

Effect of Teaching Guidelines on Knowledge, Health Beliefs, and Self-Efficacy among Post-Menopausal Women with Osteoporosis

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Received November 11, 2016; Revised December 23, 2016; Accepted January 06, 2017

Abstract Background: Osteoporosis is a worldwide health problem with decreased bone mass and altered bone structure resulting in increased bone fragility and increased fracture risk. The aim of the current study was to evaluate the effect of teaching guidelines on knowledge, health beliefs, and self-efficacy of post-menopausal women with osteoporosis. A quasi-experimental research design was used to conduct the study at rheumatology outpatient clinic at Mansoura University hospitals, Egypt from the beginning of May 2015 to the end of August 2016. Subjects: A purposive sample of 80 post-menopausal women with osteoporosis included. Tools: Four tools were used in data collection; a structured interviewing questionnaire, Osteoporosis Knowledge Test, Osteoporosis Health Belief Scale, and Osteoporosis Self-Efficacy Scale. Results revealed that mean scores of knowledge, health beliefs, and self-efficacy among the study group had significantly increased after implementation of the teaching guidelines. Conclusion: The teaching guidelines were effective in improving mean scores of knowledge, health beliefs, and self-efficacy of the study subjects. Recommendation: Assuring the importance of implementing the teaching guidelines inside the osteoporosis units, replication of the study on large proportions.

Keywords: osteoporosis, knowledge, health beliefs, and self-efficacy

Cite This Article: Madiha Hassan Nabih Mohamed, Bahia Galal Abd Elrazik Hassan, Sahar El-Bastawesy, and Ahlam Mohammed Ibrahim Gouda, "Effect of Teaching Guidelines on Knowledge, Health Beliefs, and Self-Efficacy among Post-Menopausal Women with Osteoporosis." *American Journal of Nursing Research*, vol. 4, no. 3 (2016): 100-107. doi: 10.12691/ajnr-4-3-7.

1. Introduction

Osteoporosis (OP) is a chronic progressive disease. Low bone density and deterioration of the bone tissue with increasing liability of bone fragility are the main features those increasing fractures risk among osteoporotic patients [1]. It considered a main public health issue. Around the world about 200,000,000 women were affected and resulting in approximately 9,000,000 fractures every year. National Osteoporosis Foundation registered in year 2014, a total of 54,000,000 adults aged 50 years and older are suffered osteoporosis and low BMD in the USA [2].

In Egypt, the osteoporosis affects approximately 30% of all population, and about 54% of postmenopausal women in the country have osteopenia, whereas 28.4% have full blown osteoporosis. Men are no exception, with 26 and 21.9 % [3].

Lifestyle risk factors are the main causes of osteoporosis and bone loss, including a low calcium intake, decreased

exercises, use of tobacco, and alcohol consumption in addition to heredity factors. Women aged 35 years with a positive family history were more affected than others without a family history [4].

Menopause is typically a normal change; it usually occurs in middle-aged women in the late 40s and early 50s, marking the end of the reproductive life of a woman [5]. Menopause is generally defined as the absence of menstrual flow or more precisely as the permanent cessation of the ovary's primary functions [6].

The WHO main goal is to raise the number of osteoporosis-trained women and reducing the illness, this goal can be achieved by change women's mind, behaviors, and regular practices in such a manner that enhance women's quality of life and effectiveness. Therefore, teaching preventative health behavior patterns such as physical exercise and correct nutrition are effective methods that can help people prohibit the illness, enhance and maintain health [1].

Increasing calcium intake is essential to achieve normal bone mass density (BMD) and preserve it later in life. The absorption of calcium decreases with aging; thus,

recommendations for calcium intake are significantly increase for post-menopausal women, vitamin D builds up and play an important role in muscle contraction and protein synthesis [7,8].

Weight bearing exercise builds muscle, and increases its size, elevates BMD and strength of the growing skeleton [9]. Bone adjusts to the effect of weight and muscle pull through the construction of more bone cells during weight bearing exercise. There is a loss of muscle mass when activity is shelved, which suggests less need for bone. This, in turn, results in bone demineralization. Other risk factors like menopause worsen this process [10].

