

Osteoporosis Preventive Behaviors among Women Based on the Health Belief Model and Self-Efficacy in Tanta City

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Abstract: Osteoporosis is a serious health problem among women that lessens the quality of life and takes up many financial assets for its prevention and treatment. The aim of the study: was to identify osteoporosis preventive behaviors among women based on the health belief model and self-efficacy in Tanta city. Subjects and method: Study design: - In this study, the descriptive cross-sectional study design was used. Study settings: - This study was conducted in all outpatient clinics and departments of Medical- Surgical, and Orthopedic, in Tanta University Hospital. In addition, Maternal and Child Health Centers (MCH) affiliated to the Ministry of Health in Tanta city, El- Gharbia Governorate, there were seven maternal, and child health centers representing five districts of Tanta city. The researchers chose these places because they had a high rate of attended women seeking different medical services. Study subjects: The studied subjects were 1200 women who attended the study settings through the study period (six months). Tools of data collection: Four tools were used by the researchers. Tool I: A structured interview schedule which it consisted of three parts: - part one: Personal characteristics, part two: Osteoporosis preventing behaviors and part three: Anthropometric measurements. Tool II: Osteoporosis Health Belief Scale (OHBS), Tool III: -Osteoporosis Knowledge Assessment Test (OKAT) and Tool IV: Osteoporosis Self-Efficacy Scale (OSES).Results: -Few percentages of the studied women assumed osteoporosis preventive behaviors, and 76.8% of them had poor knowledge about osteoporosis. For the Osteoporosis Health Belief Scale (OHBS), the studied women had the negative belief about their susceptibility to osteoporosis, barriers to exercise, and barriers to calcium intake. In addition, there was a significant difference between positive and negative OHBS, also positive and negative Self- Efficacy Scale (SES) $P < 0.05$. Conclusion: Most of the studied women had a poor score of knowledge about osteoporosis, and only little percentage of them followed osteoporosis preventive behaviors. More than two- thirds of the studies women had a negative osteoporosis health believe score. Recommendations: Educational programs are suggested to encourage primary health care providers to consult women at reproductive age about osteoporosis preventions. Integrate early detection and management of osteoporosis in orthopedic or rheumatology outpatient clinics in Tanta university hospital and other health facilities.

Keywords: Osteoporosis, Knowledge, Health Belief, Self-Efficacy.

1. INTRODUCTION

Osteoporosis is a big health issue in societies and it is recognized before long time as inactive disease of the horn. It is characterized by diminished bone intensity and loss of bone microstructure that lead to raise risk of fracture. The most common problem for people with osteoporosis is broken bones. These sites of fractures are mainly in the hip, arm and wrist bone. Women are at risk of exposure for osteoporosis eight times more than men. Furthermore bone mass among females is less significant than males at the same age and race. This disease is a critical health problem in health care settings in developing countries ⁽¹⁻³⁾.

Osteoporosis was moreover announced as the fourth main adversary of the human after heart failure, stroke, and cancer. Therefore, the essential aim of preventive programs of osteoporosis is to maintain bone mass among group aged the thirty to fifty years of age^(4,5). This age group of people undertakes the responsibilities of life but pay less attentiveness to their health. They play a main role in handle their families' health; therefore, their mortality, disability, and behavior that influence on different sides of health and behavior of their families⁽⁶⁾.

Osteoporosis is a global health issue load numerous budgetary for prevention and treatment^(7,8). It influences more than 75 million people around the world and, according to the U.S.A department of Health and Human Services, will influence more than 10 million women by the year 2020; if efforts to prevent it are ineffective⁽⁹⁾. In different countries, there was a significant difference in the prevalence of osteoporosis. Additionally it is considered as a health priority amongst the countries of the WHO Eastern Mediterranean Region. In Egypt,(2017), among post-menopausal women, it was estimated that 53.9% of them have osteopenia while 28.4% possess osteoporosis, and also among males aged above twenty around 21.9% have osteoporosis^(10,11).The mortality rates of post-hip fracture may be higher in the Middle East and Africa region than those reported from western populations. Whereas such rates vary between 25-30% in western populations, they are 2-3 folds higher among populations from this region⁽¹²⁾.The incidence of osteoporosis and osteopenia among Iranian women and men was found to be 32.4% and 9.4% respectively. This level of osteoporosis is less than that in Pakistan with 55%, Turkey with 27%–33.3%, Morocco with 31%, Bahrain with 27.1%, Kenya with 24.5%, Saudi Arabia with 23%–24% and less than in the United Arab Emirates with 2.5% osteoporosis⁽¹³⁻¹⁵⁾.

According to the International Osteoporosis Foundation, osteoporosis and fractures secondary to it are an essential reason for mortality and morbidity. About 1.6 million hip fractures occur every year worldwide; this incidence is increased to 6.3 million by the year 2050⁽¹⁶⁾.Globally, osteoporosis causes fractures for more than 8.9 million fractures annually, and it resulting in an osteoporotic fracture every three seconds⁽¹⁷⁾. It was surprising that even with plenty of sunrays, the Middle East and Africa registered the higher rates of rickets worldwide and low levels of vitamin D, which are prevailing all over the region⁽¹¹⁾. Furthermore, it was found that approximately 40 % to50 % of women sustains osteoporotic fractures during their life^(18,19).

There are various risk factors for osteoporosis have been recognized, which include female sex, progress age with a high proportion of osteoporosis amongst women over seventeen years old; family history of osteoporosis or frailty fractures; body weight less than 51.8 kg; premature menopause before 45 years of age. After the menopausal period, the production of estrogen hormone is decreased. Furthermore, estrogen helps women's bones stay strong as it helps in the deposition of calcium in the bones. In addition, the low level of estrogen in the body causes weakness to the bone. Other risk factors include: nulliparity; extended lactation; protracted amenorrhea which irrelevant to menopause; insufficient utilization of a diet containing calcium and vitamin D; destitute intestinal absorption of calcium; lactose intolerance; intemperate caffeine and alcohol utilization; smoking; inactive lifestyle; as inefficient weight-bearing exercise such as walking, dancing, or rising weights, lengthy therapy of thyroid hormones, together with anticonvulsants, aluminum antacids, glucocorticoids, and anticoagulants⁽¹⁹⁻²²⁾.

Osteoporosis prevalence is higher in females than in males. Most bone mass density and content among girls is formed in the age between eleven and fourteen years. Therefore, more attention should be paid to this age group. Exercises and calcium consumption are considered as modifiable risk factors for the prevention of osteoporosis because they are increasing bone density^(23,24). In addition, a good nutrition can keep up bone mass and strength among young people and adults, it is also the assorted and pleasant diets that are rich in calcium can excess bone strength and progress the quality of life at any time. Furthermore, regular exercises enhance muscle strength, result in a body balance and harmony as well as it has a direct effect overall health of the body, and it contributes to bone health. In addition, physical exercises are recommended as non-medical interventions that can raise bone mass among young age and prevent loss of bone density in middle age^(3,25).Therefore, in order to prevent the occurrence of osteoporosis women at the reproductive age were selected.

