

**Assessment and Modification of Risk Behavior of Osteoporosis among Childbearing Working Women**

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**Abstract: Background:** Osteoporosis is one of the leading health problems for women today. About two hundred million women suffer from osteoporosis worldwide, with a lifetime risk of fracture between 30–40 percent. Genetic and lifestyle factors influence the risk for osteoporosis. **Purpose:** To assess osteoporosis risk factors practiced by working women during reproductive age, and to assess the effect of nutritional counseling on knowledge and practice of working women in childbearing age. **Method:** A quasi experimental design was used. Data was collected from working women in their working place during their break time. The sample consisted of 300 working women in the childbearing age. The inclusion criteria included women not diagnosed with chronic disease and not previously diagnosed with osteoporosis. Four tools were developed for data collection namely interviewing questionnaire to collect data about sociodemographic data, medical history, obstetric history, and family history, osteoporosis risk factors assessment sheet to assess women's risk practices for osteoporosis, nutritional knowledge assessment sheet to assess women's knowledge about nutrition. The last two tools were administered twice once before nutritional counseling and 4 months after the nutritional counseling. The fourth tool was Anthropometric measurement sheet as weight height, and Bone Mass Density (BMD) which was measured for sub sample of 139 women. Counseling was done twice for each woman with the aim to increase women awareness about good nutritional practice to decrease risk for osteoporosis. **Results:** Regarding risk factors of osteoporosis only 4 % of the women on the sample were practicing regular planned exercises. No woman in the sample used Calcium supplement. Non of the women were smoking but almost half of the sample (48.7%) had exposure to passive smoking. There were statistical significant improvement of women' knowledge score after counseling than before counseling regarding diet, exercises, age risk, gender risk, signs and symptoms, and management of osteoporosis. **Conclusion:** Counseling about osteoporosis was successful to improve the women' knowledge but was not enough to significantly change their practices.

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**Key words:** Osteoporosis, Women

**1. Introduction**

Osteoporosis is a systemic disease of bone, which is characterized by decreased bone mass and changes in the micro architecture of bone tissue followed by brittleness of bones and increased risk of fractures. Osteoporosis occurs as a result of normal aging, but can arise as a result of impaired development of peak bone mass or excessive bone loss during childhood and childbearing age (**Greenspan, 2007 & Matsui et al., 2010**).

Fractures are the most dangerous aspect of osteoporosis. Debilitating acute and chronic pain in the elderly is often attributed to fractures from osteoporosis and can lead to further disability and early mortality (**Old and Calvert, 2004 & National Osteoporosis Foundation, 2008**).

The three main mechanisms by which osteoporosis develops are an inadequate *peak bone mass* (the skeleton develops insufficient mass and strength during growth), excessive bone resorption, and inadequate formation of new bone during remodeling. An interplay of these three mechanisms

underlies the development of fragile bone tissue (**Raisz, 2005, Pye et al., 2010**).

Osteoporosis risks can be reduced with lifestyle changes and sometimes medication; in people with osteoporosis, treatment may involve both. Lifestyle change includes diet and exercise, and preventing falls. Medication includes calcium, vitamin D, bisphosphonates and several others (**Vondracek, 2010 & Tang et al., 2007**). Fall-prevention advice includes exercise to tone deambulatory muscles, proprioception-improvement exercises; equilibrium therapies may be included. Exercise with its anabolic effect, may at the same time stop or reverse osteoporosis (**Drielin et al., 2011**).

Achieving a higher peak bone mass through exercise and proper nutrition during adolescence is important for the prevention of osteoporosis. Exercise and nutrition throughout the rest of the life delays bone degeneration. Jogging, walking, or stair climbing at 70-90% of maximum effort three times per week, along with 1,500 mg of calcium per day, increased bone density of the lumbar (lower) spine by 5% over nine months. Individuals already diagnosed

with osteopenia or osteoporosis should discuss their exercise program with their physician to avoid fractures. Weight bearing endurance exercise plus or minus exercises to strengthen muscles improve bone strength in those with osteoporosis (Body, 2011)

Lack of knowledge about osteoporosis can put women into the risk for fracture later in life during post menopausal years. Therefore educational programs and counseling of women during reproductive years can act as simple but effective nursing intervention to promote women's knowledge and practice toward osteoporosis risk factors.