Application of the education program based on most recent guidelines is one technique that might adjust preventative health behaviors of osteoporosis and reduce overall health care costs by preventing chronic disease complications. A numerous studies evaluated the role of health education in avoiding the development of OP and confirmed that there are critical knowledge deficits among women, men and health professionals. So, educational measures are beneficial in raising women's' knowledge [11].

Self-efficacy is a person's belief in his or her own ability to successfully perform the tasks involved in disease self-management and successfully developing and applying problem-solving to disease-related barriers over a lifespan. Health education affected the health attitudes of the patients and enhances the sense of self-efficacy to take possible actions to control osteoporosis. Furthermore, respondents expressed the desire to change their behaviors more often [12].

Health Belief Model (HBM) is one of the structures most broadly used to attempt to explain health behavior; it depends on the assumption that people are most probably to take action related to health if they feel they can eliminate a negative health situation through performing this behavior. This model states that in order to plan a successful educational intervention, the perceived susceptibility (to osteoporosis) of the individual or group; severity of the disease and its consequences; advantages in taking certain risk reduction actions; barriers and indications of action are needed [13].

Insufficient awareness and related education are significant causes to develop osteoporosis. Several researches have examined the importance of health education in prevention and control of OP and registered that women have serious knowledge deficits, which can be corrected by education. Health education could improve preventive behaviors and decrease osteoporosis through preventing complications of chronic illnesses [11].

2. Significance of Study

OP is a major public health issue that is predicted to impact many people around the world by 2050. Lifestyle activities, such as proper exercise, weight control, healthy diet, adequate intake of calcium and vitamin D influence health believes and lifestyle choices. A key component in improving knowledge, health believes, and self-efficacy is developing successful educational programs. Prior research supports the efficacy of specific structured teaching guidelines to diet, exercise, health believes that influencing the nutritional behaviors of women with osteoporosis, and brought many beneficial and pro-health effects.

3. Aim of the Study

The current study aimed to evaluate the effect of teaching guidelines on knowledge, health believes, and self-efficacy among post-menopausal women with osteoporosis.

3.1. Research Hypothesis

1. Knowledge scores of the study subjects will be higher after applying the teaching guidelines.
2. Health believes scores of the study subjects will increase after applying the teaching guidelines.
3. Self-efficacy scores will be improved after applying the teaching guidelines.

4. Subjects and Methods

4.1. Research Design

A Quasi-experimental research design was utilized in this study.

4.2. Research Setting

The study was conducted at Rheumatology Outpatients clinics of Mansoura University hospitals, Egypt.

4.3. Subjects

A purposive sample consisting of 80 postmenopausal women with osteoporosis from the above mentioned setting. The study subjects were divided into two matched groups: the study group who had the teaching guidelines and the routine care, and the control group who had only the routine hospital care. The sample size was determined statistically using power analysis using epidemiological information (EPI info.) program version 6.02 after taking into consideration the total number of osteoporotic women visiting the rheumatology outpatient clinic during year 2014/2015, alpha error 5% (= confidence level=95%) Beta error 20% (study power= 80%). Using this equation:

$$\text{Sample Size} = \frac{Z^2 * (p) * (1 - p)}{C^2}$$

Indicating that a sample size of (34) participants is needed in each group to demonstrate this effect size. The sample size was increased to be 40 participants in each group allowing for non-responders and drop out. The study sample was selected based on the following criteria:

The inclusion criteria: Postmenopausal women aged between 45 to 65 years, had the ability to understand simple instructions, and agreed to participate in the study.

The exclusion criteria were: Women with cardiac, rheumatoid, or mental diseases, women who had history of osteoporotic fractures.

4.4. Tools for Data Collection

Four tools were used in data collection:

4.4.1. Tool 1

Patients' Interviewing questionnaire: It was developed by the researchers including two parts: Part 1: Concerning the demographic data of the study subjects; including age, residence, marital status, occupation, and education.

Part 2: includes; Height (cm) and Weight (kg), Bone mass density (BMD) at the L1-4 lumbar spine, Lt Femur and Lt Forearm by dual energy X-ray absorptiometry (the device was available at the clinic).