This disease is preventable, therefore, the imperative point in preventing osteoporosis is to rectify thinking, way of the life and daily habits in order to move forward the quality and efficiency of individuals. So, teaching healthy preventive behaviors such as exercises and proper nutrition as a simple and efficient method can help in prevention of disease as well as the advancement and conservation of well-being. One of the foremost imperative goals of WHO is to extend the number of trained women for the prevention of osteoporosis through health education programs about healthy diet, exercises and other preventive measures of osteoporosis^(3,25,26).

For prevention of osteoporosis, it is critical to expend sufficient calcium and vitamin D throughout life, in order to attain maximal peak bone thickness in early, middle age, and to preserve a healthy bone in adult age. A daily intake of calcium between 1200 and 1500 mg and 400-800 IU of Vitamin D are safe and effective for most adults. Furthermore, hormone replacement therapy (HRT) may be utilized for short-term management of menopausal symptoms but generally, it is not utilized for long-term prevention of fractures⁽¹⁻³⁾.

Numerous health care experts do not get it the magnitude of the problem or the ways in which bone disease can be prevented and treated. One of the common misinterpretations is that osteoporosis is an inescapable part of aging and that it is restricted to older white women⁽²⁷⁾. This incorrect view has delayed prevention and treatment among young and middle-aged women, men, and the minority of women. In addition, misconceptions regarding osteoporosis have delayed educational efforts among youth⁽²⁵⁾. If osteoporosis should be prevented, it is essential to use the models that identify the factors affecting people's behavior such as health belief model (HBM) that might help people change their behavior by understanding the disease entity, their susceptibility, benefits, barriers, cues to action and self-efficacy in turning to healthy behaviors⁽²⁸⁻³⁰⁾.

Health belief model (HBM) is the foremost broadly applied theoretical framework for evaluating osteoporosis health beliefs and behavior⁽³¹⁻³²⁾. The most common cause for rejection of preventive behaviors of osteoporosis is a wrong belief that this disease is not dangerous. Based on HBM, people change their behavior when they know and realize that this disease is a serious, otherwise, they might not overthrow to a healthy behaviors⁽²⁹⁾. The structures of the health belief model include perceived severity, susceptibility, benefits, barriers, modifying variables, cues to action and self-efficacy⁽³³⁾. In the context of osteoporosis prevention, adopting osteoporosis preventive behaviors (OPBs) requires long-term changes rather than activities of a single nature. Increasing the likelihood to initiate and maintain OPBs are important to overcome perceived barriers against osteoporosis. Self-efficacy has also been added to the HBM because of its significance in accounting for the promoting and keeping of the behavioral change⁽³⁾.

Nurses have the responsibility to strengthen professional role as it advocates for a new generation to take charge of their bone health. Indeed, it is argued that health promotion and disease prevention should be an integral part of nursing practice. Nurses are in a powerful position to change attitudes throughout the community regarding to bone health, osteoporosis and fracture risk, by taking a long-term view of bone health from conception to older life and using a public health approach in a variety of settings, so it is possible to provide unified care across a community⁽³⁴⁾.

The significance of the study:

Identifying factors affecting behavior change can make changes easier. Therefore, investigating factors affecting the adoption of osteoporosis preventive behaviors among women, using models that identify factors affecting behavior, is necessary. So, the aim of this study was to determine the level of osteoporosis preventive behavior among women. In addition, this study examined the constructs of the Health Belief Model (HBM), perceived susceptibility, severity, benefits, barriers, and health motivation, and self-efficacy related to osteoporosis prevention.

The aim of the study:

The aim of this study was to identify osteoporosis preventive behaviors among women based on the health belief model and self-efficacy in Tanta city.

Research questions:

- 1) Are the studied women assume osteoporosis preventive behaviors?
- 2) What is the correlation between women's preventive behaviors about osteoporosis and their osteoporosis health belief?

2. SUBJECTS AND METHOD

Subjects

Study design:

The descriptive cross-sectional study design was used in this study.

Study settings:

This study was conducted in all outpatient clinics and departments of Medical- Surgical, and Orthopedic, in Tanta University Hospital. In addition, Maternal and Child Health Centers (MCH) affiliated to the Ministry of Health in Tanta city, El- Gharbia Governorate, there were seven maternal, and child health centers representing five districts of Tanta city. The researchers chose these places because they had a high rate of attended women seeking different medical services.

Study Subjects:

A convenient sample was utilized in the current study. The study was conducted on one thousand and two hundred women their age 30 years old or above who had attended the previous settings through the study period (six months).

Tools for data collection:

Four tools were used by the researchers in order to obtain the necessary data for the study.

The tool I: A structured interview schedule

A structured interview schedule was developed by the researchers according to the literature review⁽³⁻⁵⁾. It consisted of three parts:

Part one: Personal characteristics of women which included age, education level, marital status, occupation, family income per month and place of residence.

Part two: Osteoporosis preventing behaviors⁽³⁵⁾ which included the following items: the categories of activities/exercise, dietary intake of calcium containing foods, exposure to sun, drinking soft and stimulant drinks, current calcium or vitamin D supplement use and other risk factors as smoking and source of knowledge related to prevention of osteoporosis. Inadequate intake group is considered when the servings per week were less than four. The moderate intake group was the persons who their servings were ranged from five servings per week to one serving per day while adequate intake group is considered when the servings per day were two to three servings.

Part three: Anthropometric measurements. Weight, height, and body mass index.

Tool II: Osteoporosis Health Belief Scale (OHBS)⁽³⁶⁾.

The OHBS was developed by Kim, Horan & Gendler (1991). It was adopted by the researchers in the current study. It consists of forty-two item instruments, which include seven domains addressing health beliefs, as susceptibility, severity, benefits to exercise, benefits to calcium intake, barriers to exercise, barriers to calcium intake, and health motivation were the domains of health belief scale. Each item was rated by the subject using a 5-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree in all domains except barriers domain was reversely scored. The total health belief scores had a range of 42 to 210 and a possible range of 6 to 30 for each domain score. The total score for different parts and the tool was categorized as: -

* Positive belief: $\geq 60\%$ of the total score.

* Negative belief : $< 60\%$ of the total score.

Higher scores are indicating extremely positive healthy beliefs.

Tool III: Osteoporosis Knowledge Assessment Test (OKAT)⁽³⁷⁾.

The Osteoporosis Knowledge Assessment Tool (OKAT) was developed by Winzenberg and co-authors in 2003. It was adopted by the researchers in the current study. It includes twenty-item questionnaire, each item having "true", "false" and "don't know" options. Each item was coded "0" if an incorrect answer or a "don't know" answer was given and "1" if the correct answer was given, with a total potential score of twenty. Understanding (symptoms and risk of fracture) of osteoporosis, the knowledge of risk factors for osteoporosis, knowledge of preventive factors as physical activity and diet relating to osteoporosis and treatment availability were the four basic themes of OKAT. The total knowledge scores were classified into three categories as follows:

* Good: $\geq 70\%$ of the total score (more than 14).

* Fair: $50\% - < 70\%$ of the total score (from 10 to less than 14).

* Poor: $< 50\%$ of the total score (less than 10)

Tool IV: Osteoporosis Self-Efficacy Scale (OSES)⁽³⁶⁾.

The OSES was developed by Kim, Horan, and Gendler (1991). It was adopted by the researchers in the current study. An osteoporosis self-efficacy exercise scale and an osteoporosis self-efficacy calcium scale were the two subscales, which were consisted of 12- items of OSES, 6 items for evaluating self-efficacy for exercise and the other 6 items for evaluating self-efficacy for calcium intake. A question related to the self-efficacy of exercise and of calcium was their confidence in changing exercise habits and in increasing their calcium intake. Each item was rated by the subject using a 5-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The total osteoporosis self-efficacy scores had a range of 12 to 60.

The total score of all items of self-efficacy scale was categorized as follows: -

* Positive self-efficacy: ≥ 60 % of the total score.

* Negative self-efficacy: < 60 % of the total score.

Method

1. **An official permission** to conduct the study was obtained through sending an official letter from the Faculty of Nursing, Tanta University to the manager of Outpatient Clinics of Tanta University hospital and the Directorate of Health Affairs. Then an official permission from the Directorate of Health Affairs to the director of each MCH center in Tanta city to gain their cooperation.

2. The manager of Outpatient Clinics of Tanta university hospital and the director of MCH centers were informed about the study objectives to take their permission to collect the data from these selected settings.

3. **Ethical and legal considerations:** - An informed consent for participation in the study was obtained from the entire sample after explanation of the nature and purpose of the study to them. Nature of the study was not causing any harm and /or pain for the entire sample. Confidentiality and privacy were put into consideration regarding the data collected.

4. **Developing study tools:** Tool I (the structured interview questionnaire sheet) was developed based on literature review and the English version of tool II, III, and IV were translated into the Arabic language by the researchers in which their sentences, words, and expressions were put into the formal Egyptian expressions and meanings.

5. **Validity test:** The tools of data collection were distributed to a jury of 5 academic professors in Community Health Nursing Department, Maternity and Gynecological Nursing Department, Medical and Surgical Nursing Department and Orthopedic Specialists of Faculty of Medicine to test its content and face validity. Accordingly, corrections and modifications were done.

6. **A pilot study** was carried out on about 10 % of the target subjects to test the tool for relevance, clarity, applicability and to identify obstacles that may be encountered with the researchers during data collection. Accordingly, the necessary modifications were done. Those women were excluded from the study subjects.

7. **The reliability of the tools II, III, and IV of the study was done by using Cronbach's Alpha:** Cronbach's Alpha revealed reliability of the translated Arabic tool for Osteoporosis Health Belief Scale (tool II) was 0.806, for Osteoporosis Knowledge Assessment Test (tool III) was 0.863 and for Osteoporosis Self-Efficacy Scale (tool IV) was 0.902 and the Cronbach's Alpha revealed reliability for questionnaire sheet was 0.704.

8. **Field work of the study:** After obtaining a written permission from the previous settings, the researchers went to the MCH centers and outpatient clinics during work hours two day/week from September 2016 to end of March 2017. The women were informed about the objectives of the study and received answers to their questions. Verbal consent was obtained from women before conducted the study.

9. **Statistical analysis:** The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 23. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, the comparison was done using Chi-square test (χ^2). For comparison between means, student t-test was used. A significance was adopted at $P < 0.05$ for interpretation of results of tests of significance (*).

3. RESULTS

Table (1): Distribution of the studied women according to their socio-demographic characteristics

Variables	The studied subjects (N=1200)	
	n	%
Age in years	(30-75)	
Range	39.88±9.368	
Mean±SD		
Residence		
▪ Rural	814	67.8
▪ Urban	386	32.2
Marital status		
▪ Single	60	5.0
▪ Married	1032	86.0
▪ Widow	90	7.5
▪ Divorced	18	1.5
Level of education		
▪ Illiterate/read and write	134	11.2
▪ Literate certificate	30	2.5
▪ Primary education	48	4.0
▪ Preparatory education	74	6.2
▪ Secondary education	356	29.7
▪ University education	558	46.5
Work		
▪ Housewife	444	37.0
▪ Employees	756	63.0
Family income		
▪ Enough and save	160	13.3
▪ Enough	968	80.7
▪ Not enough and borrow	72	6.0
BMI		
▪ 18.5-24.9 (Normal weight)	164	13.7
▪ 25-30 (Overweight)	518	43.2
▪ >30 (Obese)	518	43.1
Range	(19.5-67.5)	
Mean±SD	29.769±5.3754	

Table (1): Shows the distribution of the studied women according to their socio-demographic characteristics. The table illustrated that the mean age of the studied women were 39.88±9.368 years. More than two - thirds (67.8%) of women were rural residents. In addition, the majority of women (86 %) were married and slightly less than half (46.5%) had a university education. Slightly less than two- thirds (63%) of them were employees. Moreover, 43.2% and 43.1 of women were obese and overweight respectively.

Table (2): Distribution of the studied women according to osteoporosis preventing behaviors

Variables	The studied women (N=1200)	
	N	%
<u>Average of glasses of milk per week</u>		
▪ Inadequate intake	878	73.2
▪ Moderate intake	216	18.0
▪ Adequate intake	106	8.8
<u>Average of servings of yogurt per week</u>		
▪ Inadequate intake	1098	91.5
▪ Moderate intake	62	5.2
▪ Adequate intake	40	3.3
<u>Regularity of calcium supplements intake</u>		
▪ No calcium supplements intake	476	39.7
▪ Always	462	38.5
▪ Sometimes	262	21.8
<u>Times of walking exercises</u>		
▪ Don't practice walking exercises	270	22.5
▪ 10 -15 minutes. One to twice weekly	338	28.0
▪ 10-15 minutes. 3 -4 times weekly	86	7.2
▪ 10-15 minutes.5- 7 times weekly	146	12.2
▪ 20-30 minutes.1-2 times weekly	38	3.2
▪ 20-30 minutes.3-4 times weekly	34	2.8
▪ 20-30 minutes.5-7 times weekly	42	3.5
▪ More than 30 minutes. Daily	246	20.5
<u>Times of swimming and ridding exercises</u>		
▪ Don't practice swimming and biking exercises	1200	100
<u>Regularity of exposure to sunlight</u>		
▪ Don't expose to sunlight	10	1.7
▪ Always	282	31.8
▪ Sometimes	798	66.5
<u>Regularity of soft drinks</u>		
▪ Don't drink soft drinks	210	17.5
▪ Always	222	18.5
▪ Sometimes	768	64.0
<u>Regularity of drink tea, coffee</u>		
▪ Don't drink tea or coffee	130	10.8
▪ Always	654	54.5
▪ Sometimes	216	18.0
Passive smoking	450	38
No smoking	744	62

Table (2): represents the distribution of the studied women according to osteoporosis preventing behaviors. The table revealed that 73.2% and 91.5% of the studied women had inadequate intake of milk and yogurt respectively per week as a source of calcium. In relation to the time of practice walking exercises, only more than one - quarter (28%) of the studied women walk 10 -15 minutes one to twice weekly. More than half of studied women (55.2%) and more than two- thirds (64%) of them were sometimes exposure to sunlight and drink soft drinks respectively. While more than half (54.5%) of them always drink coffee or tea. The table also revealed that less than two-thirds (62%) of the studied women were not- smoker while more than one-third of them (38%) were passive smoking.

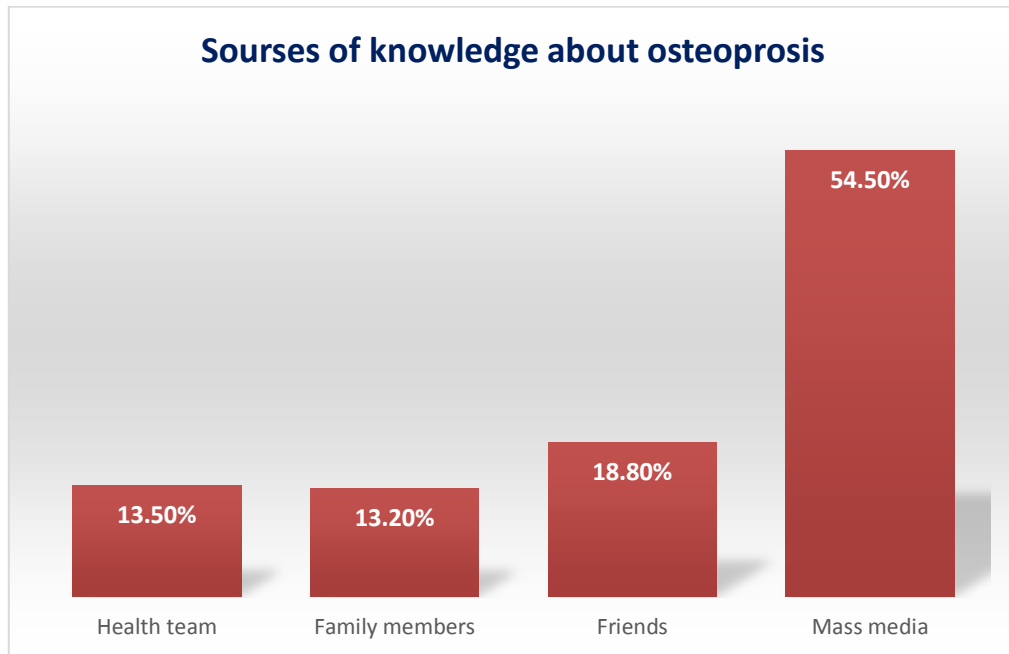
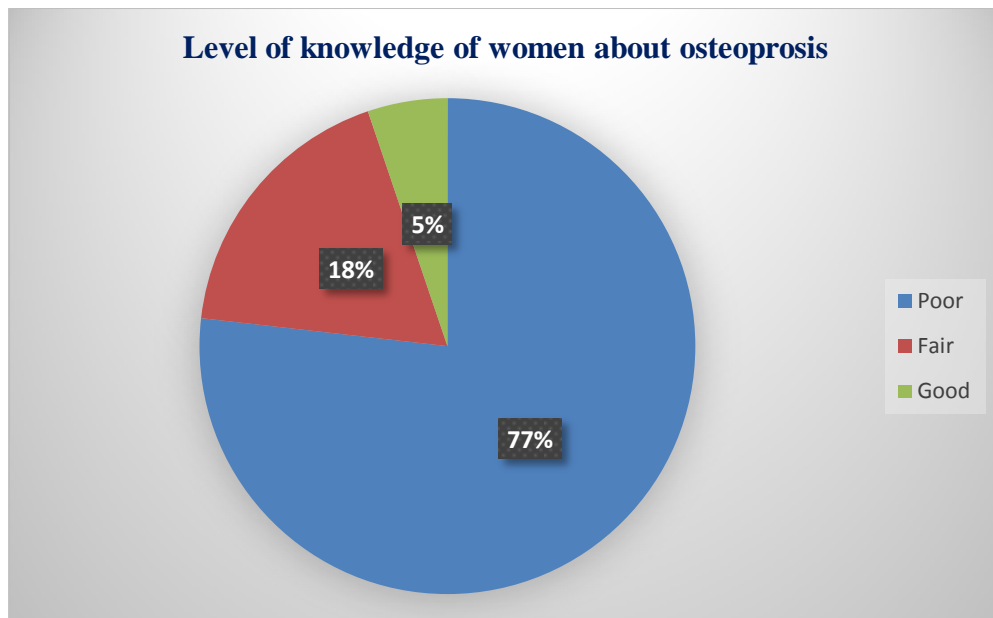


Figure (1): Distribution of the studied women according to their sources of knowledge about osteoporosis

Figure (1): shows the distribution of the studied women according to their sources of knowledge about osteoporosis. More than half (54.5%) of women reported that their sources of knowledge about osteoporosis were mass media and only 13.5% their source is health team.



Range	(0-20)
Mean±SD	7.33±3.536

Figure (2): Distribution of the studied women according to their level of knowledge about osteoporosis.

Figure (2): shows the distribution of the studied women according to their level of knowledge about osteoporosis. The figure illustrated that most of the studied women (77%) had a poor level of knowledge about osteoporosis and only (18% & 5%) respectively had a fair and good level. With the mean score of knowledge 7.33±3.536 and range of (0-20).

Table (3): Mean scores of domains of osteoporosis health belief scale (OHBS) and self-efficacy scale (SES) among the studied women.

Items	The studied women (N=1200)	
	Range	Mean±SD
1.Perceived Susceptibility	(6-30)	15.53±4.596
2.Seriousness of osteoporosis	(6-30)	20.55±5.350
3.Benefit of Exercise	(6-30)	22.99±4.680
4.Benefit of calcium intake	(6-30)	22.84±4.031
5.Barrier to Exercise	(6-30)	17.50±4.650
6.Barrier to calcium intake	(6-30)	15.62±5.039
7.Health Motivation	(6-30)	19.58±4.524
Total OHBS score (42-210)	(42-195)	134.62±18.174
1. An osteoporosis self-efficacy exercise scale	(6-30)	19.39±5.114
2. An osteoporosis self-efficacy calcium scale	(6-30)	21.41±4.674
Total SES(12-60)	(12-60)	40.80±8.827

Table (3): shows the means scores of domains of osteoporosis health belief scale (OHBS) and self-efficacy scale (SES) among the studied women. The table revealed that the studied women had the negative belief about their susceptibility to osteoporosis, barriers to exercise, and barriers to calcium intake. On the other hand, it is observed that the highest mean (positive belief) was of the benefit of exercise and benefit of calcium intake (22.99±4.680 and 22.84±4.031) respectively. The mean of an osteoporosis self-efficacy exercise and calcium scales were (19.39±5.114 and 21.41±4.674) respectively, while the total mean of SES was 40.80±8.827.

Table (4): Distribution of the studied women according to their total osteoporosis health believes score (OHBS) level and the total self-efficacy score (SES) level

Items	The studied women (N=1200)		χ^2	P
	N	%		
Total OHBS level				
▪ <142.8 (Negative)	830	69.2	88.17	0.00*
▪ ≥142.8 (Positive)	370	30.8		
Total SES level				
▪ <40.8 (Negative)	442	36.8	41.61	0.00*
▪ ≥40.8 (Positive)	758	63.2		

* Significant at P <0.05.

Table (4): shows the distribution of the studied women according to their total OHBS level and the total SES level. The table illustrated that more than two - thirds (69.2%) of the studies women had the negative osteoporosis health believe score while nearly two - thirds (63.2%) of them had positive self-efficacy score level. There was a statistically significant difference in relation to a level of (OHBS) and (SES) level.

Table (5): Relationship between total knowledge score, total OHBS level and total SES level among the studied women

Items	Total knowledge score						Total (N=1200)		χ^2 P
	<10 (Poor) (n=922)		10-13 (Fair) (n=216)		≥14 (Good) (n=62)				
	N	%	N	%	N	%	N	%	
Total OHBS level									
▪ <142.8 (Negative)	652	70.7	144	66.7	34	54.8	830	69.2	3.819
▪ ≥142.8 (Positive)	270	29.3	72	33.3	28	45.2	370	30.8	0.148
Total SES level									
▪ <40.8 (Negative)	340	36.39	84	38.9	18	29.0	442	36.8	1.007
▪ ≥40.8 (Positive)	582	63.1	132	61.1	44	71.0	758	63.2	0.604

Table (5): represents the relationship between total knowledge score, total OHBS level and total SES level among the studied women. More than two thirds (70.7%) of the studied women who had poor knowledge had a negative belief in OHBS while 45.2% of women with a good knowledge level had a positive level of OHBS. In relation to knowledge score and level of SES; nearly two - thirds (63.1%) of women with a poor level of knowledge had a positive level of SES level while most of the women with good knowledge level (71%) had positive SES level.

Table (6): Relationship between socio-demographic characteristics of the studied women and their total knowledge score

Socio-demographic Characteristics	Total knowledge score						χ^2 P
	(<10) Poor (n=922)		(10-13) Fair (n=216)		(≥14) Good (n=62)		
	N	%	N	%	N	%	
Age in years:							
▪ 30-40 years	626	67.9	146	67.6	18	29.0	104.79 0.00*
▪ 41-50 years	144	15.6	42	19.4	24	38.7	
▪ 51-60 years	138	15.0	28	13.0	2	3.2	
▪ >60 years	14	1.5	0	0.0	18	29.0	
Residence							
▪ Rural	620	67.2	152	70.4	42	67.7	0.392
▪ Urban	302	32.8	64	29.6	20	32.3	0.822
Marital status							
▪ Single	44	4.8	6	7.4	0	0.0	7.212 0.302
▪ Married	796	86.3	178	82.4	58	93.5	
▪ Widow	64	6.9	22	10.2	4	6.5	
▪ Divorced	18	2.0	0	0.0	0	0.0	
Level of education							
▪ Illiterate/read and write	102	11.1	30	13.9	2	3.2	47.944 0.00*
▪ Literate certificate	24	2.6	6	2.8	0	0.0	
▪ Primary education	22	2.4	26	12.0	0	0.0	
▪ Preparatory education	70	7.6	4	1.9	0	0.0	
▪ Secondary education	300	32.5	48	22.2	4	12.9	
▪ University education	404	43.8	102	47.2	52	83.9	
Work							
▪ Housewife	330	35.8	90	41.7	24	38.7	33.949 0.00*
▪ Employments	592	64.2	126	58.3	36	61.3	
Family income							
▪ Enough and save	106	11.5	42	19.4	12	19.4	8.765 0.067
▪ Enough	752	81.6	166	76.9	50	80.6	
▪ Not enough and borrow	64	6.9	8	3.7	0	0.0	

* Significant at P <0.05.

Table (6): shows the relationship between socio-demographic characteristics of the studied women and their total knowledge score. More than two-thirds (67.9 % and 67.6%) of studied women who had a poor and fair level of knowledge respectively their age ranged from 30 to 40 years. In relation to the residence, more than two-thirds (70.4% and 67.7%) of women with the fair and good level of knowledge respectively were from rural areas. The majority (83.9%) of studied women who had a good level of knowledge their level of education was university education. Nearly two-thirds of women (64.2%) who had a poor level of knowledge were employees. There was a statistically significant relationship between women’s knowledge about osteoporosis and their type of work, the level of education and age (P <0.05).

Table (7): Relationship between socio-demographic characteristics of the studied women and their total OHBS score

Socio-demographic Characteristics	Total OHBS level				χ^2 P
	<142.8 (Negative) (n=830)		≥142.8 (Positive) (n=370)		
	N	%	N	%	
Age in years:					
▪ 30-40 years	564	68.0	226	61.1	5.59 0.133
▪ 41-50 years	126	15.2	84	22.7	
▪ 51-60 years	120	14.5	48	13.0	
▪ >60 years	20	2.4	12	3.2	
Residence					
▪ Rural	554	66.7	260	70.3	0.728
▪ Urban	276	33.3	110	29.7	0.394
Marital status					
▪ Single	36	4.3	24	6.5	16.038 0.001*
▪ Married	694	83.6	338	91.4	
▪ Widow	84	10.1	4	1.6	
▪ Divorced	16	1.9	2	0.5	
Level of education					
▪ Illiterate/read and write	96	11.6	38	10.3	24.797 0.00*
▪ Literate certificate	18	2.2	12	3.2	
▪ Primary education	14	1.7	34	9.2	
▪ Preparatory education	44	5.3	30	8.1	
▪ Secondary education	272	32.8	84	22.7	
▪ University education	386	46.5	172	46.5	
Work					
▪ Housewife	282	34.0	162	43.8	18.763 0.00*
▪ Employee	548	66.0	208	56.2	
Family income					
▪ Enough and save	92	11.1	68	18.4	8.667 0.013*
▪ Enough	678	81.7	290	78.4	
▪ Not enough and borrow	60	7.2	12	3.2	

* Significant at P <0.05.

Table (7): shows the relationship between socio-demographic characteristics of the studied subjects and their total OHBS score. The table revealed that there was a significant relationship between total osteoporosis health belief scale (OHBS) score of the studied women and their marital status, type of work, level of education and family income (P <0.05).

Table (8): Relationship between socio-demographic characteristics of the studied subjects and their total SES score

Socio-demographic Characteristics	Total SES level				χ^2 P
	<40.8 (Negative) (n=442)		≥40.8 (Positive) (n=758)		
	N	%	N	%	
<u>Age in years:</u>					14.01 0.003*
▪ 30-40 years	280	63.3	510	67.3	
▪ 41-50 years	74	16.7	136	17.9	
▪ 51-60 years	62	14.0	106	14.0	
▪ >60 years	26	5.9	6	0.8	
<u>Residence</u>					9.587 0.002*
▪ Rural	334	75.6	480	63.3	
▪ Urban	108	24.4	278	36.7	
<u>Marital status</u>					5.395 0.145
▪ Single	30	6.8	30	4.0	
▪ Married	362	81.9	670	88.4	
▪ Widowed	40	9.0	50	6.6	
▪ Divorced	10	2.3	8	1.1	
<u>Level of education</u>					14.18 0.015*
▪ Illiterate/read and write	56	12.7	78	10.3	
▪ Literate certificate	10	2.3	20	2.6	
▪ Primary education	12	2.7	36	4.7	
▪ Preparatory education	38	8.6	36	4.7	
▪ Secondary education	156	35.3	200	26.4	
▪ University education	170	38.5	388	51.2	
<u>Work</u>					16.084 0.001*
▪ Housewife	184	41.6	260	34.3	
▪ Employee	258	58.4	498	65.7	
<u>Family income</u>					1.034 0.596
▪ Enough and save	52	11.8	108	14.2	
▪ Enough	366	82.8	602	79.4	
▪ Not enough and borrow	24	5.4	48	6.3	

* Significant at P <0.05.

Table (8): represents the relationship between socio-demographic characteristics of the studied subjects and their total SES score. The table showed that there was a significant relationship between the total score of studied subjects' self-efficacy and their age, residence, level of education and the type of work.

Table (9): Correlation between preventive behaviors of osteoporosis (calcium supplementation and physical activities) of the studied women with their age and OHBS domains

Variables	Regularity of calcium supplements intake		Physical activities	
	r	P	R	p
• Age	0.081	0.067	0.018	0.684
• Perceived susceptibility	0.013	0.767	0.022	0.623
• Seriousness of osteoporosis	0.163	0.000**	0.005	0.918
• Benefit of exercise	0.097	0.029*	-0.059	0.183
• Benefit of calcium intake	0.184	0.000**	0.092	0.038*
• Barrier to exercise	0.007	0.889	0.104	0.020*
• Barrier of calcium intake	-0.102	0.000**	0.066	0.140
• Health motivation	0.111	0.012*	0.151	0.001**
• Total of HBM domains	0.170	0.000**	0.001	0.978
• Total of OKT	0.069	0.124	0.233	0.000**

** . Correlation was significant at the 0.01 level (2-tailed).

* . Correlation was significant at the 0.05 level (2-tailed).

Table (9): shows the correlation between preventive behaviors of osteoporosis (calcium supplementation and physical activities) of the studied women with their age and OHBS domains. The table illustrated that, there was a significant positive correlation between regular intake of calcium supplementations of the studied women and their beliefs about the seriousness of osteoporosis, the benefit of exercise, the benefit of calcium intake, health motivation, and the total score of HBM domains. On the other hand, there was a significant negative correlation between regular intake of calcium supplementations of the studied women and their beliefs about Barrier of calcium intake. In addition, the table revealed that, there was a significant positive correlation between physical activities of the studied women and their beliefs about the benefit of exercise, the benefit of calcium intake, and health motivation

4. DISCUSSION

Osteoporosis is recognized as a chronic progressive disease. It has become a major public health problem that may be described as an epidemic⁽³⁸⁾. It results in a significant personal and societal impact and increases the burden on health care services⁽³⁹⁾. Osteoporosis is still considered a woman’s health problem⁽⁴⁰⁾. Prevention is the foremost effective way to promote bone health, as well as calcium intake is essential in developing healthy bones. It is critically important to build and to maintain strong healthy bones throughout life. To achieve this, every one particularly women should understand the basics strategies for the prevention of osteoporosis⁽²⁵⁾.

This study was carried out to identify osteoporosis preventive behaviors in women based on the health belief model in Tanta City, El-Gharbia Governorate. It was revealed that although slightly less than one-half of the studied women reported that they had knowledge about osteoporosis but actually more than three-quarters of them had a poor score of knowledge about osteoporosis and did not compile with osteoporosis preventive behaviors. This result may be attributed to their bad belief about osteoporosis as it was found that seventy percentages of studied women who have poor knowledge had bad beliefs. Other justification may be that more than two-thirds of the studied women were from rural residents where the knowledge and services are inadequate. Moreover, more than two-thirds of women who had poor knowledge were from rural areas. In addition, more than half of women who had poor knowledge had secondary education or low.

In the same line, **Elsabagh et al., (2015)** and **Varghese et al., (2013)**^(41, 42), found a similar result as they reported that their participants had a poor and below level of knowledge about osteoporosis. Similarly, to the findings of the present study **Etemadifar et al., (2013)**⁽⁴³⁾, found that women’s knowledge about osteoporosis was poor or limited among their subjects; therefore, health education programs and health services regarding osteoporosis are necessary. While **Malak and Toma (2015)** and **Ediriweera de Silva et al., (2014)**^(44, 45), found that the total osteoporosis knowledge scores in the

pre-intervention stage were moderate among the control and the intervention group. On the other hand, this result is contradicted with that of **El-Tawab et al., (2015)**⁽³⁸⁾, who studied knowledge of osteoporosis among women in Alexandria and found that the majority of them were aware of osteoporosis as a disease.

Regarding women's source of osteoporosis knowledge, mass media was the main source for more than half of the participants followed by friends, health team, and family. These results may be related to the presence of TV and internet access almost in every home in Egypt. This finding agreed with what was reported in Egyptian studies conducted by **El-Tawab et al., (2015)**⁽³⁸⁾ and **Elsabagh et al., (2015)**⁽⁴¹⁾, as mass media was rated as the main source of information for more than half of their studied subjects. While in the study conducted by **Varghese et al., (2013)**⁽⁴²⁾, they found that less than one-third of the working women had any source of knowledge regarding the prevention of osteoporosis. Among them, three-quarters had media (Television, Radio, internet, newspaper, and books) as a source of knowledge followed by less than one-quarter had other sources of knowledge and few percentages of them had knowledge from clinics.

Human beliefs influence his health behaviors and health status. The current study revealed that more than two-thirds of the studied women had a bad score of osteoporosis health belief scale (OHBS). In addition, the studied women had a moderate mean score of their perception of the susceptibility, seriousness of osteoporosis, barrier to exercise, barrier to calcium intake, and health motivation. These results may be related to that women had low accurate knowledge about osteoporosis as approved in this study and other studies. On the other hand, the participant women had a good perception of the benefit of exercise and benefit of calcium intake. From the researchers' point of view, this finding it could be attributed to the fact that most of the studied women were educated and about half of them had the university education. These results justify why the highest percentage of the studied women did not assume adequate osteoporosis preventive behaviors. Moreover, it highlights the importance of the evaluation of the different factors related to the prevention of osteoporosis, including osteoporosis education, eating habits, general health habits, and exercise.

On the other hand, **Malak and Toma (2015)**⁽⁴⁴⁾, found that before the educational program, over two-thirds of the subjects in the control and the intervention groups did not feel or consider themselves susceptible to developing osteoporosis and they did not believe that osteoporosis would significantly affect their lives, so that according to the HBM, they will not take preventive measures toward the disease. In addition, there was a higher level of agreement about the seriousness (severity) of osteoporosis in the control and the intervention groups in the pre-intervention stage, but less than a quarter of the participants in both groups regarded osteoporosis as a crippling disease. While, **Ediriweera de Silva et al., (2014)**⁽⁴⁵⁾, reported that perceived susceptibility towards osteoporosis appeared to be low in their study population, with few percentage of women agreeing that their chances of getting osteoporosis are high, more than half of the study population perceived osteoporosis as a serious disease, and barriers towards calcium intake were low and perceived benefits of calcium intake were high, which indicated that their study population was motivated towards taking calcium-rich food.

The result of this study was in agreement with the findings of **Tae-Hee Kim et al., (2013)**⁽⁴⁶⁾, who evaluate the osteoporosis health belief scale in Korean women and reported that the barriers to calcium intake subscale had the lowest mean score, and the benefit of exercise subscale had the highest score. In addition, this result was supported by **Elsabagh et al., (2015)**⁽⁴¹⁾, who reported that their participants had low barriers for calcium intake and physical exercises, and perceived the benefits of them as high.

In providing health education one must go beyond knowledge alone, recognizing that knowledge alone does not translate to behavior. However, without knowledge, behavior change is not informed, and individuals must be aware of osteoporosis before they can be expected to take preventive measures. Therefore, nurses should give better programs for the assessment and evaluation of osteoporosis, build up persistent instructing programs, and prepare more appropriate educational materials for osteoporosis and provide specific health messages in public media.

5. CONCLUSION

Based on the findings of the present study, it can be concluded that most of the studied women had a poor score of the knowledge regarding osteoporosis. The little percentage of the studied women assumed osteoporosis preventive behaviors. More than two-thirds of the studies women had a negative osteoporosis health believe score. There were significant differences in relation to an osteoporosis self-efficacy exercise and self-efficacy of calcium scales.

6. RECOMMENDATIONS

Based on the results of the present study the following recommendations were suggested: -

1. Primary health care providers have to consult women at reproductive age more effectively about osteoporosis prevention.
1. Continuous health education programs about osteoporosis prevention for the public in mass media.
2. Training of healthcare professionals is also important with stresses on the importance of physical exercises, adequate intake of diet rich in calcium and vitamin D and how to suspect the disease.
3. Integrate early detection and management of osteoporosis in orthopedic or rheumatology outpatient clinics and primary health care settings.

REFERENCES

- [1] Hough S, Ascott-Evans B, Brown S, et al; for the National Osteoporosis Foundation of South Africa (NOFSA). NOFSA guideline for the diagnosis and management of osteoporosis. Centurion: Medpharm Publications; 2010. Available at: <http://www.womenshealth.gov/faq/perimenopause.cfm>.
- [2] Sayed El-Tawab S, Saba E and Elweshahi H. Knowledge of osteoporosis among women in Alexandria (Egypt): A communitybased survey, *The Egyptian Rheumatologist*.2016; 38(3): 225–231.
- [3] Jeihooni A, Hidarnia A, Kaveh M, Hajizadeh E and Askari A.The Survey of Osteoporosis Preventive Behaviors in Sample of Iranian Women: Application Health Belief Model and Cognitive Theory. *Indian Journal of Fundamental and Applied Life Sciences*.2015; 5 (S2): 56-68. Available at: www.cibtech.org/sp.ed/jls/2015/02/jls.htm
- [4] Bayat N, Haji Amini Z, Ali Shiri G, Ebadi A, Hosseini MAS and Lalouei A. Frequency of Osteoporosis and Osteopenia in Post-Menopausal Military Family’s Women. *Journal of Army University of Medical Sciences of the IR Iran*.2008; 6(1): 25-30.
- [5] Shirazi K, Wallace L, Niknami S, Hidarnia A, Torkaman G, Gilchrist M et al, A home-based, Trans theoretical change model designed strength training intervention to increase exercise to prevent osteoporosis in Iranian women aged 40-65 years: a randomized controlled trial. *Health Education Research*, 2007; 22: 305-17.
- [6] Khorsandi M, Shamsi M and Jahani F. The effect of education based on Health Belief Model about prevention from osteoporosis among pregnant mother refers to Arak health centers. *Danshvarpezeshki Journal of Shahed University*, 2001; 18(89) 1-10.
- [7] Wallace I, Callachand F, Elliott J and Gardiner P. An evaluation of an enhanced fracture liaison service as the optimal model for secondary prevention of osteoporosis. *Journal of the Royal Society of Medicine Short Report*. 2011; 2:8.
- [8] Curtis J, et al. Population-based fracture risks assessment and osteoporosis treatment disparities by race and gender. *Journal of General Internal Medicine*. 2009; 24(8):956–962.
- [9] Schuling K, Robinia K and Nye R. Osteoporosis update. *Journal of Midwifery & Women’s Health*.2011; 56 (6):615–627.
- [10] Mansour S, El-Sayed H and Ibrahim A. Utilizing Health Belief Model to Enhance the Preventive Health Behavior about Osteoporosis among Young-Adult Females. *JOSR*.2017; 6 (2):11-20.
- [11] The Middle East & Africa Regional Audit: Epidemiology, costs & burden of osteoporosis in 2011. International Osteoporosis Foundation. 2011. www.iofbonehealth.org/middleeast-africa-audit
- [12] Baddoura R, Hoteit M and El-Hajj Fuleihan G. Osteoporotic fractures, DXA and fracture risk assessment: meeting future challenges in the Eastern Mediterranean Region. *Journal of Clinical Densitometry*.2011; 14(4):384-94.

International Journal of Novel Research in Healthcare and Nursing

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- [13] Lowe N, Ellahi B, Bano Q, Bangash S, Mitra S and Zaman M. Dietary calcium intake, vitamin D status, and bone health in postmenopausal women in rural Pakistan. *Journal of Health, Population, and Nutrition*. 2011; 29(5):465–470.
- [14] Tüzün S, Eskiuyurt N, Akarirmak U, Saridogan M, Senocak M, Johansson H and Kanis J. Turkish Osteoporosis Society. Incidence of hip fracture and prevalence of osteoporosis in Turkey: the FRACTURK study. *Osteoporosis International*. 2012, 23(3):949–955.
- [15] El-Hajj Fuleihan G, Gemma Adib M and Nauroy L. The Middle East & Africa Regional Audit. Epidemiology, costs & burden of osteoporosis in 2011. Nyon, Switzerland, International Osteoporosis Foundation. 2011:13–48.
- [16] International Osteoporosis Foundation (IOF). 2011. [<http://www.osteofound.org/facts-statistics>]
- [17] Johnell O and Kanis J. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *OsteoporosInt*. 2006; 17(12):1726-33.
- [18] Shawa H, Favela E and Diaz J. Knowledge of osteoporosis among men in the primary care setting. *South Med J*. 2011; 104 (8): 584-588. [PMID: 21886068 DOI: 10.1097/SMJ.0b013e3182241da1].
- [19] Etemadifar M, Nourian S, Esfahani M, Shemshaki H, Nourbakhsh M and Zarezadeh A. Relationship of knowledge about osteoporosis with education level and life habits. *World J Orthop*. 2013; 4(3): 139-143.
- [20] Sultan A, Khan D, Mushtaq M and Hassan M. Frequency of Osteoporosis and its associated risk factors in postmenopausal women in clinical practice at Rawalpindi. *Pakistan J Pathol*. 2006; 17:115-8.
- [21] Habiba U, Ahmad Sand Hassan L. Predisposition to Osteoporosis in Postmenopausal Women. *J Coll Physicians Surg Pak*. 2002; 12:297-301.
- [22] National Institute of Health. Osteoporosis prevention, diagnosis, and therapy. NIH Consensus Statements. 2000; 17:1-45.
- [23] Ohta H. Development and aging of bone in the female life cycle. *Clinical Calcium*. 2011; 21:1291–1298.
- [24] Babatunde O, Forsyth J and Gidlow C. A meta-analysis of brief high-impact exercises for enhancing bone health in premenopausal women. *Osteoporosis International*. 2012; 23(1):109–119.
- [25] Edmonds E, Turner L and Usdan S. Osteoporosis knowledge, beliefs, and calcium intake of college students: Utilization of the health belief model. *Open Journal of Preventive Medicine*. 2012; 2(1): 27-34.
- [26] Zhang Y, Li R, Mei X, Wang D and Guo X. Evaluation of educational program on osteoporosis awareness and prevention among nurse students in China. *Nursing & Health Sciences*. 2012; 14(1):74–80.
- [27] Qaseem A, Snow V, Shekelle P, Hopkins R, Forciea M and Owens D. Screening for osteoporosis in men: A clinical practice guideline from the American college of physicians. *Annals of Internal Medicine*. 2008; 148(9): 680-684.
- [28] Chan M, Kwong W, Zang Y and Wan P. Evaluation of an osteoporosis prevention education programme for young adults. *Journal of Advanced Nursing*. 2007; 57(3): 270-285. Available at: <http://dx.doi.org/10.1111/j.1365-2648.2006.04091.x>
- [29] Sedlak C, Doheny M and Jones S. Osteoporosis education programs: Changing knowledge and behaviors. *Public Health Nursing*. 2000; 17:398-402. doi:10.1046/j.1525-1446.2000.00398.x
- [30] Jeihooni A., Hidarnia A., Kaveh M., Hajizadeh E., and Askari A. Effects of an Osteoporosis Prevention Program Based on Health Belief Model Among Females, *Nurs Midwifery Stud*. 2015; 4(3):1-11
- [31] Moodi M, Mood M, Sharifirad G, Shahnazi H and Sharifzadeh G. Evaluation of breast self-examination program using Health Belief Model in female students. *Journal of Research in Medical Sciences*. 2011; 16(3):316–322.
- [32] McLeod K and Johnson C. A systematic review of osteoporosis health beliefs in adult men and women. *Journal of Osteoporosis*, 2011: 197454.

International Journal of Novel Research in Healthcare and Nursing

Vol. 5, Issue 3, pp: (527-543), Month: September - December 2018, Available at: www.noveltyjournals.com

- [33] Shamsi M, Hidarnia A, Niknami S, Rafiee M, Zareban I and Karimy M. The Effect of Educational Program on Increasing Oral Health Behavior among Pregnant Women: Applying Health Belief Model. *Health Education & Health Promotion (HEHP)*. 2013; 1(2):21- 36.
- [34] Maw J, Pollinger E and David A. *Going Upstream: Nursing's Contribution to Public Health: Prevent Promote and Protect*. Royal College of Nursing .2012:1-28.
- [35]Sizer F and Whitney E. *Nutrition: Concepts and controversies*. (11th ed). Thomson-Wadsworth: KY.2008.
- [36] Kim K, Horan M and Gendler P. Osteoporosis health belief scale. Presented at Sigma Theta Tau Inter- National Research Conference, Columbus.1991.
- [37] Winzenberg T, Oldenburg B, Frendin S and Jones G: The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: the osteoporosis knowledge assessment tool (OKAT). *BMC Musculoskelet Disord*.2003; 4:17.
- [38] El-Tawab S et al. Knowledge of osteoporosis among women in Alexandria (Egypt): A community-based survey. *The Egyptian Rheumatologist*.2016; 38(3):225-231.
- [39] Ediriweera de Silva RE et al. A Descriptive Study of Knowledge, Beliefs and Practices Regarding Osteoporosis among Female Medical School Entrants in Sri Lanka. *Asia Pacific Family Medicine*.2014; 13(1):15.
- [40] Edmonds ET. *Osteoporosis Knowledge, Beliefs, and Behaviors of College Students: Utilization of the Health Belief Model*. 2009.
- [41] Elsabagh H et al. Osteoporosis knowledge and health beliefs among employees of Tanta University. *American Journal of Research Communication*. 2015; 3(12):62-77.
- [42] Varghese N, Kumari V and Madanlal M. Evaluation of Effectiveness of an Informational Booklet on Prevention of Osteoporosis in Terms of Knowledge, Attitude and Expressed Practices of Working Women. *IOSR Journal of Nursing and Health Science*,2013;2(5):10-18.
- [43] Etemadifar M, Nourian S, Fereidan-Esfahani M, Shemshaki H, Nourbakhsh M, Zarezadeh A. Relationship of knowledge about osteoporosis with education level and life habits. *World J Orthop*.2013; 4(3):139-143.
- [44] Malak M and Toama Z. The effect of osteoporosis health education program based on health belief model on knowledge and health beliefs toward osteoporosis among Jordanian female teachers. *European Scientific Journal*.2015; 1: 385-395.
- [45] Ediriweera de Silva R, Haniffa M, Gunathillaka K, Atukorala I, Fernando A and Perera W. A descriptive study of knowledge, beliefs and practices regarding osteoporosis among female medical school entrants in Sri Lanka, *Asia Pacific Family Medicine*. 2014; 13(1):15.
- [46] Tae-Hee Kim et al. Evaluation of the Osteoporosis Health Belief Scale in Korean Women. *J Bone Metab*.2013; 20(1):25-30.