## 2. Methodology

This study used quasi-experimental research design to investigate the effect of nursing counseling on nutritional knowledge and practice which could increase the risk of osteoporosis among working women during the reproductive age. The study was conducted at three settings in Menoufiya Governorate Egypt. The three sittings are: Faculty of Nursing Menoufiya University, Menoufiya University Hospital and Shebin El-kome Teaching Hospital:

The study sample comprised of 337 working women in the childbearing age from the three settings. Thirty seven women were dropped out from the study. Twenty one women could not be reached due to error in their phone number and the rest refused to continue the study. Data analysis only included the remaining 300 women. Using the sample size calculator with the confidence level of 95% and Confidence interval =6 the Sample size was estimated to be 263 women to ensure a representative simple. The sample was increased to 300 women. The inclusion criteria included: Participants who were not diagnosed with chronic disease for example: diabetes, anemia, and hypertension, their age ranged between 18-45 years old and not previously diagnosed with osteoporosis. Faculty members, health professionals and pregnant women were excluded from the study. Telephone number of each participant was taken for communication for follow up. All the recruited sample was interviewed twice once pre-counseling and once four months after counseling.

Four tools were used to collect data for this study. The first tool was interviewing questioner sheet for socio-demographic data as age, education, and occupation. The second tool was osteoporosis risk factors assessment sheet as exercises, nutrition, and body weight. This tool was conducted twice before nutritional counseling and 4 months after nutritional counseling. The third tool was nutritional knowledge and practice assessment sheet. It included food frequency questionnaire and this was conducted

twice before nutritional counseling and 4 months after nutritional counseling with especially emphasis on foods that have negative or positive effect on bone growth (calcium, phosphorus, protein, salts, and vitamin D). The fourth tool was Anthropometric measurement sheet as weight height, and Bone Mass Density (BMD) which was measured for sub sample of 30 women. Peripheral machine to measure density in the heel bone was used for each woman of the sub sample

Validity of these tool were determine by expert colleagues from the same department at Menoufiya University who reviewed this instruments and judged it for adequacy and to ensure that these tools measure what it intended to be measured. Reliability was assessed by applying the tools twice on 10 (test re-test reliability) women who were excluded from the study.

In this study the World Health Organization Definitions Based on Bone Density Levels was adapted. Normal: Bone Density is within 1 SD ( $\pm 1$  or  $-1$ ) of the young adult mean. Low Bone Mass: Bone density is 1 to 2.5 SD below the young adult mean ( $-1$  to  $-2.5$  SD). Osteoporosis: Bone density is 2.5 SD or more below the young adult mean ( $> -2.5$  SD). Severe (established) osteoporosis: Bone density is more than 2.5 SD below the young adult mean and there has been one or more osteoporotic fractures

Nutritional counseling was done twice for each woman. Each counseling session lasted 30 minutes. The counseling was structured to give the same knowledge for every woman in the sample. The aim of the nutritional counseling was to increase women awareness and knowledge about good nutrition aiming to improve their practice. The sessions focused on the type of food and drinks that are rich in calcium, processing methods of those food, likes and dislikes of each women, Healthy behavior and behavior modification.

A pilot study was conducted on ten women to test the applicability of the tools and to estimate the time needed and the feasibility of data collection procedures. The results of the pilot study helped in refining the interview questionnaire and developing an interview schedule. Permission to collect data for this study was obtained from the Undersecretary of Ministry of Health and Population (MOHP) after the review of the protocol. Also permission from the health directorates of two hospital and faculty of nursing was also obtained.

An informed consent to participate in the current study was taken after the purpose of the study clearly explained to each subject. Each subjects were fully informed that she has the full right to withdraw from the study at any time and each one was given the free opportunity to refuse to participate.

Data were analyzed using computer program SPSS. Paired t-test was used to compare between the results before and after nutritional counseling for interval and ratio data and Wilcoxon and sign rank test for ordinal or categorical data. The significance level was chosen as ( $p < 0.05$ ).

### 3. Results

As it was shown in table 1 that relatively half of the women in the sample (48.3%) had their ages ranged between 20 - 29 years old. About one third of the women in the sample (29.3%) had their ages ranged between 30-39 years old. The mean age of the women in the sample was  $29.5733 \pm 8.28$  years.

Regarding education more than half of the women in the sample (52%) finished their university education. While 2.7% of the women in the sample read and write. Regarding their occupation the largest percentage of the women in the sample (91.3%) was employee. While only 8.7% of the women in the sample were worker. Also about two thirds of the women in the sample (65%) were married. On the other hand more than one third of the women in the sample (35%) were single.

The height of more than half of the women in the sample (53.5) ranged from 160 to 169 cm. While (1.3%) of the women's height were less than 150 cm. The mean height was  $162.1267 \pm 6.29$  cm. The BMI of the sample showed that more than one third of the women in the sample (37.03%) had ideal weight. While (4.3%) of the women in the sample were under weight. The mean BMI was  $26.2767 \pm 9.9058$

Table (3) shows measuring bone mass density for sub-sample of the study group. The majority of the women in the sub- sample (83.5%) have normal bone mass density after measurement, while two point nine percent of the women in the sub- sample had osteoporosis (low bone mass density). Also thirteen point seven percent of the women in the sub-sample were considered at high risk for osteoporosis (mild bone mass density).

Table four shows correlation between BMD, age, and pre-nutritional knowledge score of the women in the sample. There were statistically significant negative correlation between age and results of BMD  $p = (.000)$ , the higher the age the lower the BMI. There was a statistically significant positive correlation between pre-knowledge score and results of BMD  $p = (.021)$ .

There was statistical significance improvement of women's knowledge after counseling in all items of knowledge assessment. The great majority of the women in the sample (96%) had poor knowledge about the definition of osteoporosis in pre counseling, however in the post counseling assessment the great majority of the women in the sample (99.7%) had

good knowledge. More than four fifth of the women in the sample (86.7%) had poor knowledge about the causes of osteoporosis in pre counseling, compared to slightly less than two thirds of the women in the sample (64.3%) had good after counseling.

Twenty one point seven percent of the women in the sample had poor knowledge about gender risk of osteoporosis in pre counseling, compared to the great majority of the women in the sample (99.7%) had good knowledge post counseling. Less than two thirds of the women in the sample (63.7%) had poor knowledge about age risk for osteoporosis in pre counseling, compared 97% who had good knowledge post counseling. More than two thirds of the women in the sample (77.4%) had poor knowledge about the signs & symptoms of osteoporosis in pre counseling, compared the majority of the women in the sample (90%) had a good knowledge post counseling. Relatively one quarter of the women in the sample (26.3%) had poor knowledge about foods rich in calcium in pre counseling, compared to eighty point four percent of the women in the sample (84%) had a good knowledge post counseling.

There was statistical significance regarding the recommended dietary allowance of calcium (RDA) required for children. The majority of the women in the sample (99.3%) had poor knowledge about the recommended dietary allowance of calcium (RDA) required for children in pre counseling, compared to more than half of the women in the sample (53.7%) who had a good knowledge about the recommended dietary allowance of calcium (RDA) required for children in the post counseling.

Great majority of the women in the sample (99.6%) had poor knowledge about the recommended dietary allowance of calcium (RDA) required for adult in pre counseling, compared to more than two thirds of the women in the sample (79.3%) post counseling. Most of the women in the sample (99.7%) had poor knowledge about the recommended dietary allowance of calcium (RDA) required for pregnant & lactating women in pre counseling, compared to more than two thirds of the women in the sample (79%) post counseling.