4.4.2. Tool 2

Osteoporosis Knowledge Test (OKT): Adopted from Kim, Horan, and Gendler 1991[18]. It was translated to Arabic language. It consists of 24 multiple choice questions regarding knowledge about osteoporosis, classified into two subscales: OKT Exercise that consists of 16 questions (1–16) and OKT Calcium: Consists of 17 questions (1–9 and 17–24). The subscales of OKT share 9 common items that are knowledge of the overall risk factors of osteoporosis. Each item is rated by the subject using ML = more likely, LL = less likely, NT = neutral, and DK = don't know. Scoring system: Each correct answer is scored as (1), incorrect answers as (0) Total Scores for OKT exercise ranged from 0 to 16, and for OKT calcium ranged from 0 to 17. For items 1-9, responses 'neutral' and 'don't know' are incorrect. For items 10-24, 'don't know' is considered incorrect, and for OKT combined exercise and calcium (all questions on the OKT included) was 24 points. Means were used for comparing scores of the study groups.

4.4.3. Tool 3

Osteoporosis Health Belief Scale (OHBS): A five item Likert scale adopted from Kim et al, 1991[19], translated to Arabic. It was designed to measure health beliefs related to osteoporosis through seven constructs with 42 items: 1-6: susceptibility; 7-12: seriousness; 13-18: benefits of exercise; 19-24: benefits of calcium intake; 25-30: barriers to exercise; 31-36: barriers to calcium intake; and 37-42: health motivation. Scoring system: Each item in OHBS is scored from 1 (strongly disagree) to 5 (strongly agree). Six questions constitute one category, and the summary scores are calculated by summing up the scores of each category, which results in the possible score range from 6 to 30 (total scores ranged from 42 to 210). Mean scores was used for comparing the two studied groups.

4.4.4. Tool 4

Osteoporosis Self-Efficacy Scale (OSES): Adopted from Horan et al., 1998 [20], translated to Arabic, it is a 12-item visual analogues scale. It measures the self-reliance for assuming behavior modification related to calcium intake (six items) and exercise (six items). For scoring system; a 10-point Likert- scale of 0 to 10 (0=not confident at all, 10=very confident). For each subject; an exercise score is calculated by averaging the responses to exercise-related items and multiplying by 10 and a calcium score by averaging the responses to calcium-related items and multiplying by 10 (range: 0–100). Mean scores was calculated and used for comparison between the two studied groups.

4.5. Operational Design

The operational design includes the preparatory phase, ethical considerations, validity and reliability, pilot study, and fieldwork.

4.5.1. Preparatory Phase

Included reviewing of current recent related literature to develop data collection tools and teaching guidelines booklet using simple Arabic and clear words for better understanding by the patients and supplied by clear, descriptive pictures.

4.5.2. Ethical Considerations

Ethical approval was obtained to complete the study from ethics committee prior to initiation of the study, the researchers presented themselves to all study subjects, and the aim of the study was clarified before their participation in order to gain their cooperation. Oral consent was obtained from each participant. Confidentiality of data was assured. The investigators assured that participation in the study was voluntary and they have the right to withdraw at any time.

4.5.3. Validity and Reliability

Validity of the tools were assessed by a panel of 7 experts in the medical surgical, community, and woman's health nursing specialty from Faculty of Nursing at Mansoura and Port Said Universities; their comments were considered.

Reliability of the tools was assessed using Cronbach alpha reliability test for all tools reflected high reliability as: Osteoporosis Knowledge Test: The overall reliability was (0.875). The test-retest reliability coefficient for OKT calcium was (0.72) and OKT exercise was (0.69). Osteoporosis Health Belief Scale: The reliability with coefficients ranging from 0.61 (health motivation) to 0.80 (susceptibility). The overall reliability of the OHBS was (0.895). Osteoporosis Self-Efficacy Scale: Cronbach's alpha coefficients ranged from 0.90 to 0.94.

4.5.4. Pilot Study

A pilot study was carried out on 8 postmenopausal women with osteoporosis (10%) To test the clarity and applicability of the tools, the pilot study was also used to estimate the time required to complete the questionnaire by each subject. Modifications were done based on the results of the pilot study. Patients who participated in the pilot study were excluded from the main study sample.

4.5.5. Field Work

The actual field work started from the beginning of May 2015 to the end of August 2016 (for all phases). The study goes through three phases: first is Preparatory phase which includes tools development, validation, reliability, and pilot study. In addition to the official permission attaining; a formal letter was issued from the Faculty of Nursing Mansoura University to the director of Mansoura University hospitals to obtain approval for conducting this study. The second phase includes the selection of the study subjects, who met the inclusion and exclusion criteria, taking their approval to participate in the study

after explaining the purpose of the study, assessing the pretest, and applying guidelines for the study group. The third phase included the evaluation of post-test (for both study and control groups) and finalizing the research (data analysis, Discussion, and so on).

Pre & Post-test

Pretest was applied for both Study and control groups first before application of educational guidelines. After 6 months (recommended training period) post-test was done. To assess the patients' progress, and enhance the activity of the experimental group, participants were followed by telephone. Subjects submitted to BMD tests every 2 months on lumbar vertebrae L1-4, left femoral neck, and left forearm by dual-energy x-ray absorptiometry and the results were recorded. Comparison was done for the first results before applying educational program and six months later to assess the effect of the program.

4.5.6. Intervention

The intervention for the study group included four educational sessions of 30–45 min of education, group discussion, questions and answers, as well as educational booklet, and PowerPoint presentation. Guidelines provided based on the National Osteoporosis Foundation guidelines. The educational sessions applied through the following sessions:

First session: 45 minute Power Point presentation and open discussion about bone health and osteoporosis including introduction to osteoporosis and its signs, complications, diagnosis, risk factors, symptoms, complications, diagnosis, and how to promote bone health practices. The subjects were provided with the educational booklet.

Second session: 30 minute Power Point presentation about importance of Calcium, and Vitamin D for bone health, the role and benefits of healthy diet in the prevention and control of osteoporosis, recommended food, motivating self-efficacy in increasing physical activities and taking proper diet containing adequate amount of calcium and Vitamin D.

Third session: 30 minute Power Point presentation about exercise; role and importance for bone health, instructions and barriers of exercise such as walking.

Fourth session: This session took about 45 minutes for patients' training simple exercises; subjects performed an easy resistance and then stretched for 10 minutes. Resistance could be encouraged by a muscle group through a full range of motion exercise.

Control Group: The women in the control group were maintaining their routine care, physical activity and nutritional habits during the study period.

4.6. Data Analysis

SPSS version 21 was used to analyze the collected data. Descriptive statistics were used for the analysis of nominal data (demographic and clinical characteristics). One Way ANOVA was used to analyze the differences between variables of the study. To explore correlation between variables, the statistical significance and associations were assessed using the arithmetic means (t-test), standard deviation (SD), and chi square (X²). Significance level was identified at P < 0.05.

5. Results

Table 1 shows that 65% and 64% of the study and control group were aged between 50 to 60 years with average means 52.8 ± 8.1 and 52.3 ± 8.1 respectively. As regards to residence and marital status; it was observed that the subjects, 60% of study and 55% of the control group were from urban areas respectively, 50% & 52% of the study and control group were married. Concerning patients' occupation and education; it was found that 70% and 55% of study and the control groups were working respectively, 42.5% and 60% of the study and control groups were illiterate respectively.

Table 1. Distribution of the Study and the Control Groups according to Their Demographic Data (N=80)

Demographic Data	Groups				Test of Significance	P- Value
	Study Group (N = 40)		Control Group (N = 40)			
	No	%	No	%		
Age						
• 40-50	14	35.0 %	11	36.0%	X ² = 2.2	0.327
• > 55-65	26	65.0 %	29	64.0%		
Mean ± SD	52.8 ± 8.1		52.3 ± 8.1		t = 0.35	0.731
Residence						
• Urban	24	60.0%	22	55.0%	X ² = 0.16	0.687
• Rural	16	40.0%	18	45.0%		
Marital status						
• Single	2	5.0%	1	2.5%	X ² = 6.0	(0.269 [^])
• Married	20	50.0%	21	52.5%		
• Divorced	3	7.5%	5	12.5%		
• Widow	15	37.5%	13	32.5%		
Occupation						
• Employed	28	70.0%	22	55.0%	X ² = 2.2	0.297
• Unemployed	12	30.0%	18	45.0%		
Education						
• Illiterate	17	42.5%	24	60.0%	X ² = 3.4	0.338 [^]
• Primary	4	10.0%	5	12.5%		
• Secondary	9	22.5%	4	10.0%		
• Highly educated	10	25.0%	7	17.5%		

X²: Chi-square test

t: compared t-test

*P: Statistically significant at p ≤ 0.05.

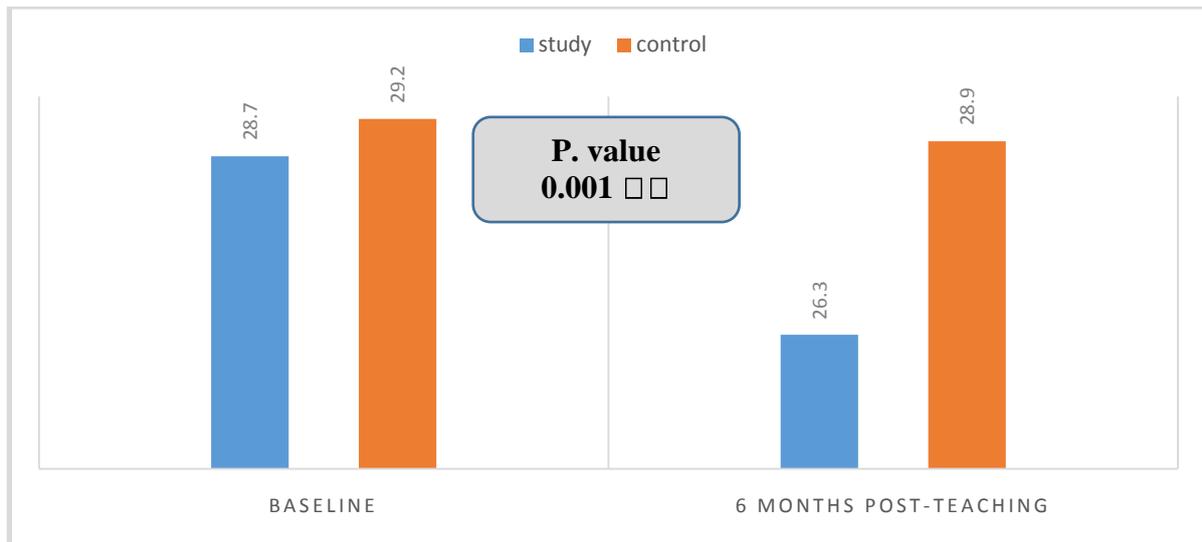


Figure 1. Comparison between Mean Scores of the study and the Control Groups Regarding Their Body Mass Index (BMI)

Table 2. Comparison between Mean Scores of the Study and the Control Groups Regarding Osteoporosis Knowledge Test Before and After Teaching Guidelines

OKT	Study Group Mean \pm SD		Control Group Mean \pm SD		t-test	P2
	Before	After	Before	After		
Total knowledge	14.12 \pm 2.57	25.25 \pm 2.35	14.82 \pm 4.17	14.25 \pm 5.35	2.23	(0.011)*
t (p ₁)	2.2 (0.027*)		0.98 (0.333)			
Exercise knowledge	10.40 \pm 2.35	15.25 \pm 3.25	9.75 \pm 3.21	8.24 \pm 2.05	2.13	(0.041)*
t (p ₁)	2.9 (0.001*)		0.31 (0.609)			
Calcium knowledge	11.14 \pm 2.23	15.69 \pm 1.47	9.46 \pm 3.30	8.89 \pm 2.4	2.14	(0.037)*
t (p ₁)	2.6(0.028*)		1.2 (0.222)			

p₁: p value for comparing between before and after guidelines in each group
p₂: p value for comparing between the two studied groups after guidelines.

*: Statistically significant at $p \leq 0.05$.

Table 3. Comparison between the Mean Scores of the Study and the Control Groups Regarding Osteoporosis Health Belief Scale (OHBS) before and after Teaching Guidelines

OHBS Constructs	Study Group		Control Group		t-test	P3
	Mean \pm SD	P1	Mean \pm SD	P2		
Perceived susceptibility						
Before	13.64 \pm 5.09	0.001*	14.22 \pm 3.45	0.738	0.49	0.546
After	24.66 \pm 4.61		15.48 \pm 5.12		6.32	0.000*
Perceived severity						
Before	17.49 \pm 5.26	0.03*	16.88 \pm 4.37	0.159	0.46	0.646
After	23.78 \pm 2.06		16.55 \pm 3.44		2.12	0.035*
Perceived benefits of exercise						
Before	14.55 \pm 3.54	0.001*	13.58 \pm 2.54	0.091	0.81	0.480
After	26.12 \pm 2.36		14.23 \pm 3.24		2.03	0.043*
Perceived benefits of calcium intake						
Before	12.88 \pm 1.22	0.01*	13.87 \pm 3.45	0.108	0.06	0.948
After	21.84 \pm 2.22		15.22 \pm 4.37		5.60	0.000*
Perceived barriers of exercise						
Before	17.47 \pm 4.25	0.03*	16.98 \pm 3.24	0.459	1.20	0.232
After	24.27 \pm 2.7		15.22 \pm 5.5		4.51	0.000*
Perceived barriers of calcium intake						
Before	11.50 \pm 3.65	0.001*	12.13 \pm 3.33	0.822	1.68	0.094
After	20.54 \pm 1.55		14.25 \pm 2.78		2.96	0.003*
Perceived health motivation						
Before	15.86 \pm 3.33	0.001*	15.24 \pm 2.56	0.273	0.23	0.818
After	28.42 \pm 4.21		15.35 \pm 2.89		2.04	0.042*

P₁: p value for comparing between before and after guidelines in study group

P₂: p value for comparing between before and after guidelines in control group

P₃: p value for comparing between the study and the control groups in post period.

Table 4. Comparison between the Mean Scores the Study and the Control Groups Regarding Osteoporosis Self-Efficacy Scale (OSES) before and after Teaching Guidelines

OSES	Study Group Mean ± SD		Control Group Mean ± SD		t-test	(P2)
	Before	After	Before	After		
Exercises	52.21 ± 26.15	72.26 ± 20.02	55.82 ± 18.45	56.68 ± 25.12	8.32	(0.01)*
t (p ₁)	3.8(0.001)		0.19 (0.853)			
Calcium	66.34 ± 19.94	84.40 ± 16.28	64.48 ± 24.37	68.35 ± 13.44	7.12	(0.01)*
t (p ₁)	2.3 (0.028)		0.98 (0.327)			

p₁: p value for comparing between before and after guidelines in each group
 p₂: p value for comparing between between the study and the control groups in post period.

Table 5. Comparison between the Mean Scores of the Study and the Control Groups Regarding Bone Mass Density (BMD)

BMD	Study		Control		t-test	(P2)
	Before	After	Before	After		
L1-L4	-2.5±0.52	-2.4±0.33	-2.48±0.85	-2.50±0.24	0.35	(0.481)
t (p ₁)	3.3 (0.081*)		1.2 (0.246)			
Lt Femur	-1.92±0.23	-1.12±0.24	-2.11±0.48	-2.36±0.84	0.42	(0.001)
t (p ₁)	2.3 (0.028*)		0.49 (0.625)			
Lt Forearm	-2.68±54	-1.99±0.95	-2.54±0.45	-2.98±0.58	0.26	(0.001)
t (p ₁)	2.6 (0.058*)		0.51 (0.609)			

p₁: p value for comparing between before and after guidelines in each group
 p₂: p value for comparing between the study and the control groups in post period.

Figure 1 reveals that there was definite decrease with a significant statistical difference in body mass index (BMI) of the study group after six months of implementation of the teaching guidelines compared to the control group.

Table 2 shows that there was a significant statistical difference in mean scores of Osteoporosis Knowledge Test ((calcium and Exercise knