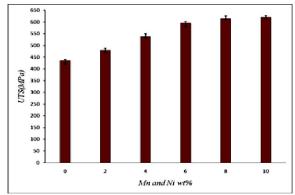


Figure 5. Effects of magnesium and nickel on tensile strength.

3.3 Wear behavior assessment

Figure 6 shows the weight loss of specimens in wear test. It can be consider that due to unstable wear in the first stage of wear test and absent of desired profile, the wear behavior of this stage is not so clear (N.P. Suh,1986). Therefore, in this research, discussions were made on 500 distances in wear test. As can be seen, by increasing the amount of alloying elements, weight losses of the specimens were declined. This phenomenon may be due to change in structure and formation of needle like microstructure of α and β phases. The wear resistance of alloy increased by grain refinement. The highest wear resistance belonged to specimen F with the highest amount of alloying elements (Figure 6).

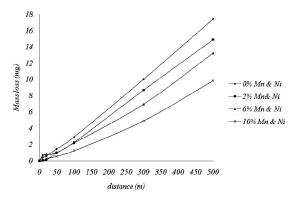
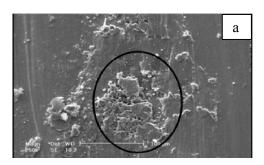


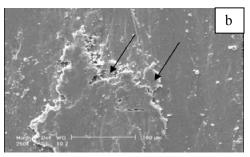
Figure 6. weight loss of specimens in wear test

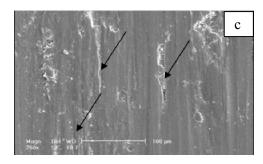
Figure 7 shows the wear line in the specimens. It can be seen that in the absence of alloying elements such as manganese and nickel (specimen A), abrasive wear in addition to delamination wear are observable. By adding the alloying element, the delamination wear is decreased (Figure. 7-b). In specimen E and F the abrasive wear is almost eliminated and the delamination wear is the only abrasive wear mechanism. By comparing specimen E and F, it can be found that the wear abrasive depth decreased. This phenomenon is attributed to the increase in wear resistance of specimens. Thus, in the absence of alloying element, because of activation of both abrasive and delamination wear mechanisms, the weight loss is increased. These results are in consistent with the data shown in figure 6.

Figure 8 illustrates the variations in pin's weight at the wear test. It can be seen that by increasing the amount of alloying elements, the weight loss of pin increased. It shows that increasing the amount of alloying elements, and the hardness of specimens, could result in increase in weight loss of wearing specimens. These results are completely consistent with the data illustrate in figures 4 and 6.

Figure 9 shows the variation in wear coefficient of various specimens. By increasing the amount of alloying elements from specimen A to F, the wear coefficient is increased which could be due to increase in hardness value. This condition is result of increase in the pin's weight loss.







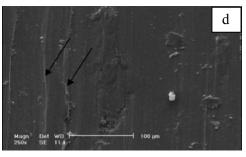


Figure 7. SEM images of wear lines in specimens with different amount of Ni and Mn: (a) Specimen A, (b) Specimen B, (c) Specimen D, (d) Specimen F.

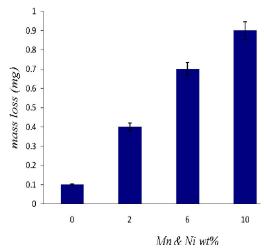


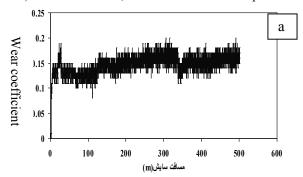
Figure 8. Pin Weight loss as a function of Ni and Mn content.

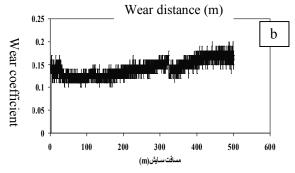
4. Conclusion

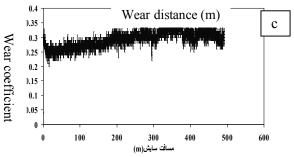
In this research, the effect of addition 0, 2, 4, 6, 8, 10 % nickel and Manganese to aluminum bronze alloy on mechanical and tribological properties has been investigated. The results are as follows:

1) The metallurgical structure after heat treatment included tempered β' and α phases. By increasing the amount of Ni and Mn elements, the mechanical and

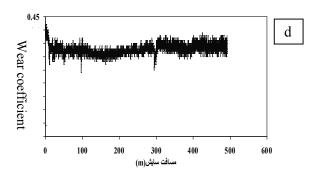
- tribological properties will be change due to grain refinement effects of alloying elements.
- 2) Increasing Ni and Mn content of alloy up to 10% will increase the tensile strength and hardness of the alloy.
- 3) By increasing the alloying elements, the wear properties will improves which attributed to change in metallurgical structure of the alloy. Also, in low amount of alloying elements, two wear mechanisms are activated, but by increasing the alloying elements up to 10%, abrasive and delamination wear mechanisms are disable.
- 4) By increasing alloying content, the wear rate will decrease.
- 5) Heat treatment, reduce hardness of samples.







Wear distance (m)



Wear distance (m)

Figure 9. Evaluation of wear coefficient as a function of wear distance for different amount of Ni and Mn: (a) Specimen A, (b) Specimen B, (c) Specimen D, (d) Specimen F.

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Potential Impact of Zinc on Hazardous Effect of Pesticides in Male Rats

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Abstract: In the present study , fifty male rats (weighted $150-170\,$ g) were divided into five groups(n=10) , the first group served as control, the second group was received acute dose of Azinphos methyl (4 mg/kg. b.wt./orally) and the fourth group was treated with Caprolin at dose of $100\,$ mg / kg b. wt./orally. The third and fifth groups were treated orally with Zn So₄ ($400\,\mu$ mol / kg b. wt.) daily for 6 weeks before pesticides treatment. Blood samples were collected at fixed time intervals of 72 hrs, 7 , 15 and 21 days after treatment with pesticides. The results of the current study showed deleterious damage due to Azinphos methyl and Caprolin administration ,represented in a significant decrease in serum zinc concentration , total proteins and albumin and significant increases in copper, iron , γ -glutamyl transferase , aspartate aminotransferase (AST) and alanin aminotransferase (ALT) levels, while the data revealed imbalance in thyroid function as a result of both pesticides administrations , which was showed in the enhancement of free T_4 level and significant decrease in free T_3 activity at 1 week (day 7) post-administration. Treatment of zinc sulphate (Zn So₄) pre-administration with Azinphos methyl or Caprolin attenuates to a great extent the damaging effects of two previous doses of pesticides on the assayed parameters except the thyroid hormones. Accordingly , Zinc treatment at the used dose may have indirect physiological effect on thyroid function. [Magda Sayed Hassanin. **Potential Impact of Zinc Hazardous Effect of Pesticides In Male Rats.** Journal of American Science 2011;7(7):723-732]. (ISSN: 1545-1003). http://www.americanscience.org..

Key words: Zinc supplementation, Pesticides toxicity, Azinphos methyl toxicity, Caprolin toxicity.

1. Introduction:

Free radicals can be generated either by metabolism of xenobiotics or by normal aerobic cellular metabolism (Slater, 1984). The peroxidation of lipids and proteins of cell membrane initiate the diverse effect of free radicals with the consequence of acute and chronic inflammatory reactions. These events are responsible for oxidative damage of the biological activity of different organs reflected by accumulation of abnormal products of oxidative intermediate compounds of metabolic pathways (Halliwell *et al.*, 1992).

The free radicals defense system, both enzymatic and non-enzymatic components, provides protection for the various cell compartments. The maintenance of cell integrity depends on the balance between the free radicals generation and the free radicals defense system. Imbalances may occur when increased free radicals generation overwhelms the defense system, or when the defense system is severely compromised and incapable of detoxifying the normal flux of increased production and accordingly, decreased detoxification will occur.

Pesticides induce oxidative stress leading to generation of free radicals and alterations in antioxidants or oxygen free radicals scavenging enzymes (Ahmed *et al.*, 2000). In this sense, various studies were carried out to investigate the effect of pesticides exposure on antioxidant enzymes and lipid peroxidation (Videla *et al.*, 2000). Additionally, Satoh *et al.* (1992) reported the toxicity of Paraquat

mediated oxidative stress on lungs induce different pulmonary biochemical responses in rats. On the other hand, Lindane, Chlopyrifos and Paraquat induce reactive oxygen species result in series of changes that are reflected by enhanced lipid peroxidation, increased Lactate dehydrogenase leakage and decreased glutathion peroxide activity in different organs (brain, liver, lungs and kidneys). These reactive oxygen species may initiate oxidative damage leading to cytotoxic effects (Osman, 1999 and Ahmed *et al.*, 2000).

The ability of zinc to retard the oxidative processes has been recognized for many years. The mechanism of antioxidation of zinc can be divided into chronic and acute effects. The chronic effects involve exposure of an organism to zinc on alongterm basis resulting in induction of some other substances that is the ultimate antioxidant such as the metallothioneins. Chronic zinc deprivation generally results in increased sensitivity to some oxidative stress (Bray and Bettger, 1990 and Garg et al., 2007). The acute effects involve two mechanisms; protection of protein sulfhydryls (Gibbs et al., 1989) or reduction of OH formation from H₂O₂ through the antagonism of redox active transition metals such as iron and copper (Fuller et al., 1987). Thus, zinc may be capable of reducing cellular injury that might have a component of site specific oxidative damage such as post-ischemic tissue damage through a mechanism that might involve the antagonism of copper reactivity (Kappus et al., 1985).

The objective of the present study is to evaluate the efficacy of zinc (as $ZnSO_4$) in hindering the toxic effects of two types of pesticides, Azinphos methyl (organophosphorus compound) and Caprolin (carbamate), which are used for treatment of rats to evaluate some biomarkers as indices for predicted oxidative stress. The current investigations deal with determination of trace elements such as zinc, copper and iron concentrations as well as the levels of γ -GT, AST, ALT, total proteins and albumin in serum. Also, free T3 and T4 concentrations were estimated in rats treated with either azinphos methyl or Caprolin solely or in combination with zinc.

2. Materials and Methods:

Experimental animals:

This study was carried out using fifty adult male albino rats weighing 150-170 grams obtained from the Animal House of Radioisotopes Application Department at Enshas, Egypt. The animals were kept under normal living condition and fed on standard diet

Chemicals:

- 1- Zinc sulfate (ZnSO₄) was purchased from Sigma Chemical Co. and dissolved in saline solution with dilution according to the used dose.
- 2- Azinphoshos methyl (organophosphrus compound) pesticide with a chemical structure O , O dimethyl S [(4-oxo-l,2,3, benzotriazin -3 (4H)- γ l methyl) phosphorodithioate] in powder form (98% purity) with defined LD₅₀ equivalent to 16 mg/kg b. wt. dissolved in corn oil.
- 3- Caprolin (carbamate) pesticide with a chemical structure 1-aryl-naphthyl-methyl-carbamate in powder form (97% purity) with defined LD₅₀ equivalent to 400 mg/kg b.wt. dissolved in corn oil.

Treatments:

 $ZnSO_4$ were administered daily for 6 weeks orally by using stomach tube at a dose of 400 μ mol/kg body weight (Satoh *et al.*, 1992).

Azinphos methyl was administered to rats with single oral dose of 4 mg/kg b.wt ($^{1}/_{4}$ LD₅₀) whereas caprolin was administered orally with single dose of 100 mg/kg b.wt ($^{1}/_{4}$ LD₅₀).

Animals groups:

Rats were divided into equal five groups each of ten rats.

First group: Animals were administered saline as a vehicle and served as control group.

Second group: Animals were administered single dose of azinphos methyl (4mg/kg).

Third group: Animals were received ZnS04 (400 μ mol/kg) daily for 6 weeks and a single dose of Azinphos methyl 1 hour after the last dose of ZnSO₄.

Fourth group: Animals were administered single dose of Caprolin (100mg/kg).

Fifth group: Animals were received ZnSO₄ (400 μmol/kg) daily for 6 weeks and a single dose of Caprolin 1 hour after the last dose of ZnSO₄.

Samples collection:

Blood samples were withdrawn from orbital venous plexuses at 3,7,15 and 21 days from all groups after the last dose of treatment. The blood was centrifuged at 3000 rpm for 30 min to obtain serum and stored at -18°C for biochemical analysis.

Biochemical studies:

Serum zinc (Zn), copper (Cu) and iron (Fe) contents were measured by using atomic absorption spectrophotometer (210 VGP Buck, Scientic). Serum gamma glutamyl transferase (γ-GT), aspartate aminotransferase (AST) and alanin aminotransferase (ALT) activities, total proteins and albumin were assayed coloremetrically according to Reitman and Frankel (1957), Lowery *et al.* (1951) and Dumas and Biggs (1972), respectively. Serum free T3 was assayed according to Burger *et al.* (1982) and free T4 was determined according to Nicoloff *et al.* (1970) using radioimmunoassay technique.

Statistical analysis

All data were subjected to statistical analysis according to Snedecor and Cochran (1983). Treatment means were compared by Duncan test at 1% level of probability.

3. Results:

Data presented in tables (1) & (2) are concerning with the change patterns of zinc, copper and iron in both normal and treated rats\with Azinphos methyl or Caprolin and zinc sulphate in relation to time after administration.

The results revealed high significant increase in serum zinc level in rats administered single dose of Azinphos methyl on day 3 recording percentage amounting of +22.81 of the control level. This increase followed by gradual decrease from day 7 to day 21 reaching percentage decreases from control equal to -22.15 (Table 1). On the other hand, there was significant (P<0.01) difference of serum

zinc level in Caprolin treated group on days 15 and 21 with percentage decrease from control equal to -32.89 and -37.11, respectively (Table 2).

The treatment with of ZnSO₄ for 6 weeks with both pesticides modulates the serum zinc level to approximate the control value.

Table 1: Effect of zinc (400 μ mol/kg b.wt.) and Azinphos methyl (4 mg/kg) on serum zinc, copper and iron levels.

	Days	Contro	1	Azinphos m	ethyl	Zinc+azinphos	methyl
Parameters	post- treatment	Mean ± S.E	Change %	Mean ± S.E	Change %	Mean ± S.E	Change %
	3	$175.31^{\text{ b}} \pm 7.03$	100	215.30 a ±3.01	+22.81	200.21 a ±4.11	+ 14.20
Zn	7	174. 84 bc ±6.85	100	166.21 a ±6.18	-4.93	175.90 b ±5.30	+0.60
(µg/dl)	15	$176.01^{bc} \pm 7.89$	100	$140.17^{d} \pm 8.31$	-20.63	$176.26^{a} \pm 3.32$	+0.14
	21	$175.88^{bc} \pm 7.03$	100	135.15 ^b ±4.75	-22.15	$!80.20^{a} \pm 4.51$	+2.42
	3	$60.51^{\circ} \pm 2.31$	100	205.11 a ±2.34	+238.96	$105.11^{b} \pm 2.01$	+73.70
Cu	7	$58.94^{d} \pm 2.05$	100	$158.16^{\circ} \pm 3.81$	+168.93	175. $17^{b} \pm 4.04$	+197.20
(µg/dl)	15	$60.09^{\circ} \pm 2.27$	100	$156.17^{\text{ b}} \pm 3.93$	+159.89	$175.16^{\circ} \pm 5.81$	+191.49
	21	$59.87^{c} \pm 2.31$	100	$165.25^{b}\pm2.03$	+176.01	$160.16^{b} \pm 4.73$	+ 167.51
Fe	3	$805.21^{a} \pm 6.58$	100	$973.96^{b} \pm 9.03$	+20.95	$1000.11^{ab} \pm 8.81$	+24.20
(µg/dl)	7	$816.71^{a} \pm 6.67$	100	$1250.90^{b} \pm 7.17$	+53.16	$835.05^{a} \pm 7.03$	+ 2.24
	15	$798.47^{a} \pm 5.89$	100	$930.85^{a} \pm 9.32$	+16.57	$895.03^{a} \pm 5.20$	+ 12.09
	21	$819.06^{a} \pm 6.40$	100	895.81 a ±8.15	+ 9.37	$870.09^{a} \pm 8.91$	+ 6.23

Values have same superscript in the same raw are not significantly different (P< 0.01).

Table 2: Effect of zinc (400 μmol/kg) and Caprolin (100 mg/kg b.wt.) on serum zinc, copper and iron levels.

	Days	Control		Caproli	n	Zinc + cap	rolin
Parameters	post- treatment	Mean ± S.E	Chang e %	Mean ± S'.E	Change %	Mean ± S.E	Change %
	3	$175.31^{\text{b}} \pm 7.03$	100	165.18 ± 3.84	-5.77	$185.79^{b} \pm 4.32$	+5.05
Zn	7	$174.84^{bc} \pm 6.81$	100	$165.71^{\circ} \pm 4.23$	-5.23	$1\ 80.81^{bc} \pm 5.31$	+3.41
(µg/dl)	15	$176.01^{\text{bc}} \pm 6.93$	100	$118.11^{\circ} \pm 4.32$	-32.89	185. $19^{bc} \pm 6.01$	+5.21
	21	$175.88^{a} \pm 7.22$	100	$110.61^{\rm b} \pm 3.02$	-37.11	$190.40^{a} \pm 5.82$	+8.25
	3	$60.51^{\circ} \pm 2.31$	100	190.19 a ±3.02	+214.31	$i90.19^{a} \pm 4.33$	+ 214.31
Cu	7	$58.94^{d} \pm 2.05$	100	$180.18^{ab} \pm 4.11$	+205.70	$200.20^{a} \pm 5.51$	+ 239.66
(µg/dl)	15	$60.09^{\circ} \pm 2.27$	100	$145.15^{b} \pm 3.85$	+141.55	$230.49^{a} \pm 5.38$	+ 283.57
	21	$59.87^{c} \pm 2.31$	100	$155.16^{b} \pm 4.15$	+159.16	$210.54^{a} \pm 4.34$	+ 25 1.66
	3	$805.21^a \pm 6.85$	100	$1860.09^{b} \pm 8.91$	+131.00		+ 41.57
Fe	7	$816.71^{a} \pm 5.29$	100	$900.97^{b} \pm 7.43$	+ 10.31	$880.91^{ab} \pm 9.67$	+7.83
(µg/dl)	15	$798.47^{a} \pm 5.99$	100	$820.94^{ab}\pm6.97$	+2.81	$865.89^{ab} \pm 6.90$	+8.44
	21	8 1 9.06 a ±6.79	100	$810.91^{ab} \pm 6.33$	+0.99	$840.\ 86^{ab} \pm 0.01$	+2.66

Values have same superscript in the same raw are not significantly different (P<0.01).

On the contrary, administration of both pesticides increased significantly (P<0.01) the serum copper level when compared to the corresponding control. This change was more pronounced in rats administered Azinphos methyl than rats administered Caprolin. The maximum percentage increase from

control was recorded on day 3 in both groups equal to +238.96 and +214.31, respectively.

The supplementation of $ZnSO_4$ before treatment increased the level of copper significantly (P<0.01) on days 3, 7, 15 and 21 and this effect was more pronounced in rats treated with Caprolin more than rats treated with Azinphos methyl.

Rats treated with Azinphos methyl in parallel with Caprolin treatment showed significant (P<0.01) increase compared to control in serum iron on days 3 and 7, which returned to normal level on days 15 and 21 post-treatment.

The administration of $ZnSO_4$ to rats can attenuate the increased iron level in groups treated with pesticides and maintain its normal level.

The results in tables (3 & 4) demonstrate the stronger harmful effects of Azinphos methyl than Caprolin on γ -GT enzyme. There is significant (P<0.01) elevation in γ -GT activity in serum of rats administered single dose of Azinphos methyl or Caprolin on days 3, 7, 14 and 21 recording percentage increase relative to control level of+83.04, +106.72, +72.48 and +122.88, respectively, in rats treated with Azinphos methyl and +48.84, +64.91, +52.36 and +41.64, respectively, in rats treated with Caprolin.

Oral administration of ZnSO₄ for 6 weeks to the rats before treatment with Azinphos methyl or Caprolin revealed significant modulation in γ -GT enzyme activity reflecting the beneficial action of zinc in reducing the harmful effects of both types of pesticides.

On the other hand, Azinphos methyl or Caprolin treatment increased the activities of transaminase enzymes (AST and ALT). During the experimental period, the percentage of AST activity in rats treated with Azinphos methyl was increased gradually from control level of +9.01% on day 3 to +21.68% on day 15 and returned to normal level on day 21 post-treatment. The same pattern of AST level was recorded in the rats treated with Caprolin, where the percentage changes were +4.93%, +13.72%, +13.07% on days 3, 7 and 15, respectively. With respect to the ALT concentration, there was significant (P<0.01) increase in all time intervals reached a maximum on day 7 post-treatment, where the percentage change was increased above the control by +59.23 % in rats treated with Azinphos methyl and +34.60 on day 15 in rats treated with Caprolin.

Administration of ZnSO₄ before treatments with both types of pesticides revealed significant (P<0.01) decreases in serum AST levels on days 7 and 15 and also in ALT values during all periods studied as compared with animals treated with pesticides only restoring values within normal levels.

Statistical analysis of data showed significant (P<0.01) inhibitory effect of both azinphos methyl and caprolin on serum total protein contents. The inhibitory effect was observed on days 3 and 7 post-treatment with azinphos methyl and on

day 3 only post-treatment with caprolin. These effects followed by non-significant decreases at the end of experiment as compared with control group. This effect was more pronounced in animals treated with azinphos methyl than animals treated with caprolin. The percentage changes from control were -19.81% -20.39%, -11.91% and -1.86% on days 3, 7, 15 and 21, respectively, in rats treated with azinphos methyl. The percentage changes from control were -8.99%, -6.79%,-2.47% and-1% on days 3, 7, 15, 21, respectively, in rats treated with caprolin. The same pattern was noticed in albumin levels in groups treated with azinphos methyl only as shown in table (3), while non-significant changes were observed in albumin levels due to caprolin treatment (table 4).

The results showed that oral administration of ZnSO₄ to rats daily over 6 weeks before pesticides treatments improve the decrease in the total proteins and albumin contents when compared with control.

As summarized in tables (5) and (6), administration of azinphos methyl resulted in inhibition of free T3 level. This decrease was more pronounced on days 7 and 15 post-treatment and percentage changes were decreased from control by -17.72 % and -15.88 %, respectively. On the other hand, the level of free T4 showed significant (P<0.01) increase on days 3, 7 and 15 followed by non-significant increase which approaching the control level on day 21 post-treatment. However, the percentage change increases, relative to control, were +43.37%, +24.69% and +25.71% on days 3, 7 and 15, respectively. The data shows that administration of single dose of caprolin has non-significant effect on free T3 and T4 activities as compared to the corresponding control.

The synergistic effect of zinc and azinphos methyl was noticed. The activities of free T3 and T4 showed significant (P<0.01) increases which reached their maximum levels on days 15 and 7, respectively and approximated to their normal levels of control on day 21 post-treatment. The percentage change of T3 levels were increased from control by+43.55%, +37.34% and +68.23% and the percentage change of T4 levels were increased from control by +14.75%, +16.67% and +14.85% on days 3, 7 and 15, respectively.

The group administered zinc before Caprolin recorded significant (P<0.01) elevation in T_3 levels on days 3, 7 and 15 as compared to the group administered Caprolin only. The fluctuating pattern of free T4 level recorded percentage increases than control by +51.5%, +2.74%, +19.14% and +4.84% on days 3, 7, 15 and 21, respectively.

Table 3: Effect of zinc (400 μmol/kg) and azinphos methyl (4mg/kg) on serum liver enzymes, total proteins and albumin levels.

Parameters	Days post-reatment	Control		Azinphos me	Azinphos methyl		Zinc + azinphos methyl	
		$Mean \pm S.E$	Change %	$Mean \pm S.E$	Change %	$Mean \pm S.E$	Change %	
	3	$4.66^{b} \pm 0.80$	100	$8.53^{a} \pm 1.25$	+83.04	5. 40° ±0.85	+15.80	
Y-GT	7	$4.76^{a} \pm 0.75$	100	$9.84^{a} \pm 1.37$	+ 106.72	$4.91^{b}\pm0.68$	+3.15	
(U/L)	15	$4.87^{\circ} \pm 0.83$	100	$8.40^{ab} \pm 0.68$	+732.48	$5.42^{c} \pm 1.24$	+112.9	
	21	$4.85^{b}\pm0.81$	100	$10.81^a \pm 1.97$	+ 122.88	$5.00^{b} \pm 0.60$	+3.09	
	3	33.41 ^b ±4.02	100	$145.43^{ab} \pm 5.33$	+9.00	$136.42^{b}\pm4.49$	+2.25	
AST	7	$134.21^{\circ} \pm 4.23$	100	$159.00^a \pm 3.42$	+ 18.47	$44.49^{bc}\pm3.56$	+7.65	
(U/L)	15	$132.65^{b} \pm 3.87$	100	$16.1.42^a \pm 4.08$	+21.68	$138.31^{b}\pm4.39$	+4.26	
	21	$131.89^a \pm 3.58$	100	$136.63^{a} \pm 5.67$	+23.59	$128.25^{a} \pm 2.82$	-2.75	
	3	$46.83^{b}\pm1.46$	100	$59.72^{a} \pm 3.87$	+27.52	$50.83^{b}\pm3.13$	+8.54	
ALT	7	$45.60^{b} \pm 1.20$	100	$72.61^a \pm 4.54$	+59.23	$48.81^{bc} \pm 3.07$	+7.03	
(U/L)	15	$44.88^{\circ} \pm 1.35$	100	$65.44^{a} \pm 4.99$	+45.81	$48.46^{bc}\pm2.09$	+7.97	
<u> </u>	21	$45.06^{b}\pm1.07$	100	$64.61^a \pm 3.38$	+43.38	$47.45^{b}\pm2.68$	+5.30	
T-4-1	3	$7.12^{a}\pm1.25$	100	$5.71^{\rm b} \pm 0.33$	-19.80	$7.04^{a} \pm 1.41$	-1.12	
Total Proteins	7	$7.06^{a} \pm 1.19$	100	$5.62^{c} \pm 0.32$	-20.39	$7.23^a \pm 2.09$	+2.40	
(g/dl)	15	$6.88^a \pm 0.95$	100	$6.08^{a} \pm 0.11$	-11.91	$7.1 \ 8^a \pm 1.45$	+4.36	
(g/ui)	21	$6.97^{a} \pm 1.06$	100	$6.84^a \pm 0.39$	-1.86	$7.14^{a} \pm 1.32$	+2.43	
	3	4.41° ±0.95	100	$3.44^{b} \pm 0.25$	-21.99	4.31 ^a ±1.22	-2.26	
Albumin	7	$4.37^{a} \pm 0.79$	100	$3.81^{b} \pm 0.37$	-14.69	$4.40^{a} \pm 1.25$	- 0.68	
(g/dl)	15	$4.50^a \pm 0.77$	100	$3.90^a \pm 0.25$	-17.02	$4.84^a \pm 1.37$	+7.55	
	21	$4.25^a \pm 0.94$	100	$3.10^a \pm 0.38$	-37.09	$4.44^{a} \pm 1.45$	+4.47	

Values have same superscript in the same raw are not significantly different (P<0.01)

Table 4: Effect of zinc (400 μ mol/kg) and caprolin (100 mg/kg) on serum liver enzymes, total proteins and albumin.

	Davs	Control		Caprolin		Zinc + caprolin	
Parameters	post-treatmen	$Mean \pm S.E$	Change %	Mean ± S.E	Change	$Mean \pm S.E$	Change
	3	$4.66^{b} \pm 0.80$	100	$6.43^{b} \pm 1.51$	+48.84	$4.56^{b} \pm 1.58$	-2.14
γ-GT	7	$4.76^{b}{\pm}0.75$	100	$7.85^{b} \pm 1.37$	+64.91	$5.00^{b} \pm 1.32$	+5.04
(U/L)	15 21	$4.87^{c} \pm 0.83$ $4.85^{a} \pm 0.81$	100 100	$7.42^{b} \pm 2.25$ $6.87^{b} \pm 1.58$	+52.36 +41.64	$6.00^{bc} \pm 1.52$ $5.66^{b} \pm 1.25$	+23.20 + 16.70
	3	133.41 ^b ±4.02	100	140.00 ^b ±2.53	+4.93	$136.64^{b} \pm 3.93$	+2.42
AST	7	$134.21^{a}\pm4.23$	100	$152.63^{\circ} \pm 4.42$	+ 13.72	$141.00^{bc} \pm 4,61$	+5.05
(U/L)	15	$132.65^{b} \pm 3.87$	100	$150,00^a \pm 3.78$	+ 13.07	$!27.87^{b}\pm5.71$	-3.60
	21	$131.89^a \pm 3.58$	100	129.44° ±2.27	-1.85	$130.44^a \pm 5.81$	-1.09
	3	$46.83^{b} \pm 1.46$	100	54.00 ^{ab} ±3.38	+15.31	$48.82^{b} \pm 2.15$	+4.24
ALT	7	$45.60^{b} \pm 1.20$	100	$59.98^a \pm 2.22$	+ 31.53	$48.42^{b}\pm2.53$	+6.18
(U/L)	15	$44.88^{c} \pm 1.35$	100	60.41a ±3.36	+ 34.60	$47.94^{\circ} \pm 2.87$	+6.81
	21	$45.06^{b} \pm 1.07$	100	$58.76^{a} \pm 3.42$	+ 30.40	$50.12^{b} \pm 3.02$	+ 11.22
	3	$7.12^a \pm 1.25$	100	$6.48^{b} \pm 1.33$	-8.98	$7.82^a \pm 0.46$	+ 9.83
Total Proteins	7	$7.06^{a} \pm 1.19$	100	$6.58^a \pm 1.26$	-6.79	$7.98^a \pm 0.58$	+13.03
(g/dl)	15	$6.88^a \pm 0.95$	100	$7.05^a \pm 1.35$	-2.47	$7.65^a \pm 0.53$	+ 11.19
	21	$6.97^{a} \pm 1.06$	100	$7.04^a \pm 1.57$	-1.00	$7.76^{a} \pm 0.52$	+ 11.33
	3	$4.41^{a} \pm 0.95$	100	$3.63^a \pm 0.77$	-17.68	$4.69^{a} \pm 0.77$	+ 6.34
Albumin	7	$4.37^a \pm 0.79$	100	$3.88^a \pm 0.74$	-11.21	$4.76^a \pm 0.66$	+ 8.92
(g/dl)	15	$4.50^a \pm 0.77$	100	$3.98^a \pm 0.89$	-11.55	$4.74^a \pm 0.83$	+ 5.33
	21	$4.25^{a} \pm 0.94$	100	$3.96^{a} \pm 0.90$	-6.82	$4.76^{a} \pm 0.95$	+12.00

Values have same superscript in the same raw are not significantly different (P<0.01).

Table 5: Effect of zinc (400 μmol/kg) and azinphos methyl (4 mg/kg) on serum free T₃ and T₄ levels.

	D .	Control		Azinphos methyl		Zinc + azinphos methyl	
Parameters	Days post- treatment	Mean ±S.E	Change %	Mean ± S.E	Change %	Mean ± S.E	Change %
	3	$1.63^{\circ} \pm 0.13$	100	$1.59^{b} \pm 0.08$	- 2.45	$2.34^{a} \pm 0.05$	+ 43.55
Free T ₃	7	$1.58^{d} \pm 0.12$	100	$1.30^{bc} \pm 0.03$	- 17.72	$2.17^{b} \pm 0.12$	+ 37.34
(pg/ml)	15	$1.70^{b} + \pm 0.10$	500	$1.43^{b} \pm 0.04$	- 15.88	$2.86^{a} \pm 0.16$	+ 68.23
	21	1 .64° ±0.11	100	$1.60^{bc} \pm 0.11$	- 2.43 .	$1.72^{ab} \pm 0.18$	+ 4.87
	3	3.32° ±0.11	100	$4.76^{b} \pm 0.17$	+ 43.37	$3.81^{abc} \pm 0.38$	+ 14.75
Free T4	7	$3.28^{b}\pm0.10$	100	$4.09^a \pm 0.41$	+ 24.69	$3.83^{b} \pm 0.26$	+ 16.76
(ng/dl)	15	$3.50^{\circ} \pm 0.10$	100	$4.40^{ab} \pm 0.26$	+ 25.71	$4.02^{b} \pm 0.32$	+ 14.85
	21	$3.30^a \pm 0.12$	100	$3.52^a \pm 0.38$	+ 6.66	$3.46^{a} \pm 0.10$	+ 4.84
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Values have same superscript in the same raw are not significantly different (P<0.01).

Table 6: Effect of zinc (400 μ mol/kg) and caprolin (100 ing/kg) on serum free T_3 and T_4 levels.

Parameters	Days	Control	Control		Caprolin		Zinc + caprolin	
	post-treatment	Mean ± S.E	Change %	Mean ± S.E	Change %	Mean <u>+</u> S.E		
	3	$1.63^{\circ} \pm 0.13$	100	$1.42^{bc} \pm 0.10$	-12.88	2.36 ^a ± 0.03	+ 44.78	
Free T ₃	7	$1.58^\text{d} \pm 0.12$	100	$1.50^{cd} \pm 0.04$	-5.06	$2.37^a \pm 0.06$	+ 50.00	
(pg/ml)	15	$1.70^{b} \pm 0.10$	100	$1.33^{b} \pm 0.37$	-21.76	$2.41^a \pm 0.18$	+ 41.76	
	21	$1.64^{\circ} \pm 0.10$	100	$1.57^{bc} \pm 0.11$	-4.26	$1.87^{bc} \pm 0.11$	+ 14.02	
	3	$3.32^{\circ} \pm 0.11$	100	$3.82^{bc} \pm 0.35$	+ 15.06	$5.03^a + 0.19$	+ 51.50	
Free T ₄	7	$3.28^{b}\pm0.10$	100	$4.07^{ab} \pm 0.07$	+24.08	$3.37^{b} \pm 0.10$	+ 2.74	
(ng/dl)	15	$3.50^{\circ} \pm 0.10$	100	$4.11^{bc} \pm 0.19$	+ 17.42	$4.17^{a} \pm 0.21$	+ 19.14	
	21	$3.30^a \pm 0.12$	100	$3.41^{a} \pm 0.17$	+3.33	$3.46^{a}\pm0.07$	+ 4.84	

Values have same superscript in the same raw are not significantly different (P < 0.01)

4. Discussion

Reactive oxygen species (ROS) may be involved in the toxicity of some pesticides (Videla *et al.*, 2000). These ROS may initiate oxidative damage leading to cytotoxic effects. Pesticides treatment induce disturbance in antioxidant enzymes functions leading to retardation of cellular activity and consequently, the function of organs will be affected (Osman, 1999). Since trace metals play a very important role in many biological activities, their imbalance may be contributed to organ dysfunction (Elnimr and Abdel-Rahim 1989).

According to the data of the present study, a moderate decrease in serum zinc concentration was recorded in treated rats accompanied by significant increase in copper and iron values, which was time dependent. These results confirmed the findings of Ferri *et al.* (2003). The decrease in zinc level may be attributed to release of zinc metal from damaged lymphoid organs and bone marrow after pesticides treatment and accumulation in the organs (Ashby and Tinwell *et al.*, 1998). Also, pesticides administration to rats lead to oxidative stress characterized by

glutathione (GSH) depletion (Videla *et al.*, 2000). Consequently, the induction of metallothioniene synthesis was enhanced (Nakagawa *et al.*, 1995) associated with zinc in different organs of the body (Powell, 2000).

The elevation in serum copper level observed in animals may be attributed to the marked reduction in ceruloplasium as a subsequent to the increase in activity of oxidative stress (Roxborough *et al.*, 2000). The copper complex protein failed to perform its function in binding with copper because 95% of copper is transformed by ceruloplasium.

It is well known that, when iron and copper are released from their carrier or storage proteins, the reduction was initiated resulting in high reactive hydroxyl radicals which enhance lipid peroxidation and hence tissue damage (Samokyszyn *et al.*, 1989). Further evidences support the concept that the magnitude of inflammation and oxidative stress play a crucial role in the regulation of the circulating trace elements and their carrier proteins (McMillan *et al.*, 2000). The excess iron present in serum may be due to the depressive action of pesticides on the

haematopoetic tissue, increase the erythrocytic destruction and direct destructive effect on red blood cell membrane itself which led to increase in the catabolism of haemoglobin (Zahran *et al.*, 2002).

Zinc sulphate supplementation to the treated rats partially normalized the serum levels of zinc and iron and raised the serum copper level. These data are in agreement with that of (Goel *et al.*, 2000 and Garg *et al.*, 2007) they studied the protective potential effect of zinc in modulating the toxicity of organophosphrus pesticides on trace elements concentrations in rats.

Both zinc and copper are co-factors in the metalloenzyme such as CuZn-superoxide dismutase, which provides the first line of defense against activated oxygen species by dismutation of superoxid anion radical (Bettger and O'Dell, 1981). The protective effect of zinc is known due to its inhibiting effect on the hydroxyl free radicals of metal ions (Cu and Fe) by competing for the binding sites of those ions (Powell, 2000) or through the induction of metalothioniene (Garg *et al.*, 2007).

The present study revealed significant elevation of γ -GT level due to azinphos methyl and Caprolin administrations and this increase was more pronounced in the group treated with Azinphos methyl.

More evidence is elicited the natural defense system represented by reduced glutathione, which is good index for the increased oxidative damage after oxidative stress induced by pesticides (Videla et al., 2000, Ahmed et al., 2000 and Lusini et al., 2001). This concept was discussed on the basis that γ -GT has physiological role in counteracting the oxidative stress and the excessive production of free radicals by breaking down extracellular GSH and making its amino acids components available to the cells against the threat of glutathione depletion (Videla et al., 2000). It was claimed that GSH depletion leads to induction of γ -GT. This argument gives evidence that the improved salvage of GSH can be obtained through increased activity of γ-GT, which has crucial role in the maintenance of intracellular GSH homeostasis and the regulation of cellular redox state (Rohman and Mac Nec, 2000).

In the present study, it was noticed moderate increase in serum AST level from day 3 to day 15 followed by decrease to reach its normal level on day 21 post-treatment. Meanwhile, serum ALT value continued in increasing trend till day 21 post-treatment. The present data support the several earlier reports that insecticides elevate the serum transaminases levels (Davalos *et al.*, 1996, Helal *et al.*, 1997, Goel *et al.*, 2000 and Heibashy and Amer, 2003). This elevation could be attributed to the disturbance in the metabolism of glutamic-glutamin

system and/or destructive effect of pesticides on hepatic cells. It is worthy mention that ALT is more specific for hepatocellular damage than AST since AST is released from different organs such as heart, muscles and liver (Heibashy and Amer, 2003).

Another explanation was suggested by Shah and Gupto (2001) who attributed the increase in liver enzymes to pesticides exposure. The effects of pesticides on the cell membrane may be through the lysis of the lipid layer and/or intracellular organoids that leads to increased permeability and permit the passage of the enzymes into the blood.

Several reports pointed at the potential role of zinc in protecting the hepatic cells from oxidative stress induced by different agents and its effect in normalize to different degrees the activity of liver enzymes. The efficiency of zinc protection may be due to its antioxidant properties in the biochemical system through various specific mechanisms (Rashmi *et al.*, 2010).

Treatment with acute dose of azinphos methyl resulted in decrease in serum total proteins and albumin comparable to controls. Meanwhile, treatment with acute dose of caprolin didn't alter the proteins level but caused slightly decrease in albumin level on day 3 and 7 post-treatment. Oxidative stress of pesticides induced hepatotoxity and alteration in antioxidant enzymes (Videla *et al.*, 2000 and Ahmed *et al.*, 2000) with subsequent disturbance in the physiological role of the enzymatic system of the liver leading to inability of hepatic cells to synthesize albumin (Heibashy and Amer, 2003).

It is possible to suggest that the animals exposed to pesticides suffer from hepatic zinc deficiency associated with high iron accumulation in the tissues (Goal *et al.*, 2000). Iron accumulation can trigger tissue oxidative damage though its capacity to undergo redox cycling and participating in one-electron transfer reactions. These reactions promote the generation of OH from H₂O₄ (Fenton reaction) that oxidizes one or more amino acids (Stadtman, 1992) and the decrease of essential amino acids resulted in insufficiency of protein synthesis (Akenami *et al.*, 1997).

With respect to co-administration effects of azinphos methyl or caprolin with ZnSO₄, it is obvious that zinc treatment increase the level of total proteins and albumin to reach the control level or slightly more. These results are not surprising since the zinc has important role in the process of protein synthesis (Rashmi *et al.*, 2010). Zinc is required for the function of many intracellular proteins, including enzymes, transcription factors and proteins involved in DNA replication. Zinc has an effect on the epidermal growth factor that stimulate intracellular signaling that stimulate tyrosin phosphorylation of its

receptors (Tang and Shay, 2001). Moreover, zinc supplementation following depletion increase total proteins, total collagen and RNA/DNA (Parasad 1979).

From the present data, it is noticed that the activity of free T_3 was decreased and free T_4 was increased as a result of azinphos methyl and caprolin treatments. It is well known that the concentration of serum T_3 was lower than T_4 but T_3 hormone is more active, more loosely bound with proteins and degrade rapidly from the blood than T4 (Silvestri *et al.*, 2005). Otherwise, pesticides exert adverse effect on the morphological follicular cells or inhibit the action of enzymes responsible for the conversion of T_4 to T_3 (Ahmed *et al.*, 2000).

The increased hepatic metabolizing capacity is coupled with reduction in T_4 level. This decline is a result of pesticides exposure mediated extrathyroidally through chemical induction of hepatic thyroid hormone (Christenson *et al.*, 1995).

Also, it is clear from the obtained data that zinc has a synergistic effect with pesticides on thyroid gland which reflected by significant increase in serum free T3 level on days 3, 7 and 21 post-treatment. There is a suggested explanation depends on the indirect physiological correlation of zinc with synthesis of thyroid hormones. The pancreatic carboxypeptidases, which degraded the polypeptides into amino acids, are metalloenzymes that require zinc for its activity. The amino acids, mainly tyrosin, were incorporated into thyroid hormone through iodination process (Tang and shay, 2001).

The data obtained highlighted the general protection sustained by zinc against the oxidative damage induced by azinphos methyl and caprolin and also conducted to suggest that the manifestation of zinc protection involve distinct differences in thyroid hormones responses in rats treated with azinphos methyl or caprolin. Pervious studies supported that zinc has a potential role in mediating the toxic effects of pesticides. This important role of zinc may be due to its antioxidant property, ability to scavenge reactive oxygen species, ability to generate endogenous antioxidanls and its possible interaction with other trace elements in maintaining the cellular harmony.

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Defensive Effect of Garlic as revealed by Molecular, Biochemical and Ultra Structure Print after Toluene Stress on Mice

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Abstract: The present study represents a trial for using the natural garlic extract (Tomox) as a treatment for the asthma caused by the organic chemical (Toluene). Twenty four mice were divided into four groups; group I kept as control, untreated animals, group II included animals treated daily with 2.5 mg/kg b.w. garlic for one week via oral gavage, group III included animals treated daily with toluene as a spray all over the body for 10 min 3 times/day for one week and group IV included animals treated with toluene followed by garlic. IgE levels were measured as an indicator for the immune response. Toluene increased the level of IgE (4.2 µg/ml), while treatment with garlic decreased its level to 3.7 µg/ml compared with 3.2 µg/ml in control animals. Transmission electron microscopic examinations were performed to reveal the effect of toluene on lung tissues. A marked changes has been observed after the treatment with toluene. These changes were represented by vacuolations, ill-defined mitochondria, fragmented rough endoplasmic reticulum and pyknotic nuclei of type I and II. Macrophage with pyknotic nuclei and condensed heterochromatin on the inner surface of the nuclear envelope and rupture nuclear envelope in some spaces. Molecular genetic analysis has been performed for the F1 to assess the genetic changes occurred in the offspring due to the treatments. There was no an observable variation on the RAPD-PCR level using 5 random primers O6 (5'- CCC AGT CAC T-3'), O10 (5'- TCA GCG CCA C-3'), C5 (5'- CCG CAT CTA C-3'), C10 (5'- TGT CTG GGT G -3') and C 14 (5'- AAG CCT CGT C-3'). The results showed that, toluene induced damage in lung tissue and immunosuppressive effects in adult animals. In spite of that, toluene did not induce genetic variation in DNA of babies of treated females as revealed by RAPD-PCR.

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Key words: Asthma, Garlic, Genetic fingerprint, IgE, Toluene.

1. Introduction:

Asthma is one of the most common chronic diseases worldwide. To treat this widespread disease there is a high prevalence of usage of herbal medicine. The use of plants is as old as humankind and it has been steadily increasing over the past 10 years. Plant-based remedies are now one of the most popular complementary treatments (Szelenyi and Brune, 2002). Chronic inflammatory pulmonary diseases such as Chronic Obstructive Pulmonary Disease (COPD) and asthma are highly prevalent and associated with a major health burden worldwide. Despite a wealth of biological and clinical information on normal and pathologic airway structure and function, the primary causes and mechanisms of disease remain to a large extent unknown as well as preventing the development of more efficient diagnosis and treatment (Auffray et al., 2010).

The incidence of asthma has increased by more than 50% in the last 2 decades. The reasons for this increase are not entirely clear, but workplace exposures may cause asthma in some patients (Linda *et al.*, 2001).

Toluene (T), also known as methylbenzene, is a volatile organic compound with highly reactive industrial applications. It is an aromatic hydrocarbon that is widely used as industrial feedstock and as a solvent (Streicher *et al.*, 1981). Toluene can exert neurotoxic and immunotoxic effects, although these effects have been studied extensively, the underlying mechanism remains obscure (Win-Shwe *et al.*, 2011). Toluene is capable of inducing lymphocyte-dependent but IgE-independent tracheal hyper reactivity in the mouse, which is not associated with cellular infiltration in the airways (Scheerens *et al.*, 1996).

The potency of Garlic (G) (Allium sativum) has been acknowledged for 5000 years. In ancient times, the Babylonians, Egyptians, Phoenicians, Vikings, Chinese, Greeks, Romans and Hindus used garlic frequently as a remedy for many diseases (Block, 1985). Garlic exhibits hypolipidemic, antiplatelet, and procirculatory effects. It prevents cold and flu symptoms through immune enhancement and exhibits anticancer and chemopreventive activities (Amagase, 2006). The use of garlic to treat wounds surfaced repeatedly through diallyl disulfide

(DADS), a component of Garlic, inhibits the proliferation of human blood, colon, lung and skin cancer cells. Although DADS had been reported to induce apoptosis in human leukemia HL-60 cells, there are no reports regarding whether or not it affects leukemia cells in vivo (Yang et al., 2006).

Hasbal et al. (2010) studied DNA damage as level of DNA strand breaks and formamidopyrimidine DNA glycosylase (Fpg)-sensitive sites, which reflects oxidative DNA damage and glutathione (GSH) level in children with mild-to-moderate persistent asthma and to examine the effect of antiasthmatic therapy on these DNA damage parameters and GSH level

The main aim of the present study is to evaluate the effect of garlic on toluene-induced asthma in mice and to determine the genetic background changes (RAPD- PCR) that might be happened in the F1 offspring of treated pregnant female mice.

2. Materials and Methods Animals

In this study, twenty four adult female mice ($Mus\ musculus$) aged about 12 weeks (25 – 30 g) were purchased from the Animal House of the National Research Center, Cairo, Egypt. Mice were acclimatized to the laboratory conditions and given food and water $ad\ lib$.

Chemicals

Toluene which known as methylbenzene, $C_6H_5CH_3$ with molecular weight 92.14 and concentration 99.5 % was purchased from Al-Gomhoria Co., Cairo, Egypt. Garlic is available in local markets as tablets (TOMOX). Each tablet contains 200 mg of specially prepared garlic powder. Tablets purchased from Atos Pharma, Cairo, Egypt.

Experimental design

Animals were grouped into four experimental groups each consists of six animals; group I, served as a control; group II, treated daily with 2.5 mg/kg b.w. garlic for one week via oral gavage; group III, treated with toluene as a spray all over the body fur (3 times, 10 min. per day) for one week to induce asthma and group IV, were treated with toluene followed by garlic to evaluate the antagonistic effect of the two substances. The samples were taken to be tested for the occurrence of asthma after 3 days from the end of exposure.

Immunoglobulin assay

Blood samples were collected from each animal, the serum was separated and the indirect ELISA method was used. The level of

Immunoglobulin E (IgE) was measured in all the samples.

Sample preparation for histopathology examinations

One animal from each group was dissected to obtain lung tissues which were then prepared for electron microscopy examination. The lungs were cut into small pieces and fixed in 2.5% glutaraldehyde and paraformaldehyde in 0.1 M cacodylate buffer (pH 7.4) for 4 h. Then samples were washed in cacodylate buffer and post-fixed in a buffered solution of 1% osmium tetroxide at 4 °C for 90 min. This was followed by dehydration in ascending grades of alcohol, immersed in propylene oxide for two changes, 5 min. each, and embedded in Epon. Semithin sections were stained with 0.5% toluidine blue and examined under a bright field light microscope. Ultrathin sections were cut, mounted on formvar-section grids, stained with uranyl acetate and lead citrate (Weakley, 1981). The prepared sections were examined and microphotographed using a transmission electron microscope (JEOL JEM-1200 EX II, Japan) operated at 60-70 KV, Faculty of Science, Ain Shams University, Cairo, Egypt.

Molecular genetic fingerprinting

DNA was isolated from lung tissue samples according to (Ausubel *et al.*, 1989).

Random Amplified Polymorphic DNA (RAPD-PCR) Analysis

The purified DNA samples were subjected to amplification using random primers via PCR. Five random primers were used in this study (C10, C5, C 14, O6, and O10, Operon Technology Inc., UK) (Table 1) to generate a distinguishable pattern. The PCR profile was as follows: 95°C for 5 min. as pre-PCR step and the cycles were 94 °C for 1 min., 40°C for 1 min., and 72°C for 1 min. and a final extension step at 72°C for 10 min. were performed. The numbers of cycles were 35. The PCR product was then separated on 1.2 % agarose gel and illuminated on UV-transilluminator after being stained with ethidium bromide. The gels were photographed and subjected to analysis via gel documentation system (Gel Pro-Analyzer, version. 3.1).

3. Results

As shown in tabulation (1) toluene-exposure group revealed reduction in food intake (1.5 - 2 g) media / day) accompanied with decrease in weight gain (15 - 20 g) compared with control and garlic group (4 - 5 g) media / day). In addition, the mean offspring numbers of toluene-exposure group were 4 animals compared to control (12 animals) and garlic

groups (10 animals). Also toluene-exposure animals showed general weakness and fatigue compared with control animals.

Immunoglobulin assay

Toluene significantly increased the level of IgE (4.2 μ g/ml) in comparison to control (3.2 μ g/ml). Meanwhile, garlic treatment revealed decrease in the level of IgE (3.4 μ g/ml). Moreover the level of IgE in the group IV which treated with toluene followed by garlic was 3.7 μ g/ml. (Fig.1).

Scanning electron microscopic examination

Histological examination of the respiratory epithelium from lung in mice exposed to toluene 3 times / 7 days was performed under a light microscope. The alveolar epithelium didn't undergo any changes in toluene-exposed mice compared with control mice. Electron microscopic examination of the alveoli of the control lung revealed two types of cells: the pneumatocytes I (the major type) and pneumatocyte II (the minor one). The pneumatocyte I are thin squamous alveolar cells with attenuated cytoplasm containing pinocytic vesicles and ovoid nuclei. The cytoplasm contains rough endoplasmic reticulum, Golgi complex and mitochondria (Fig. 2). The second type pneumatocyte II (septal cells), are interpenetrated among the type I cells. These cells rest on the basement membrane and their cytoplasm have a well developed Golgi complex, mitochondria, rough endoplasmic reticulum, lamellar bodies and microvilli on their free apical surfaces (Figs. 3 & 4). The blood air barrier consisted of cytoplasmic extensions of pneumatocyte I resting on basal lamina

of the endothelial cells lining blood capillaries (Fig. 2). Macrophages (dust cells) are observed in the intra-alveolar spaces and in the interstitial septum (Fig. 5).

Treatment of mice with toluene had produced marked changes in the ultrastructure of the pneumatocytes I and II. Many mitochondrial cristae were broken down and appeared more electron dense (Fig. 6). The cisternae of the rough endoplasmic reticulum were fragmented into small stacks. The nucleus appeared shrunken and pyknotic with irregular contour (Fig. 7). The micrograph of pneumatocytes II revealed marked cytopathological alterations. There were abundant RER with cisternae were fragmented into smaller stacks. The nucleus was also pyknotic with irregular nuclear envelope (Figs 7 & 8). The heterochromatin was condensed on the inner surface of the nuclear envelope (Fig. 8). The examination of lung sections of mice treated with toluene exhibited advanced degenerative changes. These changes were represented by vacuolations, illdefined mitochondria, fragmented rough endoplasmic reticulum and pyknotic nuclei of type I and II. Macrophage with pyknotic nuclei and condensed heterochromatin on the inner surface of the nuclear envelope and rupture nuclear envelope in some spaces (Fig. 9).

Identification of DNA changes

Fig (10) revealed no variation between the samples under study using different primers, so the time of exposure or the toluene itself didn't cause any DNA change.

Table (1): The sequence, operon codes and GC content of random primers used in the experiment.

N0	Primer	Sequence (5'- 3')
1	O6	CCC AGT CAC T
2	O10	TCA GCG CCA C
3	C5	CCG CAT CTA C
4	C10	TGT CTG GGT G
5	C14	AAG CCT CGT C

Tabulation (1): Gram feeding / day, weight and mean offspring number for the mice under study after toluene treatment.

	C group	G group	T group	T & G group
Feeding / day	4-5 g of media	4-5 g of media	1.5 - 2 g of	2-3 g of media
			media	
Weight	30 - 35 g	30 - 35 g	15 - 20 g	20 - 25 g
Mean offspring no.	12	10	4	7

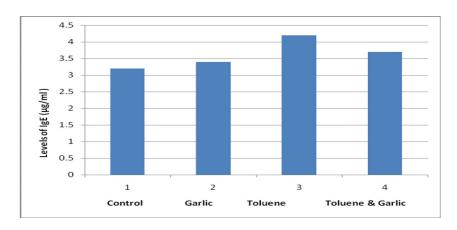
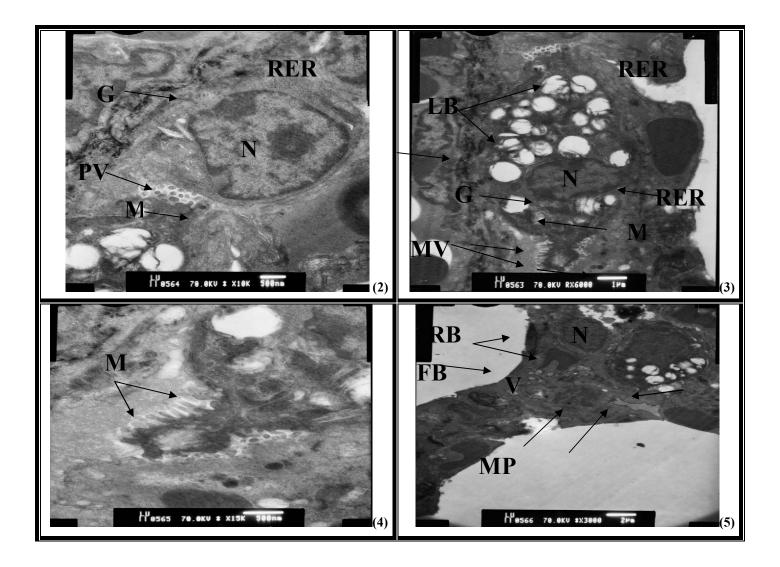
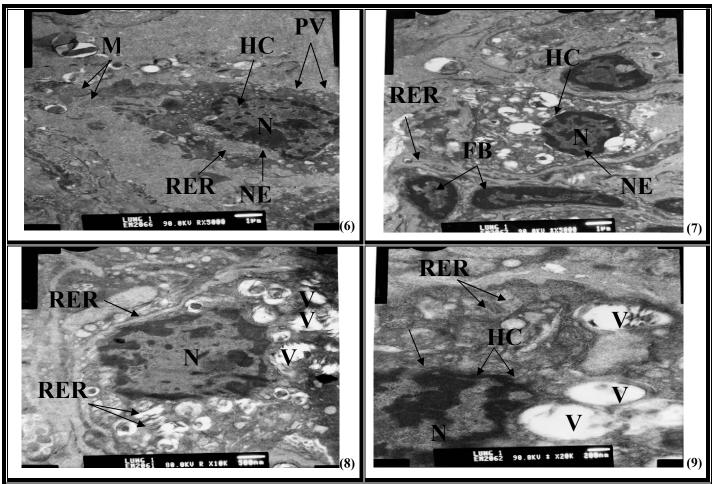


Figure (1): IgE levels in the control and the treated mice blood sample.





Figures (2, 3, 4 and 5): Are electron micrographs of lung of control mice. Figure (2): Showing squamous alveolar cell (pneumatocyte I) with attenuated cytoplasm. Notice, rough endoplasmic reticulum (RER), well developed Golgi (G) and pinocytotic vesicles (PV). (X.10.000). Figure (3): Illustrating cuboidal pneumatocyte II which rest on the basement membrane (arrow) and has microvilli (MV). Notice, a large number of lamellar bodies (LB), mitochondria (M), rough endoplasmic reticulum (RER), a well developed Golgi complex (G) and nucleus (N). (X.6000). Figure (4): Is an enlarged portion of pneumatocyte II illustrating apical microvilli (MV). (X.15000). Figure (5): Showing macrophage (MP) with pseudopodia (arrow), many vacuoles (V) and nucleus (N). (X.3000).

Figures (6, 7, 8 and 9): Showing electron micrographs of lung of mice treated with toluene for 7 days. Figure (6): Illustrating pneumatocyte I showing mitochondria (M), fragmented rough endoplasmic reticulum (RER), pinocytotic vesicles (PV), irregular nuclear envelope (NE) and nucleus (N) (X.5000). Figure (7): Showing pneumatocyte II with fragmented rough endoplasmic reticulum (RER), condensed heterochromatin (HC), irregular nuclear envelope (NE) and pyknotic nucleus (N). Interstitial fibroblast (FB) with irregular nucleus (N) (X. 5000). Figure (8): Is high magnification of pneumatocyte II illustrating highly vacuolated cytoplasm (V) and fragmented rough endoplasmic reticulum (RER). Notice the nucleus (N) with irregular nuclear envelope (X. 10000). Figure (9): Showing macrophage with vaculated cytoplasm (V), condensed heterochromatin (HC), fragmented rough endoplasmic reticulum (RER) and rupture in nuclear envelope (arrow) (X. 20000).

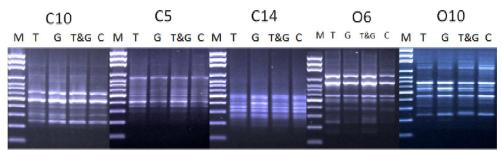


Figure (10): Random Polymorphic DNA –PCR analysis of the treated and non-treated samples. M: marker, T: Toluene, G: Garlic and C: Control.

4. Discussion

Asthma is an inflammatory disease and the attention has focused on the mechanisms of this inflammation. Over the past decade, animal models, including guinea pigs, monkeys, and mice have been employed to explain the inflammation associated with asthma (Gleich and Kita, 1997). The incidence of asthma has increased by more than 50 % in the last 2 decades. The reasons for this increase are not entirely clear (Linda et al., 2001). In the present study, the effect of toluene as an inducer of asthma in mice was assessed and the effect of garlic as an IgE reducer agent was also assessed. Our data revealed the decrease effect of toluene on body weight. offspring No and gram feeding per day which in agreement with Bowen and McDonald (2009). Results also referred to the negative effect of toluene on central nervous system (CNS), it was seen as a loss of animal appetite and affect too on the sensory organs so it couldn't reach or define the food and this is in turn reflected on animals weight (Bowen and McDonald, 2009). That is in accordance with (Ghaly et al., 2007) who stated that toluene primarily causes central nervous system disorders. In the short term, it can cause fatigue, nausea, weakness and confusion. Long term exposure to toluene can result in spasms, tremors, memory and/or coordination impairment, as well as liver and kidney damage.

Toluene reacts as a normal aromatic hydrocarbon towards electrophilic aromatic substitution (March, 2001 and Wade, 3003). The methyl group makes it around 25 times more reactive than benzene in such reactions. The toxicity of toluene can be explained mostly by its very low water solubility, it cannot exit the body via the normal routes (urine, feces, or sweat). It must be metabolized in order to be excreted. The methyl group of toluene is more easily oxidized by cytochrome P450 than the benzene ring. Therefore, in the metabolism of toluene, 95% is oxidized to become benzyl alcohol (Nakajima et al., 1997). The toxic metabolites are created by the remaining 5% that are oxidized to

benzaldehyde and cresols (Chapman et al., 1990 and Hanioka et al., 1995). Most of the reactive products are detoxified by conjugation to glutathione but the remainder may severely damage cells (van Doorn et al., 1981).

The data obtained revealed that toluene when sprayed on the mice increased IgE (4.2 µg/ml) which may be indication of asthma induction. While treatment with garlic (Allium sativum) after toluene exposure decreased the level of IgE (3.7 µg/ml) compared to control (3.2 µg/ml). Recent studies in that concern indicated that peritoneal injections of the garlic extract in mice caused a significant decrease in the hallmark criteria of allergic airway inflammation levels (Zare et al., 2008). Furthermore, Shields et al., (1995) indicated that numerous clinical studies showed that direct interference with the IgE response leads to a decrease or elimination of allergic symptoms and this was in agreement with our data. While adding garlic to animal feed showed remodulation of the immune response and decreasing the level of IgE. In the present investigation we measured the IgE level especially because of its central role in the pathogenesis of the eosinophilic inflammation as well as in the obstructive air way of the bronchial hyperreactivity physiology (Mehlhop et al., 1997). IgE antibodies are thought to play an important role in the induction of the allergic inflammation of the bronchi (Saban et al., 1994). The treatment with toluene induces asthma in mice and subsequently the level of IgE increased (4.2 μg/ml) in comparison to the control (3.2 μg/ml). The antagonistic effect was revealed when the mice were treated with garlic after toluene exposure (the IgE level was 3.7 µg/ml). This indicated that garlic could attenuate the allergic inflammatory response associated with asthma due to treatment with chemicals (Owen, 2006).

The present investigation illustrated marked deleterious consequences of changes on the alveolar cells following treatment with toluene. These changes were in agreement with (Mollenhauer et al., 1990) who found exposure of animal cells to toluene caused

cellular changes which included condensation of heterochromatin nuclei and in ultimately degeneration of organelles. These results coincides with the report of (Lange et al., 1999) who found that toluene diisocyanate vapor in vitro on differentiated human bronchial epithelial cells caused cytotoxicity as pyknosis, numerous mitochondria and DNA fragmentation, while in vivo implications of these finding include decreased ciliary movement and longer retention of toluene and hence increased exposure. Kanter (2009) and Hussain et al. (2011) found that toluene caused severe inflammatory cell infiltration and many alveoli were obstructed.

The destruction of pneumatocyte I and II referred to the action of toxic substances which is followed by a strong increase in the mitotic activity of the remaining type II cells, most of type II cells are transformed into type I cells, and the alveolar lining regains its normal appearance (Junqueira et al., 1995).

The short time of the exposure revealed no change in DNA pattern of offspring obtained through (RAPD-PCR). This result don't judge that toluene is mutagenic or no.

It can be conclude that garlic causes improvement for the immune system and that may reflect its potentiality of attenuation of inflammatory features of allergic airway inflammations. We recommend that the garlic can be used as a potential treatment for the pulmonary diseases.

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The Protective effect of Ginger and N- Acetyl Cysteine on Ciprofloxacin-Induced Reproductive Toxicity in Male Rats

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Abstract: This study was conducted to evaluate the reproductive toxicity induced by ciprofloxacin antibiotic and the protective effect of ginger and/or N-acetyl cysteine. For this purpose, forty- nine rats were divided into 7 groups (7 rats/group). Group (1) was orally given distilled water (solvent of the used drugs) and kept as a control. Group (2) was daily administered ginger at a dose of 100 mg/kg.b.wt. by a stomach tube for 65 days (5 days/week). Group (3) was daily administered N-acetyl cysteine (NAC) at a dose of 50 mg/kg.b.wt., by a stomach tube for 65 days (5 days/week). Group (4) was orally administered ciprofloxacin (CPX) at a dose of 12.5 mg/kg. b.wt. for 65 days (5 days/week). Group (5) was concurrently administered ciprofloxacin (12.5 mg/kg. b.wt) with ginger (100 mg/kg. b.wt.) by a stomach tube for 65 days (5 days/week). Group (6) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt) with N-acetyl cysteine (50 mg/kg.b.wt) by a stomach tube for 65 days. Group (7) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt.) with ginger (100mg/kg.b.wt.) and N- acetyl cysteine (50 mg/kg.b.wt) by a stomach tube for 65 days. Semen samples were collected at the end of experimental period and were used for sperm functions analysis. Blood samples were collected to separate serum for biochemical and hormonal studies. Testes homogenate was used for oxidative stress biomarkers (lipid peroxidation (TBARS), reduced glutathione (GSH) and DNA fragmentation test). Testes, epididymis and seminal vesicles were collected for histopathological study. The obtained data revealed that CPX promotes reproductive toxicity in rats through generating oxidative damage. It induces an adverse effect on reproductive organs weight, sperm parameters (sperm count, sperm motility and viability), reproductive hormones (testosterone, LH, and FSH) and histological structures. Ginger and/or NAC have an important role in ameliorating reproductive toxicity induced by CPX through restoring the oxidantantioxidant balance.

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Keywords: Ciprofloxacin; Reproductive Dysfunction; Oxidative stress; Ginger; N-acetyl cysteine; Antioxidant effect: Rat

1. Introduction:

Infertility is one of the major health problems in animals. Several conditions can interfere with spermatogenesis and reduce sperm quality and production. Drug treatment, chemotherapy, toxins and environmental factors can have harmful effect on spermatogenesis and sperm normal production (Amann and Berndtson, 1986).

Antibiotics are used in the treatment of many infections and as anticancer, antiprotozoal and antihelminthic. However, antimicrobial therapy has been shown to significantly affect semen parameters in human and animal models (Schlegel et al., 1991).

Ciprofloxacin (CPX) is one of the newer generations of antibacterial agents. It belongs to the family of fluoroquinolones with a very broad spectrum against many microbial pathogens and has been approved in more than 100 countries world-wide (Wolfson and Hooper, 1985). It is used to combat various infectious diseases in man and animals (Stein, 1996).

In vivo genotoxicity studies suggest ciprofloxacin as safe for therapeutic use (Herbold et al., 2001). However, other studies have demonstrated ciprofloxacin to significantly impair both testicular function and structure (Abd-Allah et al., 2000 and Demir et al., 2007).

Recently, it has been observed that the oxidative damage to testicular cells induced by various xenobiotics can result in testicular dysfunction and male infertility (Aggarwal and Said, 2005 and Shrilata and Muralidhara, 2007).

Oxidants and antioxidants have attracted widespread interest in nutrition research, biology and medicine. It has become clear that constant generation of pro-oxidants, including oxygen free radicals, is an essential attribute of aerobic life (Acharya et al., 2008). Therefore, the role of nutritional and biochemical factors in reproduction and sub-fertility treatment is very important.

Ginger is a strong anti-oxidant substance and may either mitigate or prevent generation of free

radicals. It is considered a safe herbal medicine with only few and insignificant adverse side effects (Ali et al., 2008). The main pharmacological actions of ginger include immuno-modulatory, anti-tumorigenic, anti-inflammatory, anti-apoptotic, anti-hyperglycemic, anti-lipidemic and anti-emetic actions (Arash et al., 2009).

N-acetyle cysteine (NAC), a potent antioxidant derives from the amino acid L-Cysteine. It has been used clinically for decades for the treatment of many diseases. It has been also used as a chelator of heavy metals to protect against oxidative stress and prevent damage of cells (**De Vries and De Flora, 1993**).

The aim of the present study is to evaluate the reproductive toxicity induced by ciprofloxacin antibiotic and the protective effect of ginger and/or N-acetyl cysteine in male rats.

2. Materials and Methods

Chemicals and Drugs:

Ciprofloxacin: Ciprofloxacin was purchased from Organopharmaceutical and Chemical Industries Co (Organopharma) in the form of Ciprofloxacin (lactate) infusion.

N-Acetyl cysteine: It was obtained from Sedico Pharmaceutical Co.

Ginger: Ginger was purchased from Mepaco Pharmaceutical Co.

Animals:

The present investigation was carried out on forty-nine apparently healthy male albino rats weighing 120-150 g. Rats were obtained from the Faculty of Vet. Med., Cairo University (laboratory animals housing unit). Rats were left for two weeks for acclimatization before starting the experiment. They were kept in metal cages, fed on basal diet and given water ad-libitum.

Experimental groups:

Rats were randomly divided into (7) groups of 7 rats each and were treated as follows:

Group(1) was orally given distilled water (solvent of the used drugs) and kept as a control.

Group(2) was daily administered ginger at a dose of 100 mg/kg.b.wt. (**Arash et al., 2009**) by a stomach tube for 65 days (5 days/week).

Group(3) was daily administered N-acetyl cysteine (NAC) at a dose of 50 mg/kg.b.wt (**Ebenezer et al., 2008**) by a stomach tube for 65 days (5 days/week).

Group(4) was orally administered ciprofloxacin (CPX) at a dose of 12.5 mg/kg.b.wt. (**Arash et al., 2008**) for 65 days (5 days/week).

Group(5) was concurrently administered ciprofloxacin (12.5 mg/kg.b.wt) with ginger at a dose of 100 mg/kg.b.wt. by stomach tube for 65 days (5 days/week).

Group(6) was concurrently administered ciprofloxacin (12.5mg/kg.b.wt) with N-acetyl cysteine (50 mg/kg.b.wt) by stomach tube for 65 days (5 days/week).

Group(7) was concurrently administered ciprofloxacin (12.5mg/kg.b.wt.) with ginger (100mg/kg.b.wt.) and N-acetyl cysteine (50 mg/kg.b.wt) by stomach tube for 65 days (5 days/week).

Collection and Preparation of Samples:

1. Blood samples:

Blood samples were collected from the retroorbital venous plexus of rats of each group at the end of the experimental period. Samples were collected in clean centrifuge tubes and were allowed to clot, then centrifuged at 3000 rpm for 10 minutes for serum separation. Serum was used for biochemical and hormonal studies.

2. Semen samples:

Semen samples were collected from cauda epididymis and used for sperm functions analysis.

3. Tissue specimens:

Testes were taken from the sacrificed rats in all experimental groups. They were perfused with PBS (phosphate buffered saline), collected in clean dry plastic bags and kept at -40° c for determination of lipid peroxidation (TBARS), reduced glutathione (GSH) and DNA fragmentation test. Specimens from testes, epididymis and seminal vesicles were fixed in 10 % neutral buffered formalin and were used for the histopathological study.

Methods:

1. Body weight:

At the end of the experimental period, the body weight of each individual rat was measured.

2. Reproductive organ indices:

2.1 Reproductive organs weight:

Rats were sacrificed after the last day of treatment and reproductive organs; testes, caudae epididymis and seminal vesicles were weighed.

2.2 Sperm functions analysis:

Sperm count:

Sperm cell count was determined according to the technique adopted by **Bearden and Fuquay (1980)** using an improved Neubauer haemocytometer.

Mass motility

The epididymal sperm content was obtained by maceration of the tail of epididymis on a dry, clean and warm slide; mixing well with a drop of warm normal saline solution and immediately examined under (10X) objective lens of a light microscope for determination of mass motility percentage of spermatozoa according

to Bearden and Fuquay (1980). Live and dead sperms:

A drop of epididymal content of each rat was mixed with an equal drop of eosin-nigrosin stain prepared in accordance with **Barth and Oko (1994).** Thin films were made by spreading the stained content onto clean slides and quickly dried. Viable sperm remains colorless. One hundred sperm cells per rat were scored for determining the viability percent.

3. Biochemical analysis:

3.1 Serum enzymes

Serum samples were used for determination of the activities of lactate deydrogenase (LDH) according to the method of **Friedman and young (1997)** and acid phosphatase (ACP) according to **Kind and King (1954)**. Activities of enzymes were assayed using commercial diagnostic kits obtained from Biodiagnostic Co., Egypt.

3.2 Hormonal assay:

Determination of serum Testosterone, Folliclestimulating hormone (FSH) and Luteinizing hormone (LH)

Testosterone determination was performed according to the method adopted by **Jaffe and Behrman** (1974) by using the coat-A-count technique, (radioimmunoassay). Follicle stimulating hormone (FSH) and Luteinizing hormone (LH) determination were performed according to **Santner et al.**, (1981) by the coat-A-count technique (immunoradiometric assay).

3.3 Oxidant –antioxidants parameters: Lipid peroxidation (LPO) Assay:

Malondialdhyde (MDA) level was estimated in the testicular homogenate according to the method of **Ohkawa et al., (1979)**. Thiobarbituric acid (TBA) reacts with malondialdehyde (MDA) in acidic medium at temperature of 95°C for 30 min. to form thiobarbituric acid reactive substances (TBARs). The absorbance of the resultant pink product can be measured colorimetrically at 534 nm.

Reduced glutathione (GSH):

The reduced glutathione (GSH) content of the testis homogenate was determined using the method described by **Beutler et al.**, (1963). The method based on the reduction of 5,5° dithiobis (2- nitrobenzoic acid DTNB) with glutathione (GSH) to produce a yellow compound. The reduced chromogen is directly proportional to GSH concentration and its absorbance can be measured at 405 nm.

3.4 DNA fragmentation assay:

DNA fragmentation assay was performed according to **Sellins and Cohen (1987).** The testes were lysed in 1ml buffer (10 mM Tris-HCl, pH 7.4, 10

mM EDTA, 0.5% Triton x100). The pellets contain total intact DNA (P) and the supernatants contain smaller fragments of DNA (S). They were treated separately with 0.5 ml of 25% trichloroacetic acid (TCA) and then both sets were left overnight at 4°C. DNA precipitated was collected by centrifugation and each sample was treated with 80 µl of 5% TCA followed by heat treatment at (90°C) for 15 min. Freshly prepared 1 ml diphenylamine reagent was added to each sample. The tubes were allowed to stand overnight at room temperature and their optical densities were recorded at 600 nm. DNA samples were electrophoresed in (1.2%) agarose gel for 90 min at 5 V/cm and visualized with ethidium bromide. Percent DNA fragmentation was calculated by the following equation: % DNA fragmentation = $[S/(S + P)] \times 100$.

4. Histopathological examination:

Tissue specimens from testes, epididymis and seminal vesicles of all experimental rats were collected at the end of the study and fixed in neutral buffered formalin, processed by conventional method, embedded in paraffin, sectioned at 4-5 um and stained by Haematoxylin and Eosin (Bancroft et al., 1996).

5. Statistical analysis:

Data were compared across groups using analysis of variance (ANOVA). Data were expressed as mean \pm S.D. Levels of significance of P <0.05 were chosen to identify the significant differences (Snedecor and Cochran, 1982).

3. Results

Effect on body weight

Mean values of rats' body weight of each experimental group are illustrated in **table** (1). Non significant difference was recorded between CPX administered group and control group.

Weight of individual male reproductive organs:

Results of reproductive organs (testes, epididymis and seminal vesicles) weights are illustrated in **table (1)**. The obtained data revealed a significant decrease in the absolute weights of testes, epididymis and seminal vesicles in rats received ciprofloxacin compared to control group. Co-administration of either ginger or NAC with ciprofloxacin antibiotic induced significant increase in these reproductive organs weight compared to CPX treated group. While concurrent administration of both ginger and NAC with ciprofloxacin antibiotic (group 7) induced a remarkable increase.

Sperm count, motility and viability:

Data of the epididymal sperm count, sperm motility and viability % are presented in **Table (2)**. A

marked reduction in sperm count, sperm motility and viability was recorded in CPX treated group (group 4) when compared with the corresponding group of control animals. Co-administration of ginger and/or NAC with ciprofloxacin attenuates the decrease in sperm count and motility in comparable to control group. On the other hand, concurrent administration of ginger or NAC with ciprofloxacin improves sperm viability % but not reaching the values of control. Administration of both ginger and NAC with ciprofloxacin induced significant increase in sperm viability % reaching the values of control group.

Results of biochemical analyses: Serum enzymes

Changes in serum acid phosphatase, and lactate deydrogenase (LDH) activities are illustrated in **Table** (3). From the obtained results, it was observed that CPX induced a significant increase in the activities of serum LDH and ACP compared to control group. The concurrent treatment of CPX with ginger and/or NAC decreased the elevated activities of these enzymes to an appreciable extent compared with CPX treated rats.

Results of hormonal study:

Hormonal assay revealed significant decrease in the levels of testosterone, FSH and LH (p>0.05) of CPX treated rats when compared with control group (**Table 3**). The co-administration of ginger with CPX

increased the serum levels of testosterone, FSH and LH reaching that of controls levels. Whereas, co-administration of NAC with CPX significantly elevated the serum levels of testosterone, FSH and LH in comparable to CPX treated rats.

Lipid Peroxidation and anti-oxidative enzyme:

Mean levels of testicular malondialdehyde, and reduced glutathione activity among studied groups are shown in **Table (4)**. The obtained results revealed a significant increase in the mean values of TBARS and significant drop in GSH activity (p<0.05) in CPX treated rats versus control group. Concurrent administration of CPX with ginger and/or NAC caused significant decrease in lipid peroxidation and a remarkable (p<0.05) increase in the GSH level compared with the CPX treated rats.

DNA fragmentation test:

Significant increases in the DNA fragmentation levels were recorded in the testicular homogenates of CPX treated rats in comparable with control group. Administration of ginger and/or NAC to CPX induces a remarkable decrease in testicular DNA fragmentation levels in comparable to CPX treated rats (**Table 4**). Non significant DNA fragmentation levels were recorded in the second group administered ginger compared to control group.

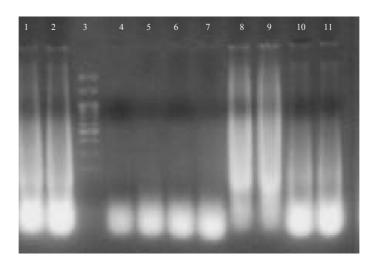


Fig. (1): The DNA was electrophoresed on TAE agarose gel for one hour at 80 V. The DNA fragmentation pattern was visualized by ethidium bromide. Lane1-2: CPX, Lane3: DNA ladder, Lane4-5: Control, Lane6-7: Ginger, Lane8-9: NAC and Lane10-11: CPX+Gin.+NAC

Table 1: Effects of ciprofloxacin (CPX), Ginger (Gin.) and N-acetyl cysteine (NAC) on the body weight and reproductive organs weights of rats.

Parameters	Control	Ginger	NAC	CPX	CPX + Gin.	CPX + NAC	CPX+Gin.+NAC
Body Wt. (g)	267.0 ±2.65 ab	269.3±3.06 a	264.0±3.61 b	268.7±2.31 ab	270.3±4.51 a	$268.0 \pm 2.00 \ ^{ab}$	269.0 ± 1.00 ab
Testes (g)	1.61 ± 0.03^{b}	1.72 ± 0.07 a	1.59 ± 0.04 b	1.26 ± 0.05 °	1.47 ± 0.03 °	1.40 ± 0.01 ^d	1.65 ± 0.04 ab
Epididymis (g)	0.36 ± 0.04 ab	0.41 ± 0.03^{a}	0.35 ± 0.04 ab	0.22 ± 0.03 °	0.32 ± 0.03 b	0.31 ± 0.05 b	0.37 ± 0.03 ab
Seminal ves.(g)	0.60 ± 0.04^{a}	0.61 ± 0.06 a	0.58 ± 0.04 ab	$0.26\pm0.03~^{d}$	0.51 ± 0.03 b	0.42 ± 0.03 °	0.54 ± 0.04 ab

Means with different superscripts (a-d) within a row are significantly different at P< 0.05

Table 2: Effects of ciprofloxacin (CPX), Ginger (Gin.) and N-acetyl cysteine (NAC) on sperm parameters.

Parameters	Control	Ginger	NAC	CPX	CPX + Gin.	CPX + NAC	CPX+Gin.+NAC
Sperm count (×10 ⁶ /ml)	71.36 ± 4.51^{a}	70.40±4.51 ^a	65.40 ± 3.97^{a}	51.6 ± 4.45^{d}	67.4 ± 4.67^{ab}	61.40 ± 3.97 °	66.4 ± 5.94^{ab}
Motility (%)	81.67 ± 2.68 a	79.80 ± 2.68^{a}	78.80 ± 2.12^{a}	$65.00 \pm 3.61^{\circ}$	79.6 ± 1.52 a	75.00 ± 2.12^{b}	79.4 ± 4.45^{a}
Viability (%)	83.2 ± 2.39 ^a	84.00 ± 2.65 a	78.8 ± 3.42 bc	48.40 ± 3.05^{d}	79.60 ± 1.14 bc	$77.60 \pm 1.82^{\circ}$	81.60 ± 2.70^{ab}

Means with different superscripts (a-d) within a row are significantly different at P< 0.05

Table 3: Effects of ciprofloxacin (CPX), Ginger (Gin.) and N-acetyl cysteine (NAC) on some serum enzymes and hormones.

Parameters	Control	Ginger	NAC	CPX	CPX + Gin.	CPX + NAC	CPX+Gin.+NAC
ACP (U/L)	12.67 ± 2.57 °	15.4 ± 2.60 bc	14.13 ± 2.27 bc	22.93 ± 2.53^{a}	18.37 ± 2.18 ab	17.7 ± 2.61^{b}	16.1 ± 3.57 bc
LDH (U/L)	208.9 ± 1.87 °	206.13 ± 1.80 °	205.47 ± 2.84 °	300.8 ± 2.88 a	259.13 ± 2.72 b	223.33 ± 3.06 °	214.93 ± 2.61^{d}
FSH (mIu/ml)	0.65 ± 0.04 a	0.62 ± 0.04 ab	0.58 ± 0.05 bc	0.36 ± 0.04^{e}	0.62 ± 0.04 ab	0.48 ± 0.03^{d}	0.55 ± 0.03 °
LH (mIu/ml)	0.19 ± 0.04 a	0.20 ± 0.02 a	0.14 ± 0.03 bc	0.05 ± 0.02 d	0.16 ± 0.02 ab	0.10 ± 0.02 °	0.11 ± 0.02 °
Testosterone (ng/ml)	1.89 ± 0.11^{a}	1.79 ± 0.17^{ab}	1.48 ± 0.15^{cd}	$0.99 \pm 0.10^{\mathrm{e}}$	1.75 ± 0.08 abc	$1.58 \pm 0.17^{\text{bcd}}$	1.35 ± 0.16^{d}

Means with different superscripts (a-e) within a row are significantly different at P< 0.05

Table 4: Effects of ciprofloxacin (CPX), Ginger (Gin.) and N-acetyl cysteine (NAC) on testicular Malondialdhyde (MDA), reduced glutathione (GSH) and DNA fragmentations (Frag.).

Parameters	Control	Ginger	NAC	СРХ	CPX + Gin.	CPX + NAC	CPX+Gin.+NAC
MDA (mmol / g. tissue)	18.67 ± 3.57 °	15.18 ± 3.07 °	19.13 ± 3.25 de	39.95 ± 3.09 a	25.63 ± 3.29 bc	30 ± 2.00^{b}	$24.33 \pm 2.52^{\text{cd}}$
GSH (mmol / g. tissue)	0.28 ± 0.04^{ab}	0.32 ± 0.04^{a}	0.23 ± 0.04 bc	0.08 ± 0.02^{e}	$0.19 \pm 0.03^{\text{ cd}}$	0.15 ± 0.04^{d}	$0.21\pm0.04^{\text{ cd}}$
DNA Frag. (%)	48.00 ± 0.83 d	47.78 ± 1.61^{d}	45.56 ± 0.93 °	64.74 ± 1.51 ^a	$53.98 \pm 0.90^{\circ}$	59.36 ± 1.19 b	52.44 ± 1.16 °

Means with different superscripts (a-e) within a row are significantly different at P< 0.05

Histopathological results:

Microscopically, testes of rats treated with CPX revealed marked necrosis of spermatogoneal cells lining seminiferous tubules (Fig.2) associated with incomplete spermatogenesis. Degeneration of germ cells lining seminiferous tubules with desquamation of those cells and the tubular lumen were filled with degenerated germ cells (Fig.3). Improvement in the histopathological picture was noticed in examined sections from rats treated with combined CPX and ginger, CPX and N acetyl cysteine as well as rats treated with CPX and ginger and N acetyl cysteine as the examined sections revealed apparent normal seminiferous tubules (Fig.4). Concerning epididymis, examined sections of rats treated with CPX showed interstitial oedema in between the epididymal tubules together with congestion of blood vessels (Fig.5). Hyperplasia of epididymal epithelium with appearance of pale vacuolated

epithelial cells (**PVEC**) containing homogenous amorphous material was noticed in all examined sections (Fig.6). Epididymis of rats treated with both CPX and ginger revealed no histopathological changes (Fig.7). Epididymis of rats treated with CPX and N-acetyl cysteine revealed interstitial oedema in between the epididymal tubules (Fig. 8) together with interstitial inflammatory cells infiltration (Fig.9). No histopathological changes were noticed in examined sections from rats treated with CPX and ginger and N acetyl cysteine.

Regarding seminal vesicles, examined sections from rats treated with CPX showed hyperplasia of epithelial lining (Fig.10) and leucocytic inflammatory cells infiltrating the muscular layer (Fig.11). Conversely, examined sections of rats treated with both CPX and ginger revealed no histopathological changes (Fig.12). Examined sections from rat treated with CPX and N-acetyl cysteine showed no histopathological changes except hyperplasia of epithelial lining (Fig.13). Seminal vesicle of rats treated with CPX and ginger and N-acetyl cysteine revealed no histopathological alterations.

Microscopically, all examined sections from testes, epididymis and seminal vesicles of control untreated rat, rats treated with ginger alone and rat treated with N-acetyl cysteine alone revealed no histopathological alterations.

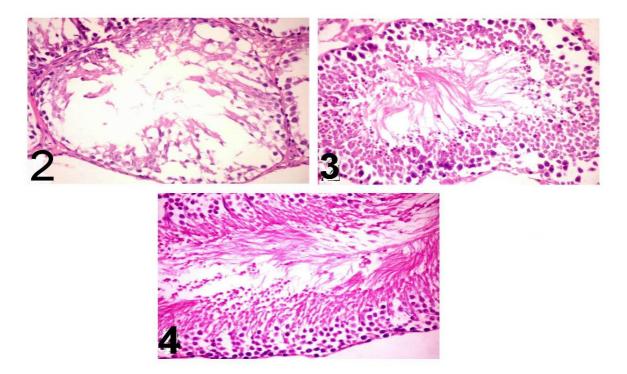


Fig. (2): Testis of rat treated with CPX showing marked necrosis of spermatogoneal cells lining seminiferous tubules (H & E X 400)

- Fig. (3): Testis of rat treated with CPX showing degeneration and desquamation of germ cells lining seminiferous tubules and the tubular lumen was filled with degenerated germ cells (H & E X 400)
- Fig. (4): Testis of rat treated with both CPX and ginger showing apparent normal seminiferous tubules (H & E X 400)

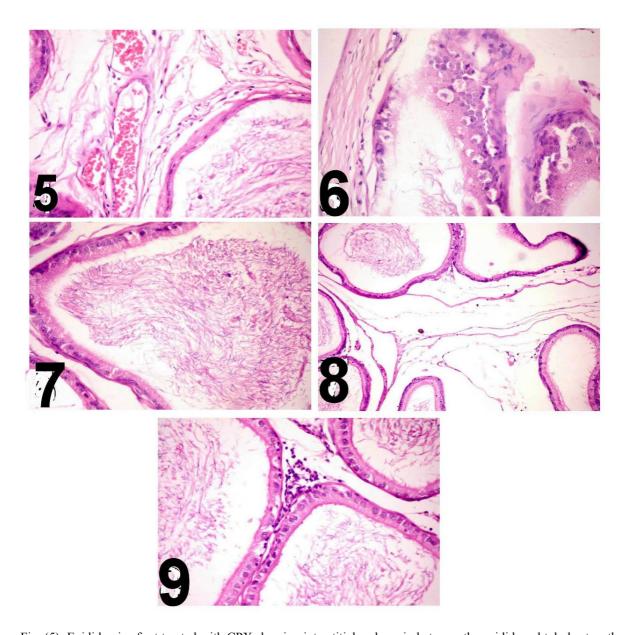


Fig. (5): Epididymis of rat treated with CPX showing interstitial oedema in between the epididymal tubules together with congestion of blood vessels (H & E X 400)

- Fig. (6): Epididymis of rat treated with CPX showing hyperplasia of epididymal epithelium with appearance of pale vacuolated epithelial cells (**PVEC**) containing homogenous amorphous material (H & E X 400)
- Fig. (7): Epididymis of rats treated with both CPX and ginger showing no pathological changes (H & E X 400)
- Fig. (8): Epididymis of rats treated with CPX and N-acetyl cysteine showing interstitial oedema in between the epididymal tubules (H & E X 200)

Fig. (9): Epididymis of rat treated with CPX and N-acetyl cysteine showing interstitial inflammatory cells infiltration (H & E X 400)

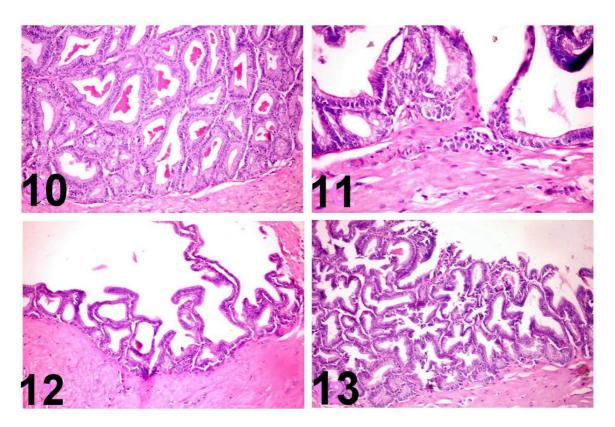


Fig. (10): Seminal vesicle of rat treated with CPX showing hyperplasia of epithelial lining (H & E X 400)

Fig. (11): Seminal vesicle of rat treated with CPX showing leucocytic inflammatory cells infiltrating the muscular layer (H & E X 400)

Fig. (12): Seminal vesicle of rat treated with both CPX and ginger showing no pathological alterations (H & E X 400)

Fig. (13): Seminal vesicle of rat treated with both CPX and N- acetyl cysteine showing hyperplasia of epithelial lining (H & E X 400)

4. Discussion

Ciprofloxacin is known to be one of the best drugs for the treatment of many bacterial infections. However, some reports (Abd-Allah et al., 2000 and Demir et al., 2007) stated that CPX significantly impair testicular function and structure.

In the present study, administration of CPX did not affect the body weight of the animals but caused a significant reduction in the weights of testes, epididymis and seminal vesicles relative to the control group. The weight of the testis is largely dependent on the mass of the differentiated spermatogenic cells; the reduction in the weight of the testis may be due to decreased number of germ cells, inhibition of spermatogenesis and steroidogenic enzyme activity (Chapin et al., 1997 and Takahashi and Oishi, 2001). Our results are confirmed histopathologically as testes of CPX treated rat revealed marked necrosis of spermatogoneal cells lining seminiferous tubules (Fig.1) associated with incomplete spermatogenesis. Degeneration and desquamation of germ cells lining

seminiferous tubules and the tubular lumen was filled with degenerated germ cells. The observed weights loss of the accessory sex organs may be due to reduced bioavailability of sex hormones (Schrade, 2003). Our results are in agreement with previous findings of Sarkar et al., (2003). On the other hand, concurrent administration of ginger and/or NAC with CPX clearly restored the reproductive organ weights towards normal which may be due to their androgenic activity (Kamtchouing et al., 2002 and Jana et al., 2006).

Epididymal sperm count, motility and viability provide a direct measure of fertility in animals (Lemasters and Selevan, 1993). A marked reduction in sperm count, sperm motility and viability were recorded in CPX treated group as compared to respective control. The diminution of these sperm parameters may be referred to the interference of ciprofloxacin with the energy production process required for sperm vitality and motility (Folgero et al., 1993). Furthermore, CPX activates caspase-3, which has an important role in apoptosis resulting in increases

in the percentage of germ cell apoptosis (Zhang et al., 2003). This is in agreement with that of Abd-Allah et al., (2000) who reported that ciprofloxacin treatment (4.5 and 9 mg/100 gm b.wt.) for 15 days in rats induced a marked reduction in sperm count, motility and daily sperm production. On the other hand, co-treatment of with ginger and/or NAC attenuated spermatogenic and testicular damage induced by CPX treatment as shown by the return of sperm count, motility and viability towards normal control values. The obtained data are parallel with Ebenezer et al., (2008) who recorded that co-administration of vitamin C and NAC with tetracycline significantly ameliorated its adverse effect on sperm motility, sperm count and percentage of live spermatozoa. It also agrees with Zahedi et al., (2010) who found that administration of ginger at a dose of (100mg/kg) significantly mitigated the toxic effect of gentamicin on sperm parameters (motility % and epididymal sperm reserves) of male

Analysis of serum enzymes revealed a significant increase in lactate dehydrogenase and acid phosphatase activities of CPX treated groups relative to the control group. LDH is an enzyme found in many body tissues that is released into the blood stream when cellular damage occurs. The increased LDH activity in CPX treated rats denotes its cytotoxic effect on germ cells. It may be elevated in most types of testicular cancer (Stenman and Alfthan, 2002). Acid phosphatase is present in the lysosomes of Sertoli cells (Peruquetti et al., 2010). The elevated activity of serum ACP in CPX treated group reflects the release of this enzyme from the lysosomes of the degenerating cells and rapid catabolism of the injured germ cells (Chidambaram Prahalathan et al., 2005). Similar changes have been reported with a number of chemicals causing testicular toxicity.

The concurrent treatment of CPX with ginger and/or NAC influences the activities of these enzymes to an appreciable extent and suggests the cytoprotective effect of ginger and NAC in preventing testicular damage.

Concerning reproductive hormonal changes in our study, a significant decrease in the concentrations of testosterone, LH and FSH were recorded in CPX treated group compared to control group.

Testosterone is the main steroid sex-hormone in male albino rats, it is secreted by leydig cells of the testes under the control of complex neuroendocrine interactions (Robinson and Huntable, 1988). High level of testosterone in testis is critically required for normal spermatogenesis, development and maintenance of sperm morphology and normal physiology of seminiferous tubules (Sharpe et al., 1988 and Sharpe et al., 1992). The significant decrease of testosterone level may be a result of direct

damage of CPX on Leydig cells, which are the main site of testicular androgen biosynthesis. FSH is also critical for sperm production. It supports the function of Sertoli cells, which in turn support many aspects of sperm cell maturation. Normal testicular function is dependent on FSH and testosterone which is absolutely required for normal spermatogenesis. Moreover, decreased testosterone level of CPX treated rats may occur due to the reduced level of LH (Shaw et al., 1979 and Kerr and Sharpe, 2006) as circulating LH is responsible for maintaining normal plasma testosterone concentrations. Kumari et al., (2008) recorded that ciprofloxacin induced a significant decrease in the testosterone level associated with degenerative changes in the seminal vesicle.

The restoration of testosterone, LH, and FSH levels to normal after concomitant administration of CPX with ginger and/or N acetyl cysteine might have stimulated the production of quantitatively and structurally normal sperm (Anahara et al., 2008 and Ebenezer et al., 2008).

Sperm plasma membrane has a high content of polyunsaturated fatty acids which is easily susceptible to lipid peroxidation caused by oxidative stress (Agarwal et al., 2005). Estimation of end products of lipid peroxidation such as malondialdehyde (MDA) is an index of the extent of oxidative damage to cellular structures (Sharma and Agarwal, 1996).

Ciprofloxacin treated rats showed an elevation in MDA level relative to control group. The increased testicular MDA level could be attributed to the concomitant increase in generation of free radicals (ROS), such as peroxide radical in the testes of the ciprofloxacin treated rats (Weyers et al., 2002). Meanwhile, there was a significant reduction in the glutathione (GSH) level in the testes of CPX treated rats in comparable to control group. This reduction could be due to the enhanced utilization of antioxidants system as an attempt to detoxify the free radicals generated by CPX treatment.

Excessive ROS production that exceeds critical levels can overwhelm all antioxidants defense strategies of spermatozoa and seminal plasma causing oxidative stress that damages the biological membranes in the testes. This in turn may cause the degeneration of the spermatogenic and Leydig cells, which disrupts spermatogenesis and reduces sperm counts (Latchoumycandane et al., 2002). The sperms themselves may also be damaged by the oxidative effects of CPX which affect the activities of mitochondrial enzymes and the structure of the microtubules in the sperm.

The increased lipid peroxidation with the reduced glutathione of testicular homogenates in the present investigation may be the initial event in producing testicular damage by CPX that could be linked to its

effects on reproductive organs weights, sperm parameters (sperm count, sperm motility and viability) and hormonal disturbances. The obtained results are parallel with Salem et al., (2008) and Zahedi et al., (2010).

The testicular toxicity induced by CPX in our study is further confirmed by increased DNA fragmentation levels in the testicular homogenates of CPX treated rats in comparable with control group. The obtained results may be attributed to the adverse effect of free radicals induced by CPX on the DNA (Itoh et al., 2006).

Since sperm morphology is controlled by various autosomal and Y-specific genes (Forejt, 1976 and Krazanowska, 1976), DNA damage may also reduce sperm motility and fertility. Numerous in vitro studies have documented that oxidative damage to sperm can subsequently lead to DNA damage, alter membrane functions, impair motility characteristics, and alter capacity to undergo acrosomal reaction and fertilization (Vernet et al., 2004).

Co- administration of ginger and/or NAC with CPX induced a significant decrease in the MDA and DNA fragmentation level with a remarkable increase in the concentration of the reduced glutathione (GSH) relative to the fourth group which administered CPX.

Ginger increased the activities of testicular antioxidants as it contains a wide variety of active phenolic ingredients (Zingerone, Gingerdiol, Zingibrene, gingerols and shogaols) (Kamtchouing et al., 2002 and Jorsaraei et al., 2008). Ahmed et al., (2000) found that ginger significantly lowered lipid per-oxidation by maintaining the activities of the antioxidant enzymes; superoxide dismutase, catalase and glutathione peroxides in rats. Whereas, NAC plays an important role in the production of glutathione, which provides intracellular defense against oxidative stress induced DNA damage (Shan et al., 1990). So the antioxidant characters of both NAC and Ginger could protect DNA and other important molecules from oxidation and damage, and can improve sperm quality and consequently increase fertility rate.

Indeed, our study revealed that CPX promotes reproductive toxicity in rats through generating oxidative damage. It induces an adverse effect on reproductive organs weights, sperm parameters (sperm count, sperm motility and viability), reproductive hormones (testosterone, LH, and FSH) and induces histopathological alterations. Ginger and NAC have an important role in ameliorating reproductive toxicity induced by CPX through restoring the oxidant-antioxidant balance.

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Compaction Behavior of Aluminum Matrix Composites Reinforced with nano/micro Scale SiC Particulates

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Abstract: The compressibility behavior of particulate reinforced aluminum matrix composite powders was examined under uniaxial cold compaction. The effect of SiC volume fraction (up to 20%) with varying particle size (ranging from 50 nm to 40 μ m) on the plastic deformation capacity of aluminum matrix was analyzed by using linear compaction equations. It was found that with increasing the volume fraction or decreasing the particle size of reinforcement, the densification coefficient decreases that means the less ability of material to deformation. Particularly, nano scaled inclusions impose higher influence on yield pressure of composite compacts. It was also shown that the effect of reinforcement size ratio on densification coefficient is more profound up to 10 vol.%. This article addresses the mechanisms involve in the densification of aluminum matrix nano-micro composites by using linear and non linear compaction equations.

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Keywords: Composite powder; Densification coefficient; Al-SiC; Linear Compaction equation

1. Introduction

Metal Matrix Composites (MMC) are important engineered materials and discontinuously reinforced aluminium (DRA) alloy matrix composites are the most extensively researched and developed amongst them [1-3]. Particularly SiC reinforced Al alloy matrix has been attracting attention mainly due to their good attributes such as high specific strength and stiffness, excellent wear resistance, low coefficient of thermal expansion and high thermal conductivity [4,5]. Currently, new development and research are focusing on the developing metal matrix nanocomposites (MMNCs) with outstanding mechanical properties such as high yield and tensile strength, good creep resistance and enhanced ductility [6-8].

The powder metallurgy (PM) method is commonly employed means by which the metal matrix composites fabricated [9]. This route offers some major advantages including the ability to have complex shapes, reduction of production time and cost, the possibility of using high volume fraction of the reinforcement, homogeneous distribution of the reinforcement in the matrix without undesirable diffusive process and good dimensional tolerance [10-12]. In PM techniques, the matrix and reinforcement particulates are blended and consolidated by various methods, deformation to fabricate almost full density products. Nevertheless, the compressibility of composite powders is remarkably lower than that of unreinforced matrixes. This effect is more noticeable with increasing reinforcement content, which often produces insufficient strength to support secondary processing like sintering, machining or extrusion [13]. Also, Ceramic powders show a tendency for agglomeration due to van der waals attraction [14], specially In the case of composite powders composed of ultra-fine particulates. Thus, it is important for optimizing properties, because clustering induces non uniform stress distribution in the materials, leading to degraded mechanical properties [15]. Hence, it would be very useful to determine the effects of particle size and volume fraction on the consolidation behavior of nano-micro scaled composites.

It is apparent that compaction is an important step which strongly influences the final properties of compacts. A glance through open literature reveals that considerable effort has been devoted to the development of empirical and theoretical compaction describe equations to the density-pressure relationships for the compaction of powders. Since the first compaction equation published by Walker [16], more than 20 different compaction equations have been proposed [17]. For instance, the modified Heckel [18], Panelli-Filho [19] and Ge [17] equations are the most commonly ones, that used today. These equations are expressed as follows:

$$Ln(\frac{1}{1-D}) = K_1 P + B_1$$
 Heckel (1)

$$Log[Ln(\frac{1}{1-D})] = K_2 Log(P) + B_2$$
 Ge (2)

$$Ln(\frac{1}{1-D}) = K_3\sqrt{P} + B_3$$
 Panelli-Filho (3)

Where:

 K_1 , K_2 , K_3 : Powders ability to densify by plastic deformation (Slope of the curves). K parameter is inversely related to the ability of the material to deform plastically.

 B_1 , B_2 , B_3 : Coefficients that represent the density of powders in the beginning of the compaction, D: Relative density of the compacted material and P: applied pressure.

It is worth to mention that owing to the complexity in densification of mixed powders, investigation on compaction behavior has been mainly focused on monolithic powders, but it has been extended to composite powders recently [23]. Lange et al. [24] studied the densification behavior of mixed aluminum and steel powders under cold compaction. Gurson and McCabe [25] examined the yield function for mixed metal powders by using data from triaxial compression test. Kim et al. [26] proposed a densification model for mixed copper and tungsten powders under cold isostatic pressing and die compaction. The analysis of consolidation behavior of Al-SiC composite powders under monotonic and cyclic load by using Heckel equation has recently reported by simchi et al. [5]. Kim et al. [27] employed a hyperbolic cap model with the constraint factors proposed by Storåkers et al. [28] to investigate the densification behavior of Al alloy powder mixed with zirconia inclusions.

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.

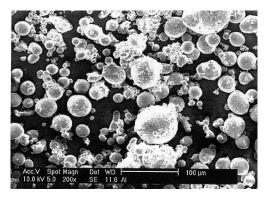
The objective of present research is to elucidate the effects of nano-micro sized reinforcement at different volume fractions on the consolidation behavior of Al-SiC composites. Based on experimental results and in accompanying with linear compaction equations, the densification mechanisms of Al-SiC composites were investigated.

2. Experimental procedure

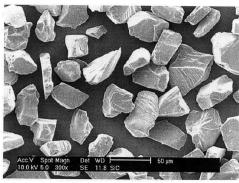
Nitrogen gas atomized Al powder with mean particle diameter of 40 μ m was used as the matrix material. Commercial available SiC powders with the average particle size of 0.05, 1, and 40 μ m were used as the reinforcement. Fig. 1 shows the morphology of Al and SiC particles taken by electron microscopy. The Al and nanoscaled SiC particles have nearly spherical shape whilst the microscaled SiC is angular type.

Different batches of Al-SiC composite blends with varying volume fractions of 5, 10 and 20% were prepared. A Turbula T2C mixer (Basel, Switzerland) was employed for 30 min to prepare the blends. To prevent the problem of static charge induced agglomeration, wet mixing using a polar solvent (n-

butanol) was afforded [9]. The composite mixtures were then dried at 100 °C in a small electric vacuum oven. The tap density of powders was determined according to the ISO Standard 3953; 1993.



a) Al (40 µm)



b) SiC (40 μm)

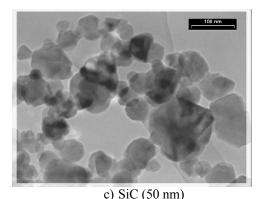


Figure 1. Morphology of starting materials taken by SEM (a, b) and TEM (c).

The prepared powder blends were then compacted in a cylindrical die with diameter of 15 mm. Die wall lubrication was afforded using polytetrafluoroethylene (PTFE) spray. 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. The method was employed through measuring the weight and dimensions of the compacts by using an accurate balance (± 0.1 mg) and a micrometer (± 0.1 mm). Note that the specimens were green and unsintered, so that water displacement method is hard to be employed for green parts. Different runs were repeated for at least three times to verify the reproducibility of the attained data. Meanwhile, when the compaction pressure was low (for example <50 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.

3. Results and Discussion 3.1. Compressibility curves

In order to highlight the role of nanoscaled particulate reinforcement on the compressibility response of Al matrix composite, the void fraction of compacts at different compaction pressures is calculated and results are shown in Fig. 2 the corresponding curve of unreinforced Al powder is included in the graph for comparison. As can be seen, the curves indicate the typical powder void fraction behavior for metallic powders, i.e. the void fraction decreases with increasing the compaction pressure with a decelerating rate. This means that different mechanisms can occur during compaction process. As received Aluminium powder is ductile so possesses good compressibility. But When the hard ceramic nanosized particles were added, two important changes in the curves can be highlighted. First, a high densification rate of the composite powders at low pressure region (<50MPa) compared to the gas atomized Al matrix powder. This effect is more profound as the volume fraction of inclusion increases. Second, the densification rate of composite compacts at high pressures is lower than that of the gas atomized elemental powder. This behavior can be attributed to the detrimental effect of the formation of ceramic clusters and networks on the plastic deformation ability of metal matrix. Also it can be observed that by increasing the volume fraction of reinforcement from 10 to 20%, the densification curves, reach almost to a plateau at relatively moderate compacting pressures.

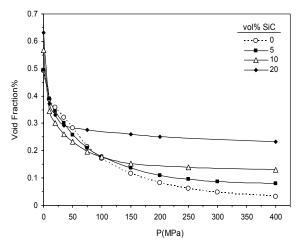
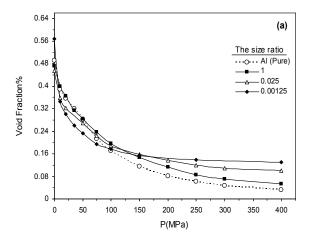


Figure 2. Void fraction of Al-SiC composite powders (the size ratio of 0.00125) as a function of compaction pressure at various SiC volume fractions.

Fig. 3 shows the effect of reinforcement particle size on the consolidation behavior of Al-SiC composites at volume fraction of 10 and 20 percent. In order to highlight the role of particle size, the ratio of the average size of reinforcement particles to the mean diameter of the matrix particles are designated as the 'size ratio'. The following statements can be enumerated:

- 1. With decreasing the reinforcement particle size from 40 μ m to 50 nm, the densification rate increases at low pressure region. It is seen that the composite powder contained finer particulates, is densified with a higher rate.
- 2. At high compaction pressures (>200MPa) and by decreasing the inclusion particle size, the densification rate decreases sharply, especially in the case of composite compacts containing nanoscale SiC particles.
- 3. With decreasing the inclusion particle size from 40 to 1 µm, the deleterious effect of size ratio on densification response of Al matrix is remarkable (Fig. 3a), but at higher volume fractions (20 vol.-%), the density level of compacts is decreased almost with a constant rate (Fig. 3b). It is known that the consolidation mechanism of metal powders in a rigid die is usually considered in four stages including and particle rearrangement, sliding deformation of ductile powders, fragmentation of brittle solids, and elastic deformation of bulk compacted powders [18]. Although these stags may occur concurrently according to the powder characteristics and pressure level, at the early stage of the densification process at low pressures, particles sliding, deformationless restacking or rearrangement, and breaking down the bridges (formed during die filling) and agglomerates of the primary particles are

the dominant mechanisms [18,29].



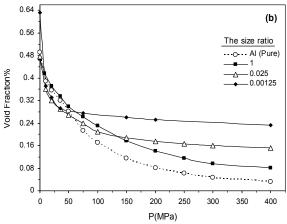


Figure 3. Effect of size ratio on densification of (a) Al-10% SiC and (b) Al-20%SiC composite powders.

When applied pressure increases, the movement of the particles is restricted and the energy applied to the powder compact is spent generally through the process of deformation and friction losses [29]. This regime is often referred to as stage II. Particle interlocking generates plastic deformation, which is first localized at the contact areas between particles [30]. Therefore, at higher pressures, plastic deformation of ductile powders becomes the predominant densification mechanism. Experimental results in this work indicated that the densification behavior of examined mixed powders show the same features as metal powders (Fig. 3). As it is seen, gas atomized aluminium powder possesses good compressibility so that uniaxial compaction at 400 MPa led to a green density as high as 97% theoretical. When ceramic particles were added, the density-pressure curve is somewhat similar to the unreinforced Al. but the densification rate is lower. Note that both SiC volume fraction and size influenced the densification of the Al matrix. although to varying degree dependent on the applied pressure level. Effect of these parameters on the plastic deformation response of Al can be evaluated as below.

3.2. Analysis of compaction behavior using linear compaction equations

The estimate of the powder plastic deformation capacity during the densification process by compaction equations is useful to evaluate the results [5]. In order to clarify the role of reinforcement particle size and volume fraction on the compressibility behavior of Al-SiC composites, the Panelli-Filho and Ge equations were selected among the most widely used ones, because the good agreement was obtained when the experimental data were fitted by these equations. In Fig. 4, the effect of volume fraction of nanosized reinforcement on the compaction response of Al matrix by using Ge equation is illustrated. (The results were calculated by the best fit - linear method). According to the results of Fig. 4, the monolithic Al powder has the highest K value, indicating the higher plastic deformation capacity. Also it can be seen that the addition of extremely small nanometric particulates. decreased the K value significantly, that means the less ability of material to deformation.

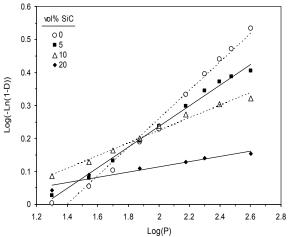


Figure 4. Effect of the volume fraction of nanometric SiC particulates on the plastic deformation capacity of Aluminum matrix by using Ge equation.

In Fig. 5 we attempt to clarify the role of inclusion particle size on the plastic deformation ability of Al-10%SiC composites by using Panelli-Filho equation. It is seen that the plastic deformation capacity of composite compacts is depended on the size ratio of the reinforcement to matrix particles. It is evident that, by decreasing the size ratio from 1 to 0.00125, the densification coefficient, considerably decreased.

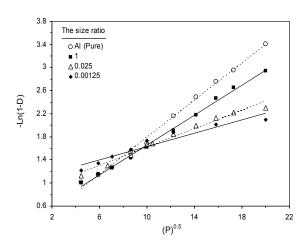


Figure 5. Effect of reinforcement size ratio on the plastic deformation capacity of Al-10 vol.%SiC composite powders by using Panelli-Filho equation.

The experimental data was evaluated according to Eq. 2 and Eq. 3 by linear regression analysis to determine the plastic deformation capacity of materials. The results of calculations are shown in Table I.

It is visible that, in most cases these equations give correlation coefficients close to unity for the compaction of composite powders. According to the calculated results presented in Table I, one can notice that the reinforcement size ratio and volume fraction, remarkably influence the plastic deformation response of composite powders. This effect is more significant in the case of composite powders containing nanometric particulates, especially at high volume fractions.

The bilateral effects of reinforcement volume fraction and size ratio on deformation ability of composite compacts can be evaluated by Fig. 6. This figure illustrates the densification coefficient of each equation (K_1 for Panelli-Filho and K_2 for Ge) as a function of SiC volume fraction and particle size. As Fig. 6 shows, the detrimental influence of reinforcement size ratio is more remarkable up to 10 vol.-% reinforcement.

In other words, when finer reinforcement particles are used (size ratio of 0.025 and 0.00125), the densification coefficient decreased significantly. This effect is more noticeable up to 10 vol.-%, but with increasing the volume fraction of inclusions, the reducing rate of densification coefficient, is almost similar for various particle size ratios. It is apparent that by decreasing the reinforcement particle size, the ceramic particulates tend promote the formation of clusters. Thus it is difficult for the Aluminum matrix

to deform and fill the voids between the reinforcement clusters. This effect is more pronounced when nanometric reinforcement was used. In this circumstance, matrix particles are surrounded by extremely small SiC particles. Consequently, it seems that up to 10 vol.-% reinforcement, the clustering of inclusions plays significant role, but at higher volume fractions, the presence of percolation network of hard inclusions that supports a part of applied pressure elastically, restricts the plastic deformation capacity of materials significantly [31]. This outcome is in consistent agreement with the results of modelling performed by Kim et al [27].

Table 1. Calculated results of linear regression analysis on the compaction of composite powders.

	Ge	,	Panelli 1	Filho
Sic Content	K (MPa ⁻¹)	R	K (MPa ⁻¹)	R
0 Vol.%	0.43	0.99	0.16	0.99
5%SiC,50nm	0.31	0.99	0.10	0.99
10%SiC,50nm	0.21	0.99	0.06	0.96
20%SiC,50nm	0.08	0.98	0.02	0.95
5%SiC,1μm	0.34	0.99	0.11	0.99
10%SiC,1μm	0.25	0.99	0.08	0.99
20%SiC,1μm	0.18	0.99	0.05	0.98
5%SiC,40μm	0.40	0.99	0.14	0.99
10%SiC,40μm	0.37	0.99	0.13	0.99
20%SiC,40μm	0.33	0.99	0.10	0.99

Note: R= Correlation Coefficient, K= Densification

Coefficient

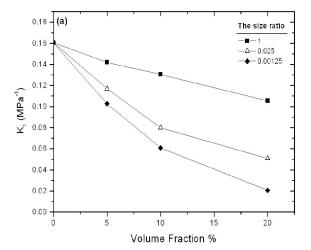
In order to get an insight about the deformation capacity of composite compacts, we call P_y (P_y =1/K) as yield pressure, since a material with higher K-value achieves higher density at a constant applied pressure.

Fig. 7 shows that, the addition of reinforcement particles increases the yield pressure required for the plastic deformation of composite powder, leading to a decrease in densification rate. For instance when 10 and 20 vol.-% nanometric SiC particles are used, the yield pressure is about 3 and 8 times more than that of unreinforced Aluminum, respectively. In spite of general good agreement between experimental data and calculations, some

limitations arise in the application of linear equations. For instance it is seen that with decreasing the SiC particle size to nanosize and increasing the volume fraction, deviations from linear slope increases.

4. Conclusion

Densification behavior of aluminum matrix powder reinforced with nano-micro sized SiC particulates during cold compaction was investigated. Experimental results were obtained for mixed Al-SiC powders under uniaxial die compaction. It was shown that the compressibility behavior of nano-micro composite powders exhibit the same features as the typical metal powder compaction. The densification is obtained through two major mechanisms, Particle rearrangement and plastic deformation. It was found that with decreasing the reinforcement particle size. the densification rate in the first stage of compaction, increases but its decreases in second stage. This effect is very noticeable in the case of composite compacts containing nanometric SiC particles, particularly at higher volume fractions. Linear compaction equations were used to determine the densification mechanisms of composite compacts. Results revealed that the addition of reinforcement particles increases the yield pressure required for the plastic deformation of composite powders. Also it can be deemed that up to 10 vol.-% reinforcement, the detrimental effect of inclusion clustering on densification plays significant role, but at higher volume fractions, presence of the percolation network of hard inclusions that supports a part of applied pressure elastically, restricts the plastic deformation capacity of compacts.



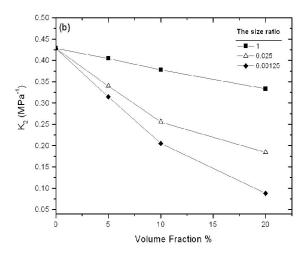


Figure 6. Densification coefficient of Al-SiC composite powder as a function of SiC particle size and volume fraction using Panelli-Filho (a) and Ge (b) equations.

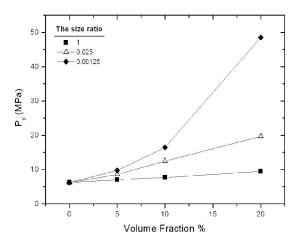


Figure 7. Yield pressure of Al-SiC composite powder as a function of reinforcement particle size and volume fraction by using Panelli-Filho equation.

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Gastroprotective effect of simvastatin against experimentally induced gastric ulcers in rats: Role of ATP-sensitive K⁺ channels

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Abstract: Simvastatin appeared to have additional benefits beyond their lipid lowering effects, which has led to interest in the use of this class of drugs outside the field of cardiovascular disease. Aim: This study aimed to investigate the possible gastroprotective effect of simvastatin against both indomethacin and cold restraint stress (CRS) induced gastric ulcers in rats and to study its effect on gastric mucosal malonaldehyde (MDA) ,nitric oxide (NO)and prostaglandin E2(PGE₂) levels in both ulcer models. Exploration of the possible contribution of ATPsensitive K⁺ channels in this action. **Design:** 72 healthy, adult male albino rats were used. The rats were randomly assigned to vehicle (distilled water or carboxymethylcellulose (0.5%), simvastatin, simvastatin +glibenclamide (ATP-sensitive K⁺ channels blocker), pretreated groups for 7 days then ulcers were induced using oral indomethacin or cold restraint stress. Assessment of gastric lesions was done, gastric juice parameters (total acid output, pepsin activity and mucin content) were determined for each group using pyloric ligation method. Rats from simvastatin pretreated groups in both ulcer models were used for determination of gastric mucosal level of MDA (as indicator of lipid peroxidation), nitrite (as indicator of NO) and PGE₂ levels. Results: Simvastatin displayed significant (P< 0.05) protection against gastric lesions induced by either indomethacin or exposure to cold restraint stress by correction of both ulcer score and the measured gastric juice parameters. This effect was partially blocked by coadministration of glibenclamide. Simvastatin significantly (P< 0.05) reduced gastric mucosal MDA; significantly (P< 0.05) increased in PGE₂ levels and corrected nitrite to near normal levels in both ulcer models. Conclusion: This study confirmed the gastroprotective effect of simvastatin in indomethacin induced ulcer in rats and proved it in CRS induced ulcer .The gastroprotective effect of simvastatin is mediated through opening of ATP sensitive K⁺ channels, free radical scavenging, increase in gastric mucosal PGE₂ and normalization of gastric mucosal NO in both ulcer models.

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Keywords: indomethacin; cold restraint stress; NO; simvastatin; ATP-sensitive K⁺ channels and ulcer.

1. Introduction

Gastric ulcer is an illness that affects a considerable number of people worldwide. The etiological factors of this disorder include: stress, smoking, nutritional deficiencies, frequent and indiscriminate use of non steroidal anti-inflammatory drugs (NSAIDs) (Khazaei and Salehi 2006). The pathophysiology of gastric ulcer has generally focused on imbalance between aggressive and protective factors in the stomach (Lima, et al., 2006). The gastric ulcerogenic action of NSAIDs is believed to occur mainly due to their local inhibitory effect on gastric prostaglandin E2 (PGE₂) and prostaglandin I2 (PGI₂) that are the main inhibitors of gastric acid secretion (Bhargava, et al., 1973; Ribeiro-Rama., et al., 2009). Hypothermic -restraint stress ulcers (CRS) have been used as an experimental model in the evaluation of antiulcer activity in rats (Murakami et al., 1985). It induces ulcer through disturbance in the gastric mucosal microcirculation, enhancement of acid secretion, reduction in mucus production and

abnormal gastric motility (Garrick, et al., 1986), free radicals formation (Bagchi, et al 1999) and decreased in prostaglandin synthesis (Bandyopadhyay, et al., 1999).

Statins (3- hydroxyl -3-methyl glutaryl-CoA reductase inhibitors) are a group of drugs that are originally designed to lower serum cholesterol level and have been recognized as the most efficient drugs for the treatment of hyperlipidemia(Heeba et al., 2009). Previous clinical trials have demonstrated that the therapeutic benefits of statins could not solely be explained by their inhibitory actions on cholesterol synthesis (Werner, et al., 2002; Wainwright, 2005). Clinical trials proved that they exhibit other effects unrelated to their lipid lowering effect (pleotropic effect) (Tamargo, et al., 2007). Simvastatin which has tested in this study is a commonly prescribed statin with antioxidant and anti-inflammatory properties (Ungureanu, et al., 2003 ; Franzoni, et al., 2003). Accordingly, this study aimed to investigate the possible gastroprotective

effect of simvastatin against indomethacin and CRS induced gastric ulcers in rats with exploration of the possible mechanisms underlying this effect.

2. Materials and methods Drugs and chemicals

Simvastatin was obtained from (Pharco Egypt) as powder. Indomethacin was obtained from Sigma chemical Co. (St. Louis, MO. USA) and was suspended in carboxymethylcellulose 0.5 %(Na salts, Merck, Darmstadt, Germany). Glibenclamide powder, EIPICO, Egypt). Ether, from SD Fine chemicals (India). All drug solutions and suspensions were freshly prepared

Animals

Seventy two adult male Albino rats weighing 180-200 grams were purchased from Abu-Rawash animal house (Giza- Egypt). Animals were given tap water ad libitum , fed with standard commercial rat chow and were left to accommodate for one week before dosing , kept 12 hours light / 12 hours dark regular cycle in partially humid and well aerated room. Protocol was approved by the local animal care committee at Zagazig University (Egypt) . All experimental procedures were carried out in accordance with international guidelines for care and use of laboratory animals.

Experimental design

The rats were fasted for 24 hours prior to the experiment in meshbottomed cages to minimize corporophagia .The animals had free access to water except the last hour before the experiments .All experiments were performed during the same time of the day to avoid variations due to diurnal rhythms of putative regulators of gastric functions .The animals were randomly classified into nine groups (8 rats per each): (1) control group: in which the animals received distilled water orally for 7 days.(2) control indomethacin group(indom): the rats received oral indomethacin in a dose of 20 mg/kg in 2.5ml/kg of 0.5% of carboxymethylcellulose after daily administration of distilled water for 7 days. (3) Indomethacin +carboxymethylcellulose: in which ulcers were induced by indomethacin after 7 days of oral administration of carboxymethylcellulose 0.5% (the vehicle of both indomethacin glibenclamide). (4) indomethacin +simvastatin (indom+ sim.): in which animals were pretreated with 40 mg/kg simvastatin orally for 7 days then, gastric ulceration was induced by indomethacin administration.(5)indomethacin +simvastatin+ glibenclamide (indom+sim+gliben) :in which animals were concurrently pretreated with 40 mg/kg simvastatin and 5 mg/ kg glibenclamide(KATP channels blocker) orally for 7 days then gastric ulcer was induced by indomethacin.(6) CRS: cold-

restrained stress to induce gastric ulcer, the rats were immobilized in individual restraint boxes without possibility of visual contact (popovic' et al. 1997) and subjected to cold (4± 1°)stress for 3.5hours .This regimen of cold-restraint stress has been reported to produce gastric ulcers reliability in food-deprived rats(Senay and Levine 1967) (7) CRS+ carboxymethylcellulose : the rats received carboxymethylcellulose 0.5% orally for 7 days then induced CRS.(8) ulcer was by CRS+ simvastatin(CRS+sim):in which the ulcer was induced by CRS after 7 days of daily oral administration of 40 mg/ kg simvastatin.(9) CRS+ simvastatin+ glibenclamide (CRS+ sim+ gliben): in which the animals concurrently pretreated with simvastatin 40 mg/kg and 5 mg/kg of glibenclamide orally for 7 days then gastric ulcer was induced by CRS. It should be noted that all drugs, vehicle, distilled water were administered in a volume of 2.5 ml/kg via gavage. Doses of drugs were in homogeny with previous reports (Tariq, et al., 2007; Aziz, 2009) Pyloric ligation

Pyloric ligation was carried out before either indomethacin administration or exposure to CRS in order to collect gastric secretion (Alumets et al 1982). This was done under ether anesthesia , a midline abdominal incision was performed , the pyloric portion of the stomach was gently mobilized and carefully ligated with a silk ligature around the pyloric sphincter taking care not to interfere with gastric blood supply .Abdominal incision was sutured and the animals were allowed to recover from anesthesia .

Assessment of gastric mucosal lesions

Three hours later after administration of indomethacin or exposure of rats to CRS, rats of all groups were killed with an overdose of ether, their stomachs were rapidly removed, opened by an incision along the greater curvature and the gastric juice were collected, the stomachs rinsed with saline .Gastric tissues were pinned out flat on a cork board, the number and the severity of discrete areas of damage in the mucosa were scored by two trained independent observers who were unaware of the drug treatment, the ulcer score was determined according to the 1 to 5 scoring system devised by Wilhelmi and Menasse-Gdynia 1972 .(1)1 or 2 minute, sporadic, punctuate lesion (2) several small lesion (3) one extensive lesion or multiple moderate sized lesions(4) several large lesions (5)several large lesions with stomach perforation.

Analysis of gastric juice

Gastric juice from each animal was centrifuged at 1000 g for 10 minutes to remove any solid debris and the volume of the supernatant was

measured. The supernatant was then assayed for total acid concentration(Hara et al 1991), the total acid output was calculated by multiplying the volume of gastric juice by the total acid concentration also pepsin activity (Sanyal et al 1971)and mucin content (Winzler, 1955) were determined in the obtained supernatant

Biochemical analysis of gastric mucosa

The stomach of each animal was divided into two parts. Gastric mucosa of one part was scrapped and was immersed in indomethacin (10µg/ml) and was immediately stored at -80 °C., afterwards, homogenized in 2 ml normal saline containing 0.1 M dithiothreitol and centrifuged at 2000g for 10 minutes at room temperature. The supernatant was used for determination of prostaglandin E2 (PGE₂) level by ELISA using PGE₂ immunoassay kit (R&D systems, USA).

The mucosa of the other part of the stomach was also scrapped, homogenized in cold potassium phosphate buffer (0.05 M, PH7.4) and centrifuged at 2000g for 10 minutes at 4°C; the supernatant was then kept at -80°C for measurement of malonaldehyde (MDA) (Mihara and Uchiyama 1978). Also the total nitrate/nitrite in the gastric mucosal homogenate was assayed after reduction of nitrate to nitrite using the cadmium reduction method (Sastry et al., 2002)

Statistical analysis:

Analyzed by One-way analysis of variance (ANOVA) followed by LSD test using SPSS for windows version 11.5. Differences were considered to be significant at P< 0.05.

3. Results

It is noted that carboxymethylcellulose 0.5% pretreated groups did not show any significant difference as compared to indomethacin group or CRS group in any of the parameters investigated in this study.

(1)Investigation of the involvement of ATP sensitive \mathbf{K}^+ channels in the gastroprotective effect of simvastatin on indomethacin and CRS induced gastric lesions

(A) Fig (1): histogram shows that either administration of indomethacin or exposure of rats to CRS induced high ulcer score 4.1 ± 0.3 & 3.1 ± 0.3 respectively when compared to control group. Pretreatment with simvastatin significantly reduced the ulcer scores in both group to 0.5 ± 0.2 & 0.3 ± 0.2 respectively. Coadministration of simvastatin and glibenclamide increased the ulcer score to 2.5 ± 0.2 & 2.1 ± 0.2 in both ulcer models respectively. Fig (2, 3): gross appearance of mucosal lesions on exposure

to indomethacin or CRS (a), pretreatment with simvastatin (b) and coadministration of simvastatin and glibenclamide (c) respectively.

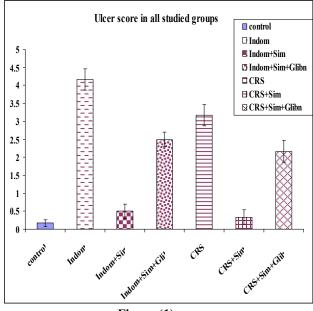
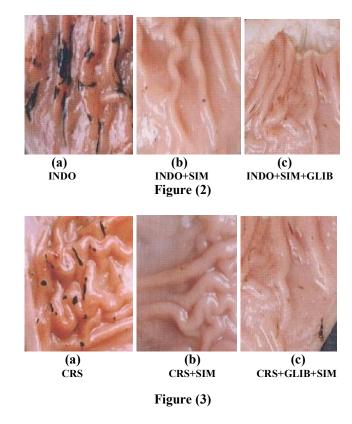


Figure (1)



(B) Effect of simvastatin on changes in gastric juice contents induced by indomethacin:

Table (1) shows that Indomethacin significantly increased gastric juice total acid output as compared to control group 92.5±4.2mEq/3h versus 56.1±3.2mEq /3h. Pretreatment with simvastatin significantly reduced total acid output to 61.2±4.5 mEq /3h while concurrent use of simvastatin and glibenclamide raised the above mentioned value to 74.2±2.7mEq/3h

Pepsin activity was significantly increased by indomethacin 208.4 \pm 10.7 μ g/ml tyrosine versus 122 \pm 3.2 μ g/ml tyrosine for the control group. Rats pretreated with simvastatin showed significant

reduction in pepsin activity with mean ±S.E. 144.9±4.3µg/ml tyrosine, this reduction was attenuated by coadministration of glibenclamide with simvastatin with value 174.9±4.5µg/ml tyrosine

Indomethacin significantly reduced gastric juice mucin content from 89.3 ± 2.8 mg% hexose for the control group to $46.2\pm~2.3$ mg% hexose. In simvastatin pretreated rats, this value significantly raised to 83.3 ± 1.8 mg% hexose while concurrent administration of simvastatin and glibenclamide significantly decreased this value to $61.8\pm~2.1$ mg% hexose.

Table (1): Effect of indomethacin, simvastatin, simvastatin + glibenclamide on the total acid output, pepsin activity and mucin content of gastric juice in rats.

Groups	Total acid output (meq/3h)	Pepsin activity μg/ml tyrosine	Mucin content mg%hexose
Control	56.1±3.2	122±3.2	89.3±2.8
Indom	92.5 ± 4.2^{a}	208.4 ± 10.7^{a}	46.2 ± 2.3^{a}
Indom+sim	61.2±4.5 b	144.9±4.3 ^b	83.3±1.8 ^b
Indom+sim+gliben	74.2 ± 2.7^{c}	174.9±4.5°	61.8±2.1°

a significantly different from control group at P < 0.05

(C)Effect of simvastatin on changes in gastric juice contents induced by CRS:

Table (2): shows that CRS significantly increased gastric juice total acid output as compared to control group 88.2±2.8 mEq/3h versus 56.1±3.2 mEq/3h. Pretreatment with simvastatin significantly reduced total acid output with mean ±S.E.62.2±2.9 mEq/3h while concurrent use of simvastatin and glibenclamide raised the above mentioned value to 77.7±3.2 mEq/3h.

CRS significantly raised the pepsin activity to 220.4±5.2µg/ml tyrosine versus 122±3.2 µg/ml tyrosine for the control group. Rats pretreated with

simvastatin showed significant reduction in pepsin activity with mean $\pm S.E.152\pm 4.3~\mu g/ml$ tyrosine. Concurrent administration of simvastatin and glibenclamide increased this value to $201\pm 5.1~\mu g/ml$ tyrosine. Gastric juice mucin content was significantly reduced by CRS .It decreased from $89.3\pm 2.8~mg\%$ hexose for the control group to $48.3\pm 1.8~mg\%$ hexose. In CRS, simvastatin pretreated rats showed significant elevation in mucin content to $83.5\pm 2~mg$ % hexose. Concurrent administration of simvastatin and glibenclamide significantly decreased this value to $59.8\pm 2~mg\%$ hexose.

Table (2): Effect of CRS, simvastatin, simvastatin + glibenclamide on the total acid output, pepsin activity and mucin content of gastric juice in rats.

Groups	Total acid output (meq/3h)	Pepsin activity (μg/ml tyrosine)	Mucin content (mg%hexose)
Control	56.1±3.2	122±3.2	89.3±2.8
CRS	88.2±2.8 a	220±5.2 ^a	48.3 ± 1.8^{a}
CRS+sim	62.2±2.9 b	152±4.3 ^b	83.5±2 ^b
CRS+sim+gliben.	77.7±3.2 °	201±5.1°	59.8±2 ^e

a significantly different from control group at P < 0.05

(2) Effect of simvastatin on gastric mucosal MDA level in both ulcer models: Figure (4): shows that

both indomethacin and CRS significantly elevated the gastric mucosal MDA) to 61.05±1.9 and 62.5±1.3

b significantly different from CRS group at P < 0.05

c significantly different from CRS +simvastatin group at P < 0.05

b significantly different from CRS group at P < 0.05

c significantly different from CRS +simvastatin group at P < 0.05

(nmol/g wet tissue) respectively as compared to control group 20.1 ± 0.8 nmol/g wet tissue. Simvastatin significantly caused reduction in the gastric mucosal MDA in both ulcer models to 35.3 ± 0.1 and 30.2 ± 1.3 nmol/g wet tissue respectively.

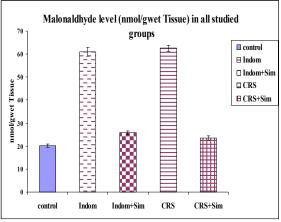


Figure (4)

(3) Effect of simvastatin on gastric mucosal nitrite level in both ulcer models: Figure (5): shows that indomethacin significantly reduced gastric mucosal nitrite level from 169.9±3.7 nmol/g wet tissue for the control group to 80.3±2.6 nmol/g wet tissue. Rats pretreated with simvastatin showed significant increased in the gastric mucosal nitrite content to 152.7±4 nmol/g wet tissue. In contrast, CRS significantly increased it from 171.5±1.7 nmol/g tissue in control group to 371.5±4.5 nmol/g wet tissue in CRS. Rats pretreated with simvastatin showed marked reduction in gastric mucosal nitrite concentration to 219.6±4.8 nmol/g wet tissue.

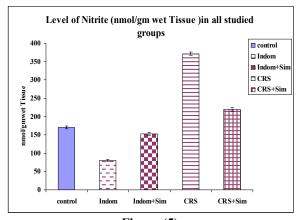


Figure (5)

(4) Effect of simvastatin on gastric mucosal PGE₂ level in both ulcer models:

Figure (6): shows that both indomethacin and CRS significantly reduced the gastric mucosal PGE₂

content from 318 ± 4.9 ng/g wet tissue for the control group to 102 ± 5 ng/g wet tissue and 125.4 ± 6 ng/g wet tissue for indomethacin group and CRS group respectively. Simvastatin significantly increased the gastric mucosal PGE₂ levels to 262.6 ± 8.1 and 256 ± 4.7 ng/g wet tissue for both groups respectively.

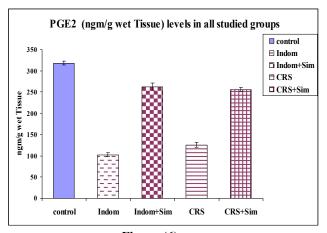


Figure (6)

4. Discussion

The diversity of etiological factors underlying gastric ulcers and the complex nature of pathways participating in healing always make peptic ulcers treatment a complicated challenge (El-Moselhy et al., 2009). Maintaining equilibrium between aggressive and defensive factors is always a critical objective in peptic ulcer management (Glavin and Szabo 1992).

The results of the present study showed either oral administration of indomethacin in rats or their exposure to cold restraint stress resulted in severe mucosal ulceration associated with significant increase in total acidity and pepsin activity and significant reduction in gastric juice mucin content.

Our work showed that simvastatin administered orally in a dose of 40 mg/kg for 7 days reversed all deleterious effects induced by indomethacin or CRS on both gastric mucosa and gastric juice contents. Tariq, et al. (2007) demonstrated that oral administration of simvastatin in doses of 20, 40, 60 mg/kg for 7 days significantly and dose dependently reduced gastric lesions induced by indomethacin and ethanol in rats, an effect accompanied by reduction in total acidity and volume of gastric juice. Heeba et al., 2009 illustrated that simvastatin in a dose of 10 mg/kg for two weeks decrease the ulcer index induced by indomethacin in rats with concomitant elevation in gastric juice mucin content . They found that neither total acidity nor pepsin activity were affected.

The present study found that the beneficial effects mediated by simvastatin on ulcer score or on

the measured parameters of gastric juice in both ulcer models were partially blocked by co administration of glibenclamide (ATP sensitive K⁺ channel blocker) which indicates that some of the gastroprotective effect of simvastatin is mediated through activation of ATP sensitive K⁺ channels.

Different researches have demonstrated antiulcer activity of some K_{ATP} channel openers like cromakalim (Goswami et al., 1997), diazoxide (Toroudi et al., 1999) and nicorandil (Patel et al., 2001). Zhao et al., 2006 and Yang, et al., 2007 illustrated that simvastatin was able to reduce the myocardial no reflow after ischemia and reperfusion through activation of K_{ATP} channels.

The suggested protective effect of ATP sensitive K⁺ channels on ulcerative lesions mediated by simvastatin may be attributed to increase gastric mucosal blood flow offering more resistance to ulcer (Ismail et al., 2007). Furthermore, K_{ATP} channels openers decreased the gastric hypermotility induced by activation of vagus nerve in CRS (Garrick et al., 1986).

The ability of glibenclamide to partially block the inhibitory effect of simvastatin on total acidity may be due to the fact that some of the potent gastric acid inhibitors as prostaglandins (Peskar et al., 2002), adrenomedullin and CGRP (Rossowski et al., 1997; Sakai, et al., 1999), act through K_{ATP} channels The results of the present work revealed that glibenclamide partially abolished the reduction in pepsin activity mediated by simvastatin. CGRP which acts through KATP channels was found to inhibit pepsin secretion (Kraenzlin, 1985). K_{ATP} channels openers were known to interfere with Ca⁺ ion influx and to antagonize mobilization of Ca++ bound to intracellular stores leading to reduction in free cytosolic Ca⁺⁺ ion important for gastric acid and pepsin secretion (Miyamoto., et al., 1992; Bose et al., 2003). The decreased gastric acidity may be a cause as its presence is essential for cleavage of pepsinogen to active pepsin (Morsy and Fouad 2008).

The ability of glibenclamide to block the stimulatory effect of simvastatin on gastric juice mucin is compatible with a previous report which illustrated that eugenol(active ingredient of Clove oil) increased gastric mucin through ATP sensitive K^+ channels (Morsy and Fouad 2008)

The result of the present work showed significant elevation in MDA level, an indicator for lipid peroxidation which is a well established mechanism for cellular injury (Kwiecien et al., 2002),in both ulcer models. This was in accordance with Vaananen., et al.,1991 who proved that the gastrotoxic effect of NSAID was mediated through induction of reactive oxygen metabolites which promote lipid peroxidation, Tandon et al., (2004)

who stated that there are positive correlation between the level of gastric mucosal lipid peroxidation products (marker of oxidative stress) and stomach damage in CRS in rats.

The result of the present study showed that simvastatin pretreatment caused significant reduction in MDA level in both ulcer models as compared to non treated control groups and it was reported that simvastatin possesses free radicals scavenger activity (Haendeler et al., 2004). This suggests that simvastatin afforded part of its gastroprotective effect in both ulcer models via antioxidant activity.

NO is a double edge weapon exerting either protective or destructive effects depending on the extent on NO synthesis (Tariq et al., 2007). It has been reported that NO generated from eNOS play an important role in gastric ulcer formation and healing (Ma and Wallace 2000) whereas NO generated from iNOS participate in ulcer formation through the production of oxygen derived radical formation and their cytotoxic action (Cho 2001)

The result of the present work showed marked reduction in nitrite level (as indicator of NO) in indomethacin treated group. This is attributed to the ability of indomethacin to upregulate the endothelin-1 leading to decrease production of gastric mucosal NO (Slomiany and Slomiany 2000) while nitrite level is markedly elevated in CRS which occurred due to stimulation of iNOS which reacts with superoxide to form peroxynitrite (potent cytotoxic oxidant) causing gastric damage (Lanas 2008) .Simvastatin was able to normalize the nitrite levels in both ulcer models. It increased NO level in indomethacin treated group. Similar finding was observed by Heeba et al. (2009), while it deceased NO level in CRS group. Madonna et al., 2005 illustrated that simvastatin attenuates expression of cytokine iNOS in embryonic cardiac myoblasts.

Earlier researches demonstrated that PGE_2 influence virtually every component of the mucosal defense; stimulate mucus, bicarbonate; maintaining of mucosal blood flow; enhancing the resistance of the epithelial cells to injury induced by cytokines (Miller., 1983)

In the present study , oral administration of indomethacin resulted in significant reduction in gastric mucosal PGE_2 level , through non selective inhibition of cyclooxygenase (Schmassmann et al., 1998) and the same in CRS rats .Bandyopadhyay et al. (1999) attributed this effect to accumulation of hydrogen peroxide (a potent PG biosynthesis inhibitor). Rats pretreated with simvastatin showed significant increase in PGE_2 level in both types of ulcers

NO was reported to increase PGE_2 biosynthesis in vivo through CGMP independent mechanism and it is

possible to assume that NO might regulate the release and or the biosynthesis of PGE2 in the stomach after damage (Takeuchi et al., 1999). Chen, et al., 2004 proved that statins induce cyclooxygenase -2 gene expressions and PGE $_2$ release in murine macrophage. Conclusion: the results obtained from this study confirmed the gastroprotective effect of simvastatin in indomethacin induced ulcer and proved it in CRS induced ulcer. This effect is mediated through ATP sensitive K^{\dagger} channel opening activity, free radical scavenging, decrease in total acid output and proteolytic activity, increase in gastric juice mucin content, increase in gastric mucosal PGE $_2$, returning of gastric mucosal NO to near normal values in both ulcer models.

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Fmcdm Evaluation Of Teachers Performance

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Abstract:One of the most important functions of management is to evaluate the performance of the organizations' employees (Stoner and Freeman, 1992). For increase efficiency and effectiveness education performance we must assessment it. Article purpose is determine and identified instructor's performance dimensions and indicator's performance. In this study, we have aggregated and identified five instructor's performance dimensions and 19 indicators of that performance. we use fuzzy logic for the measurement of performance and apply Analytical Hierarchy Process(AHP) in criteria weight and TOPSIS in ranking. A FMCDM(Fuzzy multi criteria decision making) is an approach for evaluating decision obtaining alternatives involving subjective judgments made by a group of decision makers. A pair wise comparison process is used to help individual decision makers make comparative judgments, and a linguistic rating method is used for making absolute judgments. An empirical study of instructors Performance evaluation in one of the branches of PNU (Payame Noor University) that is presented to illustrate the effectiveness of the approach.

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Introduction

Decision making in the public and private sectors often involves the evaluation and ranking of available courses of action or decision alternatives based on multiple criteria. Multi criteria decision making (MCDM) has proven to be an effective methodology for solving a large variety of multi criteria evaluation and ranking problems (Yen & Chang, 2009, p454).

Decision-making problems are the process of finding the best option from all of the feasible alternatives. In almost all such problems the multiplicity of criteria for judging the alternatives is pervasive. That is, for many such problems, the decision maker wants to solve a multiple criteria decision making (MCDM) problem (Chen, 2000, p1).

One of the most important functions of management is to evaluate the performance of the organizations' employees (Stoner and Freeman, 1992). Stoner and Freeman (1992) further stated that performance appraisals serve four primary purposes. These purposes included: "(1) to let subordinates know formally how their current performance is being rated; (2) to identify subordinates who deserve merit raises; (3) to locate individuals who need additional training; and (4) to identify candidates for promotion". Latham and Wexley (1994) define performance appraisal as "... any personnel decision that affects an employee's retention, termination, promotion, demotion, transfer, salary increase or decrease, or admission into a training program" (Schraeder&etal, 2006, p479). Also Eyres (1989) noted that using performance appraisals as a criterion for demotions, failure to promote someone, termination of employment, or for layoffs could prompt employee lawsuits (p59).

The objectives of universities are to provide in-depth knowledge, seek academic development, educate students, and coordinate national development demands. The core functions of a university are basically teaching, research and scholarship. Perkins (1973) pointed out that a university has three primary functions: education, research and service. Donald (1984) believed that universities should establish performance measure indicators based on these functions to evaluate performance of related to resource allocation (Chen et al., 2009a, p222).

Thus, performance appraisals or performance evaluation is an important issue for managers, since it can be used as a reference in decision making with regard to performance improvement, specially teaching performance improvement.

Since the judgments are usually vague rather than crisp, a judgment should be expressed by using fuzzy sets which has the capability of representing vague data. Some multi attribute evaluation methods such as AHP, ELECTRE, PROMETHEE, ORESTE, and TOPSIS can handle and solve this problem by integrating fuzzy set theory. Among these methods, AHP uses a hierarchy of attributes and alternatives while the others do not. (Kahraman et al., 2007)

This paper is organized as follows: In the second section, some information about Fuzzy MCDM methods (AHP- Fuzzy set - TOPSIS) is given. In the third section, an empirical study of

instructors Performance evaluation in Payam-e-Noor University (PNU) is presented to illustrate the effectiveness of the approach. Finally, conclusions are given.

PNU is distance education in Iran. This university has about 1.2 million students right now and has 546 branches too.

Evaluation Framework Of Evaluating Instructors Performance

This study applied the fuzzy MCDM (multi criteria decision making) to evaluate the instructors' performance in universities as shown in Fig. 1. First,

we identified the evaluating instructors' performance aspects and attributes, after constructing the evaluation criteria hierarchy; we calculated the criteria weights by applying Analytic Hierarchy Process (AHP) method. The measurement of performance corresponding to each criterion was conducted under the setting of fuzzy set theory. Finally, we conducted Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) to achieve the final ranking results. The descriptions detail of each step was elaborated in each of the following sub-section.

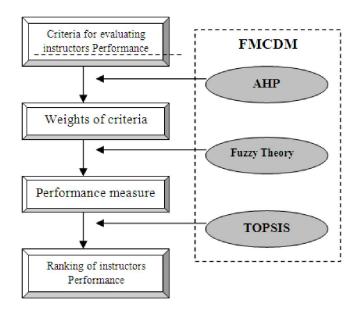


Figure 1. Evaluation framework of evaluating instructors Performance

Identifying Performance Dimensions and Criteria

There are four kinds of universities in Iran: State, Azad, Payame Noor (distance education) and Non-benefit. In each kind, different questionnaires were used to evaluate the instructors' performance. The researchers in the present study combined the different questionnaires directed by expert and from specialist finally they have reached a single

comprehensive questionnaire after identifying similarities and the differences. This questionnaire had five dimensions which were as follows: Teaching style, Individual features and social relation, Knowledge level, observance of educational regulations and Educational tools. Each dimension included a number of criteria resulting in nineteen criteria in all as shown in Table 1.

Table 1. The evaluation criteria for training performance of instructor

Dimensions	Criteria
Teaching style D ₁	C1: Ability to explain concepts. C2: Ability to initiate motivation and interest in learning and research. C3: Initiation of suitable conditions for students' participation in class discussions. C4: Maintaining a lesson plan.
	C5: Homework for learning.
Individual features and social relation D ₂	C6: preparation for answering students' scientific needs. C7: observance of individual differences among students. C8: availability of the instructor at non-class time. C9: patience of the instructor in interaction with the students. C10: instructors' social contact with the students. C11: interest of the instructor in helping the students with personal problems.
Knowledge level D_3	C12: mastery over topics of lessons. C13: presentation of new topics relevant to the field.
observance of educational regulations D ₄	C14: optimal use of class time. C15: students' roll-call. C16: administration of entrance tests, quizzes, etc. C17: observance of discipline by the instructor.
Educational tools D ₅	C18: use of facilities (pictures, graphs) to teach. C19: use of scientific trips for teaching.

Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a popular technique which is often used to model subjective decision making processes based on multiple attributes. AHP technique is widely used in both individual and group decision making environments (Bolloju, 2001, p499).

The AHP weighting is determined by the evaluators who conduct pair-wise comparisons, by which the comparative importance of two criteria is shown. Furthermore, the relative importance derived

from these pair-wise comparisons allows a certain degree of inconsistency within a domain. Saaty used the principal eigenvector of the pair-wise comparison matrix derived from the scaling ratio to determine the comparative weight among the criteria (Chiu, 2006, p1247).

In AHP, multiple pair wise comparisons are based on a standardized comparison scale of nine levels (Table 2) (Chen et al., 2009b, p8458; Yen & Chang, 2009, p465).

Table 2 . Nine-point intensity of importance scale and its description

Definition	intensity of importance
Equally important	1
Moderately more important	3
Strongly more important	5
Very Strongly more importan	t 7
Extremely more important	9
Intermediate values	2,4,6,8

Let $C = \{Cj \mid j = 1, 2 ... n\}$ be the set of criteria. The result of the pair wise comparison on n criteria can be summarized in an (n-n) evaluation matrix A in which every element a_{ij} (i,j = 1,2,...,n) is the quotient of weights of the criteria, as shown:

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix} , a_{ii} = 1, aji = 1/aij, a_{ij} \neq 0$$

At the last step, the mathematical process commences to normalize and find the relative weights for each matrix. The relative weights are given by the right eigenvector (w) corresponding to the largest Eigen value (λ_{max}), as: (Dag´deviren & et al, 2009, p8143)

$$Aw = \lambda_{\max} w$$

If the pair wise comparisons are completely consistent, the matrix A has rank 1 and $\lambda_{max} = n$. In this case, weights can be obtained by normalizing any of the rows or columns of A (Wang and Yang, 2007)

Fuzzy Set Theory

To deal with vagueness of human thought, Zadeh (1965) first introduced the fuzzy set theory, which was oriented to the rationality of uncertainty due to imprecision or vagueness. A major contribution of fuzzy set theory is its capability of representing vague data (Kahraman et al., 2003, p385).

There are two main characteristics of fuzzy systems that give them better performance for specific applications:

- 1. Fuzzy systems are suitable for uncertain or approximate reasoning, especially for the system with a mathematical model that is difficult to derive; and
- 2. Fuzzy logic allows decision-making with estimated values under incomplete or uncertain information (Kahraman et al, 2007).

Fuzzy set theory has developed as an alternative to ordinary (crisp) set theory and is used to describe fuzzy sets. For example, the set of 30-year-old men is a crisp set. The boundaries are definite and a particular person is either in the set or not, is either a 30-year-old man, or is not. In contrast, a fuzzy set does not have clear boundaries. Membership in a fuzzy set is a matter of degree (Friedlob& Schleifer, 1999, p133).

Let X denotes a universal set. Then a fuzzy subset of X is defined by its membership function: $\mu_{\overline{A}}: x \to [0,1]$ which is assigned to each element $x \in X$ a real number $\mu_{\overline{A}}(x)$ in the interval [0, 1], where the value, of $\mu_{\overline{A}}(x)$ at x represents the grade of membership of x in \overline{A} . Thus, the nearer the value of $\mu_{\overline{A}}(x)$ is unity, the higher the grade of membership of x in \overline{A} . (Sakawa, 2002, p196).

Which assigns to each element $x \in X$ a real number $\mu_{\overline{A}}(x)$ in the interval [0, 1], where the value, of $\mu_{\overline{A}}(x)$ at x represents the grade of membership of x in \overline{A} Thus, the nearer the value of $\mu_{\overline{A}}(x)$ is unity, the higher the grade of membership of x in \overline{A} (Sakawa, 2002, p196).

Triangular fuzzy numbers and Linguistic variables

TFN is a special type of fuzzy number with three parameters, each representing the linguistic variable associated with a degree of membership of 0 or 1. Since it is shown to be very convenient and easily implemented in arithmetic operations, the TFN is also commonly used in practice (Liou & Chen, 2006, p931)

A triangular fuzzy number \widetilde{m} is defined by a triplet (a, b, c). The membership function μ_m of \overline{M} is given by (Chamodrakas & et al, 2009, p7410):

$$\mu_{\overline{m}} = \begin{cases} \frac{x-a}{b-a} & (a \le x \le b) \\ \frac{c-x}{c-b} & (b \le x \le c) \end{cases}$$

The algebraic operation for the triangular fuzzy number can be displayed as follows: (Chiu, 2006, p1248; Abdolvand et al., 2008, p374)

• Addition of a fuzzy number ⊕

$$(L_1, M_1, U_1) \oplus (L_2, M_2, U_2) = (L_1 + L_2, M_1 + M_2, U_1 + U_2) \tag{1}$$

• Multiplication of a fuzzy number : \otimes

$$(L_1, M_1, U_1) \otimes (L_2, M_2, U_2) = (L_1 L_2, M_1 M_2, U_1 U_2)$$
(2)

• Any real number k:

$$K(L,M,U) = (KL,KM,KU)$$
(3)

• Subtraction of a fuzzy number Θ

$$(L_1, M_1, U_1)\Theta(L_2, M_2, U_2) = (L_1 - L_2, M_1 - M_2, U_1 - U_2)$$
(4)

• Division of a fuzzy number

$$(L_1, M_1, U_1)(L_2, M_2, U_2) = (L_1/L_2, M_1/M_2, U_1/U_2)$$
(5)

Average of fuzzy number :

$$A_{ave} = (A_1 + A_2 + \dots + A_n)$$

$$A_{ave} = [(L_1 + \dots + L_n) + (M_1 + \dots + M_n) + (U_1 + \dots + U_n)/n$$
(6)

The concept of a fuzzy number plays a fundamental role in formulating quantitative fuzzy variables. These are variables whose states are fuzzy numbers. When, in addition, the fuzzy numbers represent linguistic concepts, such as very small, small, medium, and so on, as interpreted in a particular context, the resulting constructs are usually called linguistic variables (Klir & Yuan, 1995, p102).

Fuzzy sets have vague boundaries and are therefore well suited for discussing such concepts as linguistic terms (such as "very" or "somewhat") or natural phenomena (temperatures) (Friedlob & Schleifer, 1999, p133).

Variables, whose values are given in linguistic terms, i.e. words, sentences, etc, are called linguistic variables (Chen, 2001; Lin & Chang, 2008).

Each linguistic variable the states of which are expressed by linguistic terms interpreted as specific fuzzy numbers is defined in terms of a base variable, the values of which are real numbers within a specific range. A base variable is a variable in the classical sense, exemplified by any physical variable (e.g., temperature, pressure, speed, voltage, humidity, etc.) as well as any other numerical variable, (e.g., age, interest rate, performance, salary, probability, reliability, etc.). In a linguistic variable, linguistic terms representing approximate values of a base variable, germane to a particular application, are captured by appropriate fuzzy numbers (Klir & Yuan, 1995, p102) Defuzzification

The result of fuzzy synthetic decision of each alternative is a fuzzy number. Therefore, it is necessary that the nonfuzzy ranking method for fuzzy numbers be employed during service quality comparison for each alternative. In other words, Defuzzification is a technique to convert the fuzzy number into crisp real numbers; the procedure of defuzzification is to locate the Best Nonfuzzy Performance (BNP) value (Tsuar et al., 2002, p110). There are several available methods to serve this purpose. Mean-of-Maximum, Center-of-Area, and a-cut Method are the most common approaches. This study utilizes the Center-of-Area method due to its simplicity and does not require analyst's personal judgment (Abdolvand et al., 2008, p375).

The defuzzified value of fuzzy number can be obtained from Equation (7).

$$TFN = (L, M, U)$$

 $BNF = [(U - L) + (M - L)]/3 + L$ (7)

TOPSIS

The TOPSIS (technique for order performance by similarity to ideal solution) was first developed by Hwang & Yoon (1981). According to this technique, the best alternative would be the one that is nearest to the positive-ideal solution and farthest from the negative ideal solution (Ertugrul & Karakasoglu, 2007). The positive-ideal solution is a solution that maximizes the benefit criteria and minimizes the cost criteria, whereas the negative ideal solution maximizes the cost criteria and minimizes the benefit criteria (Wang & Elhag, 2006). In short, the positive-ideal solution is composed of all best values attainable from the criteria, whereas the negative ideal solution consists of all worst values attainable from the criteria (Wang, 2007). There have been lots of studies in the literature using TOPSIS for the solution of MCDM problems. (Chen, 2000; Chu & Lin, 2002; Wang et al., 2009; Boran et al., 2009).

The calculation processes of the method are as following: (Tsuar et al, 2002, p111)

• <u>Step 1:</u> Establish the normalized performance matrix:

The purpose of normalizing the performance matrix is to unify the unit of matrix entries. Assume the original performance matrix is

$$x = (x_{ij}) \qquad \forall_{i,j} \tag{8}$$

Where x_{ij} is the performance of alternative i to criterion j.

• <u>Step2:</u> Create the weighted normalized performance matrix

TOPSIS defines the weighted normalized performance matrix as:

$$V = (V_{ij}) \qquad \forall_{i,j}$$

$$V_{ij} = w_{ij} \times r_{ij} \qquad \forall_{i,j}$$
(9)

where w_i is the weight of criterion j.

• <u>Step3:</u> Determine the ideal solution and negative ideal solution The ideal solution is computed based on the following equations:

$$A^{+} = \{ (\max V_{ij} / j \in J), (\min V_{ij} / j \in J'), i = 1, 2, ..., m \}$$
 (10a)

$$A = \{ (\min V_{ij} / j), (\min V_{ij} / j \in J'), i = 1, 2, ..., m \}$$
 (10b)

Where

 $j = \{j = 1, 2, ..., n/j \text{ belongs to benefit criteria}\}; j = \{j = 1, 2, ..., n/j \text{ belongs to cost criteria}\}:$

• Step4: Calculate the distance between idea solution and negative ideal solution for each alternative:

$$S_{i}^{+} = \sqrt{\sum_{j=1}^{n} (Vij - V_{j}^{+})^{2}} \quad i = 1, 2, \dots, m$$
 (11)

$$S_{i}^{-} = \sqrt{\sum_{j=1}^{n} (Vij - V_{j}^{-})^{2}} \quad i = 1, 2, \dots, m$$
 (12)

• <u>Step5:</u> Calculate the relative closeness to the ideal solution of each alternative

$$C_i^+ = \frac{S_i^-}{S_i^+ + S_i^-} \qquad i = 1, 2, \dots, m$$
 (13)

where $0 \le c_i^* \le 1$ that is, an alternative i is closer to A_i^* as C_i^* approaches to 1.

• <u>Step6:</u> Rank the preference order

A set of alternatives can be preference ranked according to the descending order of C_i^*

Empirical Study Of Instructors Performance

Survey & Measurement Instrument

In an effort of conducting the survey, 170 questionnaires were distributed to students in PNU. Out of the 170 surveys, all of them had been returned, 17 of them (10%) weren't completed and 153 0f them were completed that were ready for analyzing a rate equal with 90% which is a very good rate. The other demographic statistics were: all of them were at their age of less than 30 and were students of B.A education that consisted of 45.22% men and 54.75% women.

The questionnaire of instructors' performance evaluation was composed based on four parts: first section was related to properties of population, second section was about questions for evaluating the relative importance of criteria and airline's performance corresponding to each criterion. AHP method was used in obtaining the relative weight of criteria. In order to establish the membership function (third section) associated with each linguistic expression term, we asked respondents to specify the range from 1 to 100 corresponding to linguistic term 'Strongly Disagree (SD)', 'Disagree', 'Middle (M)', 'Agree' and 'Strongly Agree' and in the fourth section there were 19 questions about 5 dimensions of instructors' performance.

For determining the reliability of this questionnaire from in this research Cronbach's Alpha has been used. Values of final for each of the 5 dimensions of instructors' performance with similar questions were in Table 3. According to Saharan's opinion, Cronbach's coefficient less than 0.6 is weak, 0.7 is acceptable and more than 0.8 is very good (Abdolvand et al., 2008, p 376). Therefore the result of this research for four dimensions are acceptable and for one dimension are good and whole questionnaire from have acceptable reliability.

Table 3. Instructors' performance evaluation scores: Cronbach's alpha.

	S_1	S_2	S_3	S_4	S_5	Total
Items	5	6	2	4	2	19
Questions	1 – 5	6 - 11	12 - 13	14 - 17	18 - 19	1 – 19
Cronbach's Alpha	.701	.723	.763	.80	.735	.712

Determine Fuzzy Number

In this study, five spectrums are used that have been said already: Strongly Disagree (SD), Disagree (D), Middle (M), Agree (A), and Strongly Agree (SA).

For gaining each of the linguistic variables' fuzzy numbers, responders' opinions were used, so each responder were asked to determine linguistic variables' spectrum from 0 to 100 (Abdolvand et al., 2008, p372).

The sample of these opinions is shown in Table 4.

	Scale of lingu	uistic variables(0-	100)		
Responder	SD	D	M	A	SA
1	0- 5	5 - 20	20-40	40- 65	65 - 100
2	0-10	10-25	25-50	50-80	80-100
3	0 - 15	15 - 30	30 - 60	60 - 80	80- 100
4	0 - 10	10 - 25	25 - 40	40 - 70	70 - 100
5	0 - 10	10 - 30	30 - 50	50 - 70	70 - 100
6	0 - 15	15-30	30-60	60-85	85-100
153	0 - 20	20 - 30	30 - 40	40 - 60	60 - 100

Table 4. Scale of linguistic variables by responders

After achieving responders' opinion by evaluation of these 30 experts in linguistic variables scale, we determine triangular fuzzy numbers (TFN) of each linguistic variable.

According to the above mentioned, now TFN of each linguistic variables were consist of:

"Strongly Disagree" linguistic variable (SD):

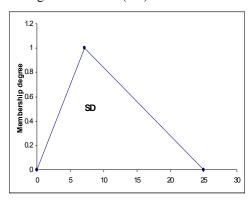


Figure 2. Triangular membership function of fuzzy number for "Strongly Disagree"

Table 5. TFN for SD linguistic variable

	L	M=(L+U)/2	U
1	0	2.5	5
2	0	5	10
3	0	7.5	15
4	0	5	10
5	0	5	10
6	0	7.5	15
• • • •			
153	0	10	20
TFN(SD)	0	7.15	25
	min	average	max

As it was mentioned, we could obtain TFN for SD linguistic variables by responders' opinion, and other linguistic variables' fuzzy numbers are obtained in this way. These numbers with their membership function are as follows:

Table 6. Linguistic variables and Triangular fuzzy number (TFN)

linguistic variables	TFN	
Strongly Disagree (SD)	(0 ,7.15 ,25)	
Disagree (D)	(5,22.15,40)	
Middle (M)	(15,41.36,60)	
Agree (A)	(45, 65.56, 85)	
Strongly Agree (SA)	(70,89.2,100)	

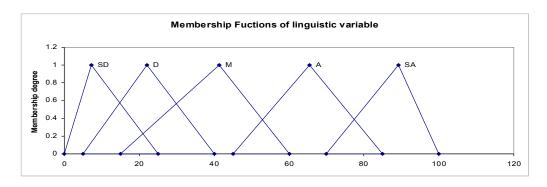


Figure 3. Membership functions of linguistic variables

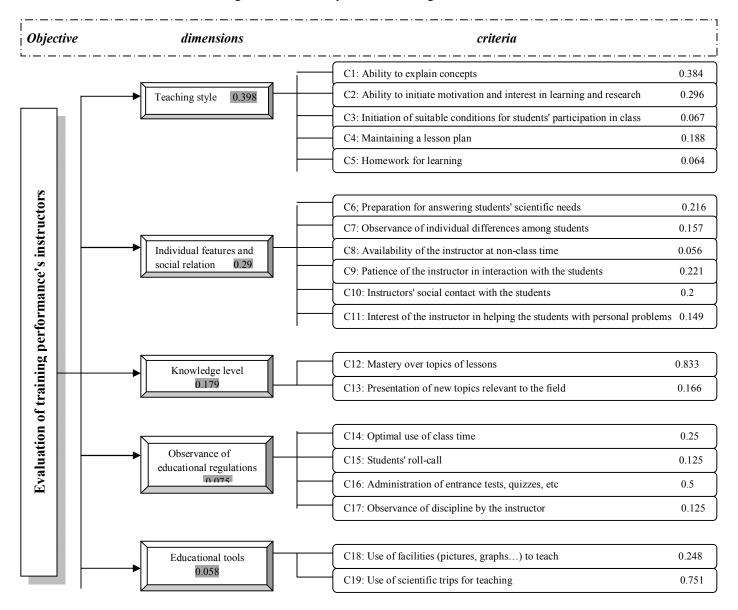


Figure 4. Weights of the nineteen criteria.

Table 7. Fuzzy performance measures of instructors

Performance evaluation criteria	instructor A	instructor B inst	ructor C instructo	r D
C1	(57.50, 77.40, 92.50)	(52.01, 71.89, 88.98)	(35.00, 54.70, 73.75)	(31.25,
53.46, 73.75)				
C2	(63.75, 83.30, 96.25)	(63.75, 83.29, 96.25)	(40.00, 60.47, 75.00)	(32.45,
55.27, 72.57)	(-1.410.00)	(aa 11 a1 a1)	(20.00.42.60.64.25)	(a. 1
C3	(51.25, 71.50, 88.75)	(57.23, 77.14, 91.24)	(20.00, 42.60, 61.25)	(21.45,
43.01, 61.25) C4	(50.00.71.20.96.25)	(57.50, 77.29, 02.50)	(17.50.27.01.56.25)	(22.45
53.78, 72.75)	(50.00, 71.30, 86.25)	(57.50, 77.38, 92.50)	(17.50,37.81, 56.25)	(32.45,
C5	(55.50, 74.20, 89.78)	(58.21, 78.65, 92.58)	(27.50, 48.65, 67.50)	(27.41,
48.39, 67.50)	(55.50, 71.20, 65.70)	(30.21, 70.03, 72.30)	(27.50, 10.05, 07.50)	(27.11,
C1 -C5	(55.60, 75.50, 90.71)	(57.74, 77.67, 92.31)	(28.00, 48.85, 66.75)	(29.00,
50.78, 65.56)		, , , , ,		2
<u>C6</u>	(49.24, 69.50, 84.23)	(58.67, 78.59, 93.02)	(33.75, 54.56, 71.25)	(34.98,
54.95, 71.02)				
C7	(50.02, 72.00, 86.25)	(50.01, 70.89, 87.95)	(21.02, 43.25, 62.39)	(27.98,
48.66, 67.94)	(26.25.50.40.76.25)	(22.75.54.50.75.00)	(17.01.26.56.55.70)	(20.27
C8	(36.25, 59.40, 76.25)	(33.75, 54.59, 75.00)	(17.01, 36.56, 55.78)	(28.27,
49.24, 68.31) C9	(63.50, 84.20, 96.25)	(62.98, 82.59, 96.20)	(32.78, 53.69, 70.58)	(28.75,
53.32, 70.00)	(03.30, 64.20, 90.23)	(02.96, 62.39, 90.20)	(32.78, 33.09, 70.38)	(26.73,
C10	(63.04, 83.80, 96.01)	(58.21, 77.95,92.50)	(25.00, 43.86, 62.50)	(43.75,
65.42, 82.50)	(03.01, 03.00, 70.01)	(50.21, 77.55,52.50)	(22.00, 13.00, 02.00)	(13.75,
C11	(50.85, 71.50, 87.54)	(28.75, 53.23, 70.00)	(16.75, 36.25, 56.86)	(17.54,
37.64, 55.89)				
C6-C11	(52.15, 73.40, 87.76)	(48.73, 69.64, 85.78)	(24.39, 44.70, 63.23)	(30.21,
51.54, 69.27)				
C12	(56.20, 76.20, 90.12)	(64.35, 85.27, 96.07)	(27.46, 48.02, 66.27)	(34.56,
52.19, 71.25)	(25.40.50.00.75.46)	(42.75 (2.42 02.50)	(10.64.40.25.60.25)	(26.25
C13 45.27, 64.57)	(35.49, 58.90, 75.46)	(43.75, 63.42, 82.50)	(19.64, 40.25, 60.35)	(26.25,
C12 - C13	(45.85, 67.60, 82.79)	(54.05, 74.35, 89.29)	(23.55, 44.14, 63.31)	(30.41,
48.73, 67.91)	(43.03, 07.00, 02.77)	(34.03, 74.33, 67.27)	(23.33, 44.14, 03.31)	(30.41,
C14	(42.50, 65.30, 80.00)	(50.89, 70.95, 88.26)	(42.58, 65.27, 81.98)	(43.89,
66.84, 83.75)	(,,	(,,,	(,,)	(,
C15	(40.00, 60.50, 75.00)	(58.63, 78.32, 92.47)	(58.25, 76.45, 91.68)	(56.19,
68.34, 89.79)				
C16	(37.10, 59.40, 76.08)	(56.25, 77.24, 90.00)	(40.25, 60.48, 74.65)	(31.25,
49.77, 66.25)	(50.01.50.00.00.10)	(60.45.00.01.06.40)	(0.05 00.05 01.00)	(56.00
C17	(58.01, 78.30, 93.12)	(62.45, 83.21, 96.43)	(76.25, 77.85, 91.28)	(56.38,
75.28, 88.61)	(11 10 65 90 91 05)	(57.06.77.42.01.70)	(54.22.70.01.04.00)	(16.02
C14 - C17 65.06, 82.10)	(44.40, 65.80, 81.05)	(57.06, 77.43, 91.79)	(54.33, 70.01, 84.90)	(46.93,
C18	(52.36, 72.20, 89.05)	(58.12, 76.89, 91.84)	(33.97, 53.89, 72.07)	(38.59,
60.25, 79.85)	(52.50, 72.20, 07.05)	(50.12, 70.07, 71.04)	(33.71, 33.07, 12.01)	(50.5),
C19	(49.87, 70.30, 86.16)	(50.00, 71.33, 86.25)	(22.13, 39.57, 55.39)	(28.52,
51.02, 67.34)				
C18 - C19	(51.12, 71.20, 87.61)	(54.06, 74.11, 89.05)	(28.05, 46.73, 63.73)	(33.56,
55.64, 73.59)				

Table 8. Overall performance measures of instructors -* Is the best performance out of the four instructors.

Performance evaluation criteria	instructor A	instructor B	instructor C
instructor D			
C1	75.79*	70.96	54.48
52.82 C2	81.10*	81.10*	58.49
53.43	81.10	81.10	38.49
C3	70.49	75.20*	41.28
41.90			
C4	69.19	75.79*	37.19
52.99	52.16	7.6 40 th	45.00
C5 47.77	73.16	76.48*	47.88
C1- C5	73.95	75.91*	47.87
49.78	13.73	75.71	47,07
C6	67.66	76.76*	53.19
53.65			
C7	69.43	69.62*	42.22
48.19 C8	57.29*	54.45	36.45
48.61	31.29	34.43	30.43
C9	81.32*	80.59	52.35
50.69			
C10	80.94*	76.22	43.76
63.89	60.05th	5 0.66	26.62
C11 37.02	69.95*	50.66	36.62
C6 - C11	71.10*	68.05	44.10
50.34	/1.10	00.03	44.10
C12	74.18	81.90*	47.25
52.67			
C13	56.61	63.22*	40.08
45.36	(5.40	70 50*	42.67
C12 - C13 49.02	65.40	72.56*	43.67
C14	62.59	70.03*	63.28
64.83	- 12-2		
C15	58.49	76.47*	75.46
71.44	57.50	71.5 02	50.46
C16	57.52	74.50*	58.46
49.09 C17	76.46	80.70	81.79*
73.42	70.70	30.70	01.77
C14 - C17	63.77	75.43*	69.75
64.70			
C18	71.19	75.62*	53.31
59.56 C19	68.76	69.19*	39.03
48.96	00.70	09.13	37.03
C18 - C19	69.97	72.41*	46.17
54.26			

• Step 1:

Table 9. Normalized performance matrix

	1	2	3	4	5
A	73.95	71.10	65.40	63.77	69.97
В	75.91	68.08	72.56	75.43	72.41
C	47.87	44.10	43.67	69.75	46.17
D	49.78	50.34	49.02	64.70	54.29
137	0.40	0.29	0.18	0.08	0.06

• Step2:

Table 10. Weighted normalized performance matrix

	1	2	3	4	5
A	0.232	0.173	0.099 0.110 0.066	0.034	0.032
В	0.238	0.166	0.110	0.041	0.033
C	0.150	0.107	0.066	0.037	0.021
D	0.156	0.122	0.074	0.035	0.025

• <u>Step3:</u> Determine the ideal solution and negative ideal solution

$$\begin{cases} A_i^+ = \{0.238, 0.173, 0.11, 0.041, 0.033\} \\ A_i^- = \{0.15, 0.107, 0.066, 0.034, 0.021\} \end{cases}$$

• <u>Step4:</u>

Table 11. Distance between idea solution and negative ideal solution

	A	В	C	D
S^+	0.023	0.007	0.118	0.102
S	0.111	0.114	0.003	0.228

• Step5-6:

Table 12. Final ranking of instructors

Instructor	Rank	Similarity to ideal solution(C ⁺)	
В	1	0.942	
Α	2	0.828	
D	3	0.690	
C	4	0.024	

The Weights of Evaluation Dimensions and Criteria

Figure 4 shows the relative weights of the five dimensions of instructor's performance, which were obtained by applying AHP. The weights for each of the aspect were: Teaching style (0.398), Individual features and social relation (0.29), Knowledge level (0.179), Observance of educational regulations (0.075) and Educational tools (0.058). The weights were described generally was that

students were more concerned on the instructors feature rather than the regulations or tools aspects.

Performance Measure of Instructors

After obtaining the criteria weights from AHP (Fig. 4), by using fuzzy number and fuzzy average is measured performance of four instructors. Table 2 lists the fuzzy performance measure for the four instructors. After obtaining the performance measure in terms of fuzzy number, we defuzzify the

fuzzy numbers into crisp numbers so as to conduct TOPSIS ranking procedure. We used Center-of-Area method (as Eq. (7)) to defuzzify the fuzzy numbers, which are as shown in Table 3. In general overview, instructor B performs better in all of aspects except Individual features and social relation that instructor A has better.

Final Ranking

In this paper, we use AHP method in obtaining criteria weight, and apply TFN to assess the linguistic ratings given by the evaluators. By using TOPSIS, we aggregate the weight of evaluate criteria and the matrix of performance to evaluate the four instructors' performance, the results of evaluation can be seen in table 8.

Conclusions And Implications

In this study, we have aggregated and identified five instructor's performance dimensions and 19 indicators of that performance. The five performance dimensions were: Teaching style, Individual features and social relation, Knowledge level, observance of educational regulations, Educational tools. For determining reliability of this questionnaire from Cronbach's Alpha has been used that Values of final were the table (3) and had acceptable reliability.

For evaluating the instructors' performance, we applied the fuzzy MCDM. So, we calculated the criteria weights by AHP and then for measuring instructors' performance, we used fuzzy set theory and TFN to assess the linguistic ratings given by the evaluators. Finally, we conducted Technique for TOPSIS to achieve the final ranking results.

In an effort of conducting the survey, 170 questionnaires were distributed to students in PNU that all of them were at their age of less than 30 years old and they were students of B.A education in this group 45.22 percent was men and 54.75 percent women.

Weights results show that students are more concern about the instructors feature than the regulations or tools because of weights for each of the dimensions were: [Teaching style (0.398), Individual features and social relation (0.29), Knowledge level (0.179), Observance of educational regulations (0.075) and Educational tools (0.058)]. For measuring four instructors' performance, TFN's performance showed in Table 2 and BNF shown table 3 which in general overview, instructor B performed better in all of aspects except Individual features and social relation that instructor A performed better. Then final ranking, after applying six steps from Topsis, instructor a higher rank than another instructor.

In general, performance evaluation is an important issue for managers, since it can be used as a reference in decision making with regard to performance improvement, specially teaching performance improvement so, in this study we applied the fuzzy MCDM to evaluate the instructors Performance in universities because we believe that judgments are usually vague rather than crisp, a judgment should be expressed by using fuzzy sets which have the capability of representing in vague data.

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Sequencing of Cytochrome C Oxidase Subunit I Gene of Mitochondrial DNA from *Chelonia mydas* in Oatar.

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Abstract: DNA of Qatari *C. mydas* samples were successfully sequenced using the Folmer forward and reverse primers. The identification with BOLD of approximately 688 base pairs sequence revealed maximum homology (99.84%) with *C. mydas*, which is a species of turtle has been declared "extinct in wild" by IUCN. The next closest species 93.79%, was *N. depressa* which has a restricted geographical distribution and was reported to be endemic to the Australian continental shelf. The finding of characteristic species-specific COI sequences offers the prospect of identifying marine turtle species by using DNA barcode methodology as an auxiliary tool for taxonomy. This can also be used during field work when identifying lost nests, animals stranded on beaches or those killed as part of catching in fishery nets. A further use is in forensic litigation when turtle eggs or meat are the only available material and for the development of Qatar gene bank information.

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Key word: DNA Barcoding, Green sea turtle, Cytochrome Oxidase, and COI sequencing.

1-Introduction

Sea or marine turtles superfamily *Chelonioidea* are marine reptiles. They were on earth for over 100 million years (Hirayama, 1998), and occupy a diverse ecosystems except the Arctic poles through their throughout highly migratory life cycles (Bjorndal and Jackson, 2003).

There are seven species of marine turtles in the world that include: the leatherback, Dermochelys coriacea; loggerhead, Caretta caretta; green, Chelonia mydas; flatback, Natator depressa; hawksbill, Eretmochelys imbricata; olive ridley, Lepidochelys olivacea and kemps ridley, Lepidochelys kempi (Storelli and Marcotrigiano, 2003). Of all the sea turtle species, E. imbricate along with C. mydas are the only two species found predominantly in the coral reefs of the gulf of Oman (Hossein et al., 2011). Limpus, (1995) had alarmingly reported that the number of sea turtles present in all the world's oceans is declining. The rapid decline in number of sea turtles is due to many well documented factors, most of them are due to human interactions. For example the excessive use of egg and turtle protein as food consumption and alteration of nesting, foraging habitats, mortification in marine waste, vessel strikes and incidental capture in commercial and recreational fisheries, are some of the major factors driving sea turtles toward extinction (Storelli and Marcotrigiano, 2003).

To save the sea turtles from extinction, all of the clearly recognized species are listed and protected

under Appendix 1 of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), so to ensure an international trade ban of the specimens of the Sea Turtles (Schouten, 1992). Furthermore, all species except *N.depressa*, are listed in Appendices I and II of the convention on the Conservation of Migratory Species (CMS) of wild animals (IUCN, 1995). The IUCN Red List considers *C. mydas*, as endangered in 1980 Bonn Convention (IUCN, 1996).

The 'Consortium Barcode of Life (COBOL), is an international collaborative organization whose purpose is to use "DNA barcoding" to generate a unique genetic standard barcode of every species of life on earth for taxonomic aims.

The DNA barcoding is a taxonomic method that uses a short genetic marker of an organism's DNA to identify it as belonging to a particular species (Stoeckle 2003). The higher the sequencing resolution of a particular gene, the better or more accurate results in taxonomic studies.

The Subunit 1 (COI or Cox1) gene is responsible for producing "Cytochrome Oxaidase C enzyme" which regulates and controls the respiratory process of the cell. Because of its unique structure and functionality from species to species, Subunit 1 (COI or Cox1) gene is therefore utilized as an accurate or optimum barcode identifier for a species. This was fully demonstrated by scientists when the Subunit (COI) gene was used to identify the North American bird species in 2004

(Hebert *et al.*, 2004). Since then many other vertebrate species' COI barcodes have been utilized for similar purposes (Chaves *et al.*, 2008). This stipulates the imminent conclusion that COI provide the most optimum and rapid solution for species' classification or taxonomy (Moritz and Cicero, 2004). The initiative opens up and enhances our recorded knowledge and understanding of taxonomy in general, and makes it easy for researchers to look at the results, which could lead further improved ways of species conservations (DeSalle and Amato, 2004).

Even so, prior to year 2010, globally threatened marine turtles were poorly represented in the DNA barcoding initiative (Eugenia *et al.*, 2010). Most recently the DNA barcoding technique has been utilized to identify species classification of sea turtles. This is the first study of its kind in Qatar that has been carried out to tackle the DNA barcoding of sea turtles, which is leads to identify lost nests, animals stranded on beaches or those killed as part of the by catch in fishery nets and in forensic litigation when turtle eggs or meat are the only available material. In addition to enhance the conservation of genetic natural resources of Qatari gene bank.

2-Materials and methods

Blood samples were collected from *C. mydas* in Pearl Lake of Qatari coast on the Arabian Gulf.

DNA was purified from 200 μ l of EDTA-anti coagulated blood with a QIAamp Blood Mini kit (Qiagen, Basel, Switzerland). The isolated DNA were quantified and qualified by using NanoDrop® ND-1000 spectrophotometer, for further estimation of the DNA quantity 2 μ l was loaded on 0.85% agarose gel at 100V for 30 min. The gels were stained in ethidium bromide and visualized under UV light.

PCR amplification of COI gene fragment using the Universal Animal Barcoding primer recommended by the Consortium for Barcoding of Life was used according to Folmer *et al.*, (1994), by the following sequence: BLCO1490F 5'- GGT CAA CAA ATC ATA AAG ATA TTG G-3' and BHCO2198R 5'- TAA ACT TCA GGG TGA CCA AAA AAT CA-3'

Polymerase Chain Reaction was performed in a total reaction mixture of 20µl containing 1µl (5 ng) of DNA template, 10µl of AmpliTaq Gold® 360 Mastermix (Applied Biosystems), 0.25µl (10pmol/µl) of forward primer and reverse primer in addition to 8.5µl of nuclease free water. Amplification was carried out in a Veriti 96 Well Fast Thermal cycler (Applied Biosystems) according to Folmer *et al.*, (1994), which consisted of an initial denaturation at 95°C for 10 minutes followed by 35 cycles of denaturation,

annealing and chain extension at 95° C (60s), 40° C (60s), 72° C (90s) respectively, The final chain extension step was for 7 minutes at 72° C and a final hold at 4° C.

The PCR amplifications were visualized on 2.0 % agarose gel using ethidium bromide staining then the PCR products were purified using ExoSap-IT.

DNA sequencing was carried out with forward as well as reverse primers of the universal primer according to standard protocol provided for Big Dye Terminator kit® V 3.1 (Applied Bio systems) using ABI 3130 genetic analyzer as 1 µl of cleaned PCR product was used for each 10 µl reaction.

The DNA sequence data was analyzed and edited with ABI Sequencing Analysis V 5.2 software. The species from the representative DNA sequence for the DNA samples was identified using the search engine of BOLD. In addition to this species identification was done from the DNA sequence using Basic locus alignment search tool (BLAST) of GenBank / NCBI.

3-Results and discussion

The mitochondrial COI gene of *C. mydas* was successfully sequenced to obtain good quality forward and reverse sequences of approximately 688 base pairs. The introduction of DNA barcoding has highlighted the expanding use of the COI as a genetic marker for species identification (Dawnay *et al.*, 2007).

DNA barcoding promises to be a powerful tool for species identification and other conservation genetic applications in marine turtles which are unique on the evolutionary tree of turtles for occupying the marine realm and widely known for their extensive migrations. Species identification is one of the main goals of the DNA barcoding initiative, was successfully carried out using their COI sequences (Eugenia et al., 2010). The multiple sequence alignment from samples showed no intra-specific variations as revealed by the similarity matrix based on the pair-wise analysis obtained by a bootstrap procedure (1000 replicates), analyses were conducted in MEGA4, which shows that there are no single differences between the sequences of Qatari C. mydas as follows:

TTAAAATTCTTTTTTAGCTGTGCAGGATAG
TCGGCACAGCACTCAGTTTATTAATCCGCGCA
GAACTAAGCCAACCAGGAACTCTTCTAGGAGA
TGACCAAATCTATAATGTCATCGTTACAGCTCA
TGCCTTTATTATAATCTTCTTCATAGTTATACC
AATTATAATTGGTGGCTTCGGAAATTGACTTGT
TCCCCTAATAATTGGCGCACCAGACATAGCAT
TTCCACGTATAAATAATATAAGCTTTTGACTCC
TACCCCCTTCACTACTACTACTTCTAGCATCAT

CAGGAATTGAAGCAGGCGCAGGTACAGGTTGA
ACAGTATATCCCCCATTAGCCGGAAACCTGGC
TCACGCCGGTGCTTCCGTAGACCTAACTATCTT
CTCCCTCCACCTAGCCCGGCGTATCTTCAATCT
TAGGGTGCCATCAACTTCATTACCACAGCAAT
CAACATAAAATCCCCCGCCATATCACAAATAC
CAAACACCCTTATTTGTATGATCCGTACTAATC
ACAGGCCGTCCTATTTACTACTTTCACTGCCAG
TACCTCGCCGCAGGCATTACCATACTACTACA
GACCGAAATCTAAATACAACCTTCTTCGACCTT
CAGGGGAGGAGACCAATCCTATACCAACACTA
TTCTGATTTTTGACCCCCCCCACAAGTATAAATA
AAAAAA.

An ideal DNA barcode should allow fast, reliable, automatable, and cost-effective species identification by users with little or no taxonomic experience (Hebert and Gregory, 2005). Representative sequences were used for species identification through BOLD and GenBank / NCBI. The sequence identification with BOLD Identification Engine revealed that the sequence showed maximum homology (99.84%) with C. mydas (Table 1), which is a species of turtle has been declared "extinct in wild" by IUCN (2008). Identifications are usually made by comparing unknown sequences against known species DNA barcodes via distancebased tree construction (Hebert et al., 2004), alignment searching e.g., BLAST; (Altschul et al., 1990; Altschul et al., 1997), or methods recently proposed such as the characteristic attribute organization system (CAOS) (Kelly et al., 2007), decision theory (Abdo and Golding, 2007), and the back-propagation neural network BP based species identification (Zhang et al., 2008).

The next closest species 93.79% (Table 1), was *N. depressa* which has a restricted geographical distribution and was reported to be endemic to the Australian continental shelf (Cogger and Linder, 1969; Limpus *et al.*, 1988).

The third closest species 92.52% (Table 1), was *E. imbricata* is a critically endangered sea turtle belonging to the family *Cheloniidae*, it is the only species in its genus. The species has a worldwide

distribution, with Atlantic and Pacific subspecies. *E. imbricata* is the Atlantic subspecies, while *E. imbricata bissa* is found in the Indo-Pacific region. The fourth closest species 92.38% (Table 1), was *L. olivacea*. The match statistics for Qatari *C. mydas* samples as derived from BOLD are given as (figure 1).

Similarly, sequence identification with BLAST tool of NCBI revealed that there are sequences for COI gene available for the genus *Chelonia* on NCBI. Min and Hickey (2007) showed that the CO1 barcoding region provides a quick preview of mitochondrial genome composition.

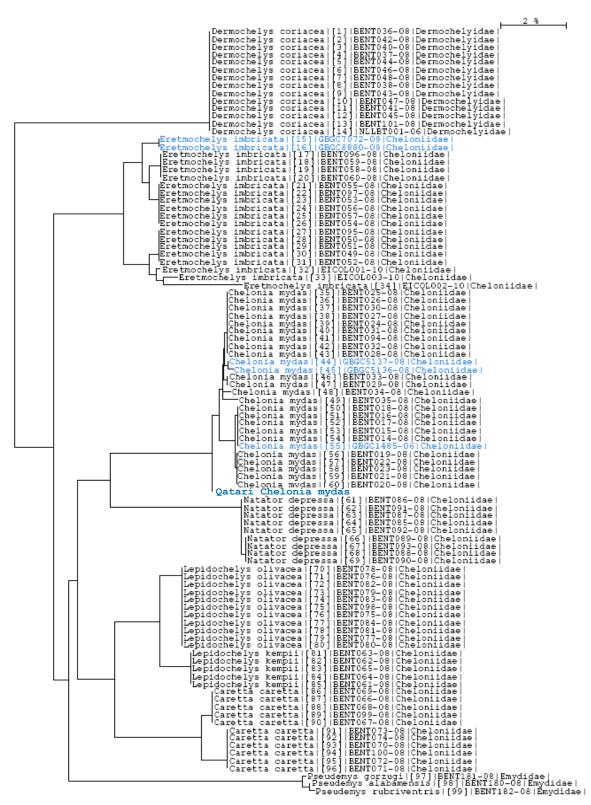
The COI marker was more suitable for barcoding than mitochondrial control objectives region sequences. However, hybridization is an important source of error for analyses relying solely on a mitochondrial marker including in this group that is known to hybridize despite ancient separations (Seminoff et al., 2003; Lara-Ruiz et al., 2006). Based on the BOLD identification engine and BLAST analysis, COI sequences of most closely related to C. mydas, were obtained from the sequence data base of GenBank/NCBI. These sequences were aligned and compared with COI sequences generated for the Oatari C. mydas sample using MEGA. Phylogenetic and molecular evolutionary analyses were carried out with MEGA. The Distance matrix was calculated using Kimura 2-parameter and the Neighbour joining tree (NJ tree) was plotted using the Kimura 2-parameter (Figure 2).

Besides its usefulness in taxonomy, the barcode methodology is expected to be of great utility in conservation biology, for example, when performing biodiversity surveys. It could also be applied when traditional methods are inefficacious, as in the identification of eggs and larval forms, and in the analysis of stomach contents or excreta to determine food webs (Stoeckle, 2003). Furthermore, it can be potentially employed in forensic cases to identify the source of tissue samples obtained from the illegal commerce or use of eggs and meat.

Table 1. Match statistics (Top Four matches) for Oatari C. mydas sequence generated through I	agh BOLD	erated through	generated	sequence	mydas s	atari (for (matches)	Con Four	statistics (1. Match	Table 1
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Phylum	Class	Order	Family	Genus	Species	Specimen Similarity (%)
Chordata	Reptilia	Testudines	Cheloniidae	Chelonia	mydas	99.84
Chordata	Reptilia	Testudines	Cheloniidae Natator		depressa	93.79
Chordata	Reptilia	Testudines	Cheloniidae	Eretmochelys	imbricata	92.52
Chordata	Reptilia	Testudines	Cheloniidae	Lepidochelys	olivacea	92.38

Figure 1. Identification tree generated through BOLD (Qatari C. mydas sample in blue).



🌳 Nafator depressa voucher ND-COFP1 cytochrome oxidase subunit1 (COI) gene, partial .. Natator depressa voucher ND- COF P2 cytochrome oxidase subunit I (COI) gene, part Eretmochelys imbricata mitochondrion, complete genome Eretmochelys imbricata voucher EFCOFA1 cytochrome ox.. Eretmochelys imbricata voucher EFCOFP1 cytochrome oxid.. Eretmochelys imbricata voucher EFCOFP2 cytochrome.. Caretta caretta voucher CC-COFA1 cytochr Caretta caretta voucher CC-.. Lepidochelys olivacea voucher LO-COFAP1 cytochrome oxidase. Lepidochelys kempii voucher LK-COFA1 cytochrome oxida. 🖣 Chelonia mydas voucher CM-COFA2 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial Chelonia mydas voucher CM-COFA1 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial 🆣 Chelonia mydas mitochondrial DNA, complete genome Chelonia mydas voucher CM+COF P2 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial 🔋 Chelonia mydas voucher C M-CO+ P4 cytochrome oxidase subunit I (COI) gene, partial cds; mitochond Chelonia mydas voucher CM-COF P1 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial Chelonia mydas voucher CHE-GT1 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial Chelonia mydas voucher CHE-GT2 cytochrome oxidase subunit I (COI) gene, partial cds; mitochondrial

Figure 2. Tree was produced using BLAST pairwise alignments. Neighbour joining tree with Max Sequence Difference 0.1 (Qatari *C. mydas* sample lcl|29149)

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🖢 Chelonia mydas voucher CM-COF P3 cytochrome oxidase subunit I (COI) gene, partial cds: mitochondrial

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Determination of degradability of whole seeds Safflower and its proteins fractions

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Abstract: This study was carried out to determine whole seed Safflower (WSS) crud protein (CP) degradation characteristics by using nylon bags. The rumen degradability of WSS CP at ruminal outflow rate of 0.02/h, 0.05/h and 0.08/h were 84.8, 77.5 and 71.7, respectively. Crud protein degradability of WSS at 0, 2, 4, 8, 16, 24 and 48 h incubation were 16.87, 42.62, 58.1, 83.79, 85.8, 88.21 and 92.58 percent.

[Hamed Amini Pour, Naser Maheri Sis, Ramin Salamatdust Nobar, Saeid Najafyar Razlighi, Mohammad Salamatazar, Mohammad Hasan Babazadeh, Mohammad Taher Maddah. Determination of degradability of whole seeds Safflower and its proteins fractions. Journal of American Science 2011; 7(7):789-791]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Whole seed Safflower, Protein degradation, in situ, crud protein

Abbreviations: WSS, whole seed Safflower; CP, crude protein.

1. Introduction

Safflower is an annual plant from the family Compositae. It is referred to in literature as cultivated (Carthamus tinctorius L.) and wild species (C.lanatus L.). Africa and Asia are mentioned as places of origin, with the Medditeranean as the main region of distribution. Safflower is an important aromatic and medicinal plant. Due to high oil content in seed, it is also cultivated as an oil crop. Cartamine (C21H22O11), a coloring substance found in the flowers of this plant, is used as colorant in foodprocessing industry (Hegi, 1954. Rapotiand and Romvani, 1972).

Also, Safflower is a major protein source for humans and other animals (Neilsen et al, 1989). Rapidly growing ruminants and lactating dairy cattle rely on both microbial protein and rumen-undegradable protein (escape protein) digested in the small in testing to meet their amino acid requirements. When good quality protein is fed to ruminants, it is subject to extensive microbial fermentation. During fermentation most protein is degraded to peptides, amino acids, and finally to ammonia (Chalupa, 1981).

In these cases, the advantage of protein quality, in terms of balance of essential amino acid and digestibility, are lost.

2. Material and Methods

2.1. Samples preparation

The WSS samples were obtained from commercial sources in Iran. The CP of a sample (5g) of seeds was determined by drying at 550C for 48h.

2.2. Animal and diets

Three ruminal cannulated Iranian Ghezel male sheep weighing approximately 54kg were placed in individual 2.2 * 1.8m pens with concentrate. Floors that cleaned were regularly. Sheeps were fed 4kg dry matter, a total mixed ration containing concentrate and alfalfa hay, diets twice daily at 08:00 and 14:00 h.

2.3. In situ evaluation of crud protein

Nylon bag technique was used to measure disappearance in the rumen of WSS. Nylon bags (45-m pore size. 8cm * 16cm bag size) containing 5g of WSS samples were incubated in the rumen of each sheep. Six bags of WSS were removed after 2, 4, 8, 16, 24 and 48h of incubation in the rumen. Then individual bags with content were washed in running tap water until the bags were free of rumen matter. Bags were then dried to a constant weight at 550C for 48h and weighed.

The solubility or washing loss was determined by socking samples of each material in water at 37-400C for 1h followed by the washing procedure above.

Digestion kinetics of CP was determined according to the equation of Orskov and McDonald (1979):

Estimated using the equation of Orskov and McDonald (1979):

Pe= a+bc/k+c

Where, Pe is the effective degradation, k the fractional ruminal outflow rate, a, b and c are as defined above. Effective degradability was calculated with an estimated solid outflow rate from the rumen (k) of 0.02, 0.05 and 0.08 h-1 (Bhargave and Orskov, 1987).

2.4 Chemical analysis

Feed samples were analyzed for CP and CP content of their residues after rumen incubation by using the procedures of AOAC (1984).

2.5. Determination of rumen degradability

In the procedure of ruminal incubation, the method of Mehrz and Orskov (1977) was followed. For this, 5g of samples of WSS were weighed in duplicate into nylon bags. Group includes 21 samples (two replicates * three sheep for treatment) prepared into individual nylon bags for assay. Bags were incubated in the ventral sac of the rumen of three Irannian Ghezel sheep for 0, 2, 4, 4, 8, 16, 24 and 48h.

Diet was offered at 4g/kg of body weight daily in two equal portions (08:00 and 14:00h). In the ditely after removal from the rumen, bags were put in ice water to stop microbial fermentation, and washed under tap water until the rinsing water became colorless, then dried out and weighed.

2.6. Statistics

Digestion kinetics of CP was determined according to the equations of Orskov and McDonald (1979) as:

P = a + b (1 - e - ct),

ERD = a + bc/(c + k)

Where 'P' is CP disappearance (g/kg) at time t (hour), 'a' the water soluble fraction (g/kg), 'b' the potentially degradable fraction (g/kg), 'c' the rate of degradation (h-1) of 'b' fraction, RED the effective rumen degradation, and 'k' the fractional ruminal outflow rate.

3. Results and Discussions

The rumen degradation characteristics of CP of WSS are given in Table1. As seen in Table1, CP washing losses were 7.66%.

Table 1. The rumen degradation characteristic was crud protein in whole seeds Safflower.

Time (h)	treatment	
	WSS	
2	42.62	
4	58.1	
8	83.79	
16	85.8	
24	88.21	
48	92.58	
Estimated parameters Washing loss (%)	7.66	

CP disappearance of WSS, after 2, 4, 8, 16, 24 and 48h of incubation in rumen were 42.62, 58.1,

83.79, 85.8, 88.21 and 92.58 g/kg, respectively. These values in WSS were higher from meal Sunflower. The values for WSS are approximately similar to that reported by Deniz and Tuncer (1995) and similar to the results obtained in earlier studies (Mir et al., 1984. Harstad and windschitl, 2000).

All discrepancies reported in varietal differences in the meal incubated, in situ technique, basal diet or variation. In the extent of microbial contamination were incubated samples (Freer and D.Ve. 1984., Nocek. 1988).

4. Conclusion

This study may provide a useful description of sub fractional protein degradation of protein supplements occurring in the rumen.

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Assessment model of E-learning for higher education

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Abstract: In this article, to evaluate the effective factors on the quality of E-learning, some researches are carried out on assessment of E-learning during 2001-2009 and the effective factors on the quality of E-learning are identified and extracted. Human factor, infrastructural, cultural, legal, economical and political, management and leadership, support and international factors as the effective factors on the quality of education, evaluate the quality of E-learning by 85 codes. Also, in this quality research, the important degree, influence of each factor and the effect of factors on E-learning quality are defined. The results of this research define the quality of the university E-learning quality and determine the merits and demerits of each part separately.

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Keywords: Higher education; the quality of E-learning; assessment model; the effective factors on quality

1. Introduction

The challenges of Higher education in the third millennium, made Higher education to move toward maintain and upgrading educational system. The rapid growth of science and technology, the limited financial resources of universities, the increasing demand of Higher education systems, increasing demand of various and flexible educations, emergence of knowledge community. requirement of more qualitative labor and permanent learning are amount the challenges of Higher education in the third millennium that should be solved. The results of the recent researches, consider proper application of the new methods based on IT and communication technologies such as E-learning as the best strategies to improve the quality of learning -teaching process, create equal learning opportunities and considering personal differences and also improving a person and its environment and it is totally meet the demands of Higher education.

One of the most important challenges of education quality in E-learning system is the various factors and effective variables in this ground and different classifications that are done from different aspects and based on different cultural and location situations. In this research it is attempted to identify main variables affecting the education quality and define the degree and importance of each factor separately. The results of the research can be a good strategy for E-learning executives in Higher education to test their education quality and remove the problems and improve education quality.

In E-learning vocabularies, there are different and sometimes opposite discussions in review of literature. Some of the researchers consider E-learning the same as virtual learning and they believe that this education is occurred in a virtual

space for more cooperation and one of its important properties is creativity. These researchers believe that virtual learning is blended with some concepts including electronic knowledge, E-book, E-library, virtual class, virtual lab, virtual teacher, virtual student and virtual school. Some of the researchers use this kind of concepts for E-learning and they believe that E-learning and internet based training are these kinds of trainings (Tasdighi& Tasdighi, 1387). In this case, Badrul Khan introduced different names includingWeb Based Learning(WBL), Internet Based Training(IBT), Distributed Learning(DL), Advance Distributed Learning (ADL), Web Based Instruction (WBI), On line Learning (OL), Open Flexible Learning (OFL), synonym of E-learning. Professor Berner Lindstrom (2009) in its fourth national conference and the first international conference of E-learning introduced some vocabularies as Distance learning (DL), Open and Distance learning(ODL), Web Based Learning (WBL), Flexible Learning (FL), Net Work Learning (NWL) as synonym of Elearning. So the studies done in this field make the researchers to use vocabularies "distance", "virtual learning", internet based learning" and E-learning" with the similar meaning in review of literature. Because the following concepts overlap with each other, E-learning is a learning occurring in the network environment and a set of multimedia technologies, super media and Tele-communications are used. Internet is the main cause of change in Elearning. Philosophically, E-learning is based on structural and cooperation based views and some of the experts believe that it is the most important technology to support the modern approaches to teaching and learning (Charlene Dodd, 2009, cited in Garrison, R., & Anderson, 2003).

Today evolutionary trend of E-learning programs is in a way that makes the assessment of E-learning programs necessary. Here there are some questions raised in E-learning such as:

- 1- Is E-learning effective?
- 2- How is the influence of social and cultural conditions on the situation of E-learning programs?
- 3- Is the expenditure to benefit of E-learning programs ratio positive?
- 4- What are the problems of successful E-learning programs?

Responding these questions requires the evaluation of E-learning programs (Saketi, 1385)

In this quality research, to present a model on which the quality of E-learning is being evaluated in Higher education, at first 11 models of E-learning assessment in 2001-2009 are studied. Then, the effective factors on the assessment of E-learning quality are identified. Also, in review of literature, the researcher found some factors and components effective on E-learning, but they were less considered in assessment models. For example, in HELAM model that was presented in 2009 by Informatics Institute, Middle East Technical University, Ankara, Turkey to evaluate E-learning systems of students, 6 effective aspects on E-learning quality and 46 criterions were indicated. Having a comprehensive view to the effective factors on learning quality in comparison with other researches, the given model is not considered as the main factor of international cooperation and considering cultural issues as the factors on E-learning quality. In another model called E-learning quality model, the researchers tried to evaluate the assessment aspects of E-learning in Higher education. The results of these researches are published in 2008 by SNA (Swedish National Agency).

In this model, the policies of communication networks and projects set up are done on the basis of European cooperation. The most important factors in this model are learning –teaching materials, virtual environment and interaction between the teacher and student, obtained from the study of various articles. The researchers of this agency with the study of 20 articles in 2007 and 13 articles during 2006-2007 and the information obtained from electronic questionnaires on E-learning in the Higher education of Australian Universities Quality Agency(AUQA).

Associated of University and College of Canada (AUCC), Danish Evaluation Institute (EVA), Finnish Higher Education Evaluation Council (FINHEEC), Accreditation Organization of the Netherlands and Flanders (NVAO) Norwegian

Agency for Quality Assurance in Education (NOKUT), Quality Assurance Agency for Higher Education (QAA), Council for Higher Education Accreditation (CHEA(, presented 10 effective factors on the quality of E-learning including, contentmaterial, the structure of virtual environment, interaction, cooperation, assessment of the students, flexibility, adaptability, support (students and staffs), experience and qualification of the staffs, organizational leadership, resources allocation and the generalities of process aspects and modeled it for assessment. But in this model special consideration is not taken to legal, cultural, economical and political issues as the effective factors on the quality of Elearning. In the third international conference of Modern (E-) Learning" MeL 2008, Varna, Bulgaria, which was held in Bulgaria in 2008, the European Foundation for Quality Management, was proposed by Jeanne Schreurs. In this research, the researcher reviewed the models used previously for the assessment of the organizations. He presented the model by reviewing two Kirkpatrick models, the modified European Foundation for Management to assess E-learning. In this model some effective components such as financial factor. technological infrastructures, ethical, cultural, economical and political, legal and international cooperation are ignored. Badrul H.Khan, the independent advisor of Federal organization Elearning and the lecturer of education technology in Washington university in his first book in 2004, presented P3 (People-Process-Product) Model indicating a comprehensive image of E-learning. In 2005, he proposed a framework influencing Elearning systems and learning issues in an extensive and complex set considering the factors influencing E-learning environment system. He finally by combining P3 (People-Process-Product) Model and E-learning framework proposed a comprehensive model for the assessment of E-learning called as the comprehensive model of E-learning assessment. This model considers E-learning framework as a particle in octahedral to review in chain with raising the related questions to each of the aspects of E-learning framework. But in this model financial, expenditure factor and international cooperation are not considered.

In the current research it is attempted to extract effective factors on the assessment of E-learning with a comprehensive view. The extracted components are presented in 8 main groups, 8 criterions and 91 indicators to measure the effective factors on the assessment of E-learning quality at Higher education level in table 1.

Table 1- The studied resources to extract the effective factors on the assessment of E-learning

		ment of E-learning		
Factor	Criterion	Ozkan, sevgi , Koseler, Refika (2009)-		
Human	Teacher	Swedish		
		Agency(2008)- Jeanne Schreurs(2008)- Graham		
	Student	Attwell(2006)- Badrul H. Khan(2005)- Saketi		
		(1385)- Terrie Lynn Thompson,		
		Colla J. MacDonald (2005)- Lam, P. & McNaught,		
		C.(2005)- Benchmarking of Virtual Campuses (2003)-		
		Sustainable Environment for the Evaluation of Quality in E-learning (2003)-Hilary Page-		
		Bucci(2002)- Roderick Sims(2001		
		Ozkan,sevgi , Koseler ,Refika(2009)-		
	Technology	Swedish Agency (2008)- Graham Attwell(2006)- Badrul H.		
	and technical	Khan(2005)- Saketi (1385)		
		- Terrie Lynn Thompson , Colla		
		J.MacDonald(2005)- Lam, P. & McNaught, C.(2005)-		
		Benchmarking of Virtual Campuses (2003)- Sustainable		
		Environment for the Evaluation of Quality in E- learning (2003)- Hilary Page-Bucci (2002)- Roderick Sims(2001)		
Infrastructure		Ozkan,sevgi , Koseler ,Refika(2009)- Swedish Agency(2008)- Jeanne Schreurs(2008)- Graham		
		Attwell(2006)- Badrul H. Khan(2005)-		
		Saketi(1385) Terrie Lynn Thompson , Colla		
	Pedagogical	J.MacDonald(2005)- Benchmarking of Virtual Campuses		
		(2003)- Sustainable Environment for the Evaluation of Quality		
		in E- learning (2003)- Hilary Page-Bucci (2002)- Roderick		
		Sims(2001)		
		Ozkan,sevgi , Koseler ,Refika(2009)-		
		Swedish Agency(2008)- Jeanne Schreurs(2008)- Graham		
		Attwell(2006)- Badrul H. Khan(2005)- Saketi (1385) - Terrie		
	Learning environment	Lynn Thompson , Colla J.MacDonald(2005)- Lam, P. & McNaught, C.(2005)- Benchmarking of Virtual Campuses		
		(2003)- Sustainable Environment for the Evaluation of Quality		
		in E- learning (2003)- Hilary Page- Bucci(2002)- Roderick		
		Sims(2001)		

		.		
		Ozkan,sevgi , Koseler ,Refika(2009)-		
		Swedish Agency(2008)- Jeanne Schreurs(2008)- Graham		
		Attwell(2006)- Badrul H. Khan(2005)- Saketi (1385) Terrie		
	Educational –	Lynn Thompson , Colla J.MacDonald(2005)- Lam, P. &		
	service	McNaught, C.(2005)- Benchmarking of Virtual Campuses		
		(2003)- Sustainable Environment for the Evaluation of Quality		
Support		in E- learning (2003)- Hilary Page-Bucci (2002)- Roderick		
		Sims(2001) Ozkan,sevgi , Koseler ,Refika(2009)-		
		Terrie Lynn Thompson , Colla		
		J.MacDonald(2005)-		
	Financial and cost	Benchmarking of Virtual Campuses (2003)- Sustainable		
		Environment for the Evaluation of Quality in E- learning		
		(2003)- Hilary Page-Bucci (2002)-		
		Roderick Sims(2001) Ozkan,sevgi, Koseler, Refika(2009)-		
		Swedish Agency(2008)- Badrul H. Khan(2005) -Lam, P. &		
	Ethical	McNaught, C.(2005)- Benchmarking of Virtual Campuses (2003)-		
		Sustainable Environment for the Evaluation of Quality in E-learning (2003)- Hilary Page-Bucci (2002)- Roderick		
		Sims(2001)		
		Graham Attwell(2006)- Badrul H. Khan(2005)-		
Cul	tural	Sustainable Environment for the		
		Evaluation of Quality in E-learning		
		(2003)- Roderick Sims(2001) Ozkan,sevgi, Koseler, Refika(2009)-		
Economical	and political	Graham Attwell(2006)- Badrul H. Khan(2005)-		
Economical	and political	Sustainable Environment for the		
		Evaluation of Quality in E-learning (2003)- Ozkan,sevgi , Koseler ,Refika(2009)-		
		Graham Attwell(2006)- Badrul H. Khan(2005)-		
Le	gal	Saketi (1385)- Lam, P. & McNaught, C.(2005)- Sustainable		
		Environment for the Evaluation of Quality in E-learning		
		(2003)- Hilary Page-Bucci (2002)-		
.		Swedish Agency(2008)- Stromquist (2007)-(1286)		
Internationa	l cooperation	Bazargan and Gholizadeh- Middlehearst (2002		
		Ozkan,sevgi , Koseler ,Refika(2009)-		
Management	and leadership	Swedish Agency (2008)- Jeanne Schreurs (2008)-Badrul H.		
	r	Khan(2005)- Saketi(1385) - Lam, P. & McNaught, C. (2005)-		
		Roderick Sims(2001)		

2. Research method

This study is done by quality method, library research and Delphi technique in 3 stages. The data obtained in the first station is done as library method, based on internet resources and studying scientific and research articles related to research basis as the followings.

- 1- The study of model, and the framework of E-learning assessment during 2001-2009
- 2- Extracting components and effective factors on E-learning assessment
- 3- Removing common components and selecting the components more referred in research literature.
- 4- Extraction of indicators and codes related to factors

The second stage of this research is done as qualitative and by Delphi technique. The obtained data in this section are analyzed by interview, E-mail, telephone call with 9 lecturers and experts in research field. Three main activities in this stage are as the followings:

- 1- Making questionnaire based on first stage results for validity
- 2- Using Delphi method to get comments from lecturers and sum up the comments
- 3- Making the final form of questionnaire The third stage of research, determination of assessment criterions for the related questionnaire by:
- 1- In a survey of the lecturers to determine the factors importance degree in the assessment of E-learning
- 2- Asking the opinion of the lecturers to determine the assessment criterion
- 3- Having a conclusion of the opinions and delivery of the assessment of the E-learning quality model

The research method in this stage was qualitative and the obtained data from two opinion poll forms were collected by interview, E-mail with 12 research experts.

Statistical population of this research are subject experts and experienced lecturers of educational science with Ph.D. degree of human science with teaching experiences on E-learning courses and registered articles and researches in this field who participated in this research for validity of the initial framework and responding opinion poll form , by quality method and Delphi. Sampling in this group is done as non-random, purposeful and based on the criterions.

Validity and reliability of research instruments

In this study, a researcher -built questioner and two opinion poll forms are used. To provide

questionnaire and opinion poll form the followings are done:

- Review the theoretical principles, evaluation of scientific resources, previous researches, comments of lecturers and subject experts and searching database in internet.
- Making the draft questionnaire in the form of 6 main factors, 8 criterions and 91 cods
- Making opinion poll form to determine the importance degree and effect of each factor in the assessment of E-learning quality at Higher education level and determining the rank of each factor
- Making opinion poll form to determine the judgment criterion about the quality of E-learning in four levels of good quality, acceptable quality, weak quality and unacceptable quality
- Making special questionnaire of opinion poll from students based on the opinion of experts in the form of 8main factors, 8 criterions and 85 codes.

For validity of the research instruments, content validity and face validity. To calculate the reliability coefficient of the related questionnaire, Cronbach's α (alpha) is used.

Reliability coefficient for effective factors on the assessment of academic E-learning quality based on Cronbach's α (alpha) are calculated separately for human factor, 0.89, infrastructure, 0.93, support, 0.87, culture, 0.75, legal, 0.82, economical and political, 0.85, international cooperation, 0.88 and management and leadership factor, 0.9.

The data analysis method

Delphi method is used to analyze the quality data of the research. In the analysis of the collected data from descriptive statistics, frequency tables, average, standard deviation and percent are used for the selection of effective factors on the assessment of the quality of academic E-learning. The determination of the validity of assessment of the academic E-learning quality, average and percent are done by Spss software.

3. Results

The proposed assessment framework for validity by subject experts was given to the experts in the form of questioner with more emphasize on 8 main factors effective on the quality assessment, 8 criterions and 91 codes for the factors measurements.

Also, in an opinion poll form the importance degree and the effect of each factors on the assessment of E-learning quality at Higher education level and the rank of each factors were asked from experts. In the current opinion poll form, judgment criterion about the quality of E-learning is determined by experts at four levels of good quality, acceptable quality, weak quality and unacceptable quality. The

data obtained from validity and opinion poll form are analyzed by quality and Delphi technique method and the results were presented as the proposed model of E-learning internal assessment. To present the proposed model, opinion poll form of the experts was made on the determination of the importance degree and the effect of each factor in the assessment of the quality of E-learning at Higher education to determine the rank of each factor and the influence percent of each factor on the quality assessment. To do this, 8 effective factors on assessment of academic E-learning quality were given to subject experts to classify the factors based on their importance and register each rank in its column. Then, considering this ranking, the share of each factor is determined based on percent that the sum of 8 factors equal 100. After collecting the data of opinion poll form, the assessment of academic E-learning quality model was made. This model is shown in table 2.

Table 2- Assessment of E-learning internal quality at Higher education level

	riigher education level							
Rank	The effective factors on the quality of E-learning		The number of indicators	The share of each factor in %				
	Technical and technological 5 Infrastructure Pedagogical 10		5					
1			10	28				
	factor	Learning environment	10					
2	Human factor Student		9	21				
2		Teacher	11	21				
	Support	Education and service	7					
3	factor	Financial and costs	3	15				
		Ethical	5					
4	Management and leadership factor		6	14				
5	Cultura	al factor	3	7				
6	Legal	factor	3	5.5				
7	Economical and	l political factors	8	5				
8	International co	operation factor	5	4.5				
	8 factors	85 indicators	100%					

In this model regarding the obtained information, the effective factors on the assessment of E-learning quality at Higher education level are shown based on the importance factor of each one and its influence factor on the quality of education.

Also, to determine the judgment criterion about the quality of E-learning, another opinion poll form is given to 12 experts in the research area. The result of survey of the second form, according to the upper limit frequency and down limit of the sum of comments, table 3 is determined as a criterion for the

judgment of the situation of the studied academic Elearning.

Table 3- The judgment criterion about the quality of E-learning

Judgment criterion in %	Quality of E-learning
80-100	Good quality
65-79	Acceptable quality
50-64	Weak quality
Below 50	Unacceptable quality

4. Discussion and conclusion

Meeting the demands of Higher education challenges in the third millennium requires the education quality improvement in universities and Higher education institutions. Today as we are faced with the rapid growth of E-learning course around the world, we should apply good strategies and by being aware of the current situation of E-learning system in the country, the efficiency of the courses are done. So it is necessary to have assessment framework and validity especially for investigating the improvement of learning -teaching process. The main problem discussed in this research is finding a framework by which academic E-learning executives can test the educational quality of their universities. In this research it is attempted to identify the main variables effective on the quality of learning and define the importance of each factor in the assessment of education quality separately. By studying the given models about the assessment of E-learning, the assessment model of internal quality of E-learning are presented based on the effective factors on the quality of education. The proposed model is assessed from validity aspect by the opinion of the experts.

The most important differences of the current model in comparison with the given model of E-learning assessment in other countries are as the followings:

- 1- In different resources, experts presented the effective factors on the assessment of E-learning quality in different classifications. In this research it is attempted to extract all the factors in different factors and after deleting the similar and repetitive cases, the effective factors on the academic E-learning quality is presented in a more complete classification in 8 main group and 8sub-groups in the form of the proposed model. Table 4shows the effective factors on the quality of E-learning referred in the proposed models of review of literature and the factors ignored to present a comprehensive model based on effective factors with Higher accuracy.
- 2- In the proposed model, it is attempted not to put the effective factors on the quality of E-learning at the same rank and each factor

is defined based on the importance degree and the influence on the assessment of the education quality and the influence amount.

- 3- A table is drawn for the judgment criterions about the assessment of E-learning quality to be a factor to determine the quality of E-learning at Higher education level.
- 4- The introduced indicators in the proposed model are a good guide for executers to find the weak points and improve the strong points of E-learning at Higher education level that can be a good instruction to improve the quality of E-learning
- 5- According to the proposed model and prioritization of the effective factors on the quality of E- learning at Higher education level and the results and evaluation starting point of education weak points considering the importance degree of each factor can be prioritized.

Table 4- The evaluation of the effective factors on the quality of E-learning obtained from review of literature

Model, framework	The effective factors on the quality of E-learning	The ignored factors
HELAM model (2009) Hexagonal E- Learning Assessment Model	The quality of the system, service quality, content quality, student's view, teacher's view, support issues	Cultural, international cooperation
E-learning quality model (2008)	Content- material, the structure of virtual environment, interaction, cooperation, assessment of the learners, flexibility, adaptability, support the learners and staffs, experience, qualification of the staffs, organizational leadership, resources allocation, generalities and process aspects.	legal, cultural, economical and political
European Foundation for Quality Management (2008)	resources and contents, learning process (personal, cooperative, support), educational results	financial and costs, ethical, cultural, economical and political, legal and international cooperation
Graham AttWell (2006)	Learners, learning environment, technology, background variables, educational variables.	Financial and costs, ethical, international cooperation, management and leadership
Comprehensive approach to E- learning assessment (2005) Comprehensive Approach to Program Evaluation in Open and Distributed Learning	organization, teaching and learning, technology, design, assessment, supporting resources, management, moralities	Financial and costs , international cooperation
Saketi model (2005)	Human force, program production process, produced programs.	Financial and costs, ethical, cultural, economical and political, international cooperation
Demand-Driven Learning Model (2005)	Structure, content, delivery, services, results	, ethical, cultural, economical and political ,legal, international cooperation, management and

		leadership
model (2005) e 3 learning e 3 learning(A Three-Layered Cyclic Model of E- Learning Development and Evaluation)	strategies (Assessment questions framework), improving programs, data collection, data analysis, decision making	Financial and costs, ethical, cultural, economical and political, legal, international cooperation
Benchmarking of Virtual Campus (2003)	giving service to the students, learning resources, teachers support, assessment, accessibility, output and efficiency (financial aspects), technology resources, organization execution	cultural, economical and political, international cooperation, management and leadership
Sustainable Environment for the Evaluation of Quality in E- learning (2003)	learning resources, learning principles process, content learning	international cooperation, management and leadership
Hilary page-Bucci model (2002)	Training and teaching, communicational interactions and facilities, students, teachers, accessibility to resources and educational facilities, technical support	financial and costs, cultural, economical and political, international cooperation, management and leadership
Roderick Sims model (2001)	strategical goals, content, site design, interaction, assessment, support, having access to the results (feed back)	Economical and political, legal, international cooperation

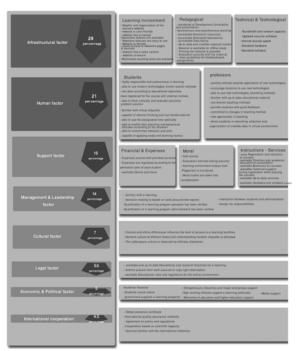


Fig 1: Suggested pattern for evaluation of internal quality of E-learning at higher education

Finally, it is worth to mention that this research doesn't claim to be successful in dealing with all the effective factors on the assessment of the academic E-learning quality, but it is attempted to have a comprehensive view on the assessment of E-learning quality to pave the way for the interested

people in researching in the assessment of academic learning quality.

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3/5/2011

Inconsistencies in Ontologies

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Abstract: Ontologies are the building blocks of semantic web. In recent year's further advancements in the area of semantic web has led to refinement and specialization of the existing frameworks for ontological development. These advancements include merging, alignment, unification, mapping etc. of ontologies usually belonging to similar domains. These operations are useful in their own respect but also bring along many inconsistencies in the ontological information. The removal of these inconsistencies is in itself an open horizon for researchers of semantic web and ontologies. In this paper, we review the different issues causing inconsistencies and some frameworks used for handling inconsistencies.

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Keywords: Ontologies, inconsistency, Mapping and Merging.

1. Introduction

The World Wide Web is a system having a collection of documents, which are linked together and are accessed through Internet. These documents have different types of information about each and every domain of life. To understand that information, different techniques and methods are introduced which are collectively known as Semantic web. In fact it is the description of information or data that is available on web and provides convenience to computers and other machines to understand that.

One of the major domains of semantic web is ontologies. Different researchers and scientists have defined ontologies in different ways. That is why ontologies are taken in different ways for different scenarios. The most common and precise definition defined by Tom Gruber is "An explicit specification of a conceptualization" (Gruber, 1993) [1]. From philosophical point of view the ontology is defined as "theory of existence" (Marek Obitko, 2007) [2]. Different operations can be performed on ontologies like merging, mapping, matching, alignment, refinement, unification, integration and inheritance [2]. An application can use different ontologies and for different applications different operations are applied on ontologies.

On performing different operations on ontologies, they may cause the ontology inconsistency. Merging and alignment are the main operations that cause inconsistencies. These operations and their inconsistencies are discussed.

In the next section 2, main issues causing inconsistency are discussed. Section 3 describes the problems due to inconsistency. In section 4, different

resolution frameworks against inconsistency causing issues are reviewed. And section 4 summarize the whole review paper and conclude it. And future directions are also given.

2. Operations on Ontologies

There are some operations of ontologies that are mostly discussed, i.e. merging and alignment. When ontology is merged with ontology, a new one is created. Ontologies to be merged have almost the same or some common domains [10].

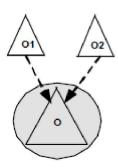


Fig. 1. Merging two ontologies O1 and O2

When two ontologies are aligned together, connected links are established between them. And ontologies, which are aligned, remain in the same conditions as they were before alignment. Ontologies to be aligned have domains that are different or complimentary to each other [10].

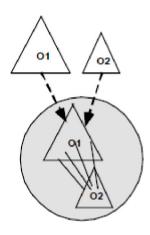


Fig. 2. Alignment of two ontologies

3. Issues Caused Inconsistency

In any operation if there is an unsatisfied condition occurs then it is called as an inconsistent state. Like In merging two or more ontologies to form the newer one may introduce the inconsistent data in the resultant ontology. The newly formed ontology may not have all the information of its parent ontologies. It shows that information is not fully transferred in merging different ontologies it means not fully consistent. This is the reason that causes the inconsistency in new ontology [2, 8].

For example: If ontologies have the facts that:

In this Example, there are two ontologies. First ontology has the facts that bird can fly and anything that can fly means that can move. In the second ontology canary is a bird, and penguin is also a bird but it cannot fly. So now if we merge these two ontologies then the resultant ontology will become inconsistent. It is because facts of $1^{\rm st}$ ontology are not matching with the $2^{\rm nd}$ ontology.

Ontology alignment is achieved via two approaches [3].

Lexical Measures

Structural Measures

Lexical measures actually depend upon surface similarities. For example two entities can have the same title or name. On the other hand in structural measures taking into account the association among components and structures identifies similarity.

Following decisive factors (structural measures) has been used to decide that whether two entities are similar or not [4]:

Notation	Decisive factors
F1	Similar super-entities
F2	Similar sibling-entities
F3	Similar sub-entities
F4	Similar descendant-entities
F5	Similar leaf-entities
F6	Entities in paths from root to the entities
	in question are similar
F7	Relative entities to the entities in
	question are similar

In event of the ontology alignment inconsistency, which means that proper similarity has not been matched between components/entities of ontologies? Much work has been done to find out the structural similarities among these entities. Now in the following table some methods are identified which help to solve the ontology alignment problem [3].

Notation	Properties
ST	Structural Topological Dissimilarity on
	Hierarchies
UC	Upward Cotopic Similarity
SD	Similarity Distance
RS	Resnik Similarity
AP	Anchor Prompt
SF	Similarity Flooding
OL	OLA (OWL Lite Aligner)

Now the decisive factors and methods are compared in the following table [3]. Comparatively OL and SF are good enough because they comply all the decisive factors.

	F1	F2	F3	F4	F5	F6	F7
ST							
UC							
SD							
RS							
AP							
SF							
OL							

The following figure uses the above structural measures to assign weights to relationships between two entities of different ontologies.

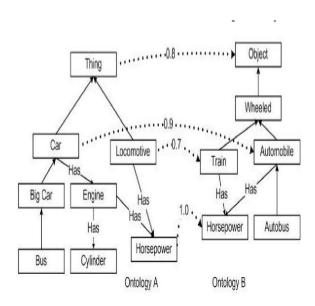


Fig. 3. Ontology Alignment

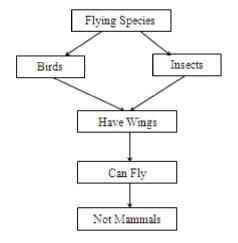


Fig. 4. Ontology 1

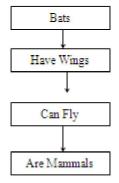


Figure 5. Ontology 2

If we merge these two ontologies, then we will get an inconsistent resultant ontology because there is a mismatch in their characteristics. In ontology 1, flying species (birds and insects) have wings, can fly but are not mammals. While in ontology 2, bats have the same characteristics except that they are mammals. So, we can't merge these two ontologies to avoid inconsistency in new resultant ontology. In order to solve this inconsistency we will re-organize these ontologies by keeping mammals as superclass.

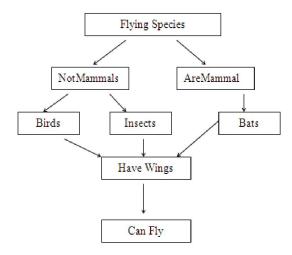


Fig. 6. Consistent merging of two ontologies

4. Some Framework Used to Resolve Ontology Inconsistency

Ontologies have the problem of inconsistencies when changes are applied to them. Different methods have been proposed for handling these inconsistencies. Peter Haase e.l had presented "A framework for handling Inconsistency in changing ontologies" [6].

In this paper [6] a framework is used to combine the inconsistency handling methods. The main components of this framework are:

Consistent ontology evolution (guarantees consistency even in the presence of changes).

Repairing inconsistencies (Repair the inconsistent ontologies).

Reasoning with inconsistent ontologies (when inconsistent ontologies are queried then meaningful results are obtained).

Multi Version Reasoning (There is a reasoning about the inconsistencies among the latest and previous versions of ontologies).

There is another paper "Screening for Inconsistencies and Changes in Semantic Web Ontologies: Experiments with Protégé" by Saumil Shah e.l, in which the basic inconsistency, incompleteness and redundancy errors are discussed. And the ontology evaluation tools are also mentioned. Inconsistency causing errors are of three type's i.e., [7].

Circulatory Errors (where a class is defined as a subclass/ superclass of itself)

Partition Errors (when there is no overlapping among subclasses then disjoint decomposition error occurs, and when one base class is partitioned into many subclasses then exhaustive decomposition error occurs.)

Semantic Inconsistency Errors (If a subclass is attached with a concept that does not belong to it.)

Ontologies have a variant nature, so after any change the resultant ontology can have many inconsistent data. When changes are applied to a consistent ontology then it is shifted to the inconsistent state. There are basic three forms in which ontology is consistent [9].

Structural consistency Logical consistency User-defined consistency

5. Conclusions and Future Directions

Blending of independently created ontologies/entities that represent somewhat similar concepts is taking pace as the semantic web is gaining more and more acceptance. Different models have come up in recent years to combine independent ontologies. Merging and Alignment are popular techniques to combine or relate different entities. These methods are pretty useful but at the same time bring along anomalies/inconsistencies because of dissimilar structures of ontologies. Different criteria, as explained above, have to be taken into consideration while entities are merged or aligned.

As semantic web is constantly growing, more and more ontologies are being created as time passes. There still isn't any completely automatic mechanism to unify or relate these growing and ever-changing ontologies without facing the irregularities and inconsistencies in the final result. So, more work needs to be done to automate this process to bring it closer and closer to perfection.

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6/16/2011

Performance Metrics for Multiagent Systems

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Abstract: Multi agent systems (MAS) bring about a change in the globe by making agents work together in a group achieving common goals and casting away monolithic paradigm. Proper understanding of the metrics that impact performance of MAS can help in employing the distinctive abilities of agents to its maximum. In this paper, we discuss various performance metrics that target an agents' role and environment and can help in accomplishing goals in optimum time. We also present an example that takes these performance metrics to account. We then move to case studies and draw attention to the best and worst cases for agents' performance against the metrics we gathered .[Aslam Muhammad, M. Junaid Arshad, Amjad Farooq, Rubab Fatima, Khair-un-Nisa. **Performance Metrics for Multiagent Systems.**Journal of American Science 2011;7(7):804-810].(ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Multiagents, Metrics, Performance, Response time.

1. Introduction

Panoptic research in artificial intelligence has shifted the mode of independent study of fields to interdisciplinary studies like mixture of cognition, sociology, psychology, robotics, fuzzy logic, computation and several other interesting subjects. This results in better understanding and application of interdisciplinary theories. Multi agents system is a product of such rigorous studies. The shining hope in this arena is brought about by the fact that agents are autonomous in their nature. Since they encompass the ability to be decisive for attaining a goal, performance should not be a hindrance for their task accomplishment.

In the past apt attention was not given to defining metrics alone for multiagents. Either frameworks were suggested for a specific type of agent or environment or performance was neglected altogether. We introduce some performance metrics based on our study and knowledge that should be catered while construction of MAS.

The objective of this paper is to spot various performance metrics in accordance to the possible roles of an agent. Agent role is categorized based on its environment and functionality expected from it. An example of RPM is considered that takes the mentioned performance metrics to account. It shows how a system can be made efficient if performance metrics are considered properly. This paper will provide benefit to designers for designing a MAS system for any environment. They can determine which metric can be best applied for maximum efficiency.

First we will give you a walk through the related work done on this topic. We then define imperative performance metrics that we think are important to consider while designing a MAS. We then shift our focus to elaborating the performance metrics by means of an example that fulfils them properly. In the last we discuss some case studies for best, medium and worst case scenarios for the defined metrics and conclude our results.

2. Related Work

A metric is a quantitative measure of the degree to which a system possesses a given attribute. A performance metric is thought to be a function of the optimization of tasks an agent conducts to reach a goal. It assists an agent to be efficient and effective on time. Performance metrics are based on measurable attributes of an agent [1]. Since only measurable quantities can be controlled and directed, we can use them for our purpose to enhance performance and reliability. Agents also have the clairvoyant ability to improve performance over time by learning through examples and experiences [2].

A metric allows finding a pattern and trend in an object's behavior. In [12], various performance metrics are defined but they focus on single agents alone. The combined effect is not discussed. It also proposes different profiles by combining a set of single agent metrics to fulfill the need of a specific type of agent. This approach provides agility but not basis for a MAS system.

Various factors and variables determine performance metrics for meeting the performance requirements of MAS. Researchers have concentrated on domain specific metrics as discussed. These include time period for task completion, efficient interaction between agents, centralized or decentralized processing, how fast a MAS reacts when input is provided, relative performance of an agent with respect to its environment or other agents, the number of agents a system can bear, the number

of tasks completed by agents etc [3][4]. These researchers have discussed only those metrics that concern or affect the particular system they have taken up as an example. What they do not define is the impact of these performance metrics in other dynamic environments. They also do not indicate which type of agent is affected by the performance metrics they are defining.

While designing MAS it is crucial to identify points where performance delays may occur and whether or not it is tolerable for the accomplishment for a global goal. Numerous conformance tests and performance evaluations may be conducted to verify these summits [5]. We present a handful of performance metrics that can be applied to any MAS system for evaluating its performance in advance.

3 Imperative Performance Metrics

The pattern followed for bringing to light distinct performance metrics in this paper is by discussing various factors that increase usability of agents in an assortment of scenarios. We then pin point which metric can be catered best for boosting performance of an agent in a particular environment or for a particular agent role.

A) Metrics for Single Agent

a. Number of Agents

The primary indicator for the size of MAS is the number of agents involved. This factor is directly proportional to the complexity of the overall MAS. The more complex a MAS, the more performance enhancement is required by it. It should be made sure that the performance enhancement does not create an extra over head decreasing the performance of overall MAS [2].

In a huge MAS grouping of agents is usually done to suppress the overhead involved in communicating among groups of agents and within groups. By and large, the performance of communicating within a group is immensely increased.

b. Computational Time for Individual Agent MAS

An active state of an agent determines its computational time. The time period for which an agent conducts its tasks is its active state. In a MAS we need to know how many agents are active in what period of time. It is also calculated that how many agents have an overlapping active state time period. The number of overlapping computational time affects the performance of system. The higher it is, the lower the performance goes.

c. Independent Memory Consumed by Individual Agent MAS

An agent may require several resources for executing its tasks. The amount of memory required by an agent for creating its own objects should be known in advance to predict the performance of MAS. Memory is an inevitable constraint for many of the MAS. The more memory consumed by an agent, the low the performance of the MAS we get [12].

d. Agent Status

The total number of statuses an agent can have determines its status set. If the set is huge, it implies that an agent would go through transition at least once for all statuses. The transitions required would be a pure overhead for the system. The less the transition is required, the more performance we can get from MAS. The statuses an agent might commonly require are Active, Wait etc. The number of switches between these statuses must be less frequent to increase performance [12].

B) Metrics for Multiagent System a. Agent Coordination in MAS

Message transport and communication protocols utilized directly determine the performance of MAS. These levels comprise of low level to abstract high level protocols like speech act theories for message content. A number of platforms are provided to support such protocols as Java Agent Development Environment (JADE) and Foundation for Intelligent Physical Agents Operating System (FIPA-OS). Coordination protocols employed can be either hierarchical or mesh structured.

In a homogeneous MAS a complex task is broken down and then delegated to agents. So this factor is more of an importance in such an environment. This is different for agents related to Mesh and hierarchical structures [12].

b. Fault Tolerance

Fault tolerance is one way to increase the dependability of agents or applications. It provides the recovery from service failure when a fault occurs [6]. Many solutions have been proposed for introducing fault tolerance in multi-agent systems, some are of curative nature while others are of preventive nature [7]. Fault tolerance can be achieved by cloning [8] or replication. Cloning has several disadvantages, like it cannot be applied to every multi-agents system, and agents are supposed to be stateless. Using replication, shortest recovery time is achieved and it scales much better.

This metric is particularly crucial in distributed environments, where failure of one system can cause failure or delay of many other systems.

c. Connection Metrics

While studying 'Structural performance evaluation of Multi- Agents systems', Dariusz and Zelmozer introduced connection metrics to evaluate the Distributed Object Systems. Since, it is more difficult to evaluate performance of distributed applications because of various environments, architectures and implementations used in distributed object systems, so, in a real-time project, it is not possible to first try different architectures and designs and then decide the one with best performance. Therefore they introduced connection metrics as the cheapest analytical tools to decide the best design and implementation.

In this study, the most suitable metric they found is *Connection Cost Metric*. It estimates average distance between agents. This metric best measures the performance of distributed multi agent systems. Best and worst scenarios are discussed for this metric. These proposed metrics can be applied efficiently by using service oriented architecture (SOA).

d. Stability

One chief performance metric is the 'Stability' of a Multi Agent System. It is hard to set a definition of stability in case of multi-agent system; it must be somewhat more concrete than the one used by software engineers, and a bit more flexible than that defined by control engineers. According to, a system is considered to be Stable if its state is converged to an equilibrium distribution. Hence, stability becomes a quantifiable metric to measure the performance of a multi-agent system. This metric is specifically applied to categorize multi-agents used in games, especially those that are close to real world. For that purpose, the experiments are performed on 'Agents Ecosystem' in which agents are not fixed over a span of time. Agents can appear and disappear at anytime. This metric has also been tested and verified on simulation models that closely resemble the real-time systems.

e. Communication

Since MAS [9] is a system based on multiple agents that are interacting with each other and they can solve multiple problems that are difficult or even impossible to be solved by individual agents, so *communication* among the agents is a key factor of performance measure. Communication metrics include average message length, average number of messages to and from individual agents and average message communication delay [12].

There are a number of metrics proposed for designing the better communication among various agents. These metrics mainly targets the load

balancing, for example, to check if a single agent is requested again and again, it will overload that agent, so based on the metrics, requests will be routed to some other agent who has less load.

The agents are divided into 5 categories depending upon their type of communication and load balancing.

- i. *Over loaders*: these are the agents that send too many messages and overload the system
- ii. Overloaded: these are the agents that receive too many messages and get overloaded.
- iii. *Isolated*: these are the stand alone agents that neither send messages nor receive them.
- iv. Overloaded-Over loader: these are the agents that are overloaded but they overload others too.
- v. Regular: these are the ideal agents that exist in a balanced system. They send and receive a balanced amount of messages.

 The metrics are derived to avoid the first four kinds of agents. Some of the metrics defined by are as follows:
 - a) Overloader system metric (BS): it measures the amount of sent messages by the agent as compared to total messages sent by the system.
 - b) Overloaded system metric (MS): it measures the amount of messages received by the agent as compared to total messages received by the system.
 - c) OverloaderRole Metric (BR): it measures the amount of messages sent by an agent as compared to amount of messages sent by agents playing the same role.
 - d) OverloadedRole Metric (MR): it measures the amount of messages received by an agent as compared to number of messages received by the agents playing the same role.

e. Agent Management

Agent management deals with keeping track of how many agents are in active state, how many are yet waiting to be invoked, which agents has accomplished its task, which is still executing, which agent require resources and which would be requiring in the future etc [12].

f. Dependencies between Agents

The mode of communication between agents may determine the degree of dependency an agent has on another agent. An agent may be operating in a synchronous mode with respect to another agent or in an asynchronous mode.

In a synchronous fashion an agent may be dependent on another agents' data when the other agent has completed execution. So the agent first waits for another agent to complete execution first and then continue with its own execution process.

In an asynchronous manner, an agent may use various algorithms to keep data synchronized among all agents. The protocols they might be following would comprise of WAW (Write after Write) or RAW (Read after Write) or WAR (Write after Read). The dependencies among agents can be computed by drawing dependency graphs.

g. The Optimization of Shared Computer Resource Usage

In a MAS environment, it might be very common for agents to have shared memory for communication of information. It is of prime importance that any action performed by an agent does not result in to memory outage. There may be various factors that will help to ensure that free memory is maintained and unnecessary data is removed from the system. There are two types of data in this regard. One comprises of end results that are useful for another agent at some time during the execution of its tasks. The other is used as helping data to reach an end result. Some tips for managing memory that are in practice may include:

- Gathering information as to when what data might be required by an agent.
- Making sure which data is no longer required after a particular agent has utilized it
- Intermediate results are discarded as soon as they are utilized and no longer required.
- Avoiding dead lock states on shared resources.
- Synchronizing the availability of resources efficiently.
- Number of concurrent processes that will execute in a system must be known in advance to identify and then handle potential bottlenecks in the system.
- Dispatcher should be able to accommodate context switch gracefully without loss of time.

Since an agent is allowed to operate in limited memory, the careful analysis of which data is required at what time in which place and whether it is no longer required, before implementation of MAS, will lead to a chance to optimize the task execution of an agent. Memory leakages if not handled correctly might result in catastrophic performance on an agents' part.

While handing out resources to agents, the system should be sure that it is the proper time and

the appropriate agent that actually needs the resource. It is of no use to an agent to confiscate a resource and then wait for another agent to provide it input for the utilization of the resource. Such states may either result in deadlocks or will force an agent to wait that will impact the performance profusely of the global goal of the system.

System itself should also minimize the response time when a resource is requested by an agent on urgent basis and make sure no other system resource or agent becomes a hindrance for its execution.

h. Ability of a system to manage the dynamics of the agent population size

A system should have the capability to administer several agents all together. The number of agents might be fixed before the execution of a process. During execution, some intermediary agents may appear. System should be well prepared to supervise these agents and to be hospitable enough to grant them resources whenever required.

When the agent population size increases, so does the demand of the system to be more responsive flourishes to grip the dynamics of all agents. Once a system is prepared to deal with the increase in population of agents, it should start providing room for storage of their result computations as well [9]. A good practice is to have an estimate to know till what extent memory requirements would exceed..

The implementation of increase in agent number can be facilitated by use of multithreading concept on software. However this approach should be employed only if one is well aware of its issues and is equipped of the expertise required to make the most of it.

i. Bandwidth and Latency

Communication efficiency in MAS is subject to improvement in overall system performance. In a fully networked environment it is observed that bandwidth and latency best define as performance metrics (Harchol, 2002). The network community lead proposes a study in which frequency of message exchanges between agents is shown to be directly proportional to the throughput of the system. The more recurrent the communication, the more frequent we get a response from the system.

A relationship between frequency, bandwidth and throughput is also discussed. It is deemed, through experimental evidence, that frequency of message passing cannot be more than the bandwidth of the system and hence throughput of the system gets an upper bound. It is quite notable that the frequency of message passing also tends to vault the maximum number of agents communicating at a time

and the rate of exchange of information between them.

The latency is described as the time required for a message to be communicated from a source agent to a destination agent. This is a critical measure when agents have to operate in a real time environment. A small delay in latency may mean to be a difference between success and failure of entire MAS. The less the latency, the more effective a MAS can be. Latency can be highly dependent on the size of the message transmitted between agents. Longer messages are prone to high latency rates. Latency has been a subject of interest for network engineers because it is believed that it affects the quality of service of a network [10].

j. Load Balancing

When agents work in a large scale system, the overall performance is usually measured by calculating the performance of the locally active agents. On a huge portal like World Wide Web it is not easy to maintain global information available at all times. So people rely on local agents that become active and supply local information to the users.

Agents gather knowledge from partner agents locally when global information cannot be supplied instantly. For this purpose appropriate partner selection is important for leaning, which is a hectic task. Recent studies reveal that this factor can be overcome by load balancing across agents when workloads are high and concentration on high performance agents when workloads are less [11].

Load balancing may comprise of shifting data computation to some partner agents and dedicating others to gather information locally. Recent research also uncovers the fact that learning parameters for local strategies to select partner agents influences the total performance of MAS. Experiments prove that statistic values of known resources can make agents more adaptive. This has a drawback of declining performance in new environments. Since environments evolve around, relationship between speed of change and adaptation starts getting worse [11].

k. Performance of Cultural Evolution

Learning is a vital aspect of multi agent system. When agents work in a culture there is a set of agents that initiate the learning process and another set that conjure up the content conveyed. The more autonomous the agent, the more an agents' performance is increased. One of the most effective metric to increase the learning process is the addition of noise in the content communicated between agents [11].

Noise was added through cultural mutation. A neural network layer was used for communicating information. The receiver of the information imitates what data is communicated by the initiator. This imitation is based on back propagation of the received content. The receiver has a hint of what possibilities an initiator has to communicate. A receiver also has an idea to how many receivers an initiator can communicate with. These factors help while interpreting after back communication.

It is observed that overall fitness is increased by introducing noise. The ratio of noise to content communicated is set by keeping in view the number of initiators and the number of receivers for a specific content.

3 Case Studies

4.1 Framework for Natural Disaster Management

Our first case study is that of a framework introduced for interaction of MAS during natural disaster (FFNDM) [13]. It consists of Sensor agents for collecting data, a platform for collaboration between agents, a decision support system for deciding what action should the response agents take.

The framework considers some onsite agents and other remote agents. This gives a distributed touch to the application. The framework fulfills most of our performance metrics and hence is the best case overall taken by us. The only metric it lacks is the ability to learn from previous records and refine decision support system accordingly. We have highlighted the ratings of performance metrics for it in Table 1.

4.2 Evaluating Urban Traffic

The second case study is based on traffic modeling, evaluating urban traffic (EUT) and effects of unexpected events or uncertain factors [14]. Real time data for busiest intersections is used for this case study. The traffic is modeled first with the help of Bayesian Networks, and then causal networks are used to measure effective factors. Experiments have proved that this model is cheap and less time consuming as compared to other models in not only modeling but also predicting the future trends/patterns in the traffic.

Attention is given to percentage saturation value, it is the basic parameter for modeling. One drawback is that modeling is done assuming long time constraints only, so the sudden rush or anomalies in traffic for short time periods cannot be modeled.

Performance Metrics Elements FMSIND **EUT** TSM Number of Agents Computational Time for Individual Agent MAS X Independent Memory Consumed by Multiagents X Agent Status X Agent Coordination in MAS X Fault Tolerance X **Connection Metrics** X Stability Communication X Agent Management X Dependencies between agents X Optimization of shared computer resource usage X Ability of system to manage the dynamics of agent X population size Bandwidth and Latency X Load Balancing X Performance of cultural Evolution X

Table 1: Comparison of case studies

Stability is very well handled in this case study, since there's a special factor called 'traffic heavy'. The performance is evaluated on the basis of maximum and minimum traffic, and the case study has shown good results for all.

Another drawback is that not many factors could be considered in this case study for evaluation purposes, since the additional factors added to the complexity of the overall system, and thus degrading the performance.

A comprehensive list of where this case study lies in our performance metrics is given in table 1.

4.3 Trading Simulation Model

This case study specifically focuses on stability of multi agent systems. As a case study, a trading simulation model (TSM) is introduced, there are M traders with their discounting prices, their capital and available resources. This scenario requires tasks that are generated by agents. A task utilizes some resources, and creates some other ones, to be used by other agents. Each trader produces some tasks, and then advertises it among other agents. All the agents bid to perform that ask, and the bid with minimum demand is accept usually. Finally, each trader re-calculates its worth, by taking into account the discounting percentage, and if its offer was accepted or not. New agents are generated any old ones are destructed based upon requirements.

The stability condition is defined as the system reaches a stationary distribution. Stability

would be if the system is left to execute for a while, and all the factors including number of traders (agents), wealth per trader etc reach to their stationary distribution.

The model can be run with initial constraints to check out the best and worst cases, especially with respect to stability.

7. Conclusion and Future Work

Performance metrics of MAS is dependent on the role an agent has to perform and the environment it works in. Performance metrics that impact MAS need to be considered in amalgamation with the that impact an individual metrics There are performance. tradeoffs between performance metrics and MAS global traffic. Increasing size of MAS may require better management of agents resulting in low response time. The user needs to decide which division of a MAS can compromise on performance and which are mission critical.

The categorization of performance metrics have been done on the basis of the role of an agent. Performance metrics can be evaluated based on several other criteria and impact of those scenarios can be studied on real time MAS systems. This could assist in analyzing performance metrics from diverse angles.

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6/12/2011

A GUI-Based Easy Web Hosting System

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Abstract: This project is to design and development of a web host that can facilitate remote users to build, host, monitor and manage their website. Different tools like interactive file and folder managers, website statistic analyzer, web site builder and user administration. The administrator of the site can also create user to share work load by assigning directories among different users. Administrator can manage their database online by running online queries and can also view user log files to get information about total logs, to see how many users are currently online and how many users are not yet logged-in.

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Keywords: Web Host, Easy Host, File Manager, Web site Builder, Web site Statistics.

1. Introduction

1.1 Project Background

Computer, in modern life, have become an indispensable tool to make life faster and easier. With the event of computer system people started using computers for sharing of many resources. Data is one if these resources.

About the Internet [1], one of the greatest things is that no one actually owns it. It is a global source, for both big and small collection of networks. These networks are connected together in several ways to form the one particular entity that we recognize as the Internet. Actually, the very name derives from this idea of interconnected networks.

To make information available to the world, different kinds of web sites are being developed; encouraging people to develop there own web sites to get instant web appearance. The constraint to this development and hosting is its high cost. To overcome this constraint the concept of free web hosting [5] was introduced.

1.2 Project Concept

The project aim is to develop a free web host. This is a web host and builder that can not only build, manage and monitor web sites but also ease the process of web development for both personal and commercial purpose. The project can be used by any person who wants easy and interactive web hosting [6] solutions.

1.3 Project Objectives

Easy Host will provide you a control panel to host your websites using HTTP. Web Site Host and Builder provide features to build monitor and manage websites.

The main objectives of my application are to develop solution for website hosting and building. It also optimized the contents and coding of HTML pages so that search engine can easily track your website.

On the designing of this application we focused mainly on easy and fully functional interactive solution that can able to provide facility to users to create, manage and monitor their websites online.

The Easy Host will provide user an easy way to develop instant web appearance. It will provide different websites templates so that the user can select according to their choice and type of the website. After selecting template user can build website in a few easy steps without having any coding experience. This means that the software will automatically generate website for you.

2. Proposed System Design and Features

This section is aimed at giving a design of what was done for implementation during the study of this project. This section provides a discussion on both ends of the project. It discusses the main finding from the literature for the project. The problems encountered in this project are introduced along with solutions, and finally a list of necessary software [2] for the purpose of development is given. It also focuses on the languages and tools used in the development of this site.

2.1 Front End

Front end is the par of software, which is visible to user or where all the user interaction takes place.

Since the project is web based [3] therefore the front end should be designed in a language that a browser can understand therefore the front end was designed using HTML.

2.2 Back End

The back end is the part of the software where all the main processing is done like maintaining database. The database used in this project is SQL Server.

2.3 Intermediate Laver

Also there is an intermediate layer that glues these both ends. Since HTML itself can not interact with the database therefore another technology call ASP [4] is used. ASP stands for Active Server Pages, the reason they are called Active is that they are not like the normal HTML pages which take us prom one page to another. As a Microsoft Technology, ASP allows us to get benefit from the functionality of a programming language i.e., we can write programming code which will create the HTML document for the web-page dynamically.

At any time a user looks through to a website and accesses one of the ASP documents, its code is executed that time with particular software (i.e., the Web Server). This procedure creates the HTML that is connected to the browser and then used to generate the webpage itself appearing onto the client's window. ASP's [4] successes lie down in two facts: i) the HTML code is not generated until the client request to access the web-page, and ii) it does not concern which type of web-browser is being utilized.

2.4 Software Used

For the development of this project following software were used.

- Internet Explorer 5
- TCP/IP
- IIS (Internet Information Server) 6
- SQL Server
- Macromedia Dreamweaver MX 2004 (for programming environment)
- Macromedia Fireworks MX 2004 (for designing graphics for the project)
- Microsoft Windows XP Professional

2.5 Proposed System Features

The proposed site will have the following features distinctive from other web sites:

- In fact, it is convenient to deal with Free Web hosting [6] however it has its downsides. Generally, it is required that user request the webserver to execute the advertisement on his website. The advertisement are usually ads/banner—e.g., a top page banner or sometimes pops-up ads as well, like GeoCities.com, FreeServers.com but this project give facility to have a website without any banner.
- This project will provide a tree view structure of the web site to be hosted to manage different files and folders in comparison to GeoCities.com that use a simple list of files and folders.
- It will provide the graphical statistics of the websites like online traffic, hits per page, top referrers, general tracking information and online disk space usage where as these graphical statistics are not provided by GeoCities.com
- To share the work load for small and medium sized web sites this project will facilitate the administrator to add multiple users and assign web site's directories to each user, where as, GeoCities.com do not provide this facility.
- As this project facilitates the administrator to add multiple users and assign web site's directories to each user, therefore administrator will also be able to manage different user and view their log file.
- This will also provide free online database management.
- This project will provide a fully functional highly interactive user friendly control panel provided with a tree view of the entire web sites directories, where as the GeoCities.com and some other web sites do not provide this Interesting facility to their users.
- All our services are free of cost.

3 Proposed System Description

3.1 Sign In-Page

 $\label{eq:Fig. 1} Fig. \ 1 \ shows \ the \ Sign-In-Page. \ From \ this page user or administrator can sign in to the system.$

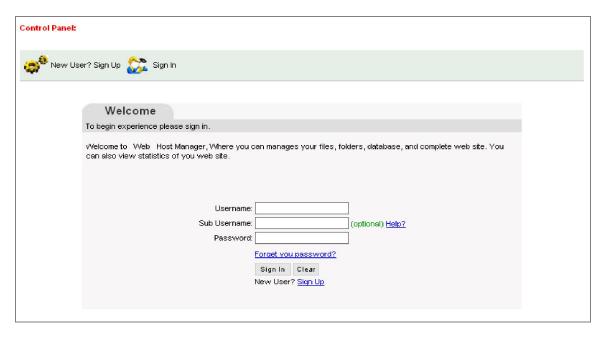


Fig. 1. Sign-In-Page of the System

3.2 Main Control Panel

This is the main control panel. From here administrator can use every tools provided with is system. Administrator will be redirected to this page after successful sign-in.



Fig. 2. Main Control Panel of the System

3.3 Website Statistics Analyzer

This is the home page for website statistic analyzer. From here user or administrator can get information about website like online disk usage, general tracking information, top 20 referrers and hit per page.



Fig. 3. Website Statistics Analyzer of the System

3.4 Online Disk Space Usage Statistics

User or administrator comes to this page by clicking disk usage option from the website statistic analyzer. From this page she/he will be able to see their online disk space usage graphically.

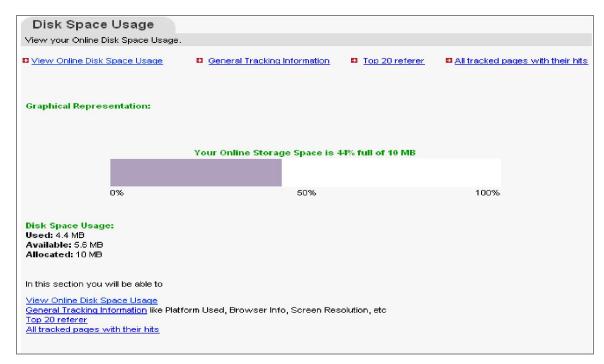


Fig. 4. Online Disk Space Usage Statistics Page

3.5 File Manager/Editor Main Control

This is the File Manager Main Control Panel. From here user or administrator can perform various operations like copy, move to, delete, rename, download and upload. This File Manager has a built-in folder manager. From here user can also delete multiple files at the same time and can also edit or create files. One of the interesting features of this file manager is that it facilitates user with a tree structure of the website. The classic Editor is also the part of File Manager. When user or admin of the website select a file from the second left tree then File Manager opens it in this Editor. The basic features of this Editor are creating new file, preview file, save/save as files. It can also copy, move, delete, rename and download the current file. It also displays the properties of the current file. In addition to these features it also has HTML tag generator, to generate html easily and quickly.

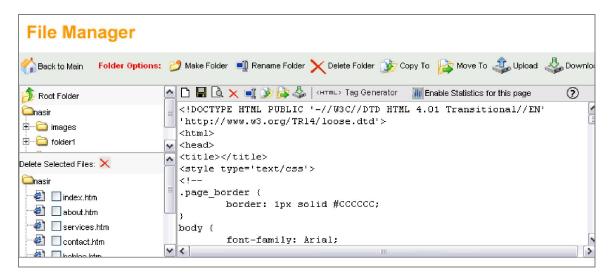


Fig. 5. File Manager/Editor Main Controler

3.6 Upload Manager

This is the upload File Manager. This Manager is the part of File Manager. It has three sections. On the left it shows the tree view of the user online directory. On the right it has file controls fields to select files from the local computer and button to upload files, finally this Manager also shows current status of the online disk space usage.

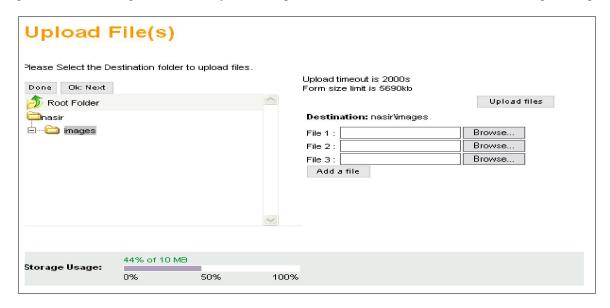


Fig. 6. File Upload Handler

3.7 Folder Manager

This is the folder manger main screen. On the top of the screen basic function like copy, move to, rename and delete are provided. It also shows the tree view of the user online directory.

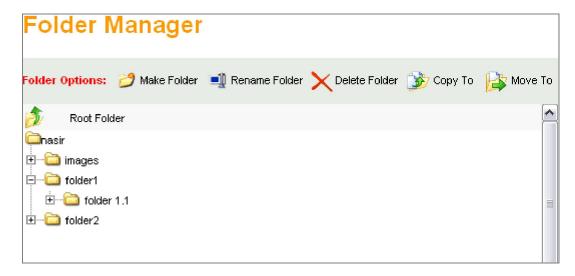


Fig. 7. Folder Manger Main Screen

3.8 Users Logs Page

From this page administrator can view users' logs. He or she can view last date and time in of the user, last date and time out of the user, total logs of the user, how many users are currently logged-in, how many users are not yet logged-in and how many users are currently online.

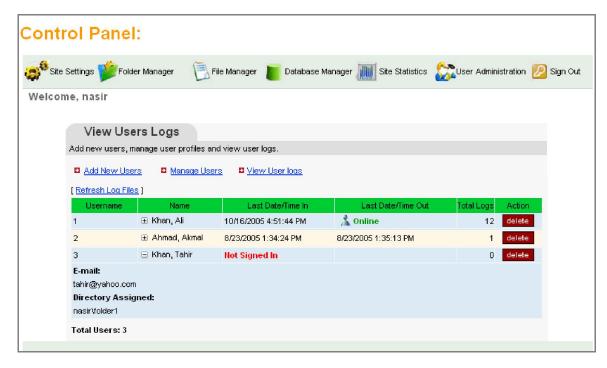


Fig. 8. Users Logs Page of the System

3.9 Web-Site Builder

User enters in this page after selecting template from template gallery, which contains large number of templates of different types and category. In this page user gives website basic information. After filling the form user save the settings and proceed next. Where he edits pages and then after saving publishes the website.

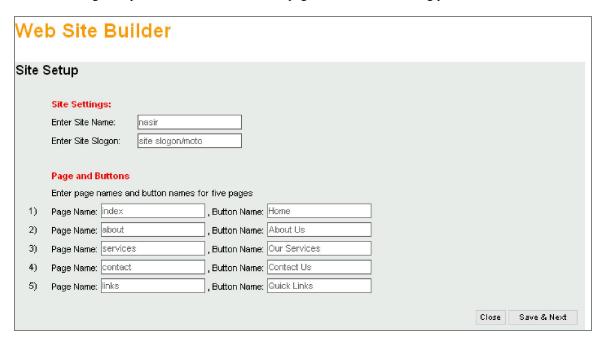


Fig. 9. Web-Site Publishing/Building Page

4. Conclusions

The purpose of this project was to develop a solution that provides facility to host and build websites for individual or median sized business. This software provided an easy fully functional interactive control panel to build monitor and manage websites online. With this control panel the user can remotely access there file or website and can manipulate them. They can even create multiple accounts under main account and can also assign directories to these accounts.

The Web Host and Builder is a control panel that can be installed on the server to provide easy access to the server to there user to host, monitor and build there website using HTTP. It provided an easy way to build an instant web appearance, for individual or medium sized business, and to host the pre-build web site from your personal computer to the server. It not only hosts your website but can also provide you fully functional online file and folder management system. With the help of witch you can create, delete, move, copy and rename your files and folders.

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Two Robust Meta-Heuristic Approaches for a New Modeling of Single Machine Scheduling Problem with Multiple Criteria

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Abstract: The aim of this paper is to propose a new model for a single machine-scheduling problem. According to just in time (JIT) approach, production managers should consider more than one criterion in scheduling problems. However, three criteria, including minimizing the number of tardy jobs, total weighted earliness and total weighted tardiness, are considered in this proposed model. To solve the model, firstly, branch and bound (BBA) method is applied, because it can solve the small size problems. Furthermore, the results obtained from this algorithm, are good measurement to test effectiveness of proposed meta-heuristic algorithms. In the literature, this problem is classified in the NP-hard class. Hence, two well-known meta-heuristic methods, including genetic algorithm (GA), simulated annealing (SA), are applied to tackle large scale problems. Finally, heuristic solutions were compared with the global optimum which is obtained by (BBA) method. Computational results showed that both the heuristic algorithms yield good quality solutions using reasonable computation time.

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Keywords: Single machine; branch and bound algorithm; genetic algorithm; simulated annealing

1. Introduction

Scheduling is the allocation of limited resources to perform a set of tasks over a period of time. Many real scheduling problems in the manufacturing industries are quite complex and very difficult to solve by conventional optimization techniques (Watanabe et al., 2005). The complexity of these problems has a direct dependence on constraints and shop environments upon which these problems are defined. One of the most well known problems in this area is single machine scheduling problem, since a complex system can be reduced to a single-machine problem, especially if there is a bottleneck machine in the system. This scheduling problem is NP-hard, but very simple to describe (Rinnooy, 1976). This type of problem became important with the advent of the just-in-time (JIT) concept. The just-in-time production philosophy has lead to a growing interest in scheduling problems considering both earliness and tardiness penalties (Monden, 1993).

Many researchers have investigated the several studies about single machine scheduling problem. A large body of literature on scheduling models with earliness and tardiness has emerged in the last two decades. There is little work in the literature handling single machine scheduling problems with different users and different criteria. First, Kanet (1981) introduced the single-machine E/T problem. Since many researchers have been worked on various extensions of the problem. Kanet

(1981) examined the E/T problem with equal penalties and unrestricted common due date. As a result, Hall (2006) extended Kanet's work and developed an algorithm that finds a set of optimal solutions for the problem based on some optimality conditions. Baker and Scudder (1990) published a comprehensive state-of-the-art review for different versions of the E/T problem. Much research has been directed to scheduling problems with multiple criteria. To the best of our knowledge, Smith (1956) was the first who deal with multiple criteria in singlemachine scheduling. In his paper, the total weighted flowtime and maximum tardiness were considered. However, most of the research focuses on JIT scheduling models with objective of minimizing total (weighted) costs of early and tardy jobs. Vairaktarakis and Lee (1995), Duffuaa et al. (1997) studied a single machine-scheduling problem to minimize total tardiness subject to minimal number of tardy jobs, independently.

For bicriteria scheduling models related to early and tardy costs, Chen et al. (1997) considered a single machine scheduling problem of minimizing total weighted earliness subject to maximum tardiness. They developed a heuristic and branch and bound algorithms based on the properties they derived to solve the problem. Baker and Scudder (1990) pointed out that the single-machine scheduling problem minimizing the summation of weighted earliness and tardiness with a restricted due date has not yet been addressed. Chand and

Schneeberger (1988) considered the problem of weighted earliness with no tardy jobs. The given weights and due dates were all job dependent. Guner et al. (1998) considered one machine scheduling to minimize the maximum earliness with minimum number of tardy jobs. Karasakal and Koksalan (2000) developed a simulated annealing approach to two single machine bicriteria scheduling problems: one to minimize total flowtime and maximum earliness while the other to minimize total flowtime and number of tardy jobs. Later, Koksalan and Keha (2003) also developed genetic algorithms for the two problems. Azizoglu et al. (2003a) considered a single machine scheduling problem with maximum earliness and number of tardy and no inserted idle time. They developed procedures to solve the problem optimally. Azizoglu et al. (2003b) further studied the same problem, but with allowed idle time. Chen and Sheen (2007) in their research have considered a single-machine scheduling problem with the objective of minimizing the summation of the weighted earliness and tardiness, subject to the number of tardy jobs. Wan and Yen (2009) studied a single machine scheduling problem with dual criteria, i.e., to minimize total weighted earliness subject to minimum number of tardy jobs.

To the best of our knowledge, so far no solution procedure has been proposed to this problem. In this paper, we will deal with a broad spectrum of objective functions and hence our results will apply to many different problems occurring in manufacturing. In principle, these objective functions include at least two of three different types of penalties, which can be motivated as follows:

- 1. Penalties arising from exceeding the contractually allotted delivery date are the most common (Explicit contract penalties, consumer dissatisfaction).
- 2. A penalty for an early completion of a job is appropriate for modeling capital intensive manufacturing processes, where the costs for bounded capital are an important part of the overall costs.
- 3. Intermediate storage costs contribute considerably to overall costs in chemical industry, if the intermediate is not stable.

The complexity of the problem necessitates meta-heuristic methods for solving large-scale problems. Our contribution is the first attempt in applying two meta-heuristics named genetic algorithm (GA) and simulated annealing (SA) to optimize this problem. Next, we compare the performance of these meta-heuristics to show the effect of the population-based and local search methods on optimization of the problem under consideration.

The remaining part of this paper is structured as follows: in Section 2 the notation needed is introduced and the problem under study is formulated; We describe our proposed methodology including a branch and bound algorithm, GA, and SA in Section 3 and 4; in Section 5 we present computational experiments, In the last section, we give our final conclusions.

2. Problem description

The simplest scheduling problem is the one in which there is a single processor or machine. Nevertheless, some features make it complicated and put it in the NP-hard class of problems. The single machine-scheduling problem is to organize the execution of n jobs on one machine. In this problem, there is a machine and a set of jobs $J = \{J_1, J_2, ..., J_n\}$. Consider a scheduling problem with n jobs to be processed on one machine with the following assumptions:

- (1) Jobs are independent from each other. There are no precedence constraints among the operations of different jobs. Nonetheless, there are precedence constraints among the operations of the same job.
 - (2) All jobs are available at time zero.
- (3) Setup time of machine and move time between operations are negligible.
- (4) At a given time, a machine can only execute one operation.
- (5) Pre-emption is not allowed. That is, each operation must be completed without interruption, once it starts.

In this section, we formally define the considered problem and give some useful properties. The notations are used throughout the paper are shown in Table 1.

Table 1. Nomenclature

n	Number of jobs
$n_{_T}$	Number of tardy job
$d_{_{j}}$	Common due date of job j
$p_{_{j}}$	Processing time of job j
$\alpha_{_{j}}$	Weight of the earliness for job j
$\beta_{_{j}}$	Weight of the tardiness for job j
γ_{j}	Weight of being tardy for job j
C_{j}	Completion time of job j
$\theta_{_{1}}$	Importance of earliness
$\theta_{_2}$	Importance of tardiness
$\theta_{_3}$	importance of number tardy job

Based on the above notations, we have the following mathematical formulation for the scheduling problem:

Min Z:

$$\theta_{1} \cdot \sum_{j=1}^{n} \alpha_{j} * \max \left\{ 0, (d_{j} - C_{j}) \right\} + \theta_{2} \cdot \sum_{j=1}^{n} \beta_{j} * \max \left\{ 0, (C_{j} - d_{j}) \right\} + \theta_{3} \cdot \sum_{j=1}^{n} n_{\tau_{j}}(1)$$

Subject to:

$$\sum_{i=1}^{3} \theta_i = 1 \tag{2}$$

$$n_{Tj} = \begin{cases} 1 & \text{if } d_j > C_j \\ 0 & \text{otherwise} \end{cases} \quad j=1,...,n.$$
 (3)

$$C_{j} > 0,$$
 j=1,...,n. (4)

The objective of the problem is to find a schedule that minimizes the total weighted earliness and tardiness subject to the minimization of the number of tardy jobs. When a job j is completed before its due date, its earliness is given by $E_j = \left(0, d_j - C_j\right)$, where C_j , is the completion time of the job j. Conversely, if the job is finished after the due date, its tardiness is given by $T_j = \left(C_j - d_j, 0\right)$. Constants a_j and b_j represent job earliness and tardiness penalties, respectively. If the job j is finished after its due date, n_{π} will be jth job that will be tardy.

3. The Branch-and-Bound Algorithm

In any B&B, three major procedures are involved:

Initialization, Branching and Bounding:

During initialization, fast heuristics are usually employed to find a good initial solution. This solution serves as an upper bound (UB) for the problem until a better solution is found. This helps in eliminating (or fathoming) any nodes that have a lower bound (LB) worse than that UB.

Branching partitions the problem into smaller sub-problems. Each sub-problem represents a partial solution and is represented by a node. A search strategy must be associated with the branching scheme. This strategy decides which node to branch next.

The *bounding* procedure is used to calculate a LB at each node considered for branching to help in eliminating nodes. If the LB is worse (higher in the case of a minimization problem) than the best solution obtained so far, the node is eliminated because a better complete solution can never be

reached in that case. In other words, exhaustive pursuit of the branching tree would be equivalent to complete enumeration of all sequences. The function of the bounding process is to provide a means for curtailing this enumeration (Baker and Trietsch, 2009). To find lower bound estimation we use Moore-Hodgson algorithm (Moore, 1968). There are two important reasons for using this method, which are described as follow:

- 1. To find minimum number of tardy jobs one of the important criteria in our model that it can be achieve whit using this algorithm.
- 2. In most cases the objective function, which is obtained by Moor algorithm, is an appropriate approximation of global optimum. The steps of this method can elucidate as follows:

3.1. Moore-Hodgson algorithm

Input: a job set J.

Output: the minimum number of tardy jobs for job set J.

Algorithm:

Step 0. Reindex the jobs in non-decreasing order of their due dates.

Step 1. $\sigma \leftarrow \phi, \sigma' \leftarrow \phi$.

Step2.

If
$$d_{j^*} = \min_{i \in J} \{d_i\}, \sigma \leftarrow \sigma \cup \{j^*\}, J \leftarrow J - \{j^*\}.$$

Step 3. If
$$\sum_{j \in \sigma} p_j > d_j^*$$
, let k^* denote the job

satisfying $p_{k^*} = \max_{j \in \sigma} \left\{ p_j \right\}$ (break ties with large due date),then $\sigma' \leftarrow \sigma' \cup \left\{ k^* \right\}, \sigma \leftarrow \sigma - \left\{ k^* \right\}.$

Step 4. If $J = \phi$, stop; otherwise go to Step 2.

In this algorithm, r and r0 denote the non-tardy job set and tardy job set, respectively. In the sequel, we assume the jobs in $\sigma = \{1,...,|\,\sigma\,|\}$ are in non-decreasing order of their due dates and denoted as $\sigma = (1,...,|\,\sigma\,|)$, where $|\,\sigma\,|$ denotes the cardinality of set σ , i.e., the number of non-tardy jobs.

4. Two robust meta-heuristics

As mentioned before, because of computational complexity of the problem, metaheuristic methods are applied to solve large scale problems of this type. In the following subsection, two well-known meta-heuristics that are proliferated to solve the studying issue of this paper.

4.1. Genetic algorithm

A genetic algorithm is an optimal search method motivated by natural selection and natural evolution. It maintains a population where each individual is characterized by its chromosome. Genetic algorithms (GAs) are adaptive searching procedures for solving optimization problems based on the mechanics of natural genetics and natural selection. Since developed in the 1960s and 1970s Holland (1975), they have been applied to a wide variety of problems. Much work has been done on exploring new applications of GA and on improving their performance through genetic operator selection, parameter setting, etc., to suit the problems better. Basically, the GA procedure includes chromosome reproduction, chromosome crossover, gene mutation, chromosome fitness, and natural selection. The reproduction operator will reproduce the next generation based on their fitness value. The crossover operator, the most important step in a GA, exchanges a pair of sub-strings of their parents to generate offspring chromosomes. The mutation operator randomly selects some of the genes of each chromosome and changes their values. In this problem, the GA is implemented by steps which are described in Figure 1. The general steps of GA are as follows:

Begin

- 1. Initialize crossover rate (P_c), mutation rate (P_m), population size (Pop.size) and generation number (Gen. No.);
- 2. Generate random numbers for initial population (chromosomes);
- 3. Evaluate the fitness function for population;
- 4. Repeat the following steps until stopping condition is satisfied.
- 5. Select two parents from population, and apply the crossover operator over the parent chromosomes and produce two offspring chromosomes for Pc ×Pop.size times;
- 6. Select an individual for Pm×Pop.size times and apply mutation to the random selected chromosomes;
- 7. Apply reproduction operation for (1- Pc Pm)×Pop.size times;
- 8. Apply heuristic method to each new individual and replace the worst chromosome by the best chromosome found so far.

9. **end**

End

Fig 1. Algorithmic skeleton of GA

4.2. Simulated annealing

Simulated annealing (SA) algorithm is based on ideas from physical annealing of solids and has proven to be a good technique for many difficult combinatorial optimization problems. Metropolis et al. (1953) was first described its main principle, SA has been applied successfully to solve a variety of problems (Kirkpatrick et al., 1983; Černỳ, 1985). SA is a local search algorithm. In a simple local search algorithm, such as a descent algorithm, an initial

solution is chosen at random and then a neighboring solution is generated based on some mechanism. If the neighboring solution is better than the current solution it replaces the current solution, otherwise the current solution is retained. The process is repeated until no improving neighbor is found for the current solution.

SA has received considerable attention in the recent past and has been widely used to solve difficult combinatorial optimization problems. Many researchers have applied SA successfully to various problems with slight variations in the cooling scheme and strategies for neighbor selection. Simulated annealing has been applied to single criterion scheduling problems in the past. Potts and Van Wassenhove (1991) and Ben-Daya and Al-Fawzan (1996) were proposed SA approaches to solve single machine tardiness problems. Tan and Narasimhan (1997) addressed the problem of minimizing tardiness on a single machine with sequencedependent set-up times. Here, we meticulously elucidate the proposed SA algorithm to optimize our problem. Following the explanation of initialization of the algorithm, the main algorithm is illuminated.

The algorithmic steps of this method are as follows:

Begin

- 1. Generate the initial solution, S_0 ;
- 2. Get, an initial temperature, T_0 ;
- 3. Set counter = 0 and repeat until the stopping criterion is satisfied:
- 4. Select a random solution $S \in N(S_0)$;
- 5. Set $\delta = f(s) f(s_0)$;
- 6. If $\delta < 0$, set $S_0 = S$, otherwise select a random number between (0, 1); go to step 7;

7. If
$$X \prec e^{\frac{-\Delta \delta}{T}}$$
, set $S_0 = S$,

- 8. Set counter = counter + 1:
- 9. **While** iterations of algorithm equal iteration, set $t = \alpha(t)$,
- 10. Local optimum is S_0 ;

11. end

End

Fig 2. Algorithmic skeleton of SA

5. Experiment and results

In our experiments, to solve this problem we use BBA, SA, GA algorithms. The problem instances were generated in a manner similar to the one which is used in Potts and van Wassenhove (1985) and Kim and Yano (1994) also Koksalan et al. (1998) that are now a standard methods to generate single machine

scheduling problems with due dates. The integer processing times p_j are drawn from a uniform distribution in the range [1, 10]. The integer earliness penalties α_j and tardiness penalty β_j are drawn from uniform distributions in the range [1, 10] and [1, 15], respectively. Also the due date for every scheduling problem is drawn from a uniform distribution in the range [1, 10]. As well as θ_j are drown from uniform

distribution in range [0, 1] respect to
$$\sum_{i=1}^{3} \theta_{i} = 1$$
. To test

the efficiency of heuristic SA and the branch and bound algorithm (BBA), the algorithm is coded in Visual Studio C# and run on a Pentium 4 2.2, 2.1 GB RAM personal computer. In the following, we use example to illustrate two heuristics GA and SA as well as the branch and bound algorithm BBA.

5.1. Calibration of parameters

In the process of acquiring appropriate and desirable parameters, to obtain high quality answer, in this section we try using a systematic method to find effective parameters on algorithm performance. In algorithm based on (SA) method there are three factors including: initial temperature (T) cooling rate (r) and the number of iteration in a temperature, on the other hands, for algorithm based on (GA) method, considering three important factors include: pop-size, percent of crossover (P_c), percentage of mutation (P_m). In table below the value of different parameters that have tested to gain best parameters are shown in Table 2.

With regard to the desired values for each algorithm on each level of the parameters in above Table, due to the nature of meta-heuristics methods was solved 10 times, so the number of running each algorithm on each level of the parameters were 100 times. After running experiments, for algorithm's performance analysis and to determine the suitable parameters, we use the relative percentage deviation (RPD), which is defined as follows:

$$RPD = \frac{Local\ optimum_{_{(GA/SA)}} - Global\ optimum_{_{(BBA)}}}{Global\ optimum_{_{(BBA)}}} \times 100\ (5)$$

 $Global\ optimum_{(BBA)}$: Global optimum obtained from branch and bound

 $\mathit{Local\ optimum}_{_{(\mathit{GA/SA})}}$: Local optimum obtained heuristic algorithm

After the implementation of programs, RPD is calculated for the objective function of all problems and finally, mean RPD in each level is

calculated, we use RPD to normalizing outputs in each level to compare whit each other. The best parameters, show in the Table 3.

Table 2. Deviation from optimum for different parameters of algorithms

parameters of argorithms						
	Value of Parameters					
Algorithm	Initial Temperature	Cooling Schedule	Number Of Iterations	Deviation From Global Optimum (SA)		
	30	0.81	100	32%		
	35	0.82	150	30%		
	35	0.83	200	25%		
	40	0.84	250	23%		
SA	<mark>40</mark>	0.85	<mark>300</mark>	11%		
SA	40	0.86	350	18%		
	50	0.87	400	20%		
	50	0.88	450	19%		
	50	0.89	500	22%		
	60	0.90	500	21%		
	Pop Size	Crossover	Mutation	Deviation From Global Optimum (GA)		
	80	0/70	0/15	33%		
	85	0/75	0/15	26%		
	90	0/75	0/10	25%		
	90	80	0/10	23%		
GA	95	0/80	0/05	22%		
UA	100	0/85	0/10	17%		
	100	0/90	0/05	<mark>9%</mark>		
	110	0/90	0/05	15%		
	120	0/90	0/03	17%		
	120	0/90	0/02	18%		

Table 3. Best parameters for heuristics algorithms

	Best Parameters			
Algorithm	Initial	Cooling	Number Of	
Aigorium	Temperature	Schedule	Iterations	
SA	4	0.85	300	
	Pop Size	Crossover	Mutation	
GA	100	0.90	0.05	

5.2. Branch and bound algorithm

To illustrate the problem and the solution method we present the following example.

Example:

Suppose the problem has the job data shown in table 4.

Table 4. Job data in Example

1 abic 4. 300 data ili Example							
j	1	2	3	4	5		
p_{j}	3	7	5	6	10		
$d_{_{j}}$	6	8	10	12	25		
$\alpha_{_{_{j}}}$	1	1	1	1	1		
β_{j}	1	1	1	1	1		
γ,	1	1	1	1	1		

In order to find suitable lower bound we used Moore-Hadgson algorithm that coded in C#. By the Branch and Bound algorithm (BBA), the optimal schedule is $\{1(0), 3(3), 4(8), 5(14), 2(24)\}$ with two tardy jobs and global optimum for this example is obtained 3.8. In which task $\#\{1, 3, 4\}$ are in early sets and tasks $\#\{2, 5\}$ are in tardy sets.

On the other hand, about the number of tardy jobs this schedule is the same one obtaining by Moore-Hadgson algorithm. We solve our problem for n=3 up to n=9 with the Branch and Bound algorithm to gain global optimal solution. Computational results with different number of jobs in the following will be compared with two meta-heuristics.

5.3. Genetic algorithm

For proof efficiency of this meta-heuristic, GA algorithm was run 200 times. These results shown that more than 82% of solutions of GA algorithm are nearly the same as optimal solution gained with BBA algorithm. Percentage of reaches global optimums is depicted in Table 5.

Table 5. Percentage of reach to global optimum

Number Of Jobs	n=3	n=4	n=5	n=6	n=7	n=8	n=9
Number of reach to global optimum (%)	38	45	63	76	69	84	89

5.4. Simulated annealing

With the same approach for above example, SA algorithm was run 200 times. These results shown that more than 89% of solutions of SA algorithm are nearly the same as optimal solution gained with BBA algorithm. Percentage of reaches global optimums is shown in Table 6.

Table 6. Percentage of reach to global

оринин							
Number Of Jobs	n=3	n=4	n=5	n=6	n=7	n=8	n=9
Number of reach to global optimum (%)	42	51	68	77	68	82	87

5.5. Comparing SA and GA

After tuning the parameters of each algorithm, we found that the robust performance of GA and SA were happened when the parameters of algorithm were: initial temperature =40 cooling rate=0.85, iterations=300, Pop.size=100, P_c =0.90,

 P_{m} =0.05. Next, in the conditions in which these two algorithms act robustly, the results of both algorithms were compared with each others. To compare these results, each algorithm was run 10 times. Then, values of the objective functions were transformed into RPD values.

Computation times and optimum solution obtained from three algorithms are shown in Table 7.

Table 7. Computation time and optimum for three algorithms

Number of Jobs	Global Optimal With Branch and Bound		Average optimum (GA)		Average optimum(SA)		
	Optimum	Run Time(s)	Optimum	Run Time(s)	Optimum	Run Time(s)	
n=3	1.31	0.17	1.836	0.332	1.772	0.328	
n=4	2.41	0.34	2.9	0.66	2.796	0.688	
n=5	3.92	0.94	4.362	0.922	4.318	1.04	
n=6	5.28	3.44	5.682	1.118	5.556	1.394	
n=7	8.13	9.12	8.558	1.94	8.388	2.226	
n=8	11.72	28.29	12.144	3.422	12.052	3.666	
n=9	16.88	170.43	17.36	5.514	17.556	7.1	
n=10	21.47	612.88	21.754	7.112	22.226	8.758	

A computational experiment was carried out in order to evaluate the performance of the proposed heuristic algorithms. To evaluate the quality of the heuristic solutions we use values of the percentage deviation of the heuristic algorithms from the global optimum, which is obtained by (BBA) method. We compare the performances of heuristic algorithms, using the Equation (5).

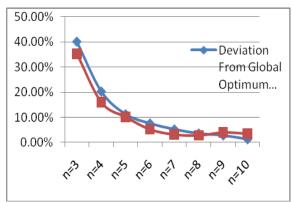


Figure 3. Deviation from global optimum

In addition, for large scale of number of jobs we solve our problem with GA and SA algorithms, and computational results for 100 Times run are shown in Table 8.

This table shows that our GA and SA algorithms for this problem are efficient. The computational results show that the heuristics performs preferably in most cases and the branch and

bound algorithm is suitable for medium-size problems. Computational results to compare two meta-heuristics which is used in this paper is depicted in Figure 4.

Table 8. Computational results for large scale of number of job

Number of Jobs	Average f		Average for 100 Runes of GA		
	Optimum	Run Time(s)	Optimum	Run Time(s)	
n=20	49.54	8.11	47.44	8.55	
n=40	79.56	9.12	86.54	10.11	
n=60	147.54	11.33	144.56	12.32	
n=80	237.65	13.66	230.87	14.1	
n=100	387.7	18.76	385.6	19.76	
n=200	459.63	24.65	472.44	25.27	
n=500	686.56	34.67	679.54	37.12	
n=1000	1065.56	38.49	1052.67	40.26	

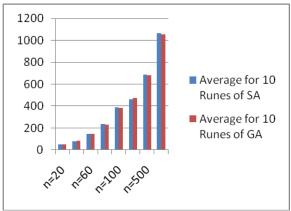


Figure 4. Compare two robust meta-heuristics

Consequently, it clearly demonstrated that in medium sized of jobs in medium sized of jobs SA has better performance than GA, but in large sized of jobs GA outperforms SA. In other words, when the total number of jobs is increased, using GA could be beneficial.

6. Conclusion

In this paper, a new model for a single machine-scheduling problem with three criteria was proposed. First, branch and bound (BBA) method was applied to solve the problem in small size. Scheduling jobs on a single machine consider specific due date for each job with respect to different earliness and tardiness penalties is an NP-hard combinatorial optimization problem. Hence, two well-known meta-heuristic methods, including genetic algorithm (GA), simulated annealing (SA),

were improved to tackle large scale problems. In small size of problem, effectiveness of the heuristic algorithms GA and SA measured by means of the percentage deviation of the local optimum which was obtained by them from the lower bound on the global optimum was determined by (BBA). The computational results show that the heuristic methods work preferably in most cases and the branch and bound algorithm is suitable for medium-size problems. The computational results indicate that the proposed heuristic algorithms can be useful for scheduling in this new modeling with multiple criteria. Further research should include developing heuristics for scheduling problem with two or more parallel machines. Furthermore, the proposed approach will be applied on other scheduling problems that are well known and have similar approach to our problem.

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Comprehensive Evaluation of Probabilistic Seismic Risk Methodology for Port Structures

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Abstract: Ports have long been the gateway for commodities and people to transport into cities and countries. In fact, ports are very important link in the total maritime transportation chain. Past experience has shown that ports are often susceptible to severe damage during earthquakes. So evaluation of direct and indirect consequence of earthquake in ports and harbors is an essential problem. Probabilistic method for this problem is introduced briefly to be used in comprehensive seismic risk management. At first, reliability of ports is evaluated in this methodology through estimation of component direct and induced damage probability. Afterwards direct economic loss of earthquake estimate with damage probability from direct and followed by sequence and consequence analysis for assessment of induced damages. Finally indirect economic impacts of direct loss are estimated using economic links between the harbor and society. Outputs of the methodology can be used in different stages of seismic risk management from risk financing to proposing mitigation measures. Effects of rehabilitation of equipments and structures, prevention and suppression systems as well as management type of mitigation actions can be estimated by this methodology in preparedness, emergency response and recovery phases.

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Key words: seismic risk, direct economic loss, indirect economic loss, port structures, probability.

1- INTRODUCTION

Seaports are the cornerstone of international trade and have become increasingly important as the trend for globalized production and distribution of goods has grown stronger. Seaports are also an important part of transportation networks because they function both as sources and sinks for the freight traffic that flows through the transportation infrastructure of a country. In the past, ports have suffered serious damages from earthquakes because their location near estuaries and river deltas and their construction on landfills has made them particularly susceptible to liquefaction and ground failure. Damage to port structures that reduces their functionality will limit the port's operational capacity and result not only in monetary losses attributed to the repair and replacement cost of the structures, but will also result in revenue losses due to reduced throughput. The operational capacity of a maritime port after an earthquake is of great concern to the port authority and tenants because port revenues and market share retention depend largely on the continuing operation of the berthing facilities. Moreover, freight movement through the port is important for the local industries and factories. For many regions, a capacity reduction in the port system results in severe economic consequences.

Two recent events demonstrate that an earthquake can severely affect port operations. After

the 1989 Loma Prieta, California, earthquake, one of the 8 container terminals of the Port of Oakland sustained heavy damage and had to cease shipping operations completely. It took almost six months to fully restore operations while the repairs continued. Eventually, the port estimates it spent \$14 million (in 1989 dollars) and it took 23 months to inspect, analyze, design, bid, and reconstruct 922m of damaged wharf in that terminal [7]. Fortunately, the ship traffic could be diverted to other operating terminals, so no loss of operating revenues was reported. After the Great Hanshin earthquake in Kobe, Japan in 1995, the direct repair cost incurred by the port of Kobe was estimated to be (in 1995 dollars) \$5.5 billion and the economic impacts on port dependent industries due to the loss of operations at the port were estimated to be about \$6 billion [28]. During the earthquake, the port lost about 80% of its operating capacity due to extensive wharf damage. It was reported [9] that the Port of Kobe had only recovered 80.4% of its monthly amount of exports and imports as compared to before the earthquake. This permanent loss of business occurred even though the port had recovered 75% of its cargo-handling capacity one year later. What is more astonishing in the case of Kobe Port is that, although Japan is a country of earthquakes and during the last 100 years had 185 earthquakes with Richter magnitude bigger than seven, Kobe had not

experienced an earthquake of magnitude bigger than seven in the last thousand years. Thus, potential for losses to a port subjected to an earthquake cannot be ignored but should be evaluated based on seismicity of region, and mitigation actions should be pursued. Consequently, when authorities plan and design new ports or evaluate and expand existing ones, it is necessary to examine the possible repercussion of potential failures due to such extreme events and account for them in their capital allocation program.

In this paper, a probabilistic methodology for evaluation of holistic seismic risk in port structures is introduced. The results of the model contain the probability of unsafe situations and economic impacts of damages in all levels. The effect of secondary hazards on damages and losses is estimated through probabilistic framework as well.

2- TYPES OF SEISMIC RISK AT PORT AND LITRETURES REVIEW

Risk is associated with the impact a disaster has on society and can be described in terms of the following metrics: casualties, damage to civil infrastructure, and downtime loss. This risk may either be deterministically or probabilistically assessed under the influence of controlling event(s).

The necessity of risk analysis studies for efficient evaluation of planning and design alternatives and for setting the performance requirements for future expansions of ports has been recognized since the late eighties [8]. Some studies of port risk analysis have appeared in the literature since then. To assess the impacts of various emergency events on a complex system such as a port, simulation is often the best option. In particular, De Vries (1990) used a ship maneuvering simulation program to study the risk of naval accidents in the entrance of harbors, while Bruzzone et al. (2000) use simulation to study the environmental risk of oil spills and fires in a port. With respect to natural hazards, Yeend (1997) analyzed the exposure of waterfront and coastal facilities of Canaveral port to hurricanes, tornadoes and tropical storms, and Werner, Taylor, and Ferrito (1999) use Monte Carlo techniques to evaluate the seismic performance of a wharf as part of their seismicrisk determination procedure. In the area of financial risk analysis of ports, Kakimoto and Seneviratne (2000a) and Kakimoto and Seneviratne (2000b) examine the probability of the return on capital investment, adjusted for uncertainty in traffic volume, port tariffs and various costs, to drop below the hurdle rate and for the net present value of an investment to fall below zero given that the return rate is equal to the hurdle rate. In their formulation however, the variable

costs from repairs and loss of income due to catastrophes are not included.

After the Kobe (1995) and Loma Prieta (1989) earthquakes, there was considerable interest in the seismic behavior of port structures and as a result, at least four documents with seismic design guidelines for ports appeared. The first (Wittcop and Martin 1990) was a result of an extensive investigation of the Port of Los Angeles to determine the seismic risk of its facilities and to establish state of the art design criteria for its future expansions. The second, edited by Werner (1998), summarized the experience gained from past earthquakes and the current engineering knowledge and proposed guidelines for risk reduction through design, response and recovery actions. Soon after, a study from US Navy was released (Ferritto et al. 1999) with seismic criteria for marine oil terminals. Finally, in 2001 the study by the PIANC (2001) gives a very detailed description of proposed damage criteria and design and analysis methods, specifically for port structures. It has been argued by (Werner, Dikenson, and Taylor), that expected cost due to future earthquakes is not currently considered in the design and construction costs of port facilities and the need for a system performance evaluation and business interruption cost estimation was recognized. To the knowledge of the author, no attempt has yet been made to lay out a methodology for determination of business interruption costs.

Simulation models have been also used extensively in planning and analysis of port operations. Many different simulators exist, varying in complexity and objectives; some studying bulk terminals [24], [18] and others studying container [21], [14], [23], [22] or military terminals [16]. The overall seismic risks to the port system that must be managed in a probabilistic holistic seismic risk evaluation methodology can be categorized as follows: (a) life safety risks: associated with risks of death, injury, or illness due to earthquake damage; (b) economic risks: corresponding to earthquake induced interruption of port operations and damage repair costs; (c) environmental risks: which relate to the potential for harm to local habitats, ecosystems and species due to the earthquake-induced releases of materials stored or handled at the port into the atmosphere, the ground, or the water; (d) political/ethical/aesthetic risks: which relate to socioeconomic impacts of port damage, such as unacceptable modifications of natural and urban environments due to port damage; and (e) psychological risks: of worry, anxiety, loss of confidence in the future, etc. These various types of risk should be considered when establishing port system seismic performance requirements.

3- TYPES OF EXPOSURE FROM SESIMIC RISK

As can be understood from the previous sections, ports that are situated in regions of high seismicity are particularly vulnerable. For this purpose, it is important to assess the potential losses resulting from extreme events and consider possible mitigating actions. The types of financial liabilities that can be identified as a result of damage to a port from an earthquake include: direct property loss, net income loss, liability loss to third parties and employees, and indirect loss. It should be noted here that losses due to fire and environmental impacts such as oil spills after an earthquake although important, are beyond of the scope of this article. The different types of losses are further discussed in the following sections.

Direct property loss includes the repair or replacement costs for the damaged facilities. These facilities are the port's wharves and docks, damaged by liquefied soils, cranes that can topple or collapse from lateral spreading of their legs and buckling, office buildings and warehouses, liquid storage tanks which can sustain loss from collapse or cracking, and failure of utility lines. Moreover, ports sometimes own various types of bridges. Depending on the magnitude of a seismic event and the design characteristics of these facilities, the cost to repair these structures can be excessively high, imposing significant financial difficulties to the port authority.

Net income loss accrues due to the reduction in revenues and the increase in operating costs if damaged facilities cause interruption of the port operations. Since most of the revenues of a port come from the transfer of cargo on and off the ships, if the wharves are unusable for a period of time, the revenue loss can be significant. This loss is sometimes also referred to as downtime loss. In the net income loss, one can include the extra expenses that will occur when the operations continue in an emergency mode, e.g., the rental costs for contingency equipment and temporary space.

Liability loss occur when port damage causes harm to another party's property or income. An example of such liability is when the power blackout caused by an earthquake results in deterioration of perishable cargo stored in refrigerated containers. Workers' compensation and tenants' loss of revenue could be classified in this category as well.

Indirect property loss arises as a result of direct property loss. Indirect loss in this methodology refers to loss of revenue or loss of port owner due to business disruption as a result of stoppage of port operation or reduction of serviceability capacity.

Assessing the risk from market share loss to competitors is considerably more difficult. It is

generally admitted that once a ship gets diverted successfully to another port, it rarely comes back. Several scenarios can be considered to evaluate the likelihood that a ship will be diverted under the assumption that the queue is too long and the ship will not wait an extended period of time.

4- MANAGEMENT OF SEISMIC RISK

The serious implications that an earthquake can have on port revenues and operations creates a need for a general and comprehensive risk assessment framework for port systems.

Such a framework should be able to describe probabilistically the damage states in which the port components will be after an earthquake event and associate them with the total functionality state of the port. Moreover, it should be able to relate the post-earthquake operations and revenues of the various port terminals with their functionality and provide probabilistic estimates of the incurred loss. If the risk of earthquake related damage to the port can be evaluated in a reliable manner, prudent investment decisions on the seismic upgrading of port facilities can be made and appropriate risk mitigation strategies can be formulated.

The basic steps for conducting comprehensive seismic risk analysis of a port system are Evaluation of seismic hazard, Assessment of damage states of port components, Evaluation of system functionality, downtime and replacement costs, Estimation of difference in revenues and Use the revenue loss process for financial risk analysis and risk management decisions.

In the previous section, various contributors of seismic risk were identified and discussed. The core of the problem lies in that most existing facilities are designed according to older standards and their damage can result not only to direct loss but also to loss of operational capacity. Facilities designed under current standards are also expected to sustain some degree of damage because design criteria are formulated primarily for life safety rather than for different performance requirements. Continued functionality after different size earthquakes, for example has not been considered until recently, as performance-based design criteria became better understood and accepted. Under certain conditions, seismic upgrade of these facilities can cost more than the anticipated loss. Thus, it is necessary for port management to find ways not only to minimize the losses from direct physical damage but also to plan for quick recovery. If mitigation measures are not taken to increase seismic resistance of port facilities, their timely repair after an earthquake requires a capital investment. significant Typically, combination of mitigation through loss control and

risk financing would provide the best approach in reducing overall risk exposure of a port [25].

5- PROPOSED APPROACH

Ports have long been the gateway for commodities and people to transport into cities and countries. In fact, ports are very important link in the total maritime transportation chain. Past experience has shown that ports are often susceptible to severe damage during earthquakes. So evaluation of direct and indirect consequence of earthquake in ports and harbors is an essential problem. Probabilistic method for this problem is introduced briefly to be used in comprehensive seismic risk management. At first, reliability of ports is evaluated in this methodology through estimation of component direct and induced damage probability. Afterwards direct economic impacts of earthquake estimate with damage probability from direct and followed by sequence and consequence analysis for assessment of induced damages. Finally indirect economic impacts of direct loss are estimated using economic links between the harbor and society. To fulfill the requirement of risk assessment in port structures, the result of the proposed methodology will evaluate:

- 1. Probability of direct physical damage.
- 2. Reliability of structures.
- The probability of unsafe conditions like probability of leakage of hazardous material or explosion in facility.
- Probability of induced damage as a result of secondary hazards in facility.
- Total economic impact of damages including direct, indirect economic.

The flowchart of proposed methodology is shown in Fig.1. First, the seismic hazard is estimated by the site hazard curve. Second, the probability of direct physical damage is computed using relevant vulnerability function in the direct damage module. Third, reliability of port structures and probability of secondary hazards in the port are assessed in sequence module. Fourth, consequences of secondary hazards in terms of physical damage probability of components are anticipated in consequence module. Fifth, total probability of direct and induced physical damages is calculated and used to estimate the direct economic loss and repair time in the direct economic impact modules. In the end, results are utilized to evaluate the indirect loss using indirect loss module. Methodology comprises of two general parts: direct and indirect losses.

6- ESTIMATION OF DIRECT ECONOMIC LOSS

The probability of total damage in each component is estimated by aggregating the probability of direct and induced damages employing probability theorem:

$$P_{k}(D = d_{i}) = \sum_{all \ j} P_{kj}(D = d_{i}) - \sum_{j} \sum_{l} P_{kj}(D = d_{i}) \cdot P_{kl}(D = d_{i}) \cdot \gamma_{jl}$$
(1)

 $P_k(D = d_i)$: Probability of damage equal to damage state d_i as a result of direct effect of earthquake and secondary hazards.

 $P_{kj}(\vec{D} = d_i)$: Probability of damage in k^{th} component due to j^{th} hazards (primary or secondary)

 γ_{jl} : correlation coefficient implying the correlation of j^{th} and l^{th} hazards.

In this method, in order to aggregate damage from different sources and due to lack of information, continuous damage state in components are divided to certain damage stats which are described by physical damage measures. This type of damage definition used by many previous studies [4], [20] provides a common base for aggregating probability of damages and assuming financial loss and repair time for each state. Damage states can be identified from different viewpoints. In addition to HAZUS's damage states which are mostly developed for estimation of economic impact of earthquake, damage states can be defined based on safety or process disruption considerations. Experience of previous damages and working condition of components can give valuable clue to identify and describe the damage states in components [13].

6-1- DIRECT DAMAGE ESTIMATION

The probability of certain structural response is estimated from total probability theorem. For continuous hazard parameter it can be written as [32]:

$$P[R < r] = F_R(r) = \int F_{R|S}(r;s) f_S(s) ds \tag{2}$$

In which:

 $f_s(s)$: Probability Density Function (PDF) of seismic hazard

R: Structural response

 $F_{(R|S)}(r;s)$: Conditional Cumulative Distribution Function (CDF) of response in given ground motion, "s"

The probability of exceeding damage from a damage state (d_i) is derived by replacing damage state in structures instead of structural response:

$$P[D > d_i] = \int F(D > d_i|m) \cdot |d[P(IM \ge tm)]| \cdot d(tm)$$
(3)

Where $P(IM \ge im)$ is hazard curve which estimates the exceeding probability of ground motion Intensity Measure, IM, from certain level, "im" and $F(D > d_i | im)$ is fragility function which estimates the conditional exceeding probability of damage, D, from a damage level, d_i , in given "im". Equation 2 can be solved either numerically or mathematically. By assuming a power function for hazard curve [10], $P(IM \ge im) = K_0 im^{-k}$ and CDF of log-normal for fragility function [4], $F(D > d_i | im) = \Phi[1/\beta_i.\ln(im/IM_i)]$ in which k and K_0 are seismic hazard parameters and IM_i and β_i are seismic fragility function parameters, closed form solution of Equation 2 can be derived [15]. Probability

$$P[D = d_i] = P[D > d_i] - P[D > d_{i+1}]$$
 (4)

of damage equal to a damage state can simply estimate:

Ground Motion Earthquake Rupture **Ground Motion Spatial Correlation** prediction model **Forecast** model **Engineering Mitigation Options Hazard Curve** Waterfront Components **Probability of** Cargo Handling **Direct Damage Direct Physical** Components Module Damage Infrastructure Components Reliability of Port **Sequence Module Structures Probability of** Consequence **Secondary Ship Arrival Schedule** Module Hazard **Probability of Total Physical Operational Induced Damage** Damage **Mitigation Options Direct Economic Port Components Direct Economic** Loss and Loss Module Assignment **Downtime Total Economic Loss Reduced Container Throughput** Indirect **Indirect Economic Loss Delayed Ships Economic Loss** Module **Re-routed Ships**

Fig. 1. Procedure of seismic risk assessment of port structure. Outputs of methodology have shown by shaded objects.

6-2- SEQUENCE ANALYSIS

Damage to one or serious of components could lead to process interruption or secondary hazards initiation. The probability of such incident is estimated in this part. In the present methodology, fault and event tree analyses which have been used conventionally for sequence analysis of port are employed. In practice, it is require to have predefined fault and event trees of events formed from damage states of components. The efficiency of prevention and suppression systems can be taken into account in fault and event tree analyses as well.

6-3- CONSEQUENCE ANALYSIS

Probability of induce damage is evaluated in probabilistic framework derived from Eq. 2 and total probability theorem:

$$P_{bi}[D > d_i] =$$

$$\int_{\mathbb{R}^{3}} \int_{\mathbb{R}^{3}} F(D > d_{i}|IS = is) f(IS = is|SH = sh) f(sh) d(sh)$$
(5)

Where:

f(sh): PDF of Secondary Hazards SH estimated from sequence analysis.

f(IS = is SH = sh): Conditional PDF function of Intensity of Secondary hazard (IS) in given "sh" which shows the attenuation of secondary hazard intensity and is derived for four major secondary hazards (fire, explosion, Tsunami and releases of hazardous materials) based on their propagation characteristic.

 $F(D > d_i | IS = is)$: Conditional probability of exceeding damage from d_i in given "is" which is strikingly similar to seismic fragility function.

6-4- ESTIMATION OF DIRECT ECONOMIC LOSS AND DOWNTIME

The probability of total direct loss of port is estimated from aggregating loss of individual components in port where direct loss of each component is:

$$P[C_i > c] = \sum_{i=1}^{NDS_i} [1 - F(C_{ij} | D = d_j)] . P(D = d_j)$$
(6)

Where

 $P[C_i > c]$: Exceeding probability of loss in component *i* from *c*

 $F(C_{ij}|D=d_j)$: Cumulative conditional distribution function of loss in component i in given damage state d_j defines by the normal distribution function with mean and deviation of \vec{C}_{ij} and σ_{ij}

and deviation of \vec{C}_{ij} and σ_{ij} $P(D = d_j)$: Probability of damage equal to d_j calculated from Equations 1 and 4.

The same formulation can be derived for probability estimation of down time and reconstruction time.

6-5- UNCERTAINTY MODELING

Considering uncertainty and randomness of input parameters on the results could help risk managers to make more robust decision by examine all possible consequences. To evaluate the uncertainty of results, numerical simulation is employed. Due to substantial amount of random and uncertain parameters in the methodology, close-formed solutions like FOSM for estimation of uncertainties are not applicable in this stage; therefore Mont-Carlo simulation has been utilized for estimation of loss uncertainty.

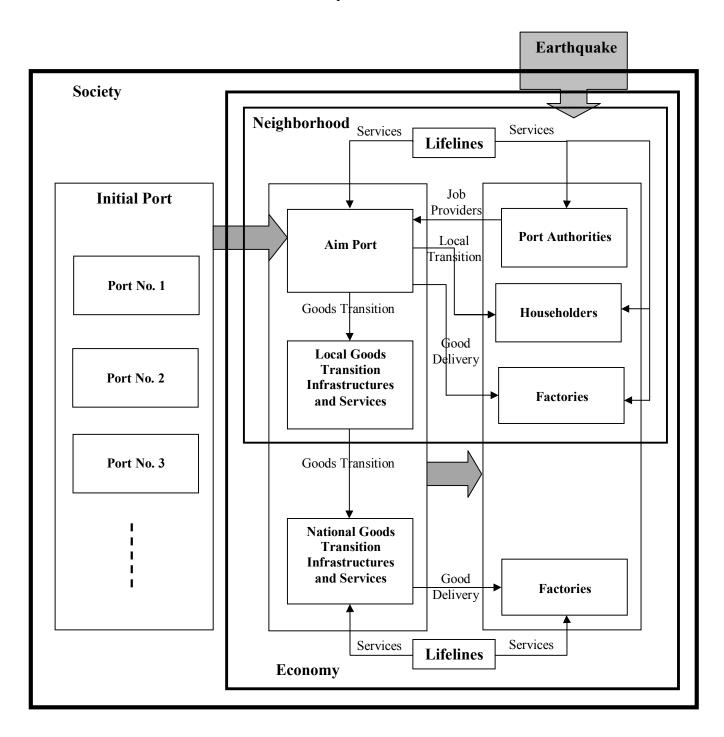
7- INDIRECT ECONOMIC LOSS ESTIMATION

Indirect economic loss in this methodology refers to loss of revenue or loss of port owner due to business interruption as a result of reduced container throughput, delayed ships and re-routed ships. In this study, the indirect economic loss is estimated by equivalent recovery. The restoration time comprise of reconstruction time and delay before, during and after it. Several external and internal parameters are contributing to delay time. For instance in reconstruction stage, shortage of financial sources, leakage of masonry or lack of trained labor after an earthquake which are considered as external factors are increasing the reconstruction time. Furthermore, physical restoration of structures of port does not guarantee the restoration of business interruption and port operation. Business recovery depends on the many external factors such as revert of ships, restoration of lifeline and etc. The substantial amount of contributing agents in the restoration of port operation and their unknown relationships imply a highly complex and dynamic system which should be considered with more detail and consideration.

The conceptual diagram of relationship of port and its relevant agents is shown in Fig.2. Based on the influential factors and the conceptual model of port process, several contributing elements are identified: initial ports, aim port, lifeline services, factories, good transition infrastructures and services port authorities and households which are a source of labors. Two levels of financial relationship between port and society can be explained based on the model. The first level is local level which defines the relationship between the port, household, consumer and lifeline and has effect on indirect loss of port. The second level is the economy level which defines the relationship between different economic sectors and has effect of macroeconomic level.

Based on the conceptual model, a system dynamic approach is employed for developing a probabilistic model of port restoration using detailed conceptual diagram, functional and mathematic model.

Fig. 2. Conceptual model of port-society relationship is used for developing the indirect and macroeconomic impact model.



8- CONCLUSION

The main objective of this article is to provide a methodology for estimation of probabilistic holistic seismic risk of port structures. Outputs of the model can be used in holistic seismic risk management of port structures from risk financing to hardware (e.g. rehabilitation) and software (e.g. management and preventing) mitigation measures which is a the major advantage of the current method compare to existing ones such as HAZUS. Effects of rehabilitation of equipments and structures, prevention and suppression systems as well as management type of mitigation actions can be estimated by this methodology in preparedness, emergency response and recovery phases.

Since every port is a unique system with its own characteristics in traffic, equipment and hazard conditions, no attempt is made to deduce general conclusions for all ports, rather to identify the key factors influencing the loss estimation and to propose an approach to the problem. Moreover, port characteristics can change rapidly over time and hence any conclusions would correspond to the state of the system at that particular period, giving general results limited applicability.

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Genetic relation of the Zagros thrust and Sanandaj-Sirjan zone

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Abstract: the Zagros thrust(crush zone) and the Sanandaj-Sirjan zone separat the Zagros Fold belt from Central Iran. The Zagros passive continental margin setting of the Jurassic-Middle Cretaceous was followed in the Upper Cretaceous by arc collision linked to the closing of the Neo-Tethys and the collision of the Arabian and Iranian plates. The northwest-southeast trending Sanandaj-Sirjan Zone consists of several elongate sub-zones and much of the orogenic activity in the Sanandaj-Sirjan Zone is now related to closing of Tethys. Therfore the Zagros thrust and the Sanandaj-Sirjan zone provide a unique opportunity within the Alpine system to evaluate the interplay between a young Tertiary collision, volcanism, metamorphism and earlier subduction/obduction processes. This article detects genetic relation of The Zagros Thrusting System and properties of the Sanandaj-Sirjan zone. Investigations show two area have related evolutionary history from cretaceous to recent.

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Key word: Zagros thrust, Sanandaj-sirjan zone, Collision, Crush zone.

1. Introduction

The Zagros folded belt passes northeastward without a sharp boundary into a narrow zone of thrusting bounded on the NE by the main zagros Thrust line. In this zone older Meosozoic rocks and Paleozoic platform cover were thrust southwestward in several schuppen-like slices on the younger Mesozoic and Tertiary rocks of the folded belt. The thrust zone represent the deepest part of the Zagros Basin in Mesozoic and early Tertiary time. The High Zagros are bounded on the NE by two faults, the reverse Main Zagros Fault (MZF) and the dextral Main Recent Fault (MRF), which together approximate the Zagros (Neotethys) suture zone between the Arabian and Eurasian plates ([Berberian, 1995], [Bosold et al., 2005] and [Authemayou et al., 2006]). To the SW, the highangle reverse-dextral High Zagros Fault (Fakhari, 1996b) defines the boundary between the High Zagros and Simply Folded Zone.

The Sanandaj –Sirjan Zone was first recognized as a separate linear structural element by stocklin (1968).the zone lies between the main Zagros Thrust in the SW and the Urumiyeh-Bazman volcanic belt in the NE. It joins the Taurus orogenic belt in Turkey. The ranges occupy a NW –trending belt in which the Zagros structural grain is overprinted on the typical Central Iran structural framework (Fig. 1).

Characteristic features include the consistent Zagros trend of the zone as a whole, the nearly complete lack of Tertiary volcanics and the poor development of Tertiary formations in general. Part of the zone is characterized by Paleozoic volcanism and Hercynian and or Early Kimmerian metamorphism.

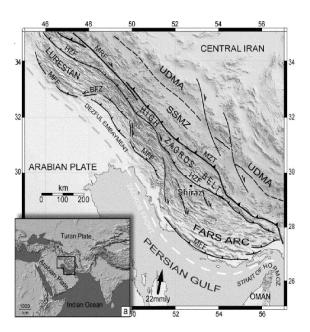


Fig. 1. Index map of the studied area within the Zagros fold-and-thrust belt "Sanandaj-Sirjan zone and situation of the different structural domains in SW-Iran. UDMA, Urumieh—Dokhtar Magmatic Arc; SSMZ, Sanandaj—Sirjan Metamorphic Zone; MZT, Main Zagros Thrust; MRF, Main Recent Fault; HZF, High Zagros Fault; ZSFB, Zagros Simple Fold Belt; MFF, Mountain Front Fault; BFZ, Balarud Fault Zone. Black arrow indicates GPS convergence vector from Vernant et al. (2004). Inset (a): location map in the Middle East.

The northwest-southeast trending Sanandaj-Sirjan Zone consists of several elongate sub-zones. From southwest to the northeast these

sub-zones are (1) radiolarite sub-zone, (2) Bisotun sub-zone, (3) ophiolite sub-zone, (4) marginal sub-zone, and (5) complexly deformed sub-zone (Fig. 2).

All five sub-zones and Cainozoic rocks in the southwestern Sanandaj-Sirjan Zone form part of a complicated imbricate thrust system with out-of-sequence thrusts locally juxtaposing younger over older units.

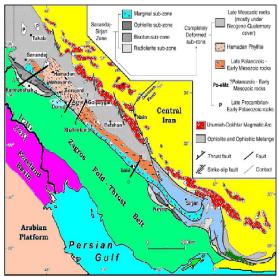


Fig.2. Simplified tectonic map of The Zagros thrust and The Sanandaj–Sirjan Zone. Showing Cross sections (See figs 3-5).

2.Structural relation of the Zagros thrust (Crush zone) and the Sanandaj-Sirjan zone

The Zagros Thrust System was previously considered to be a "Crush Zone" (Wells, 1969), or the "Main Zagros Thrust Zone" ([Takin, 1972], [Hynes and McQuillan, 1974], [Berberian and King, 1981] and [Berberian et al., 1982]), or the "Main Zagros Reverse" or the "Suture Zone" (Berberian, 1995). The so-called "Main Zagros Thrust" which is traditionally considered as the boundary between the Sanandaj-Sirjan Zone and the Zagros Simply Folded Belt is by no means a single "high-angle reverse fault", nor is it a narrow zone of "crush rocks" (Alavi, 1994). The thrust system is an array of kinematically, geometrically and mechanically related faults that developed in a sequence during regional deformation and are associated with deformation above a basal detachment ([Boyer and Elliot, 1982] and [McClay, 1992]). Therefore it is more reasonable to classify and name it as the Zagros Thrust System (Fig. 13) rather than the "Main Zagros Thrust Zone" or "high-angle reverse fault" or "Crush Zone". The Zagros Thrust System with various components of

dextral strike-slip, imbricate fans, oblique slip thrusts, shear zones and brittle listric faults contains elements that are consistent with inclined transpression, including components of strike-slip and dip-slip (Jones et al., 2004).

In the Kermanshah region an earlier thrust event occurred in the Maastrichtian–Palaeocene. This is indicated by ophiolite and radiolarite-derived clasts in conglomerates of the Maastrichtian–Palaeocene Amiran Formation in the adjoining Zagros Fold-Thrust Belt (Braud, 1987) and by an angularly unconformably overlying Eocene–Miocene rock succession (10 km east of Harsin, Braud and Shahidi).

A major Late Cretaceous deformation has affected the region and produced northwest to west-northwest trending folds, faults foliations/cleavages (see above). This deformation is recognised in the Dorud-Azna region and is mappable throughout the Hamadan Phyllite where northwest-trending synclinoria and anticlinoria forming a southwest-vergent fold belt are delineated by the Cretaceous outliers (Fig. 8). Mapscale folds in Cretaceous rocks are tight to isoclinal typically with vergence to the southwest and this is also the major deformation in the underlying Hamadan Phyllite (Fig. 8). The deformation is clearly of Late Cretaceous age as it affects Early Cretaceous (Aptian–Albian strata, Fig. 10) and is post-dated by abundant massive Palaeocene granite intrusions (Fig. 8; Valizadeh and Cantagrel, 1975). In order to relate and compare the above deformations to the tectonics of the SSZ, a brief account is given here of structures encountered at the rear (to the NE) of the main SSZ thrusts. In general, the deformation style is significantly different, as underlined by the much smoother folds involving Cretaceous Orbitolina limestones where they are preserved

The sub-Cretaceous angular unconformity provides evidence for regional uplift and tilting of the Hamadan Phyllite in the late Jurassic-early Cretaceous interval and was accompanied by intrusion of limited Late Jurassic and Early Cretaceous granites (Valizadeh and Mohajjel). This unconformity is also recognised in the marginal sub-zone to the southwest. Deformation that predates the Cretaceous unconformity has been observed in several areas (e.g. Hamadan, Berberian and Alavi-Tehrani, 1977 identified northwesttrending folds and axial planar schistosity). Early metamorphism is also indicated by the presence of low-grade metamorphic clasts in Early Cretaceous conglomerates of the marginal sub-zone. Early deformation and metamorphism in the Dorud-Azna region may be related to this event although more data is required to confirm this (Fig. 3).

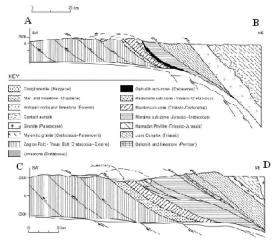


Fig 3. Cross-sections. For locations see Fig. 2. Horizontal scale=vertical scale.

The Golpaygan region is significant as the Cretaceous unconformity is exposed with the underlying Hamadan Phyllite. Alavi (1994) has missed the significance of this unconformity and instead inferred thin-skinned thrusting in this subzone and proposed that Cretaceous limestones were thrust over the Late Triassic–Jurassic Hamadan Phyllite (Fig.4).

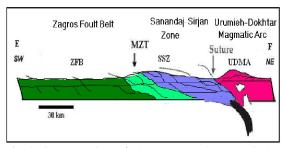


Fig 4 .Cross section of The Zagros Thrust and The Sanandaj-Sirjan in Golpayegan area.See fig.2 (Alavi, 1994).

The Heneshk shear zones in the Eghlid area, are part of the NW-striking, NE-dipping dextral strikeslip Zagros Thrust System of the Zagros orogenic belt. In this portion of the orogenic belt, plastic deformation dominates, and penetrative strain developed. The Zagros Thrust System in this area consists of eight sheets of NW-striking, NE-dipping dextral strike-slip duplex structures that are linked with imbricate fans and oblique slip thrusts (Fig. 5)..

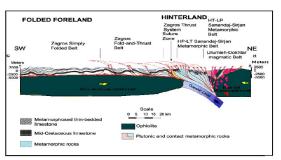


Fig. 5. Large-scale regional cross section of the Zagros inclined transpression from southwest to northeast (G to H section, see fig. 2).

Flexural duplex structures and shear zones are well developed in the Heneshk area, in southwestern Iran. The Zagros Thrust System in this area consists of eight sheets of NW-striking, NE-dipping dextral strike-slip duplexes that are linked with imbricate fans and oblique-slip thrusts.

In the South of Neyriz the Campanian-Maastrichtian Tarbur Formation angularly unconformably overlies the radiolarite and ophiolite and indicates thrusting of Turonian-Campanian age. The Nevriz ophiolite complex is part of the "Croissant Ophiolitique" (Ricou and Ricou, 1976) that stretches between Oman and the Mediterranean Stocklin; (Gansser: Stocklin; Coleman; Moores; Moores and Stoneley). The Neyriz ophiolite complex, represents an imbricate stack of NW-striking, NE-dipping thrust sheets of ophiolitic and related sedimentary, igneous and locally-metamorphosed rocks, immediately to the southwest of the "Main Thrust" of the Zagros fold-and-thrust belt(Fig. 6).

Thrust sheets containing mantle and oceanic crustal sequences occur in the middle of the stack and constitute what has called the ophiolite component of the Neyriz ophiolite complex which includes peridotite, gabbro, diorite, plagiogranite and mafic and acidic volcanic differentiates (including mid ocean ridge basalt, MORB).

The Sanandaj–Sirjan HP-LT metamorphic belt and Zagros Thrust System exhibit three distinct deformation phases. The first phase of deformation (D1) led to the formation of the main foliation (S1). This NW–SE foliation is parallel to the Zagros Thrust System. The S1 foliation may have formed at the peak of metamorphism, whereas later events (S2) are characterized by deformation of this foliation to produce weaker and less penetrative foliation under lower grade or drier metamorphic conditions (Passchier and Trouw, 2005). The third phase of deformation (D3) developed by shear along the shear zones and thrusts and gave rise to the S/C shear band cleavages (S3).

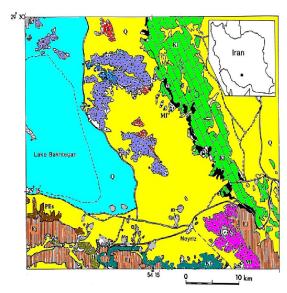


Fig. 6. Geologic map of the Neyriz area showing the distribution of the Hassanabad Unit (vs) along the Main Thrust and the Crush Zone of the Zagros fold belt, at the northeastern edge of the ophiolite belt. The inset map of Iran shows the location of the map area. The Sanandaj-Sirjan metamorphicigneous belt lies to the northeast of unit "vs" and includes the crystalline rocks under unit "Kl". Q (Quaternary); Mf (Eocene-Miocene conglomerate and sandstone); Ej (Eocene Alveolina limestone, Jahrum Fm.); PEs (Paleocene–Eocene gypsiferous marl, limestone, sandstone, conglomerate, Sachun Fm.); Kt (Campanian–Maestrichtian, Tarrbur Fm.); vs (Late Cretaceous, Hassanabad Unit); Kl (Cretaceous orbitolina limestone); m (Mesozoic mélange); d (Late Cretaceous ocean floor basalt); u (Late Cretaceous ultramafics); mb (marble); H (Infracambrian Hormuz salt diapir). Modified from Valeh and Alavi Tehrani (1985) and Sabzehi et al. (1993).

3. Evolutionary relation of the Zagros thrust (crush zone) and the sanandaj-sirjan zone

The tectonic regime between the Arabian margin and the Sanandaj–Sirjan zone changed from passive to convergent (Ricou, 1996; Sengör and Natalin, 1996 and Guiraud and Bellion, 1996). A north-dipping subduction zone under the Sanandaj–Sirjan plate is marked on the Cenomanian–Middle Campanian map (Fig.). During the Late Cretaceous, obduction occurred on the northeastern margins of the Arabian plate. This obduction was caused by the convergence of the Sanandaj–Sirjan with the Arabian plate (Ricou, 1996; Guiraud and Bellion, 1996 and Robertson and Searle, 1990).

The Sanandaj–Sirjan plate began to thrust over the Arabian Platform, forming the Zagros Mountains (Dercourt et al., 1993). The main cause of thrusting in the Zagros Mountains, according to Sengör and Natalin (1996), was the counterclockwise rotation of the Arabian plate.

Perhaps prior to the Paleocene, the Lesser Caucasus and Sanandaj–Sirjan and Makran plates were sutured to the Transcaucasus–Talysh system (Fig. 7). The closure of the Mesozoic Great Caucasus–South Caspian Basin began at this time. The author (see Golonka, 2000a; Golonka, 2000b and Golonka et al., 2000) attributes this closure to the influence of large plates—Arabian and Lut plates—as well as the development of a subduction zone along the northern margin of the basin.

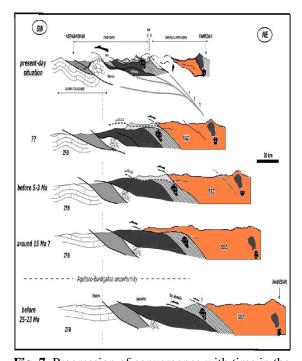


Fig. 7 Progression of convergence with time in the northwest of the Crush zone and the sanandaj-Sirjan Zone. Changes through time SW of the ophiolite unit are only indicative since our study focused on structures located beyond, to the NE; in particular, neither the amount and the timing of shortening in the Zagros Fold belt, which probably started during the latest stages of this evolution, nor the respective amount of shortening of the Bisotun units associated with collision or obduction are known with precision. The amount of shortening in the Crush zone deduced from this reconstruction (about 50–70 km during the last 20–15 Ma) should therefore be considered as a minimum estimate (Agard et al, 2005).

According to Searle (1996), beginning in the Eocene, the Arabian plate slowly converged with Eurasia closing the remnants of the Pindos Ocean along the Sanandaj–Sirjan margin (Zagros suture).

The Sanandaj–Sirjan plate began to thrust over the Arabian Platform, forming the Zagros Mountains (Dercourt et al., 1993). The main cause of thrusting in the Zagros Mountains, according to Sengör and Natalin (1996), was the counterclockwise rotation of the Arabian plate during Oligocene–Middle Miocene.

The sub-Cretaceous angular unconformity provides evidence for regional uplift and tilting of the Hamadan Phyllite in the late Jurassic-early Cretaceous interval and was accompanied by intrusion of limited Late Jurassic and Early Cretaceous granites (Valizadeh and Mohajjel). This unconformity is also recognised in the marginal sub-zone to the southwest. Deformation that predates the Cretaceous unconformity has been observed in several areas (e.g. Hamadan, Berberian and Alavi-Tehrani, 1977 identified northwesttrending folds and axial planar schistosity). Early metamorphism is also indicated by the presence of low-grade metamorphic clasts in Early Cretaceous conglomerates of the marginal sub-zone. Early deformation and metamorphism in the Dorud-Azna region may be related to this event although more data is required to confirm this.

4. Discussion

Rifting of the northeastern margin of Arabia to form the southern arm of the Tethyan Ocean has occurred in two events (Fig. 9(a) and (b)). Firstly, the southern arm of Tethys was forming by seafloor spreading in the Late Permian as shown by the geology of Oman where pelagic sediments of this age occur in the Hawasina nappes (Bechennec et al., 1990.

In Iran evidence for the first of these events is documented in the Esfahan to Sirjan part of the Sanandaj–Sirjan Zone (Saidi et al., 1997). Subsidence analysis of the Carboniferous to Cretaceous succession of the northeastern Sanandaj–Sirjan Zone near Eghlid (Fig. 1) indicates rifting in the Early Permian followed by a Late Triassic event that Saidi et al. (1997) related to subduction along the northeastern margin of Tethys. A major mid Permian marine transgression (Berberian and King, 1981) occurred throughout Iran similar to that in the Arabian Peninsula and these have been related to opening of the southern arm of Tethys.

Continental platform conditions persisted in Iran into the Mesozoic outside the Sanandaj-Sirjan

Zone with deposition of shallow marine to continental strata (St and Motiei). Within the northeastern part of the Sanandaj-Sirjan Zone, Triassic continental and shallow-marine sedimentary successions were interrupted by widespread basaltic magmatic activity (June Complex). The Late Triassic to Jurassic Hamadan Phyllite formed from deep-marine sedimentation and is probably related to thermal subsidence after the magmatic event. This sequence is synchronous with the second extensional event in the southern arm of Tethys. The deposition of volcanic sandstones interbedded in the Triassic succession in the Eglid region (Saidi et al., 1997) are thought to be derived from volcanism associated with the second rift event rather than reflecting subduction of Tethys to the southwest of Central Iran.

The age of this rifting event is similar to that in the northeastern Sanandaj–Sirjan Zone and related to the second extensional event along the passive margins of the south arm of Tethys. The northeastern margin of the Afro-Arabian continent in Iran remained a passive margin until the Late Cretaceous collision event which is consistent with the Permian to Jurassic extensional faulting along the Mediterranean margin of Africa and Early Cretaceous intracontinental rifting of the African plate (Guiraud and Bosworth, 1997).

The northeastern margin of Tethys in the Sanandaj–Sirjan Zone changed from a passive margin to an active margin with the subduction of Tethyan sea floor (Fig. 9(d)). In the reconstructions of the Tethysides by Sengör and Natal'in (1996) subduction is shown along the southern margin of the Podataksasi Zone from the Middle Jurassic to the early Miocene. Igneous activity is consistent with initiation of subduction in the Late Jurassic Cretaceous deformation in the marginal and complexly deformed sub-zones best displays evidence for this subduction.

In the Zagros, ophiolite obduction may have resulted from an island arc collision with the Arabian passive margin. Irregularities in the shape of the continental margin are related to ophiolite generation at re-entrants in passive margins (Pinet and Tremblay, 1995) and this may explain the discontinuous nature of the ophiolite sub-zone that is only found in the Kermanshah and Neyriz regions. The ophiolite generation and obduction event in the Oman-Iran region is much longer than the relatively short-lived Santonian compressional event recorded in the African plate (Guiraud and Bosworth, 1997).

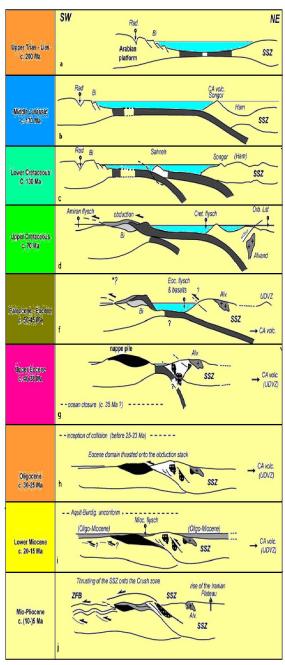


Fig.9. Tentative geodynamic evolution of the northwest of the Crush zone and the sanandaj-Sirjan Zone. Alv. Alvand intrusion; Bi Bisotun unit; CAvolc. calc—alkalinevolcanism; Cret. Cretaceous; Ham Hamedan; Orb. Lst. Orbitolina limestone; Rad radiolarian through; SSZ Sanandaj—Sirjan zone; UDVZ Urumieh—Dokhtar volcanic zone; ZFB Zagros Fold belt. (Mouthereau et al. 2005).

Opening of the Red Sea and the Gulf of Aden resulted in the rotation of Arabia with respect to Africa (Nubia and Somalia) since 30 Ma (Bonatti; Hempton and Guiraud). This plate movement has

been responsible for oblique convergence between the Arabian plate and Central Iran and final closure of Tethys. Convergence has produced deformation (southwest-vergent thrusting, out-of-sequence thrusting) mainly along the former Cretaceous obduction zone in the Sanandaj–Sirjan Zone and deformation in the Zagros Fold-Thrust Belt (Fig.9f); Berberian, 1995). Timing is well constrained by late Miocene and Recent synorogenic siliciclastics that consist mostly of conglomerate in the Zagros Fold-Thrust Belt and along the southwestern border of the Sanandaj–Sirjan Zone (Alavi, 1994).

5. Conclossion

Across the Zagros domain, several major tectonic events are shown to have taken place at the end of the Cretaceous, during the late Eocene and from the Mid-Miocene onwards (ca. <20–15 Ma), respectively. In northern Zagros (Kermanshah–Hamedan area), final resorption of the oceanic domain must have taken place slightly after 35 Ma, and collision must have started before ca. 25–23 Ma.

The Crush Zone, which includes cataclasticallydeformed rocks of both the southwestern edge of the Sanandaj–Sirjan block and the northeastern part of the ophiolite complex, formed as a result of the Miocene contractional tectonics. The Miocene contractional deformation led to renewed thrusting and slicing in the ophiolite complex and the cataclastic intercalation of the volcaniclasticvolcanic rocks with the Cretaceous limestone at the southeastern edge of the Sanandaj-Sirjan. The thrusting of the SSZ over the Crush zone after the start of collision: at least 50-70 km of convergence was accommodated by intracontinental shortening and subduction. The shortening rate across the Crush zone since the Mid-Miocene (20–15 Ma) is estimated at a minimum 3-4 mm/year. Progress of the deformation across the Main Zagros thrust also strongly suggests that the suture zone is effectively located between the Crush zone and the SSZ, contrary to earlier claims.

Comparing reconstructions of plate kinematics and, the total Eurasia–Arabia convergence reaches about 450 km since 19 Ma (early Miocene), whereas the shortening across the entire Zagros fold belt is thought to be in the range of 50–80 km during the same period.

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World Trade Organization (WTO) and its challenges with OPEC

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Abstract: Crude oil is the stimulating engine of world industry and has directly or indirectly dedicated a big deal of international trades to itself. The Group of Petroleum-Exporting Countries (OPEC) is in charge of the control of the main portion of the production and export of this product. On the other hand through its regulations and multi-aspect rules, the WTO supervises the trade of this product as well as the services between the OPEC members. However, the role of this organization in world trade of crude oil and its relations with OPEC is unclear. Today, both OPEC and WTO are eminent international financial organizations. WTO and OPEC each play a completely distinct role in the global financial stage. The former plays this role through its harsh and rigid regulations and the latter by its constant change in the oil price. Things which develop the complex issues of international laws and their related policies are the major position of OPEC in making negotiations regarding the production and procurement of crude oil and finally appraising it on one hand and the position of WTO in making rules of international trades regarding all trading goods on the other. This will raise questions such as: What is the effect of WTO on oil?, Can OPEC and WTO coexist?, is it possible that a country be satisfied of its simultaneous membership of both organizations?

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Keywords: World trade organization; Antiy Dumping; Agreement; Privilege; Global Market; Consigne

1. Introduction

For years it was assumed that oil is excluded from the area of GATT's business negotiations and agreements.

While many of the goods became subject to the laws of international trade in the primary agreement, oil and oil products were never clearly discussed in business negotiations.

Most of the Asian or African countries exporting oil were practically colonies of GATT through the first years of their emergence (till early 1960s). The total production chain of oil in these countries was under the control of international oil companies. Since Europe did not produce much oil, European countries did not set high custom tariffs on oil and oil products. In such circumstances where oil producing countries could not influence the international oil trade, they did not have an active participation in GATT. This was a reason for not discussing oil in the cycle of business negotiations.

Yet, some other oil exporting countries like Mexico became a member of GATT many years ago and have been active in negotiations ever since. In the process of negotiations for joining, Mexico was able to include a special condition in his joining protocol regarding oil under the title "conserving natural resources". This condition exempted Mexico from some of GATT's necessities in oil and oil

policy part. Besides, Mexico had a key role in negotiations in Uruguay for policies about appraising natural resources and could affect the results by making changes in the final drafts of the proceedings of the negotiations (Ja'fari, 2005).

It should of course be noted that neither in GATT's rules nor in WTO's existed any instructions to except oil and oil products from the approved rules and even in article 20 of GATT's rules there has been an indirect notice to oil. In the same article, which is related to "general exceptions", it has been mentioned that countries are free to make rules for their export of natural resources in order to save them. The mentioned rule will give the petroleum-exporting countries the right to decide about their natural resources by restricting their exports with having in mind the basis of governing the natural resources.

We will briefly go through the effect of WTO's agreements on oil in the following parts.

2. General Agreement on Tariff & Trade 1994 (GATT 94)

This agreement consists of some rules and regulations regarding the activities of governments and nongovernmental companies in field of import and export which leads into free trade of goods and services and is based on three principles which are

Most Favored Nation Treatment (MFN), National Treatment (NT) and Prohibition of Quantitative Restrictions (PQR).

Favoring the fact that the tariffs set for crude oil, oil products and petrochemical articles are so low, they will never be considered as obstacles in international trade of petroleum.

However, the principle of prohibition of quantitative restrictions which means eliminating any prohibiting element in international trade (except for specific circumstances) is in sheer contrast with OPEC's strategies for allotment of oil.

It is worth mentioning that OPEC allotment will restrict oil production rather than its export.

In addition, clause g of the article 20 of GATT has considered the exceptional situation of the prohibition of quantitative restrictions as: "this action is allowed in cases where the aim of saving in consumption of natural resources is implemented to the same extent in internal consumption and production". In other words, the petroleum-exporting countries can refer to this clause of article 20 of GATT in order to justify OPEC's allotments. Hence, the major and unique restriction of this exception is that these restrictions should also be applied to production and internal consumption (Jimenz, 2002).

One other exceptional case which relates to OPEC is clause h of article 20 of GATT agreement. It mentions the actions which "have been planned in a government to meet the responsibilities determined by a goods agreement and none of its signatories disapproved the agreement". Therefore, apparently the OPEC members can rely on clause h of article 20. This means that "the quantities and the restrictions by OPEC are the result of an intergovernmental goods agreement". Of course there is a place for doubt whether all WTO members accept the actions presented by OPEC. Finally, we get to the exceptions regarding the national security issue which is subject 21 of GATT agreement. It implies that no single article of the agreement will be interpreted in a way that:

Necessitates any of the parties to present or reveal information that are in contrast with its national security and benefits.

Avoids each of the parties from making decisions in taking actions good for its national security and benefits.

Prevents any of the parties from there responsibilities which are on their shoulders based on the liabilities to the charter of the United Nations for maintaining peace and global and international safety.

It is generally accepted that governments are qualified to decide about the things which support their "national security and benefits". Considering the

specific reputation of oil department and its strategic importance, the above mentioned exception of the article 21 can be a legal justification for limitations of the import and export of oil and oil products. That is why the United States used to apply some controls on the export of oil and oil products as a result of political and security issues. (Omidbakhsh, 2001).

3. Agreements about subsidies and compensations

This agreement which was signed in negotiations in Uruguay defined "subsidy" as government's financial support which will bring benefits for the economic agencies. This benefit can be in the form of funds transfer, exemption from incomes to be collected or some purchases by the government. According to this definition "subsidy" will be divided into three parts.

Traceable subsidies: the ones which can be named under the WTO's settlement system of discrepancies and their related compensating steps.

Forbidden subsidies: they consist of all export and import subsidies and paid subsidies given to reinforce the consumers in substituting the domestic products with the imported ones.

Untraceable or licensed subsidies: the one given to all industries of a country and which are not restricted to a special industry.

Regarding traceable or forbidden subsidies, any of the countries who is a beneficiary can refer the matter in form of a complaint to the discrepancy settlement column or start their investigation processes in order to get compensating duty for the imported goods from the exporting country. Anyhow, the existing solution of such cases is receiving compensating duty. However, this action is allowed merely when the damage on the industries of the importing country is evident. Otherwise, the members can refer to the discrepancy settlement column. In other words, if there is no damage to the industries of the importing country, it can only bring the case to the discrepancy settlement column but can not directly set the compensating duty (Gheybi, 2006).

One aspect of the above mentioned agreement is that particular subsidies are traceable and according to the meaning of the word. "particular", regarding oil one can discuss that since the subsidy for oil and natural gas supply in domestic markets is lower than the global ones, therefore, it will not be considered as a particular subsidy and eventually it is untraceable. Nevertheless, determining the subsidies as unparticular and recognizing them as untraceable is bound to legal announcement of the committee of subsidies and to WTO's compensating actions. Any implication of the natural resources subsidies will obviously affect on the ability of the petroleum-exporting countries in utilizing their oil and other natural resources as a reinforcing tool for varying their domestic economics. For instance, in the early 1980s America's international trade court interpreted public benefit as: "it should never ever be given to a specific receivers and if in action special organizations or people benefit from it, they should be subject to paying compensating duty (Omidbakhsh, 2001).

4. Agreement about compensating and antidumping rights

This agreement which is a part of WTO's package of agreements provides an exclusive framework for anti-dumping attempts. According to this agreement which is set like a precise legal text (paragraph 1, article 2), a dumped product is the one which is sold with a price lower than its own in the target country, has an export price lower than similar goods in the market of target country and is used in the country it is exported to.

For a member of a WTO to be able to make anti-dumping moves, it is necessary to prove that such thing as dumping has actually happened. Then, it should be proven that it has caused a great damage to the domestic industries of the importing country or will disrupt the process of development of domestic industries. Finally, the cause-effect relationship between dumping and damage should be clarified.

This product can have critical influences on the export of oil products and petrochemical goods.

Supplying cheap energy, oil and gas to these industries in the gas and petroleum-exporting countries has always been considered a reason for dumping in the importing countries. Based on article 2 of the agreement, this reason will be dumping only if supply of the producing companies in the preferred range of prices is restricted to exporting industries. In Petroleum-exporting countries, cheap raw material (oil or gas) is almost to the same extent available for export industries or others and so from this aspect they can not be considered as dumping.

In WTO's framework, anti-dumping actions should only be executed by the governments rather than the private section. Besides, in case that the respective country decides to take these actions, it should first go to the Goods Trade Council of WTO to get a license. Then, the dumped country should refer to discrepancy settlement column and ask for a board of investigators. This board can not express its opinion regarding the dumping but it just can evaluate and assess the legitimacy of the investigations done and information presented by the complaining country.

From the point of view of the secretariat of OPEC, one other issue that exists in interpreting and

executing the international trade laws is misuse of the anti-dumping rules. Since other obstacles of trade are more or less eliminated, today countries are increasingly bringing lame excuses to use antidumping tariffs for restricting import. As an example one can mention the actions of the Committee of saving domestic oil (CSDO) which is a group including independent oil producers in the US. Based on United States' anti-dumping rules, this group has tried several times to accuse some countries such as Venezuela, Saudi Arabia, Mexico and Iraq of dumping their petrochemical goods and oil products in America and consequently damaging America's oil industry. These accusations are based only on America's anti-dumping rules rather than that of WTO's. Hence, by collecting the effects of dumping of these exporting countries on the US, America is allowed to be certain of the damages of the competing industries in the US and consider it a cause for anti-dumping actions.

Anyway, the anti-dumping side effects are among the causes which restrict the abilities of the petroleum-exporting countries to exploit natural resources for enhancing their process of economic and industrial development (Jimenz, 2002).

5. Agreement about the technical obstacles confronting trades

This agreement which is a competed version of the Tokyo negotiations (TBT) includes a list of legal issues that should be the base of setting technical rules. This list also includes the environmental subjects. Considering the effect of oil on the environment and the complexity of the technical rules and standards of the oil section, providing that oil becomes a part of WTO, its production and international trade will be influenced by the mentioned agreement. Some of the agreed upon rules of TBT agreement are directly related to petroleum-exporting countries.

Under the TBT agreement, it is mandatory to observe certain standards and technical rules in order to be able to meet the environmental goals. The TBT agreement is considered environmental-oriented from the aspect that it will provide the importing countries with the opportunity to appoint discriminations against crude oil and oil products of exporting countries. Inn addition, the environmental movements can easily be justified as they do not need accurate tests to improve their effectiveness. It is not as well necessary to improve the effectiveness of these movements in reaching the environmental goals because these agreements do not their members to present documentation and proves to be able to scientifically justify the technical rules. As a result, UNCTAD has laid down that the environmental rules should be based on necessity and some factors such as effectiveness, indiscrimination, clarity and not causing disturbance in the process of trade should be considered in their collection. (Jimenz, 2001).

6. General agreement about service trading

GATT's general agreement of service trading includes 6 parts, 29 articles and 8 attachments. This agreement can be used regarding all kinds of actions used for service trading no matter in which of these forms like rules, regulations, processes, decisions, directorial actions or else. Its goal is to develop service trading as a tool for rising economic growth of all parties and advancement of all developing countries.

This agreement does not directly affect the oil and oil product trades. Yet, as a result of its significant impact on production of oil, it will indirectly cause changes in its trade and that is possible through changes and transformations brought about in the structure of services related to oil

In most countries of the world all activities regarding oil industry including services is under the control of governments or private sections which has caused massive exclusiveness by vertical merges. This has reduced the level of competition in these activities. Based on this, provided that oil and oil products get into WTO's negotiations, these activities which have a key function in global oil industry will also need to be part of GATT's agreements and eventually have various effects on different countries (Gheybi, 2006).

7. The joining of the OPEC members to WTO and its consequences

Before, the OPEC members were not able to influence on the results of GATT's negotiations. This was so because none of them participated in GATT's meetings and most of them thought that oil's strategic success in global market is sufficient for oil section to be excluded from all rules and regulations passed by GATT. Today, they are suffering from the consequences of their 50 years of being away from GATT and WTO. Nowadays becoming a member requires more profound economic, political and legal changes.

Here and now on one hand some of the OPEC members have become and some are in the way of becoming a member of WTO. On the other hand, in March 2000, as a permanent international organization, OPEC officially asked WTO to become a superintendent of meeting sessions of some OPEC committees such as general council, development and trade, and environment and trade committees. All

these help so that these countries would be able to coordinate their point of views and benefits (and probably form a forceful alliance within WTO) and raise their competence in bargaining and also affect the results of future WTO negotiations through their active participation.

Pertaining to everyday expansion of WTO's domain and new subjects gradually presented in their negotiations as well as the everyday increase of the optional rules and regulations into mandatory ones, we can rationally come to the point that the legal framework of this organization is ever-increasing and can more and more influence on the international economic relationship of the countries whether a member or not. Therefore, the consequences of becoming a member or overlooking to become one in this organization can not be measured by the present information. Chances are that we witness unforeseen consequences for the nonmember countries (Jimenz, 2001).

Most of the petroleum-exporting countries are the underdeveloped ones and they rely on one single kind of natural resource. Having that in mind, one implies that the greatest impact of WTO's rules on these countries is on their right of national control over their natural resources which is considered their unique relative advantage in foreign trades. The rules that WTO passes or their interpretations can restrict these countries ability in exploiting their relative natural resources to reach economic growth.

WTO's agreements impose several other musts on all countries in using natural resources. particularly limit petroleum-exporting countries in exploiting their natural resources for accomplishing economic and industrial growth. Rules regarding the subsidies and anti-dumping constrain many policies of the petroleum-exporting countries concerning economic growth. Even now the above mentioned agreements include articles which under special circumstances allow supply of energy to the domestic industries with a lower price than that of the global one. But providing these situations is not easy for the petroleum-exporting countries. WTO's agreements are moving on a track which will go to forbidding the donation of any subsidies to industries in the process of economic and industrial growth of developing countries.

Of course WTO considers certain privileges for developing countries which are:

- having more flexibility in government's use of tools of economic and commercial policy
- longer transfer period (changing internal rules and structures)
 - receiving technical assistance

It is worth explaining that all OPEC members that are now WTO members are among the

list of developing countries and hence benefit from these privileges. The title "underdeveloped" will only be given to a country by one of the WTO members and there does not exist a standard definition for it in any of the texts or documents of WTO. Though, proving that a country is developing is not an easy job for a country that demands membership of WTO for the members will oppose this claim and will not simply accept to give these privileges to a country.

OPEC's secretariat has marked the countries exporting several types of raw materials that in the clauses of section 4 of GATT's agreements have particularly been named as "developing countries" to prove that the OPEC members are considered developing.

For instance, clause 36 refers to: "... the necessity of providing a suitable situation for the exporters of these goods in order to have access to the global market (of raw materials). And also according to the situation, some policies should be carried out for making stability especially regarding the prices of these goods and causing progress in global market".

Clause 38 further mentions that: "... if possible, by the means of taking efficient steps in the framework of international arrangements ... a convenient and stable situation which is needed in international market of these goods (raw material) be provided so that the exporters become able to sell their products in good prices and have price stability in the market".11

It is of course essential to differentiate negotiations of crude oil with WTO members on one hand and having a group like OPEC in WTO on the other. In other words, the behavior of WTO members will not be the same with international trade of oil and OPEC. OPEC is a political-economic association whose members try to defend their benefits against all the pressures and interferences of great economical powers of the world which are also key WTO members. They are also attempting not to lose their authority and interventions in the global oil market.

On the other hand at the present stage neither the structure of power nor the decision making system of WTO allows OPEC, a third-world organization, for such an attendance.

Obviously we should not forget the fact that the developing countries which are WTO members will not be satisfied with OPEC's participation as a third-world organization as most of the developing countries are among the major importers of crude oil and from this aspect their benefits are in contrast with those of its exporters. Yet, their benefits are remarkably in accordance with those of the developed countries of WTO (Omidbakhsh, 2001).

In the end, it is worth reciting the advantages and disadvantages of becoming a member of WTO:

disadvantages: the possibility of using the following facilities would be less for those countries which are members of WTO:

supplying cheap energy to the domestic industries

restricting the purchases of oil companies to the domestic market

restricting the purchases of governmental companies to the domestic market (this is regarding the consignees of the collateral agreement of governmental purchases)

One should compare the disadvantages of not being a WTO member with the costs on has to bear. Not being a part of GATT system of WTO has serious costs for the nonmember countries because they will be affected by the decisions made in this framework anyway. Remaining out of the cycle of WTO is not advisable for petroleum-exporting countries. That is because even when they do not become a member, these countries should accept the consequences of execution of the agreements on their economy without having any influence on the results of negotiations. Besides, over time it might become more difficult to get a membership of WTO for those who are now qualified by are not a member.

Advantages: the possible advantages for members of WTO might be:

influencing on the results and the future ways of negotiations: since important issues regarding capitalism are going to be discussed about in the future negotiations, it is better for countries to be able to participate in them.

In addition to the impeding factors of international oil trade such as taxes and environmental policies of exporting countries, some countries have recommended that there be separate mechanisms for negotiations between the exporting countries and consumers regarding these issues. However, these mechanisms do not yet exist and it is too soon to predict its future.

Having access to the mechanism of settling discrepancies: this point can be used when the consuming countries apply discriminatory acts against oil. This has been once been used by Venezuela and Brazil in the past and has had satisfactory results.

The World Trade Organization does not directly follow the cases of deviations from its agreements and it is up to the country which claims of having unfairness should take its case to the related column: This has brought amenities to the members and made the WTO agreements flexible.

Weak countries defend their resources in multilateral negotiations; usually the determined conditions of collateral negotiations and agreements are more difficult than the multilateral ones.

It is necessary to emphasize on the fact that these advantages will exist only if the petroleum-exporting countries have a congruent procedure in negotiations and if possible provide alliances inside WTO to increase their power of bargaining in negotiations (Jimenz, 2003).

9. Conclusion

Aiming to assist free trade and remove the obstacles, the World Trade Organization by having the most members compared to other international organizations is now the leading one in international trade and is going to supersede oil and oil trade.

Though oil was not vividly emphasized in the negotiations resulting in the establishment of oil, no law of multi-trade system has clearly excluded it.

The oil exporters, who once thought strategic nature of oil suffices them for remaining out of global multi-trade system, are now concerned that by joining the WTO they will not be able to support oil prices through controlling its production.

In the situation where WTO is going to ban close-to-zero tariffs of goods, some countries like United States and Japan are deciding not to restrict their tariffs of crude oil. Hence, the benefits of the petroleum-exporting countries require them to ask for tariffs of crude oil to become a part of these legal necessities. This is not possible unless joining WTO and participating in its negotiation cycle.

Those petroleum-exporting countries who have not participated in negotiation cycles during the 50 years of GATT and WTO are paying a great cost for being far from the multi-aspect trade system. Besides, the later countries try to join WTO, the more complex, lengthy and liable will be their process of joining. Since the taken decisions in the framework of world trade will affect the nonmember countries as well, it is essential that the OPEC members investigate all advantages and disadvantages of this membership and step in the way.

A- We are now in a situation in which the oil-consuming countries impose discriminatory actions on import of oil products in the form of environmental issues or tariff plans. In such conditions, since there exists a more flexible condition for developing countries in WTO, the system of settling discrepancies will help these countries in having a shelter to restore their rights. Finally, simultaneous membership in OPEC and WTO bring about opportunities for these countries to in addition to their alliance also have an impact on

the results of negotiations through bargaining in multi-aspect contracts.

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Recognizing Operative Factors on Agroforestry Effective Extension in Guilan Province, Iran

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Abstract: Making economic, environmental and social benefits along with preservation, revival, development and appropriate exploiting from renewing natural resources is the main subject for a sustainable development in 3rd millennium that Agroforestry is trying to reach. While inhabitants of forests and its outskirts inhabitant's way of life is in contrast with natural resources improvement. The general aim of research is recognizing affective factors in presenting Agroforestry effective extension. This research in aspect of an applying proposes and correlation way is based on collecting non-experimental data's. Validity of questionnaire as a research tool confirmed by experts panel and its reliability of α = 0.885 is emphasized. Statistic society of existing research includes 230 people of extension experts in Guilan. For analyzing the data, deductive statistic is used. Results from stepwise regression shows 7 factors include extension agent's personal characteristics, way of presenting the service, economical characteristics, requirement, personal characteristics of clientele, cultural and social features of the area and policy making particulars, explained 86% variance of Agroforestry effective extension.

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1. Introduction

Those who always crop from forest and are known as partial croppers, is proved that prevent stability of biological environment in this area. They make changes in forest ecosystem and at the end lead to low economic potential of forests (Workman et al. 2005). Always when we talk about woodmen and its outskirts inhabitant's limitless usage of forest wood two factors appears: one is poverty and the other is wood for fuel and warming; that these two factors are the most essential ones in subversion of forest along with wood smuggle (Rodriguez et al. 2009). Population growth, cutting forest trees and climate change is a base to decreasing of stability in forest production. In these circumstances, possibility in exploiting from a system that one could use forestry and agriculture altogether and in a way that doesn't harms environmental structure and also makes the woodmen and its outskirt inhabitants familiar with that is useful. This system is called Agroforestry (Salil, 2008). With consideration to this fact, those woodmen and its outskirt inhabitants are not against the development of forest and are even ready to participate in recovery, preservation of forests, still their way of living is in contrast with forests production making and their livestock could make loss to forests (Mirfardi, 2004).

Among through all of world's resource, forests and pastures because of their direct effect on

people's life are the most important and superior (Forest and pastures organization, 2010). One that is obvious is the main energy needed for woodmen and outskirt inhabitants is supplied from forest. Many of markets, houses, corrals etc, is made from woods of forests (Jarju, 2008). Agroforestry system is tried to make a stable situation in jungle area (Olson & Ebert, 2007). Agroforestry is a compound name for a system in using earth and applying technologies in providing permanent wood and also deliberately administration of uniform management in units and fields for getting agricultural products, forest products and culturing livestock simultaneously in special interval and sequences, that this system has ecological and economical solidarity between members (Pinto et al., 2001). It is an appropriate way for recovering usage of earth and intensification in productivity; it makes intensification in utilizing in agriculture especially for poor farmers that couldn't afford high charge of fertilizers, pesticide and other expenses (Mazhar et al. 2009). Based on studies done in Iran, basically, 87% of subversion factors in natural resources are human and only 13% is assigned to natural factors (Forest and pastures organization, 2010). Because of this improving, knowledge level of people for preventing from subversion is inevitable. For better recognition of Agroforestry system and appropriate education of this system to them, Agroforestry extension

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programming is made. Agroforestry extension considers promoting properties in presenting education to woodmen and other people. Reviews in Agroforestry extension are done widely and complete. How to invest and risk of it and also way of marketing of products are parts of subjects to be considered in Agroforestry extension. Indeed, limits of extension agent's information and theme specialist in applying Agroforestry are in an acceptable level (Pratt et al., 2002). The thing that is important in presenting the extension services is its proper and effective presenting, that happens providing attracting the peoples partnership and using correctly from human relations (Ponniah et al., 2008). In different researches, some of researchers review the factors that their possibility of their effects in effectiveness of Agroforestry extension activities and programming is probable. In some researches, two factors are effective: economical factors and people knowledge level as individual factor (Louis et al, 1999; Darvish et al., 2009). Also in some of researcher's idea individual factor affects in Agroforestry extension (Vandenban & Hawkins, 1988; Bonnard, 1995; Strong & Jacobson, 2006). In charge system role, on ground as a policy making factor and also choosing suitable extension methods are of factors that has an important role in presenting Agroforestry (Scherr & Muller, 1990; barrow, 1991; Current & Scherr, 1995; Buyinza et al., 2009). Social and cultural factor (connection level with extension agents, knowledge level of people's environment, world's thinking level, social partnership etc.) is one of the important factors in presenting and extending Agroforestry (Waghmere, 1998; Muneer, 2008). Using from Agroforestry by woodmen and outskirt inhabitants is an innovation that for reaching it we need to provide the least requirements. On the other hand, if needed tools for system are not provided, this activity would be impossible. The requirements are prerequisites or basic and essential factors that each system needs for starting them (Gemo et al., 2005). From some researchers point of view, basic factors as required factor and in the other hand knowing them for programming is a suitable guideline (Hedge, 1991; Scherr, 1992; Nair & Latt, 1994; Reed, 2007). In this researches, requirements includes factors like making the people aware of Agroforestry, making motivation in local society, making scientific and technical substructure, making capacity in local society, attract people partnership, clientele oriented and self-sustaining are considered.

At the time that world is developing fast and technologies and different systems in agriculture and natural resources are applied, Agroforestry system has effects on recovery and preservation and appropriate exploiting of recycling resources.

Considering the challenges that exist in this field, Agroforestry has benefits that are prominent. Economical benefits (increasing food production, wood for fuel, increasing wood producing, increasing provender etc.)(Workman et al., 2003). Social benefits (improvement the rural standard's life with stable production, improvement innutritious food and health by increasing the quality and variety of food)(Salil, 2008) and environmental benefits (like lowering pressure on forest, better protection of ecological system making a useful cycle of nutritious food in trees)(Olson & Ebert, 2007). Guilan forests are greatly worthwhile from the aspect of wood producing, nutritious substance, decorative plants, medical herb, making preoccupation and producing resource of currency. Also the most important and valuable direct and indirect effects of these forests are because of making basis in order to sustainable development. Because of subversion in forests at the north of Iran, it seems that for lowering these subversions administrating Agroforestry system could smooth the existing pressure but up to now Agroforestry is not successful in motivating and attracting woodmen and outskirt inhabitant's partnership, because of not being imparted of extensional education (Mohamadi, 2008). Also protection of forest has roots in philosophy and religion. But all of the new age efforts for protecting these resources only insist on technical advices. On the other hand, mostly physical protection is noteworthy than emphasis on human knowledge, while the way you treat with nature is in human's hand and human as the last chain of every kind is a sustainable strategy (Mather, 1980). Because the most affective factors in perfect presenting of Agroforestry, is presenting extension services and increasing people level of awareness. So this research because of concentrating on extension sector is valuable. Based on this value in presenting true Agroforestry and lack of required studies in this field and also importance of preventing from subversion of natural resources by woodmen and obligation of keeping herbaceous coverage of precious Guilan forest revolve the importance of this project.

The main objective of this study is getting to know some of affective component in Agroforestry effective extension. For reaching this target, edited special objectives include: 1- Review of experts characteristics 2- Nomination of severity of correlation between dependent variables of study and effective extension of Agroforestry from experts point of view 3- Regression analysis of affective component on effective Agroforestry extension from experts point of view.

2. Material and Methods

Noting that research target of some affective components is in Agroforestry extension. It's a nonexperimental research and is done by survey Gathering information tool is techniques. questionnaire. For editing the questionnaire first visionary basis was revised and by accounting the result of studies, preliminary questionnaire provided. It included 9 parts. The first part was related to individual characteristics questions including 5 questions, seven parts was related to evaluating independent variables of research(extension agent's personal characteristics, way of presenting the service, economical characteristics, requirement, personal characteristics of clientele, cultural and social features of the area and policy making), include 77 questions in the form of 5 optional questions (Likert) and the final part is related to evaluation of dependant variable of research effective extension) includes 14 (Agroforestry questions in form of 5 optional Likret is edited. For studying the validity of tools of research, mentioned questionnaire provided for experts and specialist that after necessary reforms, its validity was confirmed. For testing reliability of questionnaire, 30 numbers of them were completed by related experts for preliminary test as Coronbakh calculated alpha was 0.885 that is a suitable reliability coefficient for this research. Statistic society of existing research include 230 people of experts that has agricultural extension position in Guilan province or has bachelor of science (BS) or upper degrees in one of agricultural and natural sources branches and were working in governmental and private companies. For delicacy increase the accuracy we use capitation way. 230 questionnaire were distributed among experts and all of them were invited (answering coefficient was 100%). In descriptive statistic from average statistics, mode, median, diagram and Coefficient of Variability (C.V), and in deductive statistics from correlation analysis (Pearson correlation coefficient) and Stepwise regression evaluation is used. For analysis and evaluation of data collected, SPSS software version 18 is used.

3. Results

First objective: Review of experts characteristics: Research findings show that 193 people of studied men experts (83.9%) and other 37 are women (16.1%). Analysis of given answers from experts about age shows that the most frequency is for age group 41 to 50 years old (%40.9) and the least frequency is related to 30 and younger (%6.5). Average age of people is 42.6. Revising education level shows that the most frequency is for BS (Bachelor of Science) degree (%48.7) and MS.C degree (%38.2) and PHD degree (%13.1) in order has

low redundancy. Revising educational level status show us that the most frequency is related to cultivating field of study (%29.6) and the least frequency is for herbal science and agricultural management. Also agricultural extension (%15.2), animal husbandry (%13.4), natural resource (%10), soil science (%10), gardening (%8.7) and wood and paper industry (%6.1), in order include the other frequency. Revising given answers from experts about job background shows that the most frequency of job background is related to range of 11 to 15 years (%34.8) and the least one is upper than 20 years(%12.2). The average of experience is 13.8 years. Also range of 6 to 10 years (%20.4), 16 to 20 years (%17.8) and range of 1 to 5 years (%14.8) in order make the other redundancies.

Second objective: Determining correlation intensity between independent variables and effective extension of Agroforestry: In this research, based on correlation results in table (1), variables such as extension agent's personal characteristics, way of presenting the service, economical characteristics, requirement, personal characteristics of clientele, cultural and social features of the area and policy making particulars have positive relation with Agroforestry effective extension and meaningful extension at the level of %99. As effective extension and independent variables of research is formed as range of 5 optional Likrets so adding results of questions from Pearson correlation coefficients is used.

Table 1-Pearson Correlations between Independent Variables and Agroforestry Effective Extension

Independent Variables	r	р
1-extension agent's	0.302^{**}	0.003
personal characteristics		
2-personal	0.442^{**}	0.004
characteristics of		
clientele		
3-economical	0.517^{**}	0.000
characteristics		
4-Requirements	0.679^{**}	0.000
5-cultural and social	0.383^{**}	0.002
features of the area		
6-policy making	0.611^{**}	0.000
particulars		
7-way of presenting the	0.481^{**}	0.003
services		

^{**}Correlation is significant at the 0.01 level

Third objective: Evaluating affective factors regression on Agroforestry effective extension from experts point of view: According to table (2), extension agent's personal characteristics, way of presenting the service, economical characteristics,

requirement, personal characteristics of clientele, cultural and social features of the area and policy making particulars in order with step to step(7 steps) way enter the regression deal. Finally with entering these variables coefficient of determination will be R=0.863. This coefficient shows that %86.3 of effective extension variance changes is related to these 7 variables and other (%13.7) relate to other factors that are not included in this research. Considering F test (sig=0.000) suitability of regression evaluation is confirmed.

Table 2-The Model summary of Stepwise Regression

Model	R	R Square	Adjusted R Square	Std. error of the Estimate
1	0.679	0.303	0.301	2.191
2	0.713	0.452	0.448	1.985
3	0.798	0.571	0.567	1.703
4	0.827	0.685	0.684	1.541
5	0.871	0.751	0.747	1.385
6	0.904	0.822	0.818	1.211
7	0.928	0.867	0.863	1.135

Entered variables in regression equation that is the main core of regression evaluation is in table (3). T test related to regression coefficient also shows that this coefficient is meaningful and is effective in calculating Y amount.

Table 3-Un-standardized and Standardized Coefficients of Stepwise Regression

Coefficients of Stepwise Regression							
	Un sta	ndardized	Standard				
	Coe	fficients	ized				
Variable			Coefficie	t	Sig.		
			nts				
	В	Std. Error	Beta				
Constant	12.485	3.237		3.821	0.000		
requirements (X_1)	0.865	0.081	0.514	19.724	0.000		
policy making							
particulars(X ₂)	0.802	0.070	0.498	17.628	0.000		
economical							
characteristics(X ₃)	0.769	0.061	0.324	15.144	0.000		
way of presenting							
the services (X_4)	0.585	0.050	0.296	12.237	0.003		
personal							
characteristics of							
$clientele(X_5)$	0.511	0.041	0.277	10.983	0.001		
cultural and social							
features of the							
$area(X_6)$	0.391	0.038	0.254	9.861	0.004		
extension agent's							
personal							
characteristics(X ₇)	0.316	0.027	0.231	8.348	0.002		

Based on table (3) in terms of B amounts, regression equivalent is written: $Y{=}12.485{+}0.865~X_1{+}0.802~X_2{+}0.769~X_3{+}0.585\\X_4{+}0.511~X_5{+}0.391~X_6{+}0.316~X_7$

But judging about role and share of each one of dependent variables in clarifying dependent variable should be assigned to β amount. So the Standardized regression equation is:

Y=0.514 X₁+0.498 X₂+0.324 X₃+0.298 X₄+0.277 X₅+0.254 X₆+0.231X₇

4. Discussions

Based on table (1) findings, there is a positive and meaningful relation between requirement variable and Agroforestry effective extension with intensity of 0.679 at the level of 99%. Also according to table (3) results, share of this variable in clarifying variance changes of dependent variable is the most shares and is equivalent to 0.514. So requirement affect on effective extension of Agroforestry is proven. Researches done by Reed (2007); Nair & Latt (1994); Scherr (1992); Hedge (1991) is compatible with mentioned result. Between policy making particulars and Agroforestry effective extension is a meaningful and positive relation with intensity of 0.611 at the level of 99%. Noting the results that share of this variable is 0.498 in clarifying dependent variable variance changes. Affect of this variable on Agroforestry effective extension will be proved. Done researches by Buyinza et al.(2009); Current & Scherr (1995) is compatible with current result. Between economical characteristics variable and dependent variable there is a positive and meaningful relation with intensity of 0.517 at the level of 99% of assurance. According to get result economical characteristics variable has share of 0.324 in clarifying dependent variable variance changes. So economical characteristics affect on Agroforestry effective extension is proven. This result is compatible with research findings done by Darvish et al. (2009) and Louis et al. (1999). Between way of presenting the services variable and Agroforestry effective extension is a meaningful and positive relation with intensity of 0.481 at the level of 99% of assurance. According to results, that share of this variable in clarifying dependent variable variance changes is 0.296 affect of this variable on Agroforestry effective extension will be proved. Done researches by Barrow (1991) and Scherr & Muller (1990) are compatible with mentioned result. Between personal characteristics of clientele variable and dependent variable there is a positive and meaningful relation with intensity of 0.422 at the level of 99% of assurance. According to results achieved, personal characteristics of clientele variable has a share of 0.277 in clarifying dependent variable variance changes so effects of this variable is proved on Agroforestry effective extension .These results is compatible with research findings done by Strong & Jackson (2006) and Bonnard (1995). Between

cultural and social features of the area and dependent variable there is a meaningful and positive relation with intensity of 0.383 at the level of 99% of assurance. According to achieved results this variable has a share of 0.254 in clarifying dependent variable variance changes so cultural and social features of the area affects on Agroforestry effective extension are proven. Done researches by Muneer (2008) and Waghmere (1998) is compatible with mentioned result. Between extension agent's personal characteristics and Agroforestry effective extension, there is a meaningful and positive relation with intensity of 0.302 at level of 99% of assurance. Considering achieved results, extension agent's personal characteristics have a share of 0.231 in clarifying dependent variable variance changes. So affect of this variable on Agroforestry effective extension is proved. Done result by Vandenban & Hawkins (1998) is compatible with mentioned result. Noting to 7 affective variables in Agroforestry effective extension it's recommended to assign some continuum educational program for extension agents in terms of their target population. And also more concentration are on less experienced people and for succeeding Agroforestry plans and preventing unpleasant experiences, increasing relation making hours between extension agents and people and presenting services and using ways of individual extension for receptive beginner of system apply. It's recommended in presenting extension, extension agents explain capability and benefits Agroforestry clearly, and they get interested and motivated in participating economical team works. It's also recommended programming be toward motivating local society, capacity making, improving the attraction of their partnership, clientele oriented and suitable with their life. Its recommended country's need for Agroforestry plan is specified with professional and precise surveys. And respective organizations get matched and co-work with each other. It's recommended with holding classes and using different extension methods start to make them familiar with economical advantages of Agroforestry. For the start, it's recommended to use big landlords. It's recommended to produce radio and television advertisement program, to improve public natural resource culture. And also for getting out of traditional and single cultivating, special privileges granted to for progenitor and receptive. So creating cooperative organizations of cultivating is useful in a way that both increase people partnership and gain economical benefits in order to divert traditional attitude to more and variable products.

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Destruction Efficacy on the Change of Dynamic Behavior in Structural Elements Using Finite Elements Method

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Abstract: Structures are exposed to main threats such as structure efficiency decrease and its destruction. These problems are intensified along natural or man-made threats like earthquake and sever explosion. Since the earthquake is implemented dynamically and in small distance in terms of time on the structure dynamic analyses is of high importance. In this paper, the structure is put under modal analyses via ANSYS5.4 finite elements software and natural and mode-shaped frequencies of healthy and damage samples are resulted. The results show that frequency is decreased in damage samples. As following by utilizing impact load of structure is put under dynamic nonlinear analyses and through investigating displacement-time, velocity-time, acceleration-time and moment-time graphs destruction effect on acceleration and moment-time graphs can be identified as the form of amplitude changes.

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Keywords: Modal Analyses, Dynamic Analyses, Crack and Frequency

1. Introduction

Structures are exposed to main threats such as structure efficiency decrease and its destruction. These problems are intensified along natural or manmade threats like earthquake and sever explosion. Structural deficiencies cause undesirable changes in structure efficiency. Destructions may be caused suddenly like element rupture because of earthquake loading or damage development and hardness and resistant decrease resulted from crack growth (lotfollahi, Koohdaragh, 2011). Therefore, some methods are demanded for destruction detection. In that case Structural Health Monitoring methods SHM are the subject of wide done researches. During recent years, many attempts are done to develop reliable and efficient SHM systems. These systems should answer the questions of structural damage and destruction place which can lead to coming preparations for repair and efficiency of structures. On the whole, SHM is defined as: ((gathering, assessing, technical information analyses in order to facilitating management decision making along structure age)) (lotfollahi, Koohdaragh, 2011).

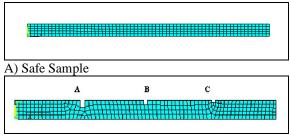
The most important point in modeling an efficient SHM system is loading changes and its identification manner. The efficacy and characteristics of damages in a special structure has a key role in a SHM system's definition and establishment (Zhong, Oyadiji. 2007). Many of SHM methods are focused on modal vibration and the study of special frequency changes and the form of

modals. Some damages and deficiencies such as crack, gap, volume mass decrease and elasticity coefficient will decrease the hardness. This will be caused as structure alternative nature time (frequency decrease) increases. It seems that because of non-monotonous distribution of tension in vibrated structure and its difference in each mode, the crack will have non-monotonous effect on vibrated modes. On the bases of this matter, different destruction identification methods are assessed and each one's efficiency is determined according to theoretical or experimental outcomes (Yan, Xiang, Zhu, Maosen, 2006, 2006, 2005, 2008).

Among these, cracks are the most important reason of structural breakage which their identification and reveal are put among SHM methods. Many attempts are done in that case that are going to be pointed in continuous.

2. Modeling Structure Element

For this purpose a straight bar with a mouth of 6m, simple support and cross section of 40×40 cm is utilized for two healthy and cracked sample and it is shown in Fig.1. Density and elasticity module of structure is respectively 7850 kg/m^3 and 2.11×10^{11} pa. Square and inertia moment of cross section of element equals: $2.13 \times 10^{-3} \text{m}^4$ and 0.16m^2 (ANSYS, 1999).



B) Cracked Sample

Figure 1. Characteristics of Modeled Structure

Table 1. Characteristics of crack place and depth in modeled samples

Sample	Crack Position	Crack Depth
1	healthy	-
2	С	10%
3	С	25%
4	С	40%
5	A, C	40%-25%
6	A, C	40%-40%
7	C, A, B	10%-40%-25%

3. Modal Analyses and Discuss Result

Modal analysis is thoroughly necessary in structural and industrial section modeling stages which are under the vibration effect because of vibration charges and kinetics. Vibrations in structure's natural frequency limit increase vibration width and disintegrate the section.

Modal analysis is utilized in assessing natural frequency and its mode shape in above frequency. The amount of natural frequency of each structure depends on the shape, material and supports of the structure. In this kind of analysis nonlinear factors are denied even in the definition. The most important options of this analyses is the number of natural frequencies and frequency limitation which goes after modeling and the analyses will be done in that distance (Chondros, Dimarogonas, 1977,1976).

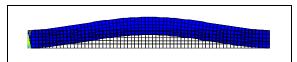


Figure 2. Deformation of structure in first mode

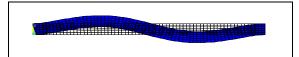


Figure 3. Deformation of structure in second mode



Figure 4. Deformation of structure in third mode



Figure 5. Deformation of structure in fourth mode

The first to forth natural frequencies for all 7 samples are shown in Table.2. Also, frequency changes of each mode in all samples are analyzed in Fig.6. Figure shows that as crack depth and number increases the amount of frequencies decreases. These decreases are tangible after 3rd mode and are shown as a disharmonious in graph.

Table 2. The Outcomes of the First 4 Natural Frequencies

Sample	Frequency of First Mode	Frequency of Second Mode	Frequency of Third Mode	Frequency of Fourth Mode
1	57.61	153.27	287.53	432.71
2	57.10	150.23	284.20	430.54
3	56.99	148.92	280.85	427.35
4	56.52	147.36	275.63	425.63
5	56.10	148.88	269.82	425.10
6	55.97	144.87	261.71	423.51
7	55.83	142.46	258.26	421.31

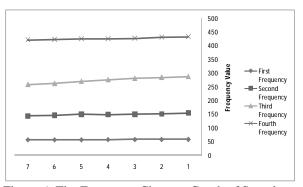


Figure 6. The Frequency Changes Graph of Samples

4. Modeling Impact Load

In order to implement impact load timeforce history is utilized i.e. in a distinct distance in terms of time the load is implemented on structure and in other time distance it is removed from structure. But special attention should be paid in choosing time distance. If this distance is very small, the impact load will be explosive load and the structure will have a big surface change in its shape before vibration or a hole in the place of load implement of structure. In order to implement impact load, a triangular load like Fig.7 is implemented on the structure in the form of time-force history (Dimarogonas, Paipets, 1986).

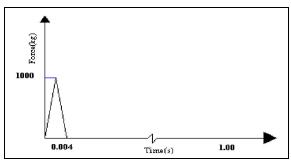


Figure 7. The History of Time-Force, Implemented Impact Load on the Structure

5. Dynamic Analyses of Structure Transitory under Impact Load

Vibration is caused when a material slips over other material. Dynamic vibration is the vibration that is caused through the movement of materials toward each other. In other words, in a dynamic vibration system the whole system is analyzed in dynamic position and all the sections are in a movable and displacement position to each other. ANSYS software in LS-DYNA environment which is dynamic environment of this software can easily analyze these vibrations and assess frequency responses of vibrated systems in the form of dynamic vibrations. The most important options of these analyses after modeling stages are frequency limitation, the number and amount of its steps, direction and the spot of load implement (Han, Ren, Sun. 2005).

As it was discussed in impact load modeling, the load is implemented on the structure in time distance of 0.002 and in the next distance of 0.002 the structure is unloaded and the structure is vibrated that these vibrations will be disappeared as time goes. But in order to view all treatments of structure after unloading to 1st second the structure treatment is investigated. The results are shown in Fig.8 in the form of displacement-time history of healthy sample.

In order to careful investigation and study of structure treatment under the effect of impact load implement, graph 8 has been studied in 3 parts. For this purpose structure vibration graph is analyzed in time distances of 0-0.004, 0.004-0.2 and 0.2-1 separately in Fig.9.

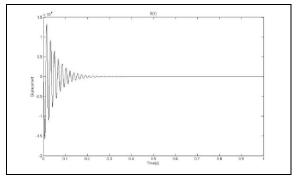


Fig. 8: displacement-time history in the spot of 3m away from left support for healthy sample

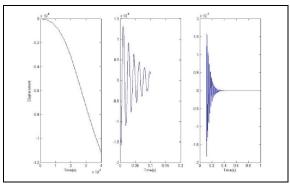


Fig. 9: displacement-time history in the distance of 3m from left support for healthy sample a) 0-0.004 b) 0.004-0.2 c) 0.2-1

As graph 9(a) shows structure in time distance of 0-0.004 has the largest displacement in comparison to other distances which is viewed as sudden displacement increase (move toward negative). But in 0.004-0.2 structure vibrations are almost in a regular decrease and in 0.2-1 structure vibration disappears and in 1st second there is no vibration.

For this purpose mentioned samples in table.1 are put under dynamic analyses through impact load implement in the middle of bar and the results are shown in the form of displacement-time, velocity-time, acceleration-time, moment-time. The results are shown for two samples of 1(healthy) and 6 in the figures of 10 and 11.

As the graphs show displacement history for each spot of structure is the same for healthy and cracked sample. Therefore it cannot be used as a criterion for identifying cracks in structure. The velocity history is used for mentioned spots in healthy and cracked samples. But there is no difference among them as velocity graphs are gained from displacement derivations. But the effect of destruction is identifiable through being careful on acceleration and moment graphs.

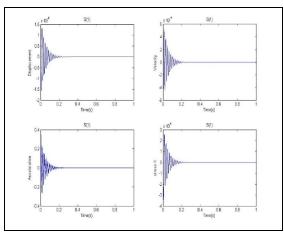


Fig.10: displacement-time, velocity-time, acceleration-time and moment-time history graph for healthy sample

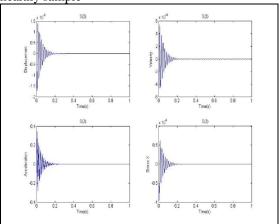


Fig.11: displacement-time, velocity-time, acceleration-time and moment-time history graph for 6 cracked samples

6. Conclusion

Investigating the effect of crack on structure which is in the form of decrease in natural frequency and disharmony among acceleration and moment graphs in healthy and cracked samples are very useful. Because the cracks are the most important reasons of structural destructions and their identification and appearance has a key role in structure resistance.

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Utilizing Dynamical Loading Nondestructive Identification of Structural Damages via Wavelet Transform

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Abstract: Different methods are represented in order to investigate and identification of damages that each one has some advantages and disadvantages. For example, Fourier Transform which represents related information over frequencies of a signal while no information is in access about the time of a frequency's creation. For identifying the place of damage, knowing the time of frequency creation is of high importance. On this base Fourier Transform encounters problem. Modern and efficient methods which are placed in signal analyses field and are in favor of researchers are wavelet transforms. The most important advantage of using wavelet is its ability in analyzing a signal place in every time or place domain. In this paper, a method for identification of damage in a beam via wavelet transform is represented. In this method beam identification is possible without dynamic parameters of healthy structure. At first, the structure is put under harmonic analyses through Finite Element Software (ANSYS5.4) and then it is put under wavelet analyses in wavelet box by (MATLAB7.1) Software and at the end the results are observable on two dimensional coefficient-location graphs which indicate high ability of wavelet theory in response analyses of a structure and disharmonic identifications in structural systems.

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Keywords: Wavelet Transform, Harmonic Analyses, Signal and Damage

1. Introduction

In recent years, many attempts are done on developing reliable systems and structural health monitoring [SHM]. The aim is to find a process in order to response the place of damage and its strength. Two main aims of this study are to represent a method for monitoring structures that firstly; do not need any response of healthy structure and secondly; its sensitivity toward measurement and other errors be less. Wavelet Transform is a method that in the case of having two mentioned characteristic can be a suitable response to this demand. In this method instead of investigating natural frequencies and their changes, vibration or static response of structure in different spots of structure in a definite time is demanded which in fact is a place-domain signal. After WT analyses the place of any kind of damage on wavelet coefficient graph in the shape of summit and disordered spots are detected.

It seems that along static loading and structure displacement measurement, compulsory vibration implement can be a suitable method for gaining the response of damaged structure. According to carried out researches, static transformation and structural modal shapes are considered as the response functions of defective structure. In current study; for the first time, harmonic loading is utilized in order to gain the response functions of defective structure.

Damage causes stiff local changes which affects significantly structure dynamic action. This matter is

observable in the change of natural frequency and vibration mode-shapes also, this change analyses makes the identification of these damages possible. In the aim of damage characteristic identification, first Dimargutas modeled the damage as local flexibility and gained the equal hardness through some experiments (Dimorogonas. 1976). Chandras made use of this method for studying dynamic response of damage beam (Chondros. 1977). Cowly and Adams represented experimental method for calculating situation and damage depth of changes in natural frequencies (Cawely. Adams. 1979). Goodmanson used disorder method for predicating changes in structure natural frequencies resulted from damages, and some other geometric changes (Gudmaunson. 1982). Since then much more works are done over identifying damages on the bases of natural frequency changes. But in some cases because of damage smallness and measurements' errors the ability of damage identification decreased. In order to solve this problem utilizing mode-shapes are considered important. Rizas proposed a method for utilizing measured width in two spots far from beam that vibrates in one of its natural modes (Rizos at all. 1990). Shancog Zhong and Olutunde Oyadiji presented a new approach for crack detection in beam-like structures when crack is relatively small. This approach is based on finding the difference between two sets of detail coefficients obtained by the use of the stationary wavelet transform (SWT) of two sets of mode shape

data of the beam-like structure (Zhong. Oyadiji. 2007). Yan and his colleagues suggested intelligent damage diagnosis and its application prospects in structural damage detection. And also the development trends of structural damage detection are also put forward (Yan at al. 2006). Xiang and his colleagues studied the model-based forward and inverse problems in the diagnosis of structural crack location and size by using the finite element method of a B-spline wavelet on the interval (FEM BSWI) (Xiang at al. 2006). Zhu and Law presented a new method for crack identification of bridge beam structures under a moving load based on wavelet analysis (Zhu at al. 2005). Maosen Cao and Pizhong Oiao proposed a new technique (so-called 'integrated wavelet transform (IWT)') of taking synergistic advantages of the stationary wavelet transform (SWT) and the continuous wavelet transform (CWT) that this technique improved the robustness of abnormality analysis of mode shapes in damage detection (Maosen at al. 2008). M. Rucka and Wilde presented a method for estimating the damage location in beam and plate structures. A Plexiglas cantilever beam and a steel plate with four fixed boundary conditions tested experimentally. And also, the proposed wavelet analysis can effectively identify the defect position without knowledge of neither the structure characteristics nor its mathematical model (Rucka at al. 2006). Zheng Li and colleagues suggested a damage detection method based on a continuous wavelet transform and applied to analyze flexural wave in a cracked beam (Zheng at al. 2006). Later an exact comparison between two methods of frequency- base, mode-shaped-base was spread for damage identification in structural beams by Kim et al (Kitada. 1998).

2. The Background of Continues Wavelet Transform Theory

Wavelet transform is a useful and modern method for analyzing signals. Wavelet functions are mixtures of a number of basic functions which are capable of separating a signal at a time (or place) and frequency (or scale). Therefore, wavelet conversions are capable to explore many unknown aspects of information that cannot be distinguished through other methods of signal analyses. These characteristics are especially very useful in detecting damage. A number of researchers (Wong, Dang and Curly) make use of wavelet transform in damage detecting in structural frames. But one disadvantages of wavelet transform is weak decomposition of signal in areas with high frequency (Ang, Wang, Wang, Dimarogonas et al 1975, 1999, 1996,1986).

According to high capability of wavelet transform in vibration or static response signal analyses of a structure that facilitates detecting any

kind of discontinuity or disharmony (e.g. sudden flexibility and resistance decrease) and through wavelet coefficient graph are detectable in one or several spots near together with disorder or disharmonic numbers in comparison to other spots. Wavelet transform of a signal is defined as:

$$W_{x}(b,a) = \mathbb{I}^{-\frac{1}{2}} \int_{-\infty}^{+\infty} x(t) \psi^{*} \left(\frac{t-b}{a}\right) dt$$
 (1)

Therefore, wavelet transform is gained through internal multiplication X(t), transformed and scaled version of single function $\psi(t)$ which is called wavelet (ψ^* is mixed binary of wavelet function).

When a transform is used in order to have a better view of signal it should be guaranteed that the signal can be completely restructured from restructured form. On the other side, restructuring can be completely or partly meaningless. In order to wavelet transform the condition of restructuring consists:

$$C_{\psi} = \int_{-\infty}^{+\infty} \frac{\Psi(\omega)^2}{a} d\omega < \infty \tag{2}$$

That $\Psi(\omega)$ is wavelet Transform. This condition is considered as admissibility condition for wavelet. Clearly for having this condition of wavelet:

$$\Psi(0) = \int_{-\infty}^{+\infty} \psi(t) dt = 0$$
 (3)

It means that wavelet is oscillatory function with average amount of $\Psi(\omega)$ should decrease as $\psi(t) = 0$. So, $\psi(t) = 0$ should be the response of cross-pass impact. Because a response of cross-pass impact is similar to a small wave this transform is called Wavelet Transform.

3. Modeling Structure

For this purpose, a direct beam of 6m mouth with simple supports and square section 40cm for damage sample is shown in Fig.1. Mass and structure elasticity are respectively 7850 kg/m^3 and 2.11×10^{11} pa. Area and inertia of shear section equals 0.16m^2 and $2.13 \times 10^{-3} \text{ m}^4$ (Gudmaunson, Rizos. 1982,1990).



Figure 1. Characteristics of modeled structure

4. Harmonic Analyses and Damage Identification Process Continues Wavelet Transform

A healthy sample and six damage samples with mentioned characteristics are shown in table 1. These samples in frequency band of 0-100 were put under modal analyses. The 1st to $4^{\rm th}$ natural frequencies are shown in table 2 for all 7 samples.

Table 1. Characteristics of place and depth of damage in modeled samples

Sample	Damage	Damage
	Position	Depth
1	Safe	
2	4.6 (m) from	10%
	left support	
3	4.6 (m) from	25%
	left support	
4	4.6 (m) from	35%
	left support	
5	4.6 (m) from	50%
	left support	
6	4.6 (m) from	60%
	left support	

Table 2. Results from the first 4 natural samples' frequencies

Sample	1 st	2^{nd}	$3^{\rm rd}$	4 th
•	Frequency	Frequency	Frequency	Freque ncy
1	10.413	24.588	42.279	63.309
2	10.411	24.477	41.932	62.855
3	9.630	24.531	39.644	59.644
4	9.420	24.251	38.562	58.635
5	8.925	24.120	37.856	56.635
6	7.564	23.532	35.229	53.470

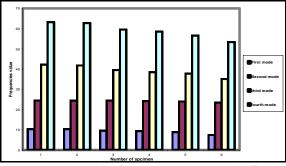


Figure 2. Samples frequency changes in first 4 frequencies

Also, each mode's frequency changes in all samples are investigated in Fig.2. As figure

shows, as damage depth increases the amount of frequencies decrease. These decreases are very tangible after 3rd mode and they are shown as disorder in graph.

Supposed force should be implemented in distance of 1m on the structure and the results of frequency displacement for 3 spots of 0.5m, 2m and 3m from left support in every 2 healthy samples (1) and damage sample (2) are shown.

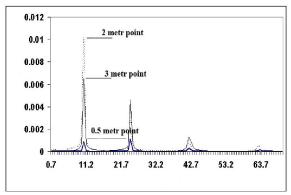


Figure 3. Displacement frequency graph of 3 spots of healthy samples

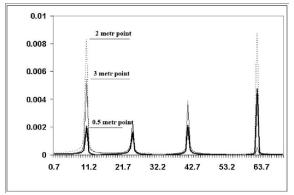


Figure 4. Displacement frequency graph of 3 spots of damage samples

The result from above figures is that the structure in frequency band of 0-70 is of 4 peak of displacements. The significant point is that the maximum amount of displacement is exactly created in principle frequency places. As figures show maximum amounts are in frequencies of 10.431 and 24.588 which are exactly equal to principle frequencies amounts from modal analyses and it is a reason for accuracy of modal analyses.

The results from harmonic analyses will be investigate later and frequency of 11 (HZ) for primary investigation is chosen for healthy and damaged samples response in data 207 in equal distances (maximum displacement in each spot). Above data are analyzed through wavelet analyses

and the results from Db5 analyzer are shown in figures 5 to 10.

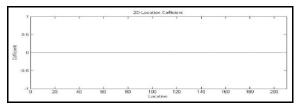


Figure 5. Location-coefficient graph of health sample

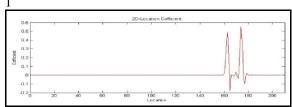


Figure 6. Location -coefficient graph of health sample 2

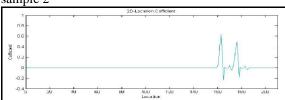


Figure 7. Location -coefficient graph of health sample 3

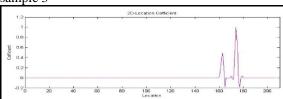


Figure 8. Location -coefficient graph of health sample 4

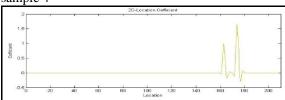


Figure 9. Location -coefficient graph of health sample 5

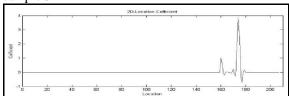


Figure 10. Location-coefficient graph of health sample 6

As it is observed in Fig.5, there is no disorder or disharmony in the length of beam which

proves that the structure has no damage or destruction in its length. Also, in Fig.6 to 10, Disorders related to 160-180 spots are the exact damages of destructive structure. Through this method the exact location of damage can be identified. The length of disorders correspond the length of damage in structure.

5. Conclution

- 1. Continues Wavelet Transform is of high ability in vibrate or static response signal analyses. This ability is clear in identifying all kinds of disorders or disharmonies like stiffness sudden decrease and can be detected through continues wavelet coefficient graph in one or several near spots with disorder or disharmony toward other spots. On these bases wavelet method is one of efficient methods of damage detecting.
- 2. In this way, force implement in the length of beam produces some disorders on wavelet coefficient graph and the identification of damage will be difficult. The end spots will affect the wavelet coefficient graph (as disorders) even without the presence of force. Therefore, spots near to support can be the most suitable spots for harmonic force implement in structure.
- 3. Since in the continuous wavelet transform method extraction of 207 data is an easy and very cheap task, therefore this method can be a practical and functional one.
- 4. Increase in the depth of the damage raises the coefficient based on the wavelet, but does not have a linear relationship with high damage in the structure.

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Design of an On-demand Routing Protocol for MANET

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Abstract: An ad-hoc network consists of a set of mobile nodes which are connected with each other by using radio waves. These networks do not need any predetermined structure or central management system and all nodes work as routers. These days the scalability of ad-hoc networks has interested some scholars. Scalability of most of ondemand routing protocols has become limited because of increasing the nodes' population and movement in network. In this paper an on-demand routing algorithm for MANET networks will be presented which aims at creating an algorithm with a high scalability. The effect of network size (number of nodes), nodes' movement, and data traffic on the efficiency of the proposed algorithm and other principal algorithms which have been utilized to create the present algorithm will be studied and their simulation results will be compared. The simulation results show that the proposed algorithm has more efficiency than the present standard algorithms.

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Keywords: MANET network, Routeing Protocol, Scalability, Simulation

1. Introduction

MANET networks [1-3] are systems of mobile ad hoc networks which are presented dynamically and self-organized in temporary topologies. These networks include a set of mobile routers and hosts which share the same radio canal by using wireless connections and exchange data without using a centralized or broad management. The nodes in these networks can vary regarding the different features such as yield, data sending ability and sources' energy.

MANET networks have several usages. First these networks were devised to be used in military applications. MANET networks are mostly used in survey, helping and saving operations, tracing and following operations, scientific conferences.

In this paper and in order to create proposed on-demand routing algorithm [4-8], we have used adjusted probabilistic flooding [9-10] and AODV [11-12] algorithms which are based on AODV [13-14, 5] routing algorithm. At present, AODV routing protocol is one of pioneering protocols for routing in ad-hoc networks. AODV routing protocol includes a route discovery and a route repair mechanism. Route discovery mechanism [15, 13, 6], is a route demand between a sender and a receiver and route repair mechanism is a new route for a disconnected active route. Disconnection is recognized by connection layer's approval or controlling messages of Hello [13].

If there is not any direct route between source and destination, multi-hop routing is used. Thus, because of limited distribution of nodes in the area, both nodes may need a chain of intermediate

nodes to establish the connection. Since these networks have an inconsistent nature, finding and maintaining the route has certain importance. Controlling information is exchanged between the nodes to identify the current status of the network. On the whole, MANET networks' routing protocols are divided into three categories of proactive, reactive, and hybrid protocols. In proactive routing protocols [19] (routing based on table), routing tables are created before sending packets and each node knows the route to other nodes. The problem of this protocol in ad-hoc networks is that maintaining and timing routing tables need a broad bandwidth. Also, most of routing information is never used and consequently the sources are wasted. In reactive routing protocols [13, 6] (on-demand routing), the route is created when there is a need for it. Before sending the packet, route discovery is done and the results are stored in a cache memory. When middle nodes are moved, route repair is done on demand. The advantage of these protocols is that only the routes needed are maintained. The disadvantages include the delay before sending the first packet and the existence of flooding for route discovery. Hybrid protocols [16], are a combination of proactive and reactive protocols.

Scalability of a lot of on-demand routing protocols is limited because of population increase and nodes' movement. When the number of users is increased, ad-hoc routing protocols (like [15-19, 5, 6]) need scalability because of nodes' increase. In this paper the two algorithms of adjusted prob. and AODV-LR will be combined and a new algorithm will be posed in which the main goal is to increase

scalability. Scalability for wireless routing protocols is basically depends on extra routing messages [20]. The efficiency of the proposed algorithm will be compared through the results of simulations of routing algorithms of AODV, AODV-LR and Adjusted prob.

2. The Proposed Algorithm

In this part we will introduce a new routing algorithm to improve scalability. Adjusted prob. Algorithm optimizes route discovery by source node and decreases the amount of PREQ in the network. AODV-LR algorithm decreases the number of route rediscovery by source node. For increasing scalability, we integrate adjusted prob. Algorithm with AODV-LR algorithm. In the resulted algorithm, when there is no route for sending the data from source to destination node, the source node performs route discovery and spreads a new PREQ packet including the information below: source address, sequence number, Broadcast id, destination address, destination packet number, number of leaps. Broadcast id increases as the spread by source increases. Broadcast id is a unique couple for PREQs' identification.

When a node receives PREQ, if it is for several times, it ignores and if it is the first time, creates the route to the source in its routing table. Information such as: destination address, next leap, the number of leaps, destination packet number, and valid time for this route is stored in the node. If a route is not used during a certain time period it would lose its validity. Then the node checks whether there is a valid route to destination node? If the node itself is the destination or it has a valid route to destination and packet's number is greater or equal to destination packet's number in PERQ, a PREP including the following information: source address, destination address, destination packet's number, the number of leaps to destination life time will be spread to the source in a single part. When the middle node receives PREP, it creates the route to destination node in its routing table and sends PREP to the source. On the other hand (if the node itself is not the destination or does not have a valid route to the destination), if the number of neighboring nodes receiving PREQ(x) is less than the average number of the neighbors, the message is spread by a high probability of (p) after adding an extra unit to the number of leaps.

Nodes located in transfer limitation of each other are called neighbors. The number of neighbors is determined by using Hello messages. Each node spreads a Hello message periodically to express its existence. The spread probability of p in each mobile node accords with the number of its neighbors. When

the nodes move to another boundary, the amount of p is changes. The average number of neighbors is calculated by formula 1 [9-10]. In this way, at the time of route discovery most of repeated PREQ spreads will be avoided.

$$\bar{n} = (N-1) * 0.8 \frac{\pi r^2}{A} \tag{1}$$

In the above formula, A is the network circumference, N the number of nodes in the network and r is the boundary for nodes' transfer.

When a connection stops, it is better to devise a new route locally and without discovering route from source. In this way, the sent data is stored in a higher node in order to restore the route locally. By using this method in large networks, the delay will be decreased because a less time is needed to search and achieve a new route.

Thus, when connection stops the higher level node tries to restore the route. A PREQ in which TTL equals the previous distance to the destination in addition to an extra amount, its packet number, destination packet number plus one is created and it is sent to the neighbors. The superior node waits to receive PREP. If it does not receive PREP after a predetermined time, it sends a RERR message to the source and all nodes which use this connection to reach to their destinations update their tables by receiving RERR. Finally, the source receives RERR, then deletes the related routes from its table and then starts the operation to discover a new route.

Figure 1, shows the processing flowchart of the received packet by a node in the proposed algorithm and also the proposed pseudo-code routing algorithm is as follow:

Protocol Receive Request()

On hearing a broadcast packet m at node X Get the Broadcast ID from the message;

n Average number of neighbors (threshold value); Get degree n of a node X (number of neighbors); If packet_m received for the first time then

If n < n then

Node X has a low degree, so set high rebroadcast probability p=p1;

Else if $n \ge n$ then

Node X has a high degree, so set low rebroadcast property p=p2;

End if

Generate a random number RN over [0,1];

If RN≤p rebroadcast message Else drop it.

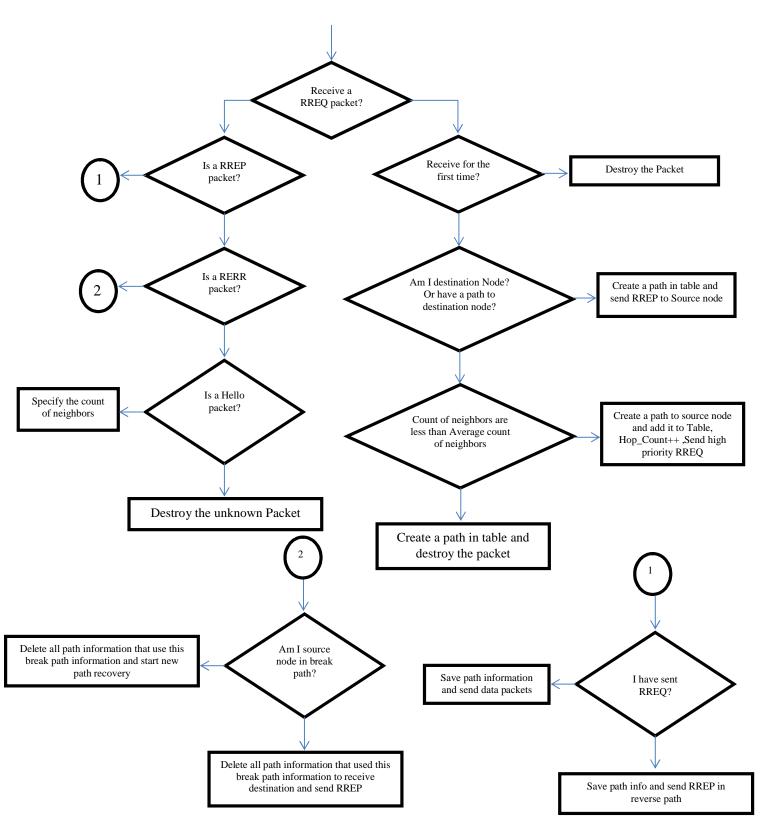


Figure 1. Processing flowchart of the received packet by a node

Protocol route link layer failed()

If the broken link is closer to the destination that source then

Attempt a local repair Else Bring down the route.

3- Simulation and performance Assessment

For simulation, we used ns2 [21] version ns2.31 which includes a set of wireless networks' components based on 802.11 [22] and it allows the nodes to move freely in network's environment. A lot of routing protocols which have been observed recently (AODV, DSR, TORA, DSDV) have been simulated in ns2 [23,24, 14].

In this simulation, the data packets were considered to be 512 bytes and CBR traffic has been used. Each node uses random way point model [24] and the speed is random between 0 to 10 m/s.

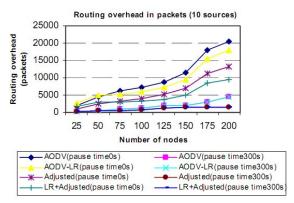
In this model, the node chooses a random destination and moves towards it with a speed which has been predetermined regarding its minimum and maximum speed. When the node reaches the destination, it stops there for predetermined pause time, and then it randomly chooses another destination and moves towards it. The ground size is 750m*750m and the nodes' number is changed from 25 to 200. Each simulation takes 300s. According to previous experiments and studies, in scenarios with high movement the difference in protocols' efficiency is clearer. In static networks, we can examine the power of a protocol in rapid discovery of a route and effective delivery of the data. In these networks because the nodes are fixed, no route is stopped and thus the administrative burden is minimum and the delays are not long or data packets are not lost. In this way, we can execute and report nodes of 25 to 200, and scenarios with fixed movement (pause time, second), while nodes are not working (pause time of 300 seconds). Also, we can study with 75 nodes, the movement effect on protocols' efficiency. We executed each experiment with 10 or 20 CBR traffic sources and with this number of sources, the protocols' scalability will be studied with traffic load.

We used two metrics of ROP and PDF to obtain the efficiency of routing protocols. ROP is the sum of transferred routing packets' number during the simulation and each leap in one route is calculated separately. PDF is a ratio of sent data packets which have been delivered by each routing protocol. Next we will study the effects of nodes' number and movement on protocols' efficiency.

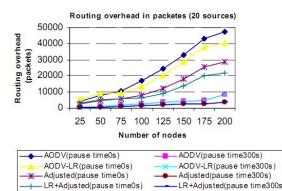
3.1. The effect of nodes

Figure 3, shows ROP protocols with static scenarios (pause time 300 seconds) and high movement scenarios (pause time, 0 seconds) as a function of nodes' number and network load for different numbers of traffic sources. In static mode, ROP is the same for the proposed algorithm and adjusted prob. Because the nodes are fixed and it is better than the two other algorithms because of less PREQ spread. In high movement scenario (more than 50 nodes), the proposed algorithm has less ROP because of spreading less PREQ while route discovering and locally restoring the disconnected route.

Figure 4 shows the measured PDF. In static scenario (pause time 300 seconds), the protocols have better scalability compared with the increase of nodes' number.

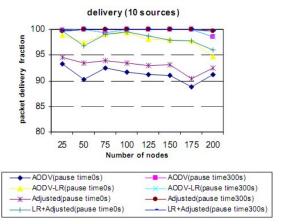


(a) Source number =10

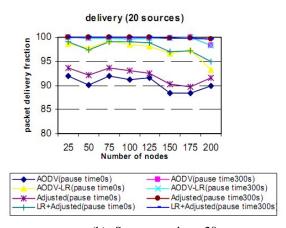


(b) Source number=20

Figure 3: the sum of transferred routing packets' number while simulating



(a) Source number = 10



(b) Source number =20
Figure 4: A ratio of sent data packets which have been delivered by each routing protocol

In high movement scenario, the proposed algorithm and AODV-LR have a better PDF than the other two algorithms because the proposed algorithm and AODV-LR do not remove data packets and thus packets' delivery is more in these two algorithms. As you can see in the figure, in high movement, the PDF with 20 traffic sources is less than the PDF with 10 traffic sources.

PDF is low because a lot of data packets fail to reach to their destinations. When the number of traffic sources increases, the protocols start to delete most of data packets in the source. When a data packet (CBR) is produced, it is labeled as a send-buffer agent. Here the data packet waits to find its route. When the route is discovered, the data packet is removed from send-buffer and is sent to connection layer and is located in IFQ. If there is a route to destination, the packet enters IFQ directly and avoids going into send-buffer. MAC layer takes the packet from IFQ and sends it onto the channel. If send-buffer is full or the packet has been preserved

for a long time and waits for a route, the data packet can be deleted in source node. The other reason to delete data packet in source node, is the overcharge of IFQ. IFQ works in FIFO mode. When it becomes full, the entrance of a new packet, deletes the old packets because of IFQ overcharge.

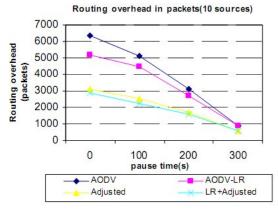
We considered send-buffer size for all protocols to be 64 packets and sending speed to be 4 packets per second. In summary, the reasons for data packets' deletion in source node are IFQ overcharge, packets' time finish, or overpopulation or collisions in which MAC layer is unable to transfer the packet. Also, administrative packets' spread, benefits a higher priority over data packets.

3.2. The effect of movement

In order to understand the movement effect and the number of traffic sources on protocols' efficiency better, the number of nodes in scenarios is kept fixed and the results of experiments will be presented.

Figure 5, shows ROP is a function of pause time and network load for different numbers of traffic sources. According to figure 5, when the pause time increases, ROP becomes less because the connections stop less and thus routing overcharge decreases.

Figure 6, shows that measured PDF for 75 nodes is a function of nodes' movement with different traffic sources. You can observe that, the ratio of packets' delivery increases by increasing pause time because the longer pause time means less movement. The proposed routing algorithm is able to deliver more data packets to destination in comparison to other algorithms. AODV and Adjusted prob. Routing algorithms remove data packets easily when a route stops and thus the ratio of packets' delivery in AODV and Adjusted prob. becomes worse in comparison to other protocols.



(a) Source node =10

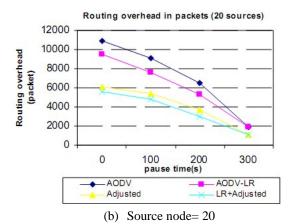
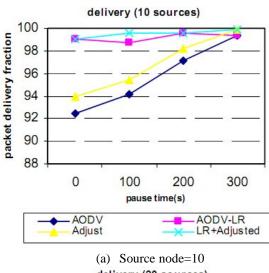


Figure 5: ROP with 75 nodes



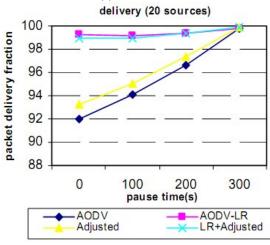


Figure 6: ROP with 75 nodes

(b) Source node=20

4- Discussions

In this article, the scalability of on-demand routing protocols was studied by choosing some protocols from among the set of protocols (AODV, AODV-LR, adjusted prob.), and a new algorithm was suggested to enhance the efficiency in big networks. The scalability of AODV, AODV-LR, adjusted prob. protocols were studied considering different aspects of the issue. We noticed that how the efficiency of these protocols depends on the number and movement speed of the nodes and data traffic load. When the movement and population of nodes increases the routing overcharge increases and it halts data packets' delivery. You observed that local restoring is beneficial in increasing data packets' delivery to the destination. Also adjusted prob. algorithm is effective in decreasing the overcharge amount of routing while route discovering.

Thus, to increase scalability, we proposed a new algorithm which in fact integrates the advantages of the two algorithms of ADOV-LR and adjusted prob. with each other and regarding the results of the simulation presents a better routing algorithm for big ad-hoc networks.

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7/.7/2011

The review of functioning of industries' privatization policy in Iran from 2003 to 2008

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Abstract: Privatization is a necessary and inevitable issue for efficient and optimum allocation of productive resources of the society. With a glance at its approach in Iran, it seems essential to observe a number of things like; opting for sound ways of transferring owing to non-productive properties and costs and profitable enterprises with providing conditions like supplying complete information, freedom of admission to and exit from markets, establishing a discipline and security and lawful ownership, clarity of investments, removing discriminating behaviors resulting from information abuse, approving facilitating rules for foreign investments and giving an assurance for not sudden change in regulations and public availability for information formats and providing timely information where needed.

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Keywords: Allocation of resources – information abuse – lawful ownership – ways of transferring – timely information

1. Introduction

The change in economic role of governments and global efforts for this change has been based on four activities;

- 1- Freeing prices and opening up to global trade and international payments in order to establish a logical relation between demand and supply according to principles of free economic discipline.
- 2- Correction of the role and structure of governmental enterprises usually seeking noneconomic objectives, and without reduction or omission of their role, the relative prices of the goods and materials in the market cannot result in an efficient and optimum allocation of productive resources of the society.
- 3- Privatization that is necessary to warranty the enterprise reply to market features. Private units react against change of prices which result in optimum allocation of resources in pursuing profitability. For loss-making units being a private unit there is no way but to renew the structure or close down and transfer the properties to the owners and to use them in a more productive way somewhere else.
- 4- Privatization that warranties the optimum allocation of resources in pursuing profitability. For loss-making units being a private unit there is no way but to renew the structure or close down and transfer the properties to the owners and to use them in a more productive way somewhere else.

- 5- The reason for failure in governmental enterprises (apart from the reason for failure in the whole system of state economy) lies in five factors:
 - Pursuing contradictory and multilayered objectives vis-à-vis the clear and final objective for a private unit (profitability).
 - B. Management dependence on political decisions.
 - C. Disproportion between awarding structure and market realities (particularly inflation).
 - D. Presence of incentives and motivators for inefficiency, resulting from limits in supplying production agents.
 - E. Development of the privatization movement all over the world based on the understanding of these realities.

The major factors for monopoly and disturbance in competition are:

- 1- Governmental system of oil and oil resources and received revenues offering the government about 19% of gross domestic product and covers about 50% its costs.
- 2- The government's full control on foreign currency earned from oil and self-determining its price that in course of time devalues the national currency resulting from wrong monetary and financial policies, have imposed an extremely heavy costs on material, machinery and import of industry items as well as on consumers of imported and domestic goods.

- 3- Monopolies pertinent to principle 44 of constitution that monopolizes all key and infrastructural industries and services like aviation, insurance, banking, railways, shipbuilding, post and telephone and radio and television.
- 4- Monopoly of production of basic metals which has a major application in industries that is at government's disposal according to number A1 item1 law of protection and development industries.
- 5- The industries of manufacturing and assembling ships, planes and automobiles are at government's disposal according to number A2 law of protection.
- 6- Founding organizations for adjusting market and departments to support consumers and producers that have been established to reduce deficiencies, although with different and varying interferences, they have made the atmosphere of industrial activities disturbed and cloudy.
- 7- Founding or developing prevailing state companies such as industrial development and renewal organization, Iran national industries organization, national company of petrochemical industries, Iran national company of steel, national company of copper industries and aluminum sharing company, that have control on hundreds of service and productive units and have narrowed the functional scope of private sectors.
- 8- Developing the functional scope of prevailing enterprises into new sectors and narrowing down the possibility of private sectors activity. To take an example; the national organization of industries which must originally preside over seized industrial units, solely has invested on 48 new different industrial projects from 1984 according to assigned duties.

Direct interference of public sectors in economic and industrial activities benefitting from government's facilities and authority vis-à-vis limits and inabilities of private sectors in utilizing these facilities for example; social security, retirement organization, the destitute and disabled organization, Emam Khomeini charity organization, executive department of Emam decree, 15 khordad organization, all possess a major part of an industry or different industries and sectors of economic activities exclusively or semi-exclusively. Meanwhile, the private sector which should be allowed into the competition to do the same activity is unable for the lack of same facilities. Receiving foreign currency, raw materials, low-cost

labor force, receiving branches for public services, receiving imports allowance and tax evasion are things which bring the private and public sectors into conflict. (Rashidi, Ali, 2006[3])

2. Statement of the problem

The word privatization means change in the equilibrium between the ruling government and the market for the benefit of market. Privatization is a tool for increase in efficiency (financial and social) of operations of an economic enterprise. Because it seems that mechanism of demand and supply and market in a competitive conditions cause employment of more productive agents, efficiency of agents and as a result production of variety of goods and services and decrease in prices. The prediction is acceptable with respect to the scientific and theoretical foundations at the level of minor economy as well as the experiences of other countries. The whys and wherefores of the problem can be answered and proved but the vague and complicated point is its procedure and the most complicated issue is transferring ownership and forming private sector at society.

3. Significance of the study

To sum up, in order to accomplish the privatization in the best way possible the following should be done simultaneously:

- A) Reinforcement of private ownership rights, change in the structure of enterprises, freeing and eradication of bureaucracy, reform in regulations, reform in financial structure (specially invest market) and labor market.
- B) To encourage and guide towards development of private sector in order to provoke competition and to enter producers to the market.
- C) Transferring governmental public enterprises to private sectors (ownership change)

4. Objectives of the research

The goals for privatization vary according to a country's situation and economic characteristics. However, in all countries dealing with privatization, the main goal is to improve economic conditions. Beside this main goal there can be other ones which are:

- Increase in profitability and national production
- Government access to financial resources of private sectors

- To encourage competition, welfare enhancement and increase in efficiency of economic activities
- Economizing the government costs
- Development in invest market and expanding the culture of collaboration in the country
- To prevent obvious monopolies (such as sugar, smoking and ...) and secret monopolies (granting special advantages to certain people)
- Accumulation of cash and producing balanced discipline of revenue distribution among different strata of society.

5. Theoretical framework of the research

Environmental requirements of privatization at national level should commence with relying on particular strategic goals because many of the assessable projects either stop working or stray from original direction. Stated goals should be defined without negative interference and with prioritized and harmonious endeavor. Strategic goals of privatization could be towards economic, social and cultural development both in the region and the country, omission of monopoly and increase in competition, producing employment, activity growth, reduction of current expenditures of enterprises and downsizing the government. Research hypotheses are as follow:

First hypothesis: There is a meaningful difference between approaches for transferring and problems of industrial privatization in Iran

Second hypothesis: There is a meaningful difference between produced goods problems of industrial privatization in Iran

Third hypothesis: There is a meaningful difference between costs and benefits and problems of industrial privatization in Iran

Fourth hypothesis: There is a meaningful difference between sum of assets and problems of industrial privatization in Iran

Fifth hypothesis: There is a meaningful difference between productive costs and problems of industrial privatization in Iran

Sixth hypothesis: There is a meaningful difference between non-productive costs and problems of industrial privatization in Iran

Seventh hypothesis: The number of staff before and after transferring is different.

Eighth hypothesis: Benefit of the enterprises before and after transferring is different.

Ninth hypothesis: Sum of the assets of enterprises before and after transferring is different.

Tenth hypothesis: Productive costs of enterprises before and after transferring are different.

Eleventh hypothesis: Non-productive costs of enterprises before and after transferring are different.

6. Review of the related literature

It could be said that the Classic economists and to mention the founder of this school of thought, Adam Smith, are among theoreticians that, for the first time, have theorized about the science of economy in a disciplined scientific framework and about efficiency of market system in allocation of optimum resources. And perhaps that is why Adam Smith is known as the father of the science of economy. According to Classics' doctrine, the free market's mechanism is able to produce the best resource allocation and maximum welfare for society through its self-improving systems. Adam Smith disagreed with any sort of governmental interference in economic activities and identified a good government with the least interference and the lowest costs. Smith believes that the only task for Governments is to defend the society's borders against aliens, to enact rules and regulation to establish discipline and to perform some public activities. He sees economic problems like unemployment, inflation, poverty and deprivation, waste of resources and... resulting government's undue and excessive interference. He identified the governments as corrupted, weak and spendthrift and states; great nations are never plunged into misery with big spending and misdemeanors of private sector but fall into poverty and begging with extravagancy of public sector. Despite belief in selfimproving mechanism of market, Neo-classics assumed a more active role for government compared with Classics. They consider that the most basic and important tool for sound functioning of the selfimproving mechanism of the market, after perfect competitive conditions, is the presence of ownership rights and warranty to accomplish it. They believe that these two parameters are conducive to reassure the economic job creators that their efforts would be rewarded and as a result, talents, new ideas and creativities appear which make economic activities dynamic and efficient. Kingz, a great scholar in economy, known as the father of major economy, didn't believe in self-improving characteristics of market as well as flowing knowledge and information in it. He believed that the free market discipline is susceptible to chronic imbalance and cannot perfectly utilize the productive resources of the society and is doomed to imbalance. Therefore, Kingz believed that government must interfere in economic activities and adjust and guide the economic atmosphere so that the market system shows all its potentials. Accordingly, government interference in economy and its different

social, infrastructural and military investments became a normal course of events to prevent a dull economy and annual budgets of governments achieved increasingly significant figures owing to economic status and probable dullness.

7. Methodology of the research

The explanatory approach is of congruent sort and by taking into account the research objective parameter; the current research is considered as fundamental- functional approach as the research results seeks to obtain solutions in this regard simultaneous with research process. (doas di eybagher sarukhani- h.ali. houman[2],[6],[7]).

Using Morris Morgan's tables the required information from 24 companies consist of Iran's tractor manufacturing company, Pegah Khorasan pasteurized milk, automobile axis manufacturing company, Iran's national copper industries, Sazeh Pooyesh, GolGohar iron rocks, West Azarbaijan Pegah pasteurized milk, Piazar industry and agriculture, Iranian telecommunicating factories, AzarAb energy expansion industries, Sipa glass, Kashan's Amirkabir steel, Fars cement, Tabas' Negin coal, Iran's engine makers of tractor manufacturing company, Iran industrial consultative engineering, Kashmar's zohre enameled granites and tiles, Toos' Sepide glass, company of training buildings, Tehran's electricity logistic services, AlamAra TV screen, Tabriz Machinery manufacturers, Razi petrochemistry, heavy diesel engine producing company. The above mentioned enterprises have been privatized by two approaches of Stock market and auction between the years 2003-2008. Among these transferred enterprises, 15 companies have been selected with stock market approach and 9 with auction approach.

Statistical specimen of under study industries based on the sort of produced goods is as followings:

8. Data analysis

The results of T test for coupled comparison of 15 industrial manufacturing companies with stock exchange approach and 9 manufacturing companies with auction approach showed that the mean variance equals 108.9 and T equals 3.7 at meaningfulness level of (0.006) which is lower than the research (0.05). The results show that the auction approach for transferring has been more than stock exchange approach. To explain, the enterprises transferred with auction approach are among those which have been profitable.

The meaningfulness level among variables is higher than 0.05, therefore, there is no meaningful difference between variables.

Table 1. Type of commodity production

Type of commodity	N	Percent
production		
Capital	11	45.83
Intermediate	5	20.83
Consumable	8	33.33

Since the meaningfulness level is higher than 0.05, therefore, the congruence coefficient is not significant so there is no connection between privatization problems and loss and benefit.

Since the meaningfulness level is lower than 0.05, therefore, the congruence coefficient is significant so there is an indirect relationship between privatization problems and sum of assets.

Since the meaningfulness level is higher than 0.05, therefore, the congruence coefficient is not significant so there is no connection between privatization problems and productive costs.

Since the meaningfulness level is lower than 0.05, therefore, the congruence coefficient is significant so there is a direct relationship between privatization problems and non-productive costs.

The results of T test for coupled comparison of the number of staff before and after transferring show that the mean variance equals 0.34337 and T equals 0.008 at meaningfulness level of (0.993) which is higher than the research (0.05). The results show that the difference between number of staff before and after transferring is not significant statistically.

The results of T test for coupled comparison of the benefit before and after transferring show that the mean variance equals 363420.667 and T equals 1.08 at meaningfulness level of (0.004) which is lower than the research (0.05). The results show that the difference of benefit before and after transferring is significant statistically. To explain, the benefit of enterprises has increased after transferring.

The results of T test for coupled comparison of sum of assets before and after transferring show that the mean variance equals 0.243 and T equals 0.181 at meaningfulness level of (0.858) which is higher than the research (0.05). The results show that the difference in sum of assets before and after transferring is not significant statistically.

The results of T test for coupled comparison of productive costs before and after transferring show that the mean variance equals 170893.7826 and T equals 1.294 at meaningfulness level of (0.209) which is higher than the research (0.05). The results show that the difference between productive costs before and after transferring is not significant statistically.

The results of T test for coupled comparison of non-productive costs before and after transferring

show that the mean variance equals 50493.3182 and T equals 1.991 at meaningfulness level of (0.040) which is lower than the research (0.05). The results show that the difference between non-productive

costs before and after transferring is significant statistically. To explain, non-productive costs have decreased after transferring.

Table 2. Hypothesis.

Table 2. Hypoth	iesis										
First hypothesi	S	Signif	icant	T-	- Test	Deg	grees of		Meandiffere	nnce	Transfer
		leve	el			fre	freedom				
		0.00)6		3.7	8			108.90		Exchange- Auction
							'			•	
Second	S	ignificant	F- T	'est	Degree	s of	Mean sq	uare	e Total so	uare	
hypothesis		level			freedo		1		-		
V 1		.083	2.8	15	2		12998.1	170	25996.	340 No	on linear relation ship
											between varibles
		.049	4.3	46	1		20070.8	385	20070.	885	linear relation ship
											between varibles
							•		•	•	
Third hyp	oth	esis			N		Corr	elat	ion coefficen	t	Szh significant
• • • • • • • • • • • • • • • • • • • •					24			-	-0.144		0.501
			L							ı	
Fourth hy	poth	nesis		N	1		Corre	latic	on coefficent		Szh significant
0.1				2	4			0.	.262		0.000
						l			-		
Fifth hypo	thes	sis		N		(Correlation	coe	fficent	Szh significant	
J F				24			-0.477			0.018	
		· ·			ļ.		<u> </u>	<u> </u>			0.010
Sixth hypo	Sixth hypothesis			N			Correlation	COE	efficent	Sa	zh significant
этин нуро		_		24			0.262		2.	0.000	
		L									0.000
Seventh		Significar	ıt level	Т-	Test	De	grees of		Meandiffere	ennce	Staff
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пуросполь		0.99	3	0	.008	23			0.34337		Before- Next
			_							<u> </u>	
Eighth	9	Significan	t level	Т-	Test	Deg	rees of		Meandifferen	nce	Profit
hypothesis				_			edom				
J F		0.00	4	1.	.08		17		363420.667		Before- Next
Ninth		Significar	t level	T-	Test	Des	grees of		Meandifferer	nnce	Total assets
hypothesis				_			eedom				
пурошени		0.85	8	0.	.181		22		0.243		Before- Next
										I	
Tenth		Significan	t level	Т-	Test	Des	grees of		Meandiffere	nnce	Prodaction Cost
hypothesis	[]	- O			U		freedom				
J P		0.20	9	1.	.294		22 170893.7826		26	Before- Next	
		0.20						<u> </u>		-	1,0,10
Eleventh		Significan	t level	Т	Γ- Test	1	Degrees of		Meandiff	erennce	Non marufacturing
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-J P Strices		0.04	0		1.991		21		50493	.3182	Before- Next
		0.040		1.771			21		30493.3162		DUIGIO I TORE

9. Implications and suggestions

1- A format and organization which leads to dynamism, accountability, durability and consolidation of the free market mechanism depends

on conditions such as individual freedom, complete information, freedom to enter to and exit from markets, reinforcing rules and regulations, not to

have secret bargains and compromises and efforts to generate competitive conditions.

- 2- To make a rational economic culture. A rational culture in which discipline, hard and fast rules, security and lawful ownership have been institutionalized since this is crucial for its growth and planning in this regard.
- 3- Development of communities is dependent on change in people's view about economy, running enterprise and economic behaviors. As reflected in the latest report by the international monetary fund about economic status in Iran: efforts to heighten public knowledge about importance of the mentioned reforms (general policies of principle 44 of constitution) to gain public support, would be essential. (central bank -areport of the international monitory[5])
- 4- To have a clear, explanatory, and systematic informative discipline accountable for the concerns of investors and job creators including clarity in investments, integration and development of invest markets and the manner of investment in production and service units, monopolies and discriminating behaviors resulting from information abuse and factors increasing the risk for investments. (gh.reza.safarzadeh[4])
- 5- To accomplish some other integrative activities to better inform foreign investors about facilitating rules and regulations supervising on foreign investments and giving assurance that the rules would not change abruptly, through the media like internet, out of border TV channels, advertising catalogues in international languages and its distribution via embassies and economic bureaus of Islamic Republic of Iran.
- 6- In order to achieve the mentioned goals, in designing a proper informative discipline the following conditions must be observed:
- A. People should be informed of accurate and timely information
- B. The required information consisting of facts about enterprises, manner of evaluation, manner of transferring and public distribution of stocks should be available for applicants
- C. The clarity of information system should be done for the following purposes:
 - I. Clarity of the manner of operation (process of the action)
 - II. Accuracy in execution of processes
 - III. Correct information system

In addition, the followings should be observed in process of information systems:

A- Certain departments should be identified to provide information

- B- Market information should be provided in a proper time to benefit from
- **C-** A legitimate department should be determined to verify the accuracy of information
- D- The data should be supplied in a similar format
- E- The needs of beneficiaries of the data should be met in designing the format
- **F-** Various and proper tools should be provided in a way that majority of people can have access to it. (Gh.reza.heidari kord, zohre alipour[1])

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A Comparison between Initial and Effective Fundamental Period of RC Frames with Steel Eccentric Bracing

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Abstract: In earthquake resistant designs the value of fundamental period needs to be set close to reality. Special emphasis can be placed on designs which are based either on static equivalent method or performance level. The static equivalent method employs the seismic factor which is strongly dependant on fundamental period. Also during the later design, target displacement is directly connected with square of fundamental period. In this connection most of seismic codes (including Iranian National Seismic Standard) offer an experimental equation distributed for different structural systems to present fundamental period. To make sure for required modifications on seismic design codes, one hundred eighty concrete moment resisting frames with steel eccentric braces has been considered to capture vibration period by performing two-dimensional nonlinear pushover analyses. Pushover Analyses have been conducted using SAP-2000 program, which can consider material nonlinearities almost near reality. In this case the applied forces have been considered as the lateral forces of the Seismic Standard. At the end, fundamental period and effective fundamental period both derived by analysis and the experimental has been discussed concerning bracing kind of spans, length of link beam and height of structure. Analytical results confirm the validity of the experimental equation for presenting fundamental period in the case of reminded frames.

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Keywords: Vibration, Fundamental period, Reflection factor, Earthquake.

1. Introduction

Structure's attitudes toward the moderate and major earthquakes lie in inelastic ranges, so inelastic analysis should be selected for them. But because of the time and cost concerns, lack of comprehensiveness of inelastic analysis softwares, and availability of elastic methods (or other practical methods), the designs are preferred to be conducted by elastic analysis together with seismic reduced forces (Hoseinzadeh, 2010). Reducing strength of structure from elastic strength is usually introduced by strength reduction factor. In this regard, the building codes extract seismic loads of inelastic designs from a linear spectrum (Fig. 1) which is dependent on natural period of structure, and ground zone type (Tasnimi et al., 2007).

One of the important dynamic properties of buildings toward the seismic vibrations is natural period defined as the time required for one cycle of simple harmonic motion. Dynamic excitations induce dynamic loads that are greater than the static loads into the buildings. Also, for the excitation with shorter natural period, the greater loads are expected. But the conclusion is not completed because the response spectrum of structure should be contemplated. Generally the response of structure is dependent on response spectrum which is calculated based on maximum response of a single degree

freedom system at various periods or frequencies. This put more emphasize on investigation the period of vibration which can be conducted by one of analytical or experimental methods.

Under the provisions of NEHRP, UBC, SEAOC, ATC3-06, and Iranian Code (issued in 1988 and revised in 2005) vibration period of buildings can be extracted experimentally by:

$$\begin{cases} T = 0.08H^{0.75} & for steel frame \\ T = 0.07H^{0.75} & for concrete frame \\ T = 0.05H^{0.75} & for other system \end{cases}$$
 (1)

To make a point, one eighty concrete moment resisting frames by eccentric braces, designed based on the Iranian National Seismic Standard, has been considered to capture seismic parameters by performing two-dimensional nonlinear pushover analyses. This paper has made more intense study on reliability of Equation 1, which is suggested by the mentioned codes. Seismic parameters including fundamental period and effective fundamental period are excerpted then investigated in connection with length of link beam, bracing kind of spans and height of building.

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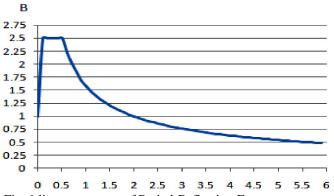


Fig. 1 linear spectrum of Period-Reflection Factor at ground type 2 (Iranian Code).

2. Materials and Methods

Fundamental period is directly derived by solving the characteristic equation (equation 2) while acquiring aid of Equation 3, sets value of initial vibration period (Chopra, 1995).

$$[K] - \omega^2[M] = 0 \tag{2}$$

$$T_i = 2\pi / \omega_i \tag{3}$$

Where $[K],[M],\omega$ respectively are stiffness matrix, mass matrix and modal frequency of structure. T_i is defined as fundamental (initial) period and ω_i is initial frequency of structure. Effective fundamental period needs referring to bilinear diagram belonging to Roof Drift/Shear Base curve (Figs. 2, 3) in case of structure under lateral displacement up to the target point (Code-360).

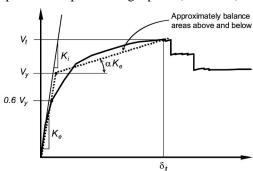


Figure 2. Idealized force displacement curves, Positive post-yield slope (FEMA-356).

Figs. 2, 3 employ K_i , K_e respectively as initial stiffness and effective stiffness

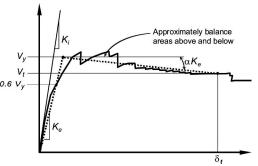


Figure 3. Idealized force displacement curves, Negative post-yield slope (FEMA-356).

 V_y is referred to shear base of total yielding, also δ_y , δ_t are displacement at yield base shear and target displacement. Now effective fundamental period can be calculated from:

$$T_e = T_i \sqrt{\frac{K_i}{K_i}} \tag{4}$$

3. Results

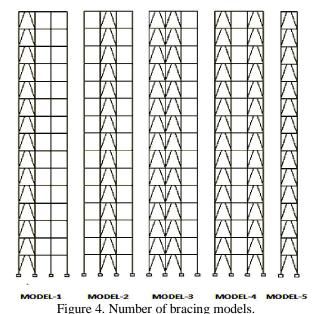
To draw a concrete conclusion, wide variety of concrete frame structures has been scrutinized under earthquake designs. One hundred eighty braced moment resisting frames giving variety in number of stories (1, 2, 4, 6, 8, 10, 12, 14, 15), bracing kinds of spans, length of link beam (0.5, 1, 1.5, 2 meters) and number of spans (1, 3) have been investigated under elastic-inelastic analysis procedures. Also the five models applied for bracing the spans are plotted at Fig. 4. Analysis methodology covering provision of Iranian Code has been followed by using SAP-2000 (version 12) computer program which consider both gravity and lateral loads. Details of the frames profile in this study are presented at Tables 1, 2.

Zone Type	High Risk Level
Ground Type	Type 2
Ductility of building	Intermediate
Frame Type	Middle
Length of Loading Span	4 m
Length of Spans	4 m
Height of Stories	3.2
Dead Load	550 kg/m ²
Live Load	200 kg/m^2
Equivalent Partition Load	100 kg/m^2

Table 1. Characteristics of frames.

F _c	240 kg/cm^2
V	0.15
Е	2100000 kg/cm^2
V	0.3
Е	2100000 kg/cm ²
F _y	3000 kg/cm ²
V	0.3
Е	2100000 kg/cm^2
F _y	2400 kg/cm ²
F _u	3700 kg/cm ²
	V E V E F _y V E F _y

Table 2. Properties of materials.



4. Discussion

Generally speaking, vibration period of structures in the first mode can be taken as fundamental period. The application of fundamental period can be extended to finding response factor of building during static equivalence method. Also fundamental period has been presented by Iranian Code by Equation 1; with this in mind the third term of the equation addresses all unmentioned structural systems. On the other side, effective fundamental period, required to make bilinear pushover curve, is mostly functional at estimating target displacements during the designs based on performance level.

In this section, three types of diagrams discuss the vibration period in connection with bracing kind of spans, length of link beam, and height of building. Because of attending wide variety of buildings and weighty structural elaborations, presenting results has been abbreviated only to averages for two first items.

Attention in Fig. 5 will be focused on the effects of bracing type of spans on the vibration period. In the usual sense adding the number of bracing spans is associated with rising in stiffness. So, shorter vibration periods are expected in this condition as we can see at Fig. 5.

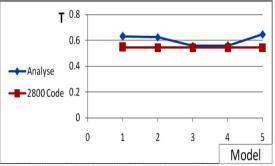


Fig. 5 Variation of vibration period considering bracing kind of spans.

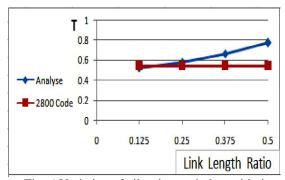


Fig. 6 Variation of vibration period considering length of link beam.

Length of link beam over the span beam is concerned in Fig. 6 to present vibration period. In this connection increasing length of link beam has led to rise vibration period.

Investigating variation of vibration period via height of building has been depicted in Figure 7. The values for fundamental period and effective fundamental period both extracted by analysis, together with fundamental period calculated by Iranian Code (third term of equation 1) are included respectively by red, blue and green pencils with this in mind the red and blue lines have been coincided in almost all of the Figure's presentations. By this presents, fundamental period in the first mode can be taken as effective fundamental period.

To make a conclusion, the averages of parameters in Fig. 7, have been gathered in Fig. 8. By this mean the analytical equation $(T=0.057H^{0.75})$ is suggested to assess validity of the equation 1. Close fitness is observable through the Fig. 8 to support the idea.

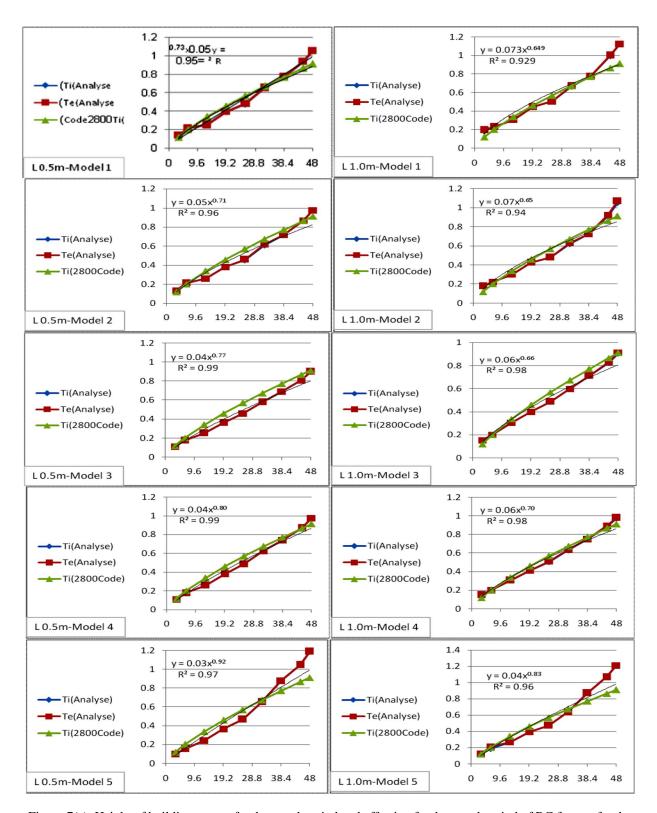


Figure 7(a). Height of building versus fundamental period and effective fundamental period of RC frames for the length of link beam 0.5, and 1 meter.

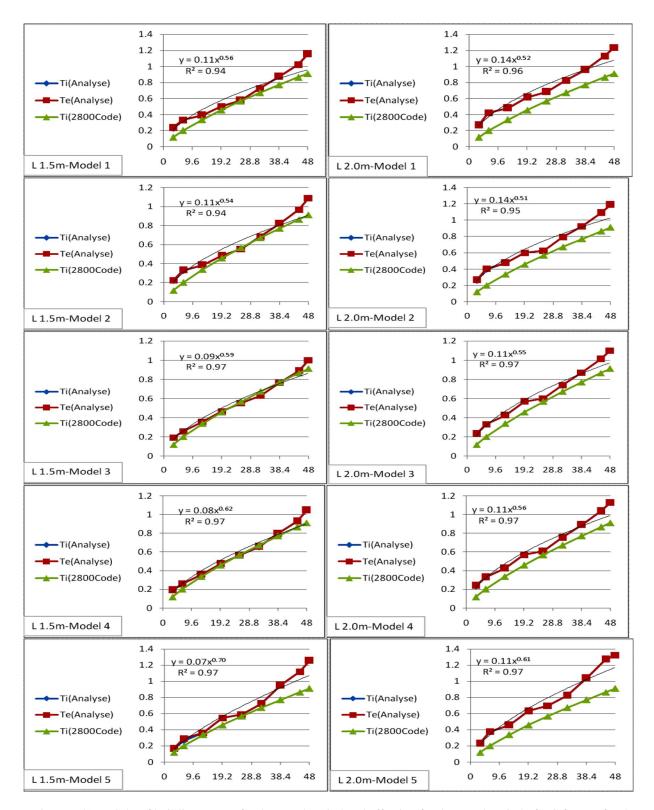


Figure 7(b). Height of building versus fundamental period and effective fundamental period of RC frames for the length of link beam 1.5, and 2 meter.

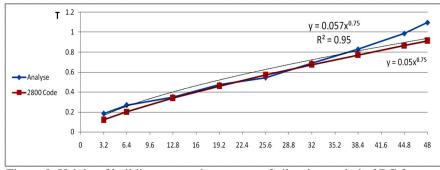


Figure 8. Height of building versus the average of vibration period of RC frames.

5. Conclusions

To capture fundamental period and effective fundamental period, one eighty concrete moment resisting frames with eccentric steel bracing are analyzed by performing two dimensional pushover analysis. The following conclusions can be drawn:

- For initial estimation of target displacement at the design based on performance level, the analysis has presented close values for fundamental period and effective fundamental period parameters. So, it is of interest to take fundamental period (vibration period at the first mode) as a reliable estimation on effective fundamental period for the mentioned structural systems.
- Adding number of bracing spans has made shorter vibration period. As a corollary, Figure 4 has reported longer vibration periods for the models with one bracing span then the ones having two bracing spans.
- The frames with symmetric or antisymmetric bracing spans had the same vibration period.
- Increasing length of link beam has led to rise the vibration period of building.
- To validate experimental relation of seismic codes (such as Iranian code) for presenting vibration period (T=0.05H^{0.75}), the analysis has suggested an analytical equation in Fig.7 (T=0.057H^{0.75}). Concerning the connection between reflection factor and fundamental period in Fig. 1, the experimental equation 1 was detected very satisfactory for short and intermediate tall buildings. Also, by this equation tall buildings have been designed for more safety. In summing up, the experimental equation proposed in the mentioned Codes was monitored very close to reality.

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The Influence of Emotional Intelligence of Secondary School Teachers on Classroom Discipline Strategies

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Abstract: The purpose of the study is to analyze level of emotional intelligence among teachers employed in government secondary schools based on selected demographic variable. The sample of the study comprised 203 teachers. The findings of the study showed that there was a significant difference in the teachers' races (Malay, Indian and Chinese) and their emotional intelligence. The study also revealed that there were significant differences between teachers with high and moderate level of emotional intelligence in five strategies of classroom discipline used i.e. teachers with high level of emotional intelligence scored higher in the classroom discipline strategies of discussion, recognition, involvement, and hinting, whereas teachers with moderate level of emotional intelligence scored higher in the use of aggression and no significant relationship with one strategy (punishment) of classroom discipline.

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Keywords: Emotional intelligence, classroom discipline, race.

1. Introduction

One of the fundamental problems among educational systems of many countries is related to classroom discipline and students' misbehavior. Disciplinary problems have long been recognized as a major issue in schools (Edwards, 2008). Classroom discipline management refers to control of time and behavior of students as well as of teachers in a classroom setting (Fredrick, Deitz, Bryceland, & Hummel, 2000). Classroom discipline management involves teachers encouraging positive social interactions as well as active management in learning and self-motivation. They shape a positive learning society in which the students are actively engaged in individual learning process and classroom management. They establish the physical climate, control students' behavior, establish an environment full of respect, ease instruction, create safety, wellness, and communication with others when required. All these are related to classroom discipline management, the major objective of which is to establish a positive learning environment and take steps to maintain this positive climate by directing and correcting students' behavior (Burden & Byrd, 2002). Classroom discipline management strategies play an effective role in building positive teachers and students relationships (Wang, Haertel, & Walberg, 1993).

Behavior management is a set of interactions that assist teachers to influence students' behavior and teach them to act positively. These interactions are developed not only to reduce teacher's stress level but to help these professional people and students to establish social climates of cooperation, a setting in

which children and adults can learn together, play together, and build quality relationship (Danforth & Boyle, 2007). The primary tactics to control behavior are still reward and punishment. As Thorndike (1920) observed, behavior is influenced by its results, this is, the outcome. However the impact is on the future occurrence of the behavior under the same or similar conditions (Wielkiewicz, 1995).

Discipline, during the past decade, has been referred to as the main problem for classroom teachers (Chiodo & Chang, 2000). Teachers, themselves, accept that disciplinary problems are becoming an epidemic phenomenon in the public schools (Elam, Rose, & Gallup, 1996; Rose & Gallup, 2004). Many teachers have been reported to have left schools because of the frequent problem of classroom disruption (Ingersoll & Smith, 2003). Charles (2008, p. 9) mentioned: "Overall, the tactics teachers use to manage student behavior are referred to as discipline or behavior management. Educators today often use the term behavior management to indicate preventing, suppressing, and redirecting misbehavior. The term of discipline has traditionally suggested teacher control, coercion, and forceful tactics' educators today often use the term behavior management to indicate preventing, suppressing, and redirecting misbehavior".

There are three major points of view about classroom discipline, each supporting special tactics (Burden, 2003; Lewis, 1997; Wolfgang, 1995). Firstly, some psychologists argue that to encourage responsibility among children, the teachers should set up obvious expectations for their students' behavior and then fairly use a range of rewards and support for

good behavior as well as punishments for misbehavior (Canter & Canter, 2002; Swinson & Melling, 1995). According to this point of view, children are viewed as being molded by the impacts received from the environment. Secondly, some researchers have the view that this objective could only be achieved by placing less stress on students' obedience and teacher's force, and more on students' self-regulation. The teacher has the responsibility to structure the classroom environment to make the students at ease and have control over their own behavior (Burden, 2003). The third approach supports group participation and decision making, in which the group is responsible for the behavior of its members (Edwards & Mullis, 2003; Johnson & Johnson, 2006). Hence control of the students' behavior is a shared responsibility between both the students and the teacher. Teachers who in moderate control advocate student-oriented psychology, which is manifested in the low control philosophy, but they also recognize that learning occurs in a group environment (Burden, 2003).

It is important to study how teachers promote classroom discipline and limit or reduce disruptive behavior of students. Teachers are expected to be able to create a non-disruptive classroom environment (Doyle, 1986). According to Goleman (1995), Bar-On (1997) and Mayer, Caruso and Salovey (1999), one of the factors that influence behavior management in the classroom is emotional intelligence. Weisinger (2004) defines emotional intelligence as the intelligent application of emotions, where one deliberately force one's feelings to work through applying them in order to help to guide behavior and thought in the ways that promote consequences. Goleman studied emotional intelligence as a different kind of knowledge. Emotional intelligence is the ability to motivate oneself and insist in the face of hopelessness, to control incentive and delay satisfaction, to organize one's moods and to empathize (Goleman, 1995).

Emotional intelligence in teachers could assist in creating a classroom environment for improving academic, social and emotional performance of students. Emotional intelligence can be instrumental in improving classroom discipline management and assisting teachers to achieve success in their professional life. Teachers must be in touch with their emotions and feelings to be able to resolve any problems. Emotional intelligence contributes towards an increased sense of creativity, promotes innovative thinking, reduces stress and improves relationships. It enables an individual to fulfill his/her desires at the physical, mental and emotional levels and relate effectively with others (Singh, 2006). The decision making abilities and empowerment of teachers on a variety of issues relating to the school are crucial towards creating and sustaining a positive school culture (David, 1989; Murphy & Shiffman, 2002)

Findings by Michael and Idris (2003) and Ishak (1995) showed that teachers in Malaysia lack positive emotion and hence are not able to impart the feelings to their students (Noriah, Ramlee, Zuria & Siti, 2006). Studies by Stuhlman and Pianta (2002) affirmed that a teacher's negative comments on a student's grades would elicit difficult behavior from the student. Emotional intelligence is also linked with aggression, recognition, involvement and discussion. Ouebbeman and Rozell (2002) stated that there is a negative relationship between emotional intelligence and aggression while Resnicow, Salovey, and Repp (2004) found that it has a positive relationship with recognition. Singh (2006) noted that emotional intelligence could stimulate discussions, while Obiakor (2001) believed emotional intelligence is linked to teamwork, discussions and rewards in classrooms.

According to Rahimah and Norani (1997), schools in Malaysia have some disciplinary problems such as petty crimes, immoral conduct, dressing, truancy, disrespect for others and maladjustments with the school environment. They also added that bullying, school violence and maladjustments are increasing among students. The Khaleej Times (March, 2006) stated that the government had warned that some school teachers will soon not be allowed to publicly punish students for disciplinary offenses. In earlier years, students who had severe disciplinary problems such as stealing, vandalism and smoking were punished by school principals. It was easier to manage classroom discipline then and there were lesser problems.

Golemans' theory of emotional intelligence is the most widely used and related theory in this area. It has been referred to as a guide for extensive research on teachers' decision making (Goleman, 1996) pointed out emotional intelligence is getting along with others, self-regulation, motivation, empathy, social-skill, regulation and one's mood. As a conclusion, he expressed that emotional intelligence plays an important role in school achievement since it lets confidence, self-control, students promote communication, and cooperativeness. Though both Goleman (1995) and Bar-On (1997) state that emotional intelligence contributes significantly to social, behavioral, and academic improvements, there is only limited empirical evidence that reflect such outcomes or findings. High emotional intelligence scores indicate a strong, well-developed, and efficient emotional intelligence skill while low scores indicate a deficiency and a need to improve particular competencies and skills to meet environmental demands (Bar-On, 2004). Stuhlman and Pianta (2002) pointed, between the teacher's emotional feedbacks and the student's behavior, noticing that teachers' negative descriptors of their students cause greater examples of behavior conflicts.

The main objective of the study is to analyze the teachers' emotional intelligence and their classroom discipline strategies in secondary schools in Selangor State of Malaysia. The emotional intelligence level of teachers is important for teachers and students communication and to improve classroom discipline strategies. The specific objectives of the study involve examining the significant difference between levels of teachers' emotional intelligence based on classroom strategies (punishment, discipline discussion, aggression, involvement, recognition. hinting). possible differences between the level of teachers' emotional intelligence and teachers of different races (Malay, Indian and Chinese).

2. METHODOLOGY

2.1 Design

Quantitative approach is applied in this study. A descriptive correlational design is implemented in order to decide if there are any relationships between the variables under investigation. A descriptive method is explained as gaining information which is related to the present situations of the phenomena (Ary, Jacobs, Razavieh, & Sorensen, 2007). This study is designed to use a descriptive correlational design to examine the relationship between classroom discipline strategies as a dependent variable, and, teachers' emotional intelligence as the independent variables.

2.2 Sample

The target population for this study was secondary school teachers, however the accessible population was form Two and form Four teachers in secondary schools. This study employed the multi-stage sampling procedures: random sampling and cluster sampling. To obtain the required number of samples, two moderate classes (one class form two and one class form four) in secondary school teachers were chosen from each school. Once the class is identified, about 10 teachers teaching different subjects in the class were selected. This is based on cluster sampling where each teacher teaching the selected class was included as sample for the study. Based on this method, 203 teachers were chosen. Moreover, a sample size of 180, based on Cohen table (1992) is considered sufficient to answer all the research questions that required the use of mean, standard deviation, percentage, ANOVA and MANOVA. The sample was chosen according to government secondary school types (public) and region.

3. Measures

3.1 Emotional Intelligence Scale (ECI)

This section describes emotional intelligence based on the Emotional Competencies Inventory (ECI) designed by Boyatzi, Goleman, and Rhee, (2000). The ECI was developed in order to evaluate the emotional competencies of people as well as organizations. The ECI was used in this study because it was shown to have high validity and reliability (Norsidh, 2008). The emotional competence inventory scales of twenty five competencies are classified into four subscales: self-awareness, self-management, social awareness and social-skill. The inventory includes 110 items showing adaptive orientation toward emotional intelligence. Each item in the questionnaire explains a single behavior. Participants use a 7-point scale on which they are supposed to show if the items are "slightly", "somewhat" and or "very" traits of themselves (Boyatzis, et al., 2000). The scale has a Cronbach alpha of .98.

3.2 Classroom Discipline Strategies

In 2009 Shlomo Romi developed this questionnaire. The questionnaire for classroom discipline strategies for teachers' perception comprises 25 items and six strategies. The strategies measured include punishment, reward or recognition, involvement in decision-making, hinting, discussion and aggression, all of which are based on teachers' perceptions. Examination of a number of discipline texts (Charles, 2008; Lewis, 1997; Tauber, 2007; Wolfgang, 1995) indicated that one or more of these strategies were the basis for most of the available approaches to classroom discipline. It would have been possible to utilize exploratory factor analysis on data sets from point of view of nationality to obtain assessments of discipline most appropriate to other countries (Australia and China). This questionnaire focused on teachers' perceptions on classroom discipline strategies. The scale has a Cronbach alpha of .083.

3.3 Data Analyses

SPSS version 17 was used to analyze the data. Descriptive statistics such as; mean, standard deviation, percentage was used to describe the relationship to respondents. MANOVA tests were used to examine the association and influence between teachers' emotional intelligence and classroom discipline strategies. The ANOVA test was used to examine the different races

4. RESULTS

4.1 Level of Teachers' Emotional Intelligence

Table 1, displays the teachers' levels of emotional intelligence. The finding indicated that the majority of the respondents' emotional intelligence scores were high ($n=145,\ 71.4\%$). The data also showed that 58 respondents (28.6%) had moderate emotional intelligence scores, while none scored in the low level of emotional intelligence. Based on the results, the minimum score was 3.73 and the maximum was 6.76, with a standard deviation of .059. The mean score for emotional intelligence was 5.38 implying that the level of emotional intelligence score was high.

Table 1: Distribution of Respondents' EQ Scores

Levels	Mean	Frequency	Percentage
Low	1.0-3.0	0	0
Moderate	3.1-5.0	58	28.6
High	5.1-7.0	145	71.4
Total		203	100.0

Mean=5.38; Std=0.059;

Minimum=3.73: Maximum=6.76

4.1 Teachers' Races

This section would also fulfill the research objective, which is to determine the level of teachers' emotional intelligence with respect to their races (Malay, Indian and Chinese). The following research is intended to pursue the stated question: Is there any significant difference in the level of teachers' emotional intelligent across teachers of different races (Malay, Indian and Chinese)?

To answer the research question, the researcher used one-way ANOVA to compare the total scores of three variables; teachers' emotional intelligence across their races (Malays, Indians and Chinese). Table 2 shows that there were significant differences among different races and their level of emotional intelligence, F (2, 200) = 3.23, P= .041. There was a statistically significant difference between Indians and Chinese teachers.

Table 2: ANOVA Results of Intelligence by Race

				_	- ,	
variable	Races	N	Mean	SD	F	Sig.
	Malay	130	5.39	.59	3.23	.041
EO	Chinese	40	5.21	.51		
ĽŲ	Indian	33	5.56	.65		
	Total	203	5.38	.59		

4.2 Teachers' Levels of Emotional Intelligences across Classroom Discipline Strategies

The objective is to investigate the cross interaction effects of two levels of the emotional intelligences with the classroom discipline strategies

as practiced by respondents, and the research question is if there were any significant differences between level of teachers' emotional intelligence based on classroom discipline strategies (punishment, discussion, recognition, aggression, involvement, hinting)?.

This study proceeds with a multivariate analysis of variance (MANOVA). The purpose of this test is to see if there are any significant differences between teachers with high and moderate emotional intelligence in their level of usage of the six disciplinary strategies. Only two groups (moderate and high) are used because there is no respondent in the low category group.

The first step is to ensure if there are significant differences using multivariate tests. In this study, both Wilk's Lambda and Pillai's Trace are referred. Table 3 shows both tests are suitable when comparing two groups. However, in cases where there are violations of assumptions, Pillai's Trace is normally recommended as it is more robust (Pallant, 2007). Based on table 3 below, it is clear that all the tests show significant difference between teachers with high and moderate emotional intelligence in using six disciplinary strategies.

Table 3: Multivariate Analysis of EQ across Classroom Discipline

		· 1					
Effect		Value	F	H- df	Error df	Sig.	Partial Eta Squared
Reco-d	Pillai's Trace	0.381	20.075	6	196	000	0.381
EQ	Wilks' Lambda	0.619	20.075	6	196	000	0.381

According to Pallant (2007), as there are many numbers of separate analyses involved, a stricter alpha level is set to reduce the chance of Type 1 error. This is done by applying Bonferonni adjustment, involving dividing the original alpha level (.05) by the number of analyses conducted (in this study, six) resulting in a new alpha level of .0083. Therefore only those findings with significant values of less than .0083 will be considered as significant. Table 4 indicates the findings show that there are significant differences between teachers with high and moderate emotional intelligence in all of the six disciplinary strategies used, except punishment. Referring to the partial eta square values, emotional intelligence was found to have the most impact on discussion strategy, explaining 30.1% of its variance. This is followed by recognition (29.4% variance explained), hinting (27.2% variance explained), involvement (12.6% variance explained) and aggression (8% variance explained).

Table 4: Test between Subject Effects

Source	Dependent Variable	df	F	Sig.	Partial Eta Squared
Recode EQ	T.Punishment T.Discussion T.Recognition T.Aggression T.Involvement T.Hinting	1 1 1 1 1	1.779 86.643 83.508 17.583 28.950 74.918	.184 .000 .000 .000 .000	.009 .301 .294 .080 .126 .272

The estimated marginal means computed in Table 5 shows that teachers with high level of emotional intelligence scored higher in discussion, recognition, involvement and hinting. In contrast teachers with moderate level of emotional intelligence scored higher in the usage of aggression and punishment.

Table 5: Descriptive of Means across Level of Emotional Intelligence

Dependent Variable	Recode of EQ	Mean	Std. Error
T. Punishment	Moderate	3.879	.090
1. I umsimient	High	3.737	.057
T. Discussion	Moderate	3.858	.092
1. Discussion	High	4.869	.058
T. Recognition	Moderate	4.073	.085
1. Recognition	High	4.995	.054
T. Aggression	Moderate	3.272	.120
1. Aggression	High	2.676	.076
T. Involvement	Moderate	3.440	.094
1. Ilivorveillelit	High	4.038	.059
T. Hinting	Moderate	4.026	.087
1. Filliting	High	4.914	.055

5. Conclusion

In terms of emotional intelligence and race, the findings of above indicated that there were significant differences in emotional intelligences among teachers of different races (Malays, Indians and Chinese). One-way ANOVA was conducted which explored the differences between races across levels of emotional intelligences. The analysis showed Indian teachers scored significantly higher than Chinese teachers in their emotional intelligence as measured by the research instrument. However, the results obtained in the study did not find statistically significant differences in emotional intelligences between Malay and Indian teachers, as well as Malay and Chinese teachers. The results of above are also in keeping with the findings by Encinas (2001) who conducted an exploratory study on emotional intelligence, ethnicity and generational groups in higher education settings. Encinas found that white participants reported a higher overall level of emotional intelligence than the non-whites. The findings of this study are also similar to those of Okech (2004) who conducted a study on relationship between emotional intelligence among primary school teachers. Okech found that there were statistically significant differences in emotional intelligence among African, Hispanic, and White elementary school teachers.

This section discusses the research objective of the study which was to determine the level of teachers' emotional intelligence based on strategies classroom discipline (punishment, discussion, recognition, aggression, involvement and hinting. MANOVA has clearly indicated that teachers of different levels of emotional intelligence significantly differ in their usage of both positive disciplinary strategies (discussion, recognition, hinting and involvement) and negative ones (punishment and aggression). The effect size of the impact of teachers intelligences on the strategies used ranged from small (explaining around 5% of the variance) to quite large (explaining 30.1% of variance). This implies that the teachers' intelligences play an important role in influencing the kind of strategies teachers use and implement in their quest to achieve educational goals.

On the role of emotional intelligence, the findings of this study were found similar to the findings of Moriaty and Buckely (2003). Studies have also shown that it is possible to learn emotional intelligence techniques and improve emotional intelligence ability which will increase the chance of success in classroom. Results are also in line with Obiakor (2001) who believed educators' emotional intelligence relates to teamwork, discussion and reward. Furthermore, emotional intelligence can help individuals to stimulate to discussion (Singh, 2006). Results of this study are also supported by Quebbeman and Rozell (2002) who showed that aggression is seen to have a significantly negative relationship with emotional intelligence.

Some researchers stated that punishment, to a small extent is necessary for schools. Punishment in schools is related to various factors. The SUHAKAM journal in Malaysian education (2008) stated that majority of the teachers and administrators agreed that class teachers should be given the authority to cane students with serious disciplinary problems. However, Curwin and Mendler (1997) believed that teachers should punish students in private to allow students to maintain their dignity. In addition, McLeod, Fisher and Hoover (2003) stated that the purpose of negative reinforcement or punishment is to change misbehaviors, and not to torture students. Resnicow, Salovey and Repp (2004) suggest that, people who have high emotional intelligence and their recognition in the different tasks were significantly correlated (r=.54). The findings of the current research also were in line with the study done by Goleman (1998), who concluded that emotional intelligence significantly contributes to the teachers' achievement and teachers' behavior management. Goldman (1995), Bar-On (1997) and Mayer et al. (1999) stated that emotional intelligence is related to the ability in behavior management. They contended that emotional intelligence contributes significantly to improving behavior. Brownhill (2009) also found that high emotional intelligence scores indicate that the emotional intelligence skills are functioning efficiently in classroom and school environment; low scores suggest a deficiency and lack of skills in meeting environmental demands.

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Abbreviations:

EQ=Emotional Intelligence
"T." stands for the Teachers'
H=Hypothesis

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Review and Discussion of Theories related to Dynamic Model of World Class Manufacturing Strategy

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Abstract: World Class Manufacturing (WCM) has attracted so much manufacturing industries and operation strategists' attention. The expansion of this issue gets back to using "Best Techniques" of the companies with "Best Performance". In this study, we have addressed the lack of identifying WCM factors by using several different criteria and test of the relations between techniques and WCM performance. Studying different perspectives for acquiring a dynamic model which is capable of covering all aspects and primary/secondary factors including the internal and external ones, strategies, objectives and policies is highly important. Therefore, determining the relations between mentioned factors can bring about a systemic enterprise which helps identify the World Class Manufacturing level of performance status and devising an appropriate mental/conceptual model in a way that it involves the effective leading causes and factors is the initial stage of implementation and institutionalization of a dynamic model. In this paper by reviewing sources, viewpoints, definitions, attitudes, and WCM causes and factors, the research carried out in this regard, the conceptual model and WCM dynamic elements and the relations between them have been discussed. Finally, the dynamic model conceptual model of WCM strategy is presented.

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1. Introduction

Today, to achieve world class manufacturing (WCM), any producer shall have superior performance in terms of competition major criteria (quality, price, prompt delivery, reliable delivery, flexibility and innovation). Such an organization should increase its own performance with respect to the aforementioned yardsticks for the purpose of enhancing its compatibility.

Some scholars maintain that a plant considered being of WCM provided that its maximum production capacity. Other suggests that high quantity in production together with high quality signify a manufacturing division of WCM. Having two dynamic and pro-active strategies (one for currently area and the other one for the future) has been regarded the dominant characteristic of a world class organization in some other specialists' viewpoint. Yet there some commentators who look at this subject matter from a competition-oriented perspective, that of client's or consumers, in order to establish a WCM and specify the features of such an organization. Some authors have been studying the internal functioning factors and have outlined the definition for WCM. Nonetheless, another group of professionals have taken into account the external factors with respect to the point, as well. By virtue of such diverse outlooks, we reach the conclusion that WCM is actually a status which any given organization seeks to protect (Nouri & Asgari, 2004).

"World class manufacturing" was first used by Hayes and Wheelwright (1985) for the purpose of describing an organization that has managed to achieve competition superiority through exploitation of their production capabilities serving as strategic weapons. Schonberger (1986) interestingly compared "world class manufacturing" with the Olympics games motto: faster, higher and stronger. Its equivalent is continuous and rapid improvement where we are concerned with WCM. WCM as a general expression has been defined to cover several specific production processes and organization strategies whose main objective has been determined to be flexibility. Womack and others (1990) presented a method for measuring and defining WCM. Furthermore, they proposed lean production which operates economically in all respects, in other words half the workforce at the plant, half the production space, half the investment in tools, and half the working hours allocated to develop a new product by the relevant engineers.

Literature Review

Grobler (2005) were discussed four capabilities: cost, quality, delivery, and flexibility and he illustrated the relationship between these four factors and causes on the basis of flow and stock model, supportive a preventive priorities in a direct or an indirect manner. Descriptive model of system dynamic examines the strengths (capabilities) general rule, hence through development of the model, experimentation and simulation we can test the

dynamic conditions, and moreover the short term situation and various policies can be tested by it, as well. The model potential improvement involves quantifying some specific parameters. The flaw and weak point of mentioned study are that the model in the presently status does not reflect the integrity of qualifications and outlet and this model is definitely an ideal for operations management, but it has not demonstrated the important relations between this model and capabilities and other secondary departments of organization and the way they affect each other.

Wang (2001) has studied the experimental relationship between WCM techniques and performance, and he sought a measuring model for WCM techniques and performance. Moreover, through making use of efficiency analysis and one-directional, multidirectional and variance analysis statistics method (ANOVA). He examined hypotheses and analyzed efficiency. Due to the fact that Wang's study lacks nonlinear and multi causal relations and dealing with statistical correlation causal relations, it can not account for balanced and nonlinear feedback structures of WCM model and its occlusions are provisional and ephemeral.

Bueno (2005) presented a practical model of macro economy which demonstrated the economy changes and fluctuations responding to stability policy by using system dynamic method, and he also demonstrated the time delays in the industry provision and supply division. He concluded that system dynamic together with control theory denote a modern language. Mentioned investigation is very useful in terms of a study conducted in the area of economy ,but no studies have been carried out regarding establishing links with other fields of economy sub divisions and their particulars, thus by expanding this model and relating it to different levels it can turn into a comprehensive and realistic model of an economic system.

Rydzak & et al (2004) teaches the way system dynamic method can be configured with balanced scorecard and its application. Moreover, he has provided an example of cause effect and stock & flow concerning six sets of machines, production/inventory, material/workforce productivity and market at IBM Corporation. This investigation disadvantage is that it simply delves into the categories of studies, concepts and has not reached the execution and simulation stages in a way that the model's validation and verification would be secured and by taking use of analysis tool the reliability and validity of the model at all levels could be checked upon.

Muda and Hendry (2002) constructed a new model of WCM for production upon order division. The objective of this study was to bridge the gap between companies in terms of reaching global level or

determining their strong points and making some revisions in the 16 principles already stipulated by schonberger. Its investigation method has been in the form of case study and comparing the companies' causes and principles. This study involves a conceptual model of establishment stages and suggests the relevant principles for companies which apply customization system, yet it illustrates the companies' problems and difficulties with regard to attainment of WCM or explains the changes of concerned rivals, customers, time and etc. And it is devoid of deep knowledge about the dynamic model out of organizational changes and can not be considered a yardstick for analyzing and examining the policies based upon mathematical relations.

Shabahang and Ebrahimi (2005) presented a model for designing the balanced scorecard performance evaluation comprehensive model. They eventually checked upon the four separate aspects of balanced evaluation (financial, customer, internal processes, growth and learning) in the form of hypothesis and quantative data and results obtained denote that there is a significantly relationship between most components of growth/learning facet and internal processes, on one hand and between the internal process facet and that of the customer's and between the customer facet and that of the financial facets, on the other hand). This work, from the perspective of testing the relations between dimensions and levels, is a good study and enhances the authenticity and validity of balanced evaluation model but it has not examined the various causal and multiple feedback relations existing in each of the realms by the help of WCM elements and causes and just indicates a one directional relationship (logic of cause & effect), whereas most strategies perceptive factors influence each other in feedback circle pattern. Furthermore, simple balanced evaluation without taking into account system dynamic might lead to incorrect and misleading conclusions with regard to strategic intuition effect since the delays and dynamic major factors in each certain environment has not been accounted for. And due to its sustainable nature, the mapping system is not capable of answering questions such as "what will happen if".

Kodali and Sangwan (2004) have dealt with measuring factors and values of WCM performance in India's industries and by the help of PVA algorithm the assessed indicators/criteria/quantitative and qualitative of the gap and distance between the presently level and the ideal .Kodalis' study weak point is like that of the previous one's. In other words, this investigation is a kind of identification behaviors such as experiences and historical trends and it is incapable of responding and reacting to the thoroughly new circumstances and policies. In this study the issue of presently knowledge is considered the knowledge of a temporal and

ephemeral nature and rapid changes in factors/criteria may dissect the previous existing sustainable and trust-worthy correlation between the variables. Therefore, having a vantage point and system causal method is definitely very much important for getting to know the actual system.

Todd and Palmer (2001) focused on designing and developing a "dynamic" measuring system and explore some of the current factors in this regard. This model, In particular, through a case study in a governmental department in newzland executed three stages of pre-designing, designing and post-designing and presented the stock & flow for four outlooks: finance, customer, internal process growth/learning. In this mentioned study, WCM factors and criteria at any given organization can be added to the model and in accordance with the WCM yardsticks and elements and organizational problems at any of those four spheres we can further contribute to the model comprehensiveness, and its becoming realistic in terms of demonstrating the system structure and behavior and through getting it balance embark on analyzing the governmental strategies.

Kim et al (2006) approached the construction of a model that could be compatible with dynamic balanced scorecard dedicated to the governmental organizations and by introducing the system dynamic method concentrated on cause & effect relations and interactions between key indicators and accounting for feedback time delays by means of the new policy and its changes. This investigation is the basis for identification of the constituents complexity conceptually and the cause & effect structure. By virtue of further research the detailed and nuanced particulars of factors and indicators can be incorporated and demonstrated in the sphere of flow - aggregation mathematical charts, structure and behavior. And it should be noted that this study has only recourses to examination of dynamic balanced scorecard structure in the conceptual province.

Steen and Erland Nielson(2006) has analyzed dynamic of balanced scorecard theoretical principles by the help of simulation method and this model comprises five perspectives and several financial and non financial criteria. All the indicators have been defined and are based upon cause & effect relations. The time delays in this study are considered as one of the important characteristics of BSC. And this model has been employed for simulating several different policies and scenarios through passage of time. The obtained results show that at least there are three variables: Skill, primary customer, and workflow which influence the profit in different manners. Advantage of this study is that the concerned model requires further development and expansion so as to provide adequate coverage for balanced evaluation and

all of its levels. And the effects of other variables of importance in a real organization should be also examined at other levels so that the model can get into the organization's problem and its difficulty as much as possible.

WCM Strategy Key Elements

The manufacturing management's perspective, the strategic capability significantly contributes to the companies' success in terms of competition. In other words, supporting the institution strategy and helping its improvement and accomplishment in the target market is the strength and power of an enterprise. Development, cultivation and assignment of the strategic capabilities are all the crucial functions of manufacturing strategy. Frequently, this function conflicts with daily affairs handling and difficult activities of the operation management. One of the most renowned authors in this field has discussed four strategic capabilities with regard to operation and productions: Manufacturing ability with lower costs(1), with high quality(2), with assured delivery(3), with flexibility in combining the products and the number of products manufactured(4)(Grobler, 2005).

Behzadian (2000) has specified the key elements and factors of Manufacturing Strategy and WCM performance criteria which are briefly outlined in Table 1.

One of conceptual pattern that exhibits the relation between technique and performance is demonstrated in figure 1. The efficiency indicator has measured the relationship between technique and performance and it is considered to be a medium (Wang, 2001, p. 42).

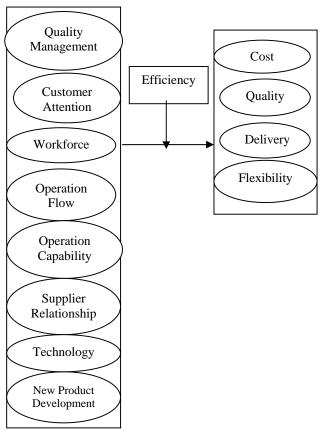
So as example for modeling of dynamic World Class Manufacturing, The factors and variables affecting the demand and market share in Iranian Auto Industry are concisely illustrated in Table 2, in primary and secondary parts of a dynamic and BSC and by including the factors of WCM.

Model Conceptualization

After recognizing system Boundaries and identifying endogenous and exogenous factors in the four levels of customer, learning and growth, internal processes and finance, a unified and comprehensive model was designed (figure 2) displaying the major and minor factors (model and sub models). Regarding the technological, social, political and economic changes as well as the time changes, the deletion of ineffective factors and addition of effective and important factors are possible in this model. And by setting it in software, the model updating can be possible.

Descriptive model of dynamic systems have the ability to support the capability of general rules; thus, it

can be possible to examine the development of model, the simulation of dynamic conditions, short-term status, and various policies.



Source: Wang, 2001.

Figure 1.The Relation between Technique and performance

Table 1. Key Elements and Performance Criteria of WCM Strategy

No	Elements	Performance Criteria
1	Manufacturing	-processing time or
	Cycle Time	processes
		-Transfer time
		- Line time
		-Setup Time
2	Flexibility	- Number of different
		Processes
		Ratio of output to
		Capacity
		- Number of New
		Products
		- Training grade supplied
		into market per year
		- Date of New Product
		into market
		-Number of levels in
		material
		- Quick response to Flexibility in product
		design goods delivery - Flexibility in responding
		to products volume
3	Quality	- Quality of incoming
3	Quanty	materials
		- Data quality
		- Production Quality
		- Quality cost
		- Preventive Maintenance
		plans effectiveness
4	Delivery	-Performance of seller
+	Delivery	delivery
		-Production Scheduling
		- lost sales
		-level of customer services
5	Workforce	-Responsibility
	Management	Assignment
	1.1anagement	-Training
		-Workforce Moral
		-Teamwork
6	Cost	-Ratio of Defects
`		-Turn over
		-Value-added analysis
		-Human resource
		productivity
		-Cost productivity
		-Overhead efficiency

Table 2. System Boundary and level Relations within Effective Variables.

Levels	Endogenous Variables	Exogenous Variables	Excluded Variables
Customer and Market	- Market Share - Customer Satisfaction - Sale Price - Volume of Sales	- Supply - Demand - Domestic Competitors and Import	- Vehicle Price Index - Consumer goods price - Export - The public's Perception - Competitors' Price - competitors' quality - Gasoline Consumption - Gasoline Ration - popularity (brand familiarity) - Volume of advertizing and marketing - Gasoline Import - Average time of retendering vehicles - Environmental rules and principles - Security principles - Air Pollution - Non-oil Goods exports - political threats
Internal processes (Manufacturing)	- Vehicle Replacement rate - Products Lifetime - Inventory - Production Capacity - Delivery Time - Process Quality (Technology and Automation level) - Machinery depreciation - Volume of New Products(Products Diversity and Flexibility) - Products Quality - Production Rate - Operations Time Period (production cycle)	- Cost of a made unit - Products lifetime - Depreciation Rate - Cost of a unit of training - Number of R&D programs - Overhead Cost - Process Quality elevation rate - Rate of Change in Manufacturing Investment	- Project Completion date - Project Completion date - Flexibility in the processes (office automation) - work volume in Manufacturing Process - Wastage volume - Gross Domestic product(GDP) - replacement goods conditions (public transportation)
Learning and Growth	Employees' knowledge level Number of innovations and recommendations Labor productivity Employment	Level of knowledge and skill Rate of knowledge loss	Morality Labor participation rate Labor flexibility Capabilities Rate of ceded responsibility Unemployment rate
Finance	- Operating Profit - Net Profit - Revenue - Cost price - Manufacturing costs (wages and materials) - Overhead costs - Operating costs: a-general and administrative b- Sales and Distribution c- R&D - Capital budget - Investment in manufacturing technology - Investment in Human Resource - Investment in sales and distribution networks	- Customs Tariff and Tax - Government Support (domestic loans) - Investment in R&D - Foreign Funds.	- Investment in marketing and advertizing - Stockholders value - Growth of per capita income - People's median income - Vehicle ownership costs (insurance, tax, maintenance, and gasoline) - Inflation rate - Growth of liquidity - Economic Development - Investment in Information Technology

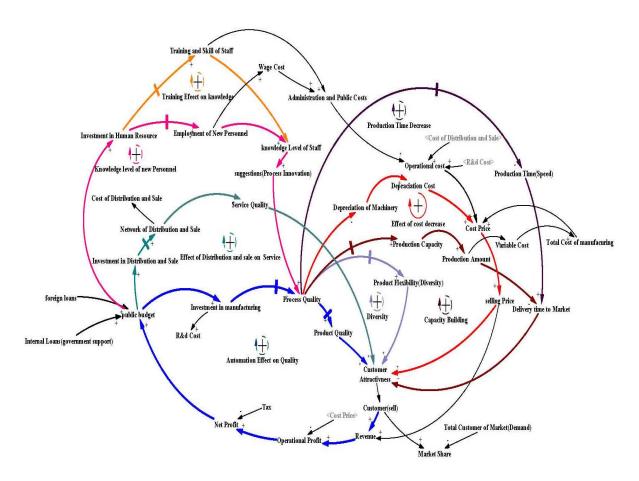


Figure 2. Integrated Model of Dynamic Balanced Scorecard within Causal loop For WCM Strategy

Conclusion

With regard of the above mentioned perspectives, it is highly crucial to achieve a dynamic model which can cover all the aspects and major/secondary factors including the internal and external ones, strategies, objectives and policies. Therefore, determination of the above factors can bring about a systematic movement helping specify the performance condition of world class manufacturing. And the execution backdrop and institutionalization of a dynamic model is to design a proper mental and conceptual model in a way that incorporates the effective key factors and causes.

Of course, this is not a static situation but it is a dynamic one meaning that by customers, consumers and rivals changes this very status is constantly transforming. Thus, It can be said that the ideal functional conditions for an organization or world class manufacturing is a target by itself which Is not a static goal but a dynamic one. In other words, this objective constantly gets transformed in line with changes in the conditions of customers and rivals. Mobility and high

level performance of world class organizations compel them to persistently pursue" superior goals" within their real time.

Respecting the fact that there are no particular definitions offered in the various definitions already provided by relevant authors and they have all introduced somehow the new ideas and thoughts about production and the best performance, here through reviewing the available definitions and literature we are present a comprehensive definition for world class manufacturing:

"World Class Manufacturing is an instantaneous, integrated and systemic approach of the WCM factors and elements at Learning and Growth, Internal Processes, Customer, and Finance levels in a way that it becomes capable of responding dynamically to environmental complicated changes and organizational difficulties so that by implementation of this dynamic model and accounting for adjoining time and delay. It can systematically react immediately in the face of

quick changes and attain the best strategies, objectives and competitive advantage at a global scale."

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Studying role of Organizational justice and Organizational health personality in Deputy of Research and Technology, Ministry of Health and Medical Education, Tehran, Iran

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Abstract: This study has been done in Iranian Deputy of Research and Technology, Ministry of Health and Medical Education to gather information about the MS degree of Public Management that describes a Psychological Problem between staff of case. This study is case study/descriptive in the field of research and is of correlation type. In this study the five aspects of an Organizational Citizenship Behavior through an organization's point of view has been assessed. Then, organizational justice was assessed in 3 aspects and finally the effects of the Health of an Organization or Organizational Healthy Personality with an emphasis from the 11 branches from the point of views of Lynden and Klingle's were analyzes with personnel's concept in the case study. Data were based on using a structural questionnaire that contained 3 standard questionnaires. Then we have analyzed data by SPSS. Results from data analysis showed that there exist a 95% relationship between Organizational Justice and Organizational Citizenship Behavior and as a result, the more the personnel have positive concept about the organization's justice, the more the Organizational Citizenship Behavior increases. And with the same confidence coefficient between Organizational Justice and Organizational Citizenship Behavior with the intervention of the Organizational Health Behavior, a relationship exists; meaning that, in each organization, there is an Organizational Health Personality. Effects of the personnel's positive concept of an Organization's Justice through Organizational Citizenship Behavior will be more increased. Research findings showed that strengthening the Organizational Citizenship Behavior of which is the goal of an organization is dependent on the Organization's Justice with the mediation of the Organization's Health Personality.

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Keywords: Iranian Ministry of Health and Medical Education; Organizational Citizenship Behavior; Organizational Justice; Organizational Health Personality

1. Introduction

In academic and professional literature of management, remarkable attention has been made for comprehension of effect of organizational citizenship behavior as extra-duty behaviors of staff and personnel on their contribution positively in performance of organizations. Organizational citizenship behavior provides approach and capacity of staff for their higher empowerment and flexibility in line with objectives of organization in various environmental conditions. Hence, loyalty and commitment, which established among staff and personnel, is a factor for guaranteeing health of organization and surviving it in a developed and competitive environment [1-2].

Fair, logical and justice-based behavior through organization with staff will generally result in their (staff) higher commitments towards organization and their ultra-duty citizenship behavior. On the other hand, those individuals who feel injustice, they will probably discard or set aside organization and/or show low levels of organizational commitments.

Under such circumstance, they (staff and personnel) may start doing abnormal behaviors like taking avenge. Hence, comprehending this issue i.e. how individuals judge about justice in their organizations? or how they respond to comprehended justice or injustice? Is regarded as basic discussions especially for comprehending organizational behavior.

Although initial studies on justice date back to early 1960s and works of Jay Stacy Adams, most studies with regard to justice in organizations started as of 1990. According to a report released from published resources in this field, almost a number of 400 applied researches and more than 100 fundamental researches, concentrated on discussion of justice and equity in organizations, have been registered up by 2001.

Karash and Epector in 2001 carried out studies in this field. In their studies, they were after

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determination of justice hubs or resources. That is to say that what or who is the main factor of injustice in organizations in view of staff.

Finally, results of these studies showed recognition of three types of justice in organizations as follows: 1- Distributional justice, 2- Procedure-based justice and 3- Interaction justice [3].

If an organization intends to be effective or constructive, it should take necessary measures at the time of crisis. Moreover, this organization should use all its resources and capabilities and adapt itself with changeable environment coupled with confronting with any problem wisely and logically. Under such circumstances, this organization should take a positive approach with its threatening foreign workforces successfully coupled with guiding their force in line with main objective of the organization. While safeguarding its capabilities and potentials continuously, this organization should develop and invigorate these capabilities in the best form possible. In other words, it should enjoy organizational health. The said issue requires observing justice in organization, based of which, staff and personnel are able to have a positive approach and contemplation from their working environment.

Moreover, with the emergence of appreciable behaviors, staff can take giant strides in line with materialization of most objectives of the organization [4].

Discourse Analysis and Significance of Subject

What will be mentioned in below is the prime and major problem extant in organizations especially state-run organizations in line with materialization of supreme objectives of organization. For materialization of organizational objectives, the below mentioned issue has been invigorated and revived in mind of researcher: What behaviors should exist among staff and personnel of organization with the aim of more materialization of objectives of the organization appropriately?

The most important issue is this that which factors interferes directly or indirectly in outbreak of such behaviors?

In other words, which factors will cause staff and managers of organizations to show ultraorganizational behaviors among themselves?

As an example, which background or preliminaries should be created for staff with the aim of being philanthropic, loyal and conscious to the activities of the organization? What is bedrock and infrastructure of organizational citizenship behavior? And which elements and factors have interference in its formation and establishment [5]?

In other words, what effects will entity and organizational health personality put in behaviors, actions and reactions of staff and personnel?

To what extent very important factor of organizational behavior, which is tantamount to organizational justice, plays an effective role in outbreak of such reactions?

At this study, it has been tried to study the mentioned subject meticulously in Research and Technology Deputy Office of the Ministry of Health and Medical Education in Iran. The following question is answered at the deputy office whether organizational health plays an adjusting role with regard to the organizational justice and organizational citizenship behavior?

Staff and personnel will show citizenship behavior when they feel that justice is observed in their organization strictly and this factor will cause fluctuations in this explanation. Organizational health personality factor admits individuals the same as they are and answer detestation with love, angry and irk with compassion, animosity with friendship and intimacy and misconduct with clemency and finally explains its view as well.

Organ defined OCB as behaviors that are "discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promote the effective functioning of the organization". He identified five categories of OCB:

- 1. altruism: the helping of an individual coworker on a task
- 2. courtesy: alerting others in the organization about changes that may affect their work
- 3. conscientiousness: carrying out one's duties beyond the minimum requirements
- 4. sportsmanship: refraining from complaining about trivial matters
- 5. Civic virtue: participating in the governance of the organization [6-7].

Organizational Justice:

Studies made with regard to organizational justice has witnessed remarkable and noticeable growth in recent 30 years, including laboratory and field studies. The organizational justice refers to ethical and just behavior of individuals of an organization [8].

The factor of justice is defined with the following three factors, total of which indicate the way of justice contact and behavior of organization with various strata, free from any discrimination:

- 1) Equality: Payment of salary and appropriate and just fringe benefits and also equal approach to all staff and personnel as a member of organization,
- 2) Impartiality: Impartiality in decisions related to the selection and promotion of staff and personnel,

3) Lack of discrimination: preventing from any type of discrimination and granting right of appeal to staff and personnel, i.e. right of revising in their decisions [9].

The studies made by scientists unanimously refers to this subject that organizational justice is comprised of three types [10-11].

Procedural justice, distributional justice and Interaction justice

According to Lind & Taylor in 1988, there are two main sources which evaluations on rate of observing procedure-based justice are derived from them:

- 1. Official procedures and instructions of organization which are called as official basics of procedure-based justice.
- 2. Experiences of individuals with specific authorized persons at the group who have been tasked with administering the group. This aspect is called unofficial basics of procedure-oriented justice. The official basics have structural nature and it is probable to safeguard its stability during times and various occasions and among different individuals.

The concept of justice in organizations is deep rooted in discussions related to social psychology with regard to the distributional justice. It should be noted that distributional justice deals with justice and equality comprehended from consequences and is considered as tantamount to a potential factor with important applications in organizational fields.

Many of studies carried out in this regard indicate that distributional justice is produced in payments and awards related to work of equality theory.

When staff and personnel of an organization judge on rate of appropriate, accurate and ethical consequences, in fact, they arbitrate the rate of observing distributional justice in organization as well.

Communicative or colloquial justice contains aspects of communications process such as etiquette, courtesy, truth, righteous and respect between source and receiver.

Communicative justice concentrates on perceptions of individuals from quality of interpersonal behaviors in the long run of execution of procedures [12].

Two factors undertake a very constructive and important role in perception of communicative justice:

- 1) Has main reasons of decisions related to appropriation of resources clearly explained with honesty and with enough degree for the persons that are affected?
- 2) Will individuals who are responsible for execution of decisions conduct with respect with the individuals who are affected by decisions?

Organizational literature tends to focus on three specific forms of justice perceptions:

- Distributive justice considers perceptions of fairness of outcomes (equity, equality, and needs)
- Procedural justice emphasizes the importance of fairness of the methods or procedures used (decision criteria, voice, control of the process)
- Interaction justice is based on the perceived fairness of the interpersonal treatment received, whether those involved are treated with sensitivity, dignity and respect, and also the nature of the explanations given [13].

Generally, maintaining good organizational justice can lead to ideal and favorable outcomes in the workplace. It is expected that employees will act according to organizational rules and regulations if they are treating fairly and receive the outcomes they desire. In research, it has been shown that employees are more committed to the organization, have more trust, and are more satisfied when the procedures within an organization are perceived as being just. There is also research that compared organizational justice to various employee behaviors and elements of interpersonal communication, such as sexual harassment, ethics, performance, feedback, and citizenship behavior.

Relationship of organizational justice and organizational citizenship behaviors:

In fact, today organizations are miniature of society and materialization of justice in them is tantamount to materialization of justice across the society. For this reason, nowadays, organizational justice similar to other significant variables in organizational behavior such as organizational commitment and occupational satisfaction has found specific status in management texts.

Research and studies made in this field shows growing trend and outcome of these studies has been new achievements in this field. However, managers in today organizations cannot be indifferent to this subject, for, justice like other human requirements has and is considered as a requirement.

As managers of organizations are after progress and improvement in organization, they should able to create comprehension of existence of justice in organizations among staff and personnel. Without preparing and paving appropriate backgrounds, organizations will face many problems in motivation and guidance of staff for perception of justice and equity. Greenberg believes that perception of organizational justice is a fundamental necessity for effective performance of organizations, personal satisfaction of individuals who are working in organizations [14].

Organizational Health Personality:

Health is meant lack of disease and/or lack of abnormality or deficiency in a live creature.

Outbreak of a disease may result in injury or damage and/or death of live creature. Now this question is posed here that can concept of health be applied for organizations?

Thinkers and experts are of the opinion that organizations are live creature, based on which, health and disease can be studied for organizations as well.

Each human creature or human system, like an organization, enjoys three various situations in an environment.

There is "anxiety or illness" at one end, in middle part "ordinary or normal status" and at the other end, there exists "health".

Illness or anxiety normal status health

"Illness or anxiety status" includes total personal, environmental and tensional condition which causes individuals in an organization to have a performance less than expectation and their potential.

"Normal or ordinary status" is a condition, based on which, organizational and personal performance in expected levels stand at average level.

The concept of "health" is a status which exists in individuals and their respective organization and gives this possibility to them with the aim of having higher performance more than expected level and/or even more than their rivals.

Here, organization is turned into a productive, cute, agile and flexible entity in best aspect in its category.

If continuous motivation is not made in a healthy system, this healthy system will enter normal status gradually. If this loss is continued, it will enter illness status.

Criteria of Organizational Health Personality from Lynden and Klingle Outlook

Lynden and Klingle, thanks to statistical research findings made on evaluation of organizational health, have presented 11 components for organizational health:

- 1) Relationship: In a health organization, consecutive relation between staff and personnel should be facilitated appropriately the same with subordinates and senior officials. Relation should be mutual, details of which should be established in various levels of organization.
- 2) Contribution and Involving in Organization: In a health organization, staff and personnel of all levels should involve themselves with decision makings of organization.

- 3) Loyalty and commitment: In a health organization, there is a high trust and confidence among persons.
- 4) Validity, fame or prestige of organization: In a health organization, perceptions will reflect positive credit and prestige to staff, based on which, staff values and honors prestige and validity of their department or division.
- 5) Spirit: Appropriate spirit in organization is established in a friendly environment where staff likes each other and their jobs.
- 6) Ethics: In a health organization, generally, there is not immoral behavior. Staff desire to respect and value more to their inner ethics and conducts.
- 7) Recognition or cognition of performance: In a health organization, staffs are encouraged to actualize or materialize their talents and are supported. Generally, they feel that they are beneficial.
- 8) Path of Target: In a health environment, staff can recognize high concentration of their departments and distinguish objectives inside the organization, for; they contribute in formulation of objectives.
- 9) Leadership: Leaders are considered as determining factor on profitability and efficacy and effectiveness of organization. Leaders have generally friendly behavior and staff and personnel can establish relation with them in peace of mind and easily.
- 10) Improvement or development of performance of staff: in an organizational health environment, there is almost a special board for supporting training and consecutive improvement of existing manpower in organization.
- 11) Application of Resources: staff and personnel should observe that resources and facilities have divided among them deservedly and appropriately in accordance with their expectations on their progresses. In healthy organizations, system workforce especially staff and personnel are used effectively i.e. individuals are neither unemployed not work more than ordinary time.

Concept of organizational health is a unique or unprecedented concept which allows us to have a large image on organizational health. In healthy organizations, staff and personnel are committed, duty bounded and beneficial and enjoy high performance and spirit.

Health organization is a place where individuals rush to workplace with deep interest and boast to work at this place. In fact, health of organization plays a very constructive role in effectiveness of behavior of any system in terms of physical, mental, security, meritocracy and valuation to knowledge, specialty and personality of beneficiaries and

boosting their capabilities and fulfilling duties delegated by its ultra systems. In organizations which possess staff and personnel with organizational health personality, organizational justice is defined meaningfully and staff feels it with all their means wholeheartedly [15-51].

Research Conceptual Objective and Model

Study of relation of justice and organizational citizenship behavior and role of organizational health personality on it, as an adjuster variable at Research and Technology Deputy Office of the Ministry of Health and Medical Education, is the main objective of the present study. The conceptual model has been shown in Fig. 1, as a displaying tool of relationship, between variables of research for the desired study.

Basic Questions of Research and Its Hypotheses

The present study enjoys two basic questions. Firstly, is there any relation between organizational health and organizational citizenship behaviors? Secondly, the following question is posed that: "will organizational health personality adjust relation of organizational justice and organizational citizenship behavior?

The hypotheses of study based on questions of research include as follows:

1) The more positive perception of organizational justice is observed among minds of staff and personnel, the more organizational citizenship behavior will be intensified.

In organizations which possess organizational health personality, impact of positive perception of staff from organizational justice will be exceeded than organizational citizenship behavior.



Figure 1- Research model

2. Material and Methods

The location of the present study has been made at Dept. of Development and Coordination Medical Informatics, Undersecretary for Research and Technology, Ministry of Health and Medical Education, Tehran, Iran which includes bureaus of the Deputy Office, general affairs department, Financial and Medical Ethics Department. Also, total number of staff and personnel (official (crew members) and contractual) of the Deputy Office of the ministry stands at 150 persons.

Sample volume or subject of the present study is equal.

This study is descriptive in the field of research and is of correlation type. For collection of information, questionnaire tool has been used in three parts, including 114 purposeful questions which have been posed from reliable domestic and foreign questionnaire. According to Fig. 2, Cronbach's Alfa Coefficient has obtained appropriate and pleasant rate for each of three parts as mentioned in above. Hence, reliability and validity of the questionnaire at this part is approved.

Library-based method has been used for collection of information related to the literature of the present study. In analysis of data, descriptive statistics methods (including overuse distribution table, average, standard deviation and table and diagram) and inference statistics (including Pearson Moment Correlation Coefficient, Partial Correlation) and SPSS software package has been used.

Statistical Analysis

We have used Pearson Correlation Coefficient for testing first hypothesis in a way that we will put forward statistical supposition of this hypothesis in the following form:

$$H_0: \rho = 0 \ H_1: \rho \neq 0$$

Where, " ρ " indicates degree of correlation between two variables of organizational justice and organizational citizenship behavior.

With due observance to the output of SPSS software package, as shown in Fig. 3, it is observed that degree of correlation between two equal variables is 375%, which indicates relative weak correlation. On the other hand, since probability rate of the mentioned correlation test (0.000) is less than the rate of research error coefficient (0.05), hence, hypothesis H0 (hypothesis lacking relation) is rejected (turned down) and we come to this conclusion that there is a positive relationship between organizational justice and organizational citizenship behavior.

Accordingly, with 95% degree of confidence, the first hypothesis of the research is not rejected, i.e., the more positive perception of organizational justice is observed in minds of staff, organizational citizenship behavior will be boosted.

Correlations

Although, for testing second hypothesis we have used Partial correlation coefficient in a way that we will put forward statistical supposition of this hypothesis in the following form:

Where, " " indicates degree of correlation between two variables of organizational justice and organizational citizenship behavior in health organizations.

With due observance to the output of SPSS software package, as shown in Fig. 4, it is observed that degree of correlation between two equal variables is 269%, which indicates relative correlation. On the other hand, since probability rate of the mentioned correlation test (0.002) is less than the rate of research error coefficient (0.05), hence, hypothesis H0 (hypothesis lacking relation) is rejected (turned down) and we come to this conclusion that there is a positive relationship between organizational justice and organizational citizenship behavior.

Accordingly, with 95% degree of confidence, the second hypothesis of the research is not rejected, i.e., the more positive perception of organizational justice is observed in minds of staff, organizational citizenship behavior will be boosted with the mediation of the Organization's Health Personality.

3. Results

The results, obtained from analysis of data and hypothesis test of the desired research, indicate that there is a positive relation between organizational justice and organizational citizenship behavior with degree of confidence (95%).

Consequently, the more positive conception is observed from organizational justice in minds of staff, organization citizenship behavior will be boosted. One of the other significant findings of the study, obtained from statistical analysis with the same coefficient of confidence, shows that there exists a positive relation between organizational justice and organizational citizenship behavior. Namely, in organizations, possessing organizational health personality, impact of positive perception of staff from organizational justice will exceed than organizational citizenship behavior.

That is to say that mental perception of staff and personnel on observing justice in outbreak of their citizenship behaviors will be exceeded when organization enjoyed health personality. Finally, it is considered as general clarification of conceptual model of research.

Table 1- Cronbach's Alpha Reliability

Acce	ptation Yes	Cronbach's Alpha Coefficient	Variable	No
	*	0.86	Organizational citizenship behavior	1
	*	0.86	Organizational justice	2
	*	0.69	Organizational health personality	3

Table 2- **Correlation is significant at the 0.01 level (2-tailed)

		Organizational citizenship behavior	Organizational justice
Organizational	Pearson correlation	1	0.375**
citizenship	Sig . (2- tailed)		0.000
	N	134	134
01	Pearson correlation	0.375**	1
Organizational justice	Sig . (2- tailed)	0.000	
	N	134	134

Table 3- **Correlation is significant at the 0.01 level (2-tailed)

Control variables		Organizational justice	Organizational citizenship behavior
ų:	Correlation	1.000	0.269
healt v	Sig . (2-tailed)		0002
ational h	df	0	131
rganizational healt	Pearson correlation	0.269	1.000
Jrga	Sig . (2-tailed)	0002	
	N	131	0

4. Discussions

The present findings, while approving theories of Morgan, Lynden and Klingle, indicate that staff of an organization show citizenship behaviors from themselves when they enjoy health mental condition. According to this supposition, health personality is invigorated among them. When health personality is invigorated among them, they will feel sense of satisfaction and will enjoy their work excellently. Finally, their (staff) positive approach from work and occupation will boost their loyalty to organization, based on which, they will feel sense of belonging ad commitment to the organization. Finally, having such sense of belonging and commitment unconsciously in their behaviors and reactions will be manifested excellently and beautifully.

With due observance to statistical results, obtained from this research, researcher of this study has come to this conclusion that factor of organizational health personality is considered as adjusting factors of relation between comprehension of individuals from organizational justice and organizational citizenship behaviors. Also, in view of researcher, managers and supervisors of organizations, with recognition of factors effective on outbreak of citizenship behaviors among staff and personnel and also double effort in promotion of organizational personality, can take giant stride in

line with moving towards organizational excellence objectives. Consequently, they can prevent organizational vulnerability. Establishing sense of justice-based environment is one of the basic and major duties of managers of organizations, for, such environment has high relation with effectiveness criteria of organization.

Invigoration of organizational citizenship behavior among staff and personnel of an organization, with observing organizational justice, will accelerate trend of materialization of objectives of organization. The results, obtained in this regard, is in compatible with results of studies made by Mormon (1991), Williams and et al (2002), Escandora (1999), Spector and Karash (2001), Lee Vankesian and Wan Vio (2007), Zengel WHNG Leung, Laam, Hoy, Tater and Kottcamp, Patel, Hoy and Volfok, Stephan Rob, Daniel Koumi and Richard Greef (2005), Natolie Vincent (2003).

The following suggestions are presented for other researchers:

- 1) Studying obstacles of observing organizational justice,
- 2) Studying relation of organizational health personality and organization citizenship behavior
 - 3) Recognition of justice-based organizations,
- 4) Studying obstacles for establishing health organization,
- 5) Studying debilitating or weakening factors of organizational citizenship behavior,
- 6) Studying organizational citizenship behavior from viewpoint of theoreticians

Although, the following suggestions are presented for Managers and Supervisors:

- 1) Guiding organizations towards paving suitable infrastructure for contribution and justice-based organizations,
- 2) Comprehending and appreciating fair and satisfactory work of staff by managers and granting appropriate feedbacks with regard to the performance
- 3) Setting up complains and proposals system in organization in line with more contribution of staff and personnel and respecting them,
- 4) Boosting level of confidence in organization and establishing very intimate and close relation of managers with staff and personnel,
- 5) Organizing workshops and consultation sessions with regard to occupation or job special of dissatisfied staff and personnel in organization,
- 6) Performing individual and group encouraging programs among customer-oriented staff and personnel,
- 7) Establishing consultation groups (special of staff and managers) for institutionalization of organizational citizenship behavior,

8) Embarking on revising some of encouraging bylaws and instructions based on observing organizational justice

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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Pattern of Breast Cancer Metastasis at the Radiotherapy Clinic, Ibadan - A Ten Year Review.

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ABSRACT: Introduction: - Breast cancer is the commonest cancer among Nigerian women. In Nigeria and indeed Africa and most underdeveloped countries, majority of patients with breast cancer present to the Hospital late with advanced disease. At this stage, the cancer involves the axillary nodes, it may be attached to the underlying muscles and distant metastases are almost certainly present. The primary treatment intent therefore is palliative. **Objective:** The aim of this study is to determine the pattern of metastasis of breast cancer among patients treated at Radiotherapy Department, University College Hospital, Ibadan. Methodology: Five hundred and eighteen patients with histological diagnosis of breast cancer seen between 2000 and 2009 were studied. Results: There 5 were Males and 513 Females. The mean age was 48.15 years and 63.5% were between the ages of 30 and 50 years. Fifty eight percent of the women were premenopausal while 42% were postmenopausal. The percentage of patients that presented with stages 1, 11, 111 & 1V diseases were 6.2%, 24.7%, 38.8% and 30.3% respectively. The overall incidence of metastasis to distant organs were lung 25.7%, bone 24.1%, liver 7.7%, brain 5.8%, contra lateral breast 0.6% and kidney 0.2%. Conclusion: Based on the data obtained from this study, breast cancer mostly occurred among young women. Compared to earlier studies in Nigeria, breast cancer patients still present late with advanced stage disease with distant metastasis. Baseline bone scan, chest X-ray and abdominopelvic ultrasound scan are recommended for breast cancer patients before commencing treatment to enhance early detection of metastasis. Efforts should be increased towards early detection and treatment.

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Key words: Breast cancer, ten years review, advanced disease, distant metastasis, pattern of metastasis

1. Introduction

Men and women have breasts; but they are better developed in women. The breasts are accessory to reproduction in women and rudimentary and functionless in men 1 . Breast cancer was regarded in early studies as the second commonest cancer among Nigerian women after carcinoma of the uterine cervix $(1960\text{-}1980)^2$. However in 1992, Campbell et al, revealed that breast cancer was the commonest malignancy accounting for 23% of 5000 cancer cases reviewed at the radiotherapy centre, Ibadan and that a large proportion of these patients presented to the orthodox doctor with an advanced and metastatic diseases in stages 111 and $1V^3$.

The incidence of breast cancer in Nigeria is on the increase from 13.8-15.3 per 100,000 in 1992 to 33.6 per 100,000 in 2000 in a report from Ibadan ⁴. The peculiar characteristics of breast cancer among blacks are increasingly being appreciated by researchers worldwide. Blacks often have aggressive unpredictable disease, some patients come with relatively early stage disease and die of widespread metastasis within six months to one year, while others present with advanced disease and yet survive longer ⁵. The current treatment of breast cancer includes surgery, chemotherapy, radiotherapy, hormonal therapy and targeted therapy using monoclonal antibodies like,

Bevacuzumab and Trastuzumab as well as palliative and supportive care in advanced cases. The aim of this study is to determine the pattern of metastasis in patients with breast cancer, A similar study was carried out by K K Ketiku in Lagos, between 1971 and 1981, 28 years ago, when breast cancer was the second commonest cancer after carcinoma of the cervix and at a time when diagnostic equipments like, whole radioisotope scan, computer tomographic scan, magnetic resonance imaging were not available, as well as potent cytotoxic drugs like Epirubicin, Taxanes, Capecitabine, Gemcitabine and targeting agents like Herceptin and Avastin. A revisit is important so as to assess whether there is a change in the pattern of disease spread among these patients.

2. Material and Method

This is a retrospective study. All available radiotherapy case files with treatment and follow-up records of breast cancer cases attended to between 2000 and 2009 were retrieved and analysed. Data obtained included biodata, level of education, employment status, menopausal status, parity of the patient: (classified as nulliparous - no child birth, multiparity - 2-4 childbirth and grandmultiparity - >5 childbirth). The duration of the illness before presentation, and the distance the

patient had to travel from his/her home town to Ibadan in kilometres was also obtained. Pathological features like site of the disease (left, right or both breast), the stage at presentation using Manchester staging, the commonest staging system used by the surgeons referring patients for Radiotherapy, the lymph node status, the histological cell type, the histological grade of the disease, either well differentiated (grade 1) moderately differentiated (grade 2) or poorly differentiated (grade 3). The site(s) of metastasis at presentation were determined from records of clinical examination and radiological examination during pre-treatment evaluation. The treatment the patient received for example, conservative or radical surgery, the chemotherapy regime and number of cycles received, the site and the dose of radiotherapy treatment. Two year follow-up records for Manchester stage I to III cases were also extracted. The outcome of treatment was determined over two years of follow up in terms of absence or presence of locoregional recurrence and distant metastasis and the disease free interval in terms of locoregional recurrence free interval (LRFI) or distant metastasis free interval (DMFI) after oncology treatment as most patients are rarely seen beyond two years. The end point of observation or follow up was distant metastasis. Follow-up record of patients with Manchester stage 1V disease at presentation was not a concern to this study; instead the pattern of metastasis at this stage was documented. The above information was extracted from the records using a data extraction form. Only 518 cases met the inclusion criteria of case files with complete relevant information for the study. Case files with incomplete data were excluded.

The data obtained was analysed using the Statistical Package for Social Sciences version 15.0 (SPSS version 15.0). Data analysed was presented using percentages, tables and charts. Ethical considerations: Ethical clearance to conduct the study was sought from the Joint Ethical Review Committee of the University of Ibadan/University College Hospital, Ibadan.

3. RESULTS

Five hundred and eighteen (518) case files and treatment cards of breast cancer patients between 2000 and 2009 at the Radiotherapy clinic, University College Hospital, Ibadan were reviewed. Figure 1 shows the age distribution of the patients. Three hundred and twenty eight patients 328(63.5%) were between the age of 30 and 50 years, the age group with the highest frequency was 40-50 years (5th decade) and the mean age was 48.15 years.

Figure 1 – Age distribution among the 518 breast cancer patients.

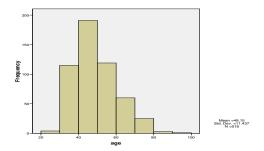


Table 1 – Patients Characteristics.

Sex		
	Male	5(1.0%)
	Female	513(99.0%)
Menop	ausal status	
_	Premenopausal	303(58.5%)
	Postmenopausal	210(40.5%)
	Not documented	5(1.0%)
Parity		
-	Nulliparity	38(7.3%)
	Multiparity	232(44.8%)
	Grandmultiparity	243(46.9%)
	Not documented	5(1.0%)
Educat	ion	
	Primary	29(5.6%)
	Secondary	110(21.2%)
	Tertiary	103(19.9%)
	None	81(15.6%)
Employ	yment	
	Employed	230(44.4%)
	Not employed	288(55.6%)
Site of	cancer	
	Right	228(44.0%)
	Left	253(48.8%)
	Bilateral	37(7.2%)

Table 1 shows the patients characteristics the sex, menopausal status, parity and site of cancer of patients reviewed. There were 513 Females and 5 Men, 303 (58.5%) were premenopausal while 210 (40.5%) were postmenopausal. Thirty eight (7.3%) were nulliparous, 232 (44.8%) were multiparous and 243 (46.9%) grandmultiparous. Twenty nine (5.6%) had primary school education, 110 (21.2%) had secondary school education, 103 (19.9%) had tertiary education where as 81 (15.6%) had no formal education. Corporate or self-employment was observed in 230 (44.4%) while 288 (55.6%) were not employed (House wives, Students, Retired, etc). Two hundred and twenty eight (44.0%) had disease on the right side, 253(48.8%) had disease on the left side while 37(7.2%) had bilateral breast disease

Table 2 - Stage at presentation

				Cumulat	
	Frequ	Perce	Valid	ive	
Stage	ency	nt	Percent	Percent	
1	32	6.2	6.2	6.2	

11	128	24.7	24.7	30.9
111	201	38.8	38.8	69.7
1V	157	30.3	30.3	100.0
Total	518	100.0	100.0	

Table 2 show the stage of the disease at presentation. The proportion of patients that presented with stages 1, 11, 111 and 1V diseases were 32(6.25%), 128(24.7%), 201(38.8%) and 157(30.3%) respectively. The minimum distance a patient has to travel to access radiotherapy facility was 0Km, the maximum distance was 1500Km and the average distance was 311Km. The minimum duration of illness before commencing treatment was one month, the maximum duration was 150 months where as the average duration of illness before commencing treatment was 11.4 months.

Table 3 – Histological subtypes

able 3 – <u>Histological subtypes</u>					
	Developed	Without			
Histology	Metastasis	Metastasis			
Туре	No. (%)	No. (%)			
Total No. (%)					
Invasive ductal carcinoma	244(59.4%)	167(40.6%)			
411(79.3%)	26(56.5%)	20(43.5%)			
Invasive lobular carcinoma	13(86.7%)	13.3%)			
46(8.9%)	10(100.0%)	0(0.0%)			
Anaplastic carcinoma	9(100.0%)	0.0%)			
15(2.9%)		2(40.0%)			
Inflammatory breast	3(60.0%)	4(80.0%)			
carcinoma 10(1.9%)		2(50.0%)			
Breast sarcoma	1(20.0%)	2(66.7%)			
9(1.7%)		3(100.0%)			
Malignant phylloides	2(50.0%)	3(42.9%)			
tumour 5(1.0%)		205			
Mucinous carcinoma	1(33.3%)				
5(1.0%)					
Medullary carcinoma 4(0.8%)	0(0.0%)				
Metaplastic carcinoma	4(57.1%)				
3(0.6%)	313				
Colloid carcinoma	313				
3(0.6%)					
Unspecified					
7(1.4%)					
Total					
518					
310					

Figure 2 shows pie chart of grade of histology while Table 3 shows the distribution of histological subtypes. Invasive ductal carcinoma 411(79.3%) and invasive lobular carcinoma 46(8.9%) were the commonest subtypes diagnosed in the patients. All the patients with inflammatory carcinoma and sarcoma developed metastasis while 86.7% with anaplastic, 59.4% with invasive ductal and 56.5% with invasive lobular histological types developed metastasis.

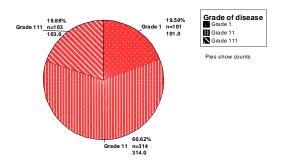


Figure 2 - Grade of histology

Table 4 – Grade of Histology

Grade	Total No. (%)	Developed Metastasis	Without Metastasis
Grade 1	101(19.5%)	35(34.7%)	66(65.3%)
Grade 11	314(60.6%)	193(61.5%)	121(38.5%)
Grade 111	103(19.9%)	85(82.5%)	18(17.5%)
Total	518	313	205

Table 4 shows grade of histology, the proportion of patients with grades 1, 11 and 111 were 101(19.5%), 314(60.6%) and 103(19.9%) respectively. Table 4 also shows the distribution of metastasis by grade of differentiation. Thirty five patients with grade 1(34.7%) developed metastasis where as 193(61.5%) and 85(82.5%) of patients with grade 11 and 111 diseases developed metastasis respectively.

Table 5 – <u>Frequency of metastasis to different sites at the time of presentation manchester stage 1V disease.</u>

Site of metastasis	No. %
Lymphnodes	
Ipsilateralaxillary	89(17.2%)
Contralateralaxillary	40(7.7%)
Bilateralaxillary	10(1.9%)
Ipsilateralsupraclavicular	35(6.8%)
Contralateralsupraclavicular	15(9.6%)
Bilateralsupraclavicular	8(2.9%)
Lung	80(15.4%)
Bone	83(16.0%)
Liver	22(4.2%)
Brain	12(2.3%)
Kidney	1(0.2%)
Total	157(100%)

The frequency and pattern of metastasis in patients with stage 1V disease at the time of presentation are presented in Table 5. The number of patients presenting with stage 1V disease were 157. Multiple lymph node groups and multiple distant organ sites involvement were, however,

noted among the 157 patients studied above. Ipsilateral axillary lymph nodes was observed in 89(17.2%) patients, 40(7.7%) in contralateral axillary nodes, 10(1.9%) in bilateral axillary, 35(6.8%) in ipsilateral supraclavicular, 15(9.6%) in contralateral supraclavicular and 8(2.9%) in bilateral supraclavicular lymph node. Metastasis in lung was observed in 80(15.4%) patients, bone 83(16.0%), liver 22(4.2%), brain 12(2.3%) and kidney 1(0.2%).

Table 6 – Outcome of treatment in patients without distant metastasis at presentation (Manchester stage 1, 11 &111) post triple therapy * at 2 years from follow up Record.

		Disease	Locoregiona	<u>Distant</u>
Stag	Total	Free	1	
		<u></u>	Dogumenco	N 4 - 4 4 :
<u>e</u>			Recurrence	<u>Metastasi</u>
				<u>s</u>
1	22/6 20/1	27/04 40/\	2/0 40/\	2/6 20/1
1	32(6.2%)	27(84.4%)	3(9.4%)	2(6.2%)
11	128(24.7%	88(68.8%)	16(12.5%)	24(18.7%)
	,	, ,	- (/	(/
	,			
111	201(38.8%	90.0(44.8%	58.0(28.9%)	53(26.4%)
))		

* Triple therapy = Surgery, Chemotherapy and Radiotherapy.

Table 6 shows the outcome of treatment in patients with stages 1, 11& 111 breast cancers from followup record after adjuvant chemoradiation therapy. Due to frequent default from follow up after treatment patients were observed for the development of locoregional recurrence and or distant metastasis within 2 years of follow up after treatment. Distant or locoregional metastasis was recorded in 156 out of 301 patients with stages 1, 11 &111 breast cancer. Over 95% of the patients completed radiotherapy dose of 40-50Gy to the breast or chest wall and 6 cycles of combination chemotherapy either Adriamycin with Cyclophosphamide(AC), Cyclophosphamide, Flourouracil(CAF), Adriamycin and 5 Cyclophosphamide, and Methotrexate 5 Flourouracil(CMF), **Epirubicin** and Cyclophosphamide, Cyclophosphamide(EC), Epirubicin and 5Flourouracil(CEF), Adriamycin, Cyclophosphamide and Paclitaxel (AC+Paclitaxel), Paclitaxel and Epirubicin(ET), Docetaxel and Epirubicin(ET), Epirubicin and Cisplatin(EP), Docetaxel and Cisplatin(TP), Gemcitabine and Cisplatin(GP) etc. The 2 years disease free survival for stages 1, 11, & 111 were 84.4%, 68.8%, and 44.8% respectively.

Locoregional recurrence post chemoradiotherapy increased from 3(9.4%) in patients with stage 1 disease to 16(12.5%) in stage 11 and 58(28.9%) in patients with stage 111 breast cancer. Distant metastasis also increased from 2(6.2%) in patients with stage 1 to 24(18.7%) in

stage 11 and 53(26.4%) in stage 111 disease. The mean disease free interval post adjuvant chemoradiotherapy was 20.6 months, 11.6 months and 8.9 months for stages 1, 11 & 111 respectively, and 8.3% of locoregional recurrence or distant metastasis occurred within 6 months of follow up however, about two third 75.1% occurred between 6-12 months, while 9.4% and 7.2% occurred between 13-18 months and 10-24 months respectively.

Table 7 - Pattern and frequency of metastasis to different sites within two years of follow up for stages 1, 11 & 111 patients.

Site of Metastasis	Total No. (%)
Chest wall	58(15.0%)
Lymph nodes	
Contralateral axillary	23(4.4%)
Bilateral axillary	11(2.1%)
Ipsilateral supraclavicular	10(1.9%)
Contralateral supraclavicular	5(1.0%)
Bilateral supraclavicular	3(0.6%)
Contralateral breast	3(0.6%)
Lung	53(10.2%)
Bone	42(8.1%)
Liver	18(3.5%)
Brain	18(3.5%)

Table 8 – Pattern of metastasis between patients with (stages 1, 11 & 111) after triple therapycompared to patients with stage 1V disease (metastasis at presentation)

disease (metastasis at presentation)			
Site of Metastasis	Stage	Stages	
	1V	1, 11	
		& 111	
Contralateral axillary	7.7%	4.4%	
Bilateral axillary	1.9%	2.1%	
Ipsilateral supraclavicular	6.8%	1.9%	
Contralateralsupraclavicular	9.6%	1.0%	
Bilateral supraclavicular	2.9%	0.6%	
contralateral breast		0.6%	
Lung	15.4%	10.2%	
Bone	16.0%	8.1%	
Liver	4.2%	3.5%	
Brain	2.3%	3.5%	
Kidney	0.2%		

Overall, there was reduction (shown in table 8 above) in the pattern of metastasis when the proportions of metastasis in patients with stage 1V disease at presentation are compared with that of patients with (stages 1, 11 &111) treated with adjuvant chemoradiation post-surgery and who were distant metastasis free at presentation. There was, however, increase in proportion of metastasis in few sites notably in bilateral axillary and brain. Therefore, the pattern put together for stages (1, 11, 111 and 1V) were 12.1% to contralateral axillary

nodes, 4.0% to bilateral axillary nodes, 8.7% to ipsilateral supraclavicular nodes, 10.6% to contralateral supraclavicular nodes, and 3.5% to bilateral supraclavicular nodes while to the lung 25.7%, bone 24.1%, liver 7.7%, brain 5.8%, contralateral breast 0.6% and kidney 0.2%.

4. DISCUSSION

The results of this retrospective study between the year 2000 and 2009, shows that the mean age of the patients was 48.15 years and 63.5% of these patients are between the age of 30 and 50 years. This means that most of the patients are young, premenopausal and perimenopausal. Breast cancer at this age range is noted to be more aggressive. associated with higher mortality, shorter disease free survival and more likely to recur after treatment locoregionally or at distant sites than in older women ⁶. Ohaeri et al ⁷ reported a mean age of 48 years in a series of breast cancer patients that is similar with that of our patients. Breast cancer is a disease of older women in developed countries which is contrary to the finding in developing countries⁸. The proportion of our patients that was premenopausal was 58.5%, while 40.5% were postmenopausal, this is in sharp contrast with the developed countries where premenopausal patients accounted for less than one-third of the patients. Adebamowo et al reported a much higher incidence of 80% of premenopausal women in Nigeria breast cancer patients⁹. The percentage of patients that was nulliparous was 7.3%, 40.5% were multiparous while 46.9% were grandmultiparous. These would have been the reverse since the higher the number of full term pregnancies, the greater the protection from breast cancer and that there is a reduction in risk of breast cancer by 7% for each birth after the first, in the absence of breast feeding, also women who breast feed reduces their risk compared to those who do not ¹⁰. Nulliparity is also associated with 30% increase risk compared with parous women. Majority of our patients (68.8%) presented at an advanced stage. There was, however no change in the stage at presentation compared to earlier studies in this environment. The factors responsible for late presentation with advanced disease include low socioeconomic level as most of the patients in this study 55.5% were not employed (corporate or self employment). Fear mastectomy is another major problem deterring early presentation of women with breast cancer 11 Tumour biology of breast cancer seen in Nigeria and African Americans which tend to be more aggressive than in cases of breast cancer seen in Caucasians are of paramount importance ¹². This study also showed that the patients have to travel an average distance of 311 Km, range (0-1500Km) in order to have access to radiotherapy facility. This means that patients come from all over Nigeria, with a population of over 140 million.

Organization World Health (WHO) recommendation of radiotherapy facility to a population was 1: 250,000 persons ¹³. These mean that there would be long waiting time and poor treatment outcome. The average duration of breast cancer symptoms before presenting for surgery and adjuvant treatment in our study was 11.4 months, all these may also lead to late presentation. Okobia et al reported a similar duration of illness before commencing treatment ¹⁴. The histological subtype and grade of differentiation of breast cancer have a considerable influence on the development of metastasis and survival ¹⁵. In this study invasive ductal and invasive lobular carcinoma were the commonest histology and accounts for more than half of the patients with metastatic disease. However, more than eighty five percent of patients with anaplastic carcinoma, inflammatory breast cancer and breast sarcoma presented with advanced disease with early metastasis 16.

The presence of high proportion of locoregional disease in these patients is an indication that they have advance stage disease ¹⁷. Distant metastases in this study were most commonly to bone, lung, liver and brain. They were detected using chest Xray, abdominopelvic ultrasound scan, skeletal Xtechnetium T⁹⁹ bone scan, computer ray, tomographic scan (CT scan) and magnetic resonance imaging (MRI). Lung metastasis was the commonest visceral metastasis in this study accounting for 25.7% of cases. Adesunkanmi et al, from Ile Ife, reported a slightly lower incidence of 20.3% ¹⁸. The disparity could be due to the fact that they receive referral from a small locality and the smaller sample size (212 patients). Glynne-Jones R et al ¹⁹, reported a lower incidence of 9.1% among Caucasians with breast cancer, the lower figures in Caucasians could be due to early presentation and less aggressiveness of their disease. Bone metastasis in this study, was 24.1%, K K Ketiku, from Lagos, reported an incidence of 19.6% ²⁰. Cox et al, reported an incidence of 18.1% among Caucasians²¹. These lower rates could be explained by the recent availability of bone scan diagnosis in our centre compared with the result from Lagos since patients in both studies present late. The rates were slightly higher among Caucasians, though lower than our results because bony metastasis is the commonest site of distant metastasis of breast cancer in the Caucasians ²². Bone scan detects subclinical as well as symptomatic bony metastases. In this centre the frequently used modalities for detection of bone metastasis are skeletal X-ray and bone scan. Radiotherapy could be given to patients with bony metastasis to relieve pain, avert imminent fracture and to control tumour growth ²³.

Liver metastasis accounted for 7.7% of distant metastasis in this study, a near similar incidence of 6.0% was reported by Panatanaphan et al ²⁴, from

Baltimore, a lower incidence of 3.3% was reported by Shariari et al from Tehran ²⁵, the lower value could be due to the fact that most of their patients presented with stage 11 and grade 11 disease compared to most of our patients who had stages 111 and 1V disease. The variations with these two groups of patients with our study could be due to racial difference in the tumour biology.

Brain metastasis accounted for 5.8% in this study, a similar value of 6.3% was reported by JNA Clegg-Lamptey et al, from Ghana ²⁶. Diagnosis of brain metastasis requires brain CT scan, MRI or PET scan, most of our patients by the time they develop brain metastasis might not afford CT scan or MRI and the fact that it occurs in a terminally ill patients who basically need palliative care, therefore, cost and benefit must be weighed.

From the result of this study, breast cancer mostly occurred among young women between the ages of 30 and 50 years. Most 58.5% are premenopausal and 69.1% presented with advanced stage disease. Compared with earlier studies in Nigeria, breast cancer patients still present late with advanced stage disease with distant metastasis. Overall, the commonest site of distant metastasis was to the lung followed by bone, liver, brain, contralateral breast and kidney. Therefore, baseline bone scan, chest X-ray and abdominopelvic ultrasound scan are recommended for breast cancer patients before commencing treatment to enhance early detection of metastasis. More efforts should be put into public awareness on breast cancer, health education and improving socioeconomic status of the patients at risk and the provision of more facilities for early detection and treatment.

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The Effect of CO₂ Emission on Agricultural Sector Value Added; Evidence from G8 Countries

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Abstract: In this paper, we investigate the relationship between carbon emissions and Agricultural Sector Value Added in G8 countries for the period of 2000–2007. Employing the panel regression approach, we find that the effect of CO₂ emissions on Agricultural Sector Value Added is negative. So, the G8 group should decrease CO₂ Emission by necessary policies.

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1. Introduction

The main source of global warming is emissions of greenhouse gasses (GHG), and the main source of GHG emissions is believed to be energy consumption. Therefore, reducing consumption will also decrease the emission levels. However, it is not a simple matter of applying energy conservation methods, since energy consumption may have important effects on economic growth. Due to these presumed links between GHG, energy consumption and economic growth, it is widely believed that decreasing carbon dioxide (CO2) emissions to the Kyoto targets would also reduce the growth of GDP. In other words, emission reduction requires energy conservation which hinders economic growth assuming that there is a causal relationship from energy consumption to CO2 emissions and real income. Because of these presumed links, many countries are hesitant to keep with Kyoto targets. However, there is abundant number of empirical studies, employing diverse methods, conducted in several countries, which point out that the link between energy consumption, income and CO2 may not be unique.

Selden and Song (1994), and Stern, Common, and Barbier (1996) suggested that certain types of environmental pressure exhibit an inverted-U relationship with per capita income. This has also been referred to as the environmental Kuznets curve (EKC hereafter), analogous to the pattern Kuznets found between income inequality and economic development. According to this EKC-hypothesis, environmental pressure tends to rise faster than income growth in the early stages of economic development, then slows down, reaches a turning point and declines with further income growth. This last stage has been referred to as the 'de-linking of

environmental pressure from economic growth' (see IBRD (1992), and Simonis (1989)). The World Bank Development Report IBRD (1992) shows that for OECD countries this alleged de-linking has emerged for several pollutants, i.e. lead, particulates, sulphur oxides and nitrogen oxides. Similar conclusions, also for other measures of environmental pressure, have been reported by a number of empirical studies: Janicke, Monch, Ranneberg, and Simonis (1989) for a composite of materials throughput; Shafik, and Bandyopadhyay (1992) for several indicators for air and water pollution; Selden and Song (1994) for four types of air pollution and Hettige, Lucas, and Wheeler (1992) for aggregated toxic intensities. An overview of these and other studies is given by Stern, Common, and Barbier (1996), and Ekins (1997). The inverted-U curve between an aggregate indicator of throughput and income, as found by Janicke, Monch, Ranneberg, and Simonis (1989), has been reexamined in De Bruyn, and Opschoor (1997). It was concluded that several developed economies showed an upswing in their environmental pressure measured by the indices of Janicke, Monch, Ranneberg, and Simonis (1989) after 1985, probably invalidating the suggested inverted-U curves for aggregated material and energy input in the economy.

The Group of Eight is a forum, created by France in 1975, for the governments of six major economies: France, Germany, Italy, Japan, the United Kingdom, and the United States. In 1976, Canada joined the group (thus creating the G7). In 1997, the group added Russia, thus becoming the G8. These countries are the most important polluters' countries in the world.

The lack of studies about relationship between CO2 Emission and Agricultural Sector Value Added was incentive for writing this paper. In this paper, we have considered the Effect of CO2 Emission on Agricultural Sector Value Added in G8 Countries at 2000-2008 periods.

2. Material and Methods

I have used the following model for considering the effect of CO_2 emissions on Agricultural Sector Value Added in G8 Countries based on panel data:

Agricultural Sector Value Added_{lt} = $\alpha_1 + \beta CO2$ emissions_{lt} + $\delta CO2$ emissions_{lt} + ϵ_{lt} (1) where i and t are symbol country and time period for G8 countries at 2000-2007 period.

I have the World Development Indicators (WDI2009) data base for these countries. I have a quadratic function for considering the nonlinearities the effect of CO₂ emissions on Agricultural Sector Value Added as a Kuznets Curve.

3. Results

Table 1 indicates the estimates results. Results indicate that the effect of CO_2 emissions on Agricultural Sector Value Added in G8 countries at 2000-2007 period. Results show that, the effect of CO_2 emissions on Agricultural Sector Value Added is negative. Figure 1 shows that actual, residual and fitted for estimated model. Figure 2 represents histogram and normality test for residuals. Result indicates that the residual distribution is normal.

Table 1. Estimation Results

Variable	Coefficie	Prob.
С	4.33E+10	0.0000
CO2	-	0.0000
	2.75E+09	
R-Square	0.97	
Prob F-Statistic	0.00	
Durbin Watson	2.02	

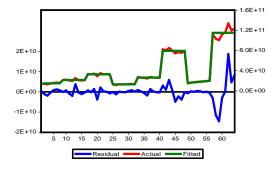


Figure 1. Actual, Residual and Fitted

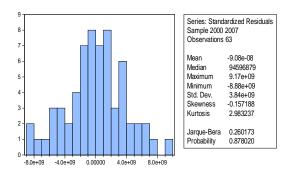


Figure 2. Histogram and Normality Test for Residuals

4. Discussions

Concerns about sustainability in agricultural systems centre on the need to develop technologies and practices that do not have adverse effects on environmental goods and services, accessible to and effective for farmers and lead to improvements in food productivity. Despite great progress in agricultural productivity in the past half-century, with crop and livestock productivity strongly driven by increased use of fertilizers, irrigation water, agricultural machinery, pesticides and land, it would be over-optimistic to assume that these relationships will remain linear in the future. New approaches are needed that will integrate biological and ecological processes into food production, minimize the use of those non-renewable inputs that cause harm to the environment or to the health of farmers and consumers, make productive use of the knowledge and skills of farmers, so substituting human capital for costly external inputs and make productive use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation, forest and credit management.

These principles help to build important capital assets for agricultural systems: natural; social; human; physical; and financial capital. Improving natural capital is a central aim, and dividends can come from making the best use of the genotypes (G) of crops and animals and the ecological (Ec) conditions under which they are grown or raised. Agricultural sustainability suggests a focus on both genotype improvements through the full range of modern biological approaches and improved understanding of the benefits of ecological and agronomic management, manipulation and redesign.

The ecological management of agro ecosystems that addresses energy flows, nutrient cycling, population-regulating mechanisms and system resilience can lead to the redesign of agriculture at a landscape scale. Sustainable

agriculture outcomes can be positive for food productivity, reduced pesticide use and carbon balances. Significant challenges, however, remain to develop national and international policies to support the wider emergence of more sustainable forms of agricultural production across both industrialized and developing countries.

The main reason for studying CO2 emissions is that they play a focal role in the current debate on environment protection and sustainable development. CO2 has been recognized by most scientists as a major source of global warming through its greenhouse effects. Pollutants like sulphur oxides or oxides of nitrogen, have a more local impact on the environment. Another reason is that CO2 emissions are directly related to the use of energy, which is an essential factor in the world economy, both for production and consumption.

The lack of studies about relationship between CO2 Emission and Agricultural Sector Value Added was incentive for writing this paper. In this paper, we have considered the Effect of CO2 Emission on Agricultural Sector Value Added in G8 Countries at 2000-2008 periods.

Results show that, the effect of ${\rm CO_2}$ emissions on Agricultural Sector Value Added is negative. So, the G8 group should decrease CO2 Emission by necessary policies.

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