The majority of the women in the sample (93.7%) had poor knowledge about treatment of osteoporosis in pre counseling, compared to more than half of the women in the sample (56.7%) post counseling.

More than two thirds of the women in the sample (77.6%) had poor knowledge about prophylactic factors in pre counseling, compared to the post counseling the majority of the women in the sample (92.7%) post counseling.

There was statistical significant difference between the pre-post total knowledge score of the

women in the sample. Sixty two point seven percent of the women in the sample had fair knowledge before counseling, compared to three point one percent of women in the sample who had fair knowledge after counseling. Also more than one third of women in the sample (36.7%) had poor knowledge before counseling, compared to zero percent of the women in the sample who had poor knowledge after counseling.

Figure three illustrates comparison between practicing exercises before and after counseling. There was statistically significance difference in practicing exercises before and after counseling The majority of the women in the sample (91%) were not practicing exercises pre counseling. When compared to post counseling nearly half of the women in the sample (45.7%) were not practicing exercises. Only nine percent of the women in the sample were practicing exercise in pre counseling, compared to more than half of the women in the sample (54.3%) were practicing exercises in post counseling

Table six shows comparison between pre-post counseling nutritional practices of women in the sample. There was significant improvement in calcium, protein, fish, vegetable and fruits intake, while there was not a significant change in legumes and carbohydrate intake. More than two thirds of women in the sample (73.3%) often have calcium before counseling, compared to the great majority of women in the sample (97%) after counseling.

Less than one quarter of women in the sample (19.3%) often have protein before counseling, compared to the great majority of women in the sample (97%) after counseling. One point three percent of women in the sample often have fish before counseling which did not change after counseling.

More than one quarter of women in the sample (27.3%) often have vegetables before counseling, compared to more than two thirds of the women in the sample (85%) after counseling. Less than one fifth of women in the sample (19.3%) often have fruits before counseling, compared to more than two thirds of the women in the sample (71.7%) after counseling. The great majority of women in the sample (99.3%) often have carbohydrate before counseling which was not changed after counseling.

Figure (4) illustrates comparison between pre-post counseling of women's frequency exposure to sunshine. There was a statistically significant difference in relation to frequency distribution of women's practice related to exposure to sunshine. Twenty four point three percent of the women in the simple indicated that they rarely expose to sunshine (ultraviolet rays) in the pre counseling, compared to only point seven percent after counseling.

Nearly one third of the women in the sample (32.7 %) indicated that they usually expose to sunshine pre counseling, compared to nearly half of the women in the sample (49%) who had usually exposure to sunshine after counseling

Table seven shows comparison between mean SD of counseling of unhealthy drinks of the women in the sample pre –post counseling. There was a statistically significant reduction in the consumption of unhealthy drinks after counseling. The mean daily tea (cups) consumption was  $(3.1033 \pm 1.65)$  before counseling compared to only  $1.0900 \pm .77$  after counseling. In relation to coffee intake mean daily coffee (cups) consumption was  $(1.2000 \pm .49)$  before counseling compared to  $0.5000 \pm 0.037$  after counseling.

Figure five demonstrates comparison between the pre-post counseling total practices of the women in the sample. There was statistically significant improvement in the total practices score of the women in the sample after counseling. Only seven point four percent of the women in the sample had poor practice before the counseling, compared to zero percent of the women in the sample had poorly practice after counseling. Two percent of women in the sample had good practice before counseling, compared to 41.3% who had good practice after counseling.

Table 9 demonstrates correlation between post-counseling total knowledge score and post practices total score of the women in the sample. There were statistically significant positive correlation between post- total knowledge score and post total practices score of the women in the sample.

**Table (1): Frequency Distribution of Socio- demographic Characteristics of the Sample:**

Variable	No	%
<b>Age (years)</b>		
< 20	13	4.4
20-	145	48.3
30-	88	29.3
40-45	54	16.8
Mean $\pm$ Std. Deviation	29.5733 $\pm$ 8.2853	
<b>Education</b>		
Read and write	8	2.7
High school	136	45.3
University	156	52
<b>Occupation</b>		
worker	26	8.7
employee	274	91.3
<b>Marital status</b>		
Married	195	65
Single	105	35

**Table (2): Frequency Distribution of Weight, Weight, and Body Mass Index of the Sample**

Variable	No	%
<b>Weight</b>		
<50 kg	7	2.3
50- kg	58	19.2
60- kg	98	32.7
70- kg	79	26.3
80- kg	35	11.6
90- kg	15	4.8
≥100 kg	8	2.6
Mean ± Std. Deviation	69.1667 +12.7037	
<b>Height</b>		
<150	4	1.3
150-	86	28.7
160-	161	53.5
170-180	49	16.4
Mean ± Std. Deviation	162.1267 ± 6.2909	
<b>Body Mass Index (BMI)</b>		
Under weight	14	4.3
Ideal weight	118	37.03
Over weight	116	73.1
Obese	52	16

Mean ± Std. Deviation	26.2767 ± 9.9058
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**Table (3): Measuring Bone Mass Density for Sub-Sample of the Study Group:**

Variable	Bone Mass Density	
	N = 139	%
<b>Normal</b>	116	83.5
<b>Osteopenia</b>	19	13.7
<b>Osteoporosis</b>	4	2.9

**Table (4): Correlation between BMD and Age, and Pre-Nutritional Knowledge Score Of The Women In The Sample:**

Variable	BMD	
	P	r
Age	0.000	-0.433
Pre-knowledge score	0.021	0.196

**Table (5): Comparison between Pre and Post Counseling Knowledge Assessment of Women in the Sample:**

	Pre counseling knowledge assessment N=300						Post counseling knowledge assessment N=300						P -value
	Good		Fair		Poor		Good		Fair		poor		
	No	%	No	%	No	%	No	%	No	%	No	%	
<b>Def. of osteoporosis causes</b>	8	2.7	4	1.3	288	96	299	99.7	1	.3	0	0	.000
<b>Gender risk</b>	4	1.3	36	12	260	86.7	193	64.3	105	35	0	0	.000
<b>Age risk</b>	235	78.3	0	0	65	21.7	299	99.7	1	.3	0	0	.000
<b>Signs and symptoms</b>	108	36	1	.3	191	63.7	291	97	1	.3	8	2.7	.000
<b>Foods rich in calcium</b>	5	1.7	63	21	232	77.4	270	90	30	10	0	0	.000
<b>RDA of Calcium for children</b>	3	1	218	72.7	79	26.3	252	84	46	15.3	2	.7	.000
<b>RDA of Calcium for adult</b>	0	0	2	.7	298	99.3	161	53.7	1	.3	138	46	.000
<b>RDA of Calcium for pregnant &amp; lactating</b>	1	.3	0	0	29	9.6	238	79.3	1	.3	6	2.03	.000
<b>Treatment of osteoporosis</b>	1	.3	0	0	299	99.7	237	79	1	.3	62	20.7	.000
<b>Prophylactic factors</b>	1	.3	18	6	281	93.7	170	56.7	129	43	1	.3	.000
	3	1	64	21.3	233	77.6	278	92.7	21	7	1	.3	.000

**Table (6): Comparison between Pre-Post counseling Nutritional Practices of Women In The Sample:**

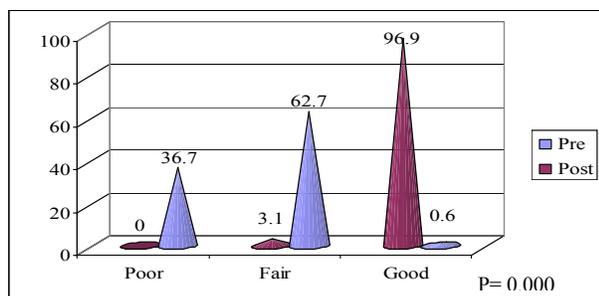
Variable	Pre counseling						Post counseling						P-
	Rarely		Sometimes		Often		Rarely		Sometimes		Often		
	No	%	No	%	No	%	No	%	No	%	No	%	
<b>Present ca. Intake</b>	9	3.0	71	23.7	220	73.3	1	.3	8	2.7	291	97	.000
<b>Protein intake</b>	20	6.7	222	74	58	19.3	3	1	273	91	24	8	.041
<b>Fish intake</b>	125	41.7	168	56	4	1.3	44	14.7	252	84.0	4	1.3	.000
<b>Legumes intake</b>	28	9.3	125	41.7	138	46	11	3.7	146	48.7	134	44.7	.189
<b>Vegetables intake</b>	14	4.7	201	67	82	27.3	1	.3	44	14.7	255	85	.000
<b>Fruits intake</b>	65	21.7	175	58.3	58	19.3	4	1.3	81	27	215	71.7	.000
<b>Carbohydrate intake</b>	--	--	2	0.7	298	99.3	--	--	2	.7	298	99.3	1.000

**Table (7): Comparison between Mean and Standard Deviation of Counseling of Unhealthy Drinks Of The Women In The Sample Pre –Post Counseling:**

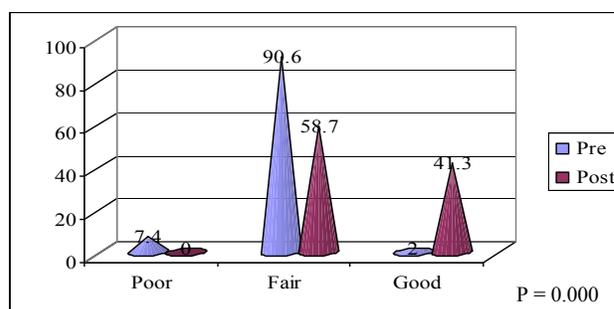
variable	Pre counseling		Post counseling		p-value
	Mean	±S. D	Mean	±S. D	
Tea Intake	3.1033	1.6477	1.0900	0.7737	0.000
Coffee Intake	1.2000	0.4975	0.5000	0.0370	0.000
Nescafe Intake	2.2100	0.4080	1.0100	0.0460	0.000
Cola Intake	1.3600	0.4945	0.3100	0.0000	0.000

**Table (9): Correlation between Post- Counseling Total Knowledge Score And Post Practices Total Score of The Women In The Sample:**

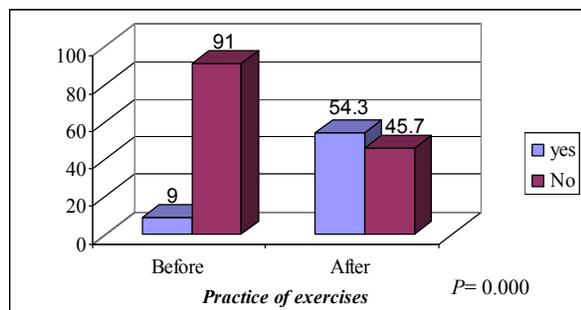
Variable	Post- Counseling total knowledge score	
	r	P
post practices score	0.186	0.001



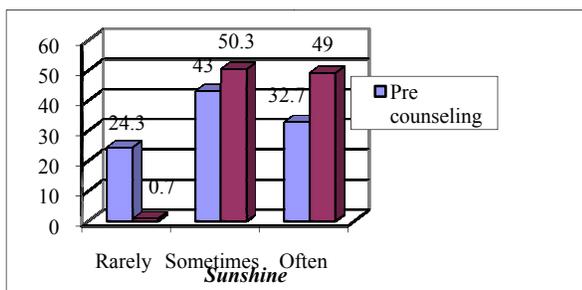
**Figure (2): Comparison between the Pre-Post Total knowledge score of the Women in the Sample**



**Figure (5): Comparison between the Pre-Post Counseling Total Practices Score of the Women in the Sample**



**Figure (3): Comparison between Practicing Exercises before and after Counseling**



**Figure (4): Comparison between Pre-Post Counseling of Women's Frequency Exposure to Sunshine**

**4. Discussion**

This study focused on assessment and modification of nutritional risk behavior for osteoporosis among childbearing working women. In most studies about the relationship between women's age and osteoporosis researchers selected the studied sample during the post menopausal period when they had osteoporosis or at risk for it, but in the current study the age selected for inclusion into this study was during the reproductive years because at this age it was anticipated that there is lower risk for osteoporosis among this group of women. Fortunately awareness of the risk factors that exist during the reproductive years is critical in helping women to retain bone minerals density. This is accomplished through guiding women on overcoming bone-damaging habits and implementing certain preventive practices that can go a long way toward preventing this disease--not only in postmenopausal women, but also in young women at high risk.

In the present study several risk factors for osteoporosis have been identified. These include advancing age; family history of osteoporosis or fragility fractures; low body mass index; menopause

before age 45 years; prolonged amenorrhea unrelated to menopause; nulliparity; prolonged lactation; diet low in calcium and vitamin D; excessive caffeine; smoking; sedentary lifestyle; and prolonged treatment with thyroid hormone.

Regarding family history of diagnosed osteoporosis the present study revealed that the majority of the sample had no family history of osteoporosis or fracture, while very low percentage had family history of osteoporosis, and about less than two thirds of the women in the sample (60%) had family history of back pain. This could be due to other medical problems such as obstetric problems (e.g. pelvic inflammatory disease) or vertebral colon disease or injury.

In relation to the effect of counseling on knowledge and practice. At the pre-test, before the counseling, the majority of women in the sample had poor knowledge about definition, causes, age risk, signs and symptoms of osteoporosis, (RDA) needed for children, (RDA) needed for adult, and (RDA) needed during pregnancy and lactation periods; prophylactic methods of preventing osteoporosis, and treatment measures. This may be attributed to the fact that the majority of the women in the sample were young in age. While the majority of women in the sample had good knowledge about gender risk and type of food that is rich in calcium during pre-counseling; this could be explained by the fact that the majority of the sample were educated. However the good knowledge about type of food that is rich in calcium may be due to availability of sources of calcium. Also good knowledge about gender vulnerability may be due to the women's concept that correlate with any bony disease, pregnancy and parity.

The findings of the current study were in agreement with Berarducci (2004) who studied the senior nursing students' knowledge of osteoporosis to explore the terminal knowledge of senior nursing students regarding osteoporosis at the end of their baccalaureate programs at University on the Coast of Florida. The studied sample composed of ninety-five senior nursing students, who found that senior nursing students demonstrated limited knowledge related to the magnitude of osteoporosis, risk factors associated with the disease, detection, treatment and preventive measures. These findings should encourage educators to develop or enhance existing curricula to adequately prepare nurses to assume advocacy roles in both the practice settings and public policy arena regarding osteoporosis.

Burgener *et al.* (2005) studied the Older adults' knowledge and beliefs about osteoporosis: results of semistructured interviews used for the development of educational materials to develop effective

osteoporosis health education messages and materials. Semistructured one-on-one interviews with 15 older adult volunteers, found that they were poor knowledge in a survey of the older adult's knowledge and beliefs regarding osteoporosis, have illustrated that there is high level of awareness about osteoporosis, but they had inadequate understanding of the condition, this could hinder the effort to improve awareness of prevention and treatment of osteoporosis.

On the other hand at the post-test of the current study after the counseling, the majority of women in the sample had good knowledge about definition, causes, age risk, gender risk, type of food that is rich in calcium, signs and symptoms of osteoporosis, (RDA) needed for children, (RDA) needed for adult, and (RDA) needed during pregnancy and lactation periods; prophylactic methods to prevent osteoporosis, and treatment.

Rolnick *et al.* (2001) who studied what is the impact of osteoporosis education and bone mineral density testing for postmenopausal women in a managed care setting to assess whether osteoporosis education, with and without bone mineral density (BMD) testing, increases the initiation of lifestyle changes and pharmaceutical treatment to prevent osteoporosis. A total of 508 women, aged 54-65, from a large managed care organization who were not on osteoporosis prevention therapy participated in an intervention study. Participants were randomly assigned to either an education class on osteoporosis (n=301) or education plus BMD (n=207). A control group of 187 women receiving no intervention were also surveyed to serve as comparison. This study have mentioned that education regarding osteoporosis prevention seems to encourage women to make lifestyle changes. The goal of health education is to provide information to affect attitudes, beliefs, and intentions for behavior change. However, little is known about the effects of changes in knowledge on behaviors for osteoporosis prevention.

These findings of the current study in agreement with Chan *et al.* (2005), have demonstrated that educational program can act as simple but effective nursing intervention to promote women's attitudinal and behavioral intentions towards osteoporosis-prevention.

Regarding frequency distribution of women's taking calcium supplementation. There was no statistical significant difference between pre and post counseling in relation to frequency distribution of women's taking calcium supplementation. All the women in the sample did not receive calcium tablets during pre and post counseling. These findings might be due to financial causes or they might not value the importance of calcium supplement. Also they might

think that it has bad side effects and they are not in need of calcium supplement during this period of life.

Dietary calcium intake was sufficient in most cases, but the amount and type of physical activity was inadequate to achieve enhanced bone mass; most women in this study performed some physical activity in the course of paid work or housework, but did not admit to systematic daily exercise. Other studies on Caucasian and African-American women found that most of them had heard about osteoporosis, but few women got both adequate exercise and the recommended intake of calcium per day (Kasper *et al.*, 2001) who studied the need for comprehensive educational osteoporosis prevention programs for young women: results from a second osteoporosis prevention survey to assess osteoporosis knowledge, beliefs, and preventive behaviors among young adult women and to identify sources that they would most likely utilize to learn more about the disease. 321 women (mean age: 21.6 years; 63.5% were white, 29.2% were black) enrolled in a required undergraduate health course at a southeastern state university.

These findings were in agreement with Satterfield *et al.* (2000) who studied the perceived risks and reported behaviors associated with osteoporosis and its treatment. This study investigates older American women's knowledge and risk perceptions about osteoporosis and its treatment, who reported that women scored highest on osteoporosis knowledge questions related to items under their personal control, such as diet or exercise. Further, women who understood the effects of a particular behavior on osteoporosis were more likely to act in accordance with that knowledge than were women who did not understand those effects.

Regarding correlation between post knowledge score and BMI and age, there was a positive relation between post knowledge score and age; and there was a negative correlation between post knowledge score and BMI.

Regarding comparison between the post practice score and education of the women in the sample, there were statistically significant correlation between the post practice score and education of the women in the sample.

As recommendations for this study Integration of BMD measurements in regular routine gynecological examination through availability of bone measurement machine at university or teaching hospital to measure bone mass density especially at maternal department or al family planning center is extremely important. Encourage women for exposing to sunshine at time of ultraviolet rays is available. Representation on the nutrition label showing calcium content of the food and portion of women 's

needs should be labeled on the products to provide information about how much calcium they need and why it is important for their health

Providing an access to enjoyable physical activity opportunities for women in various socioeconomic backgrounds is important. In conclusion for this study, counseling about osteoporosis was successful to improve the knowledge and practice of childbearing women. Women changed their practice based on their knowledge improvement.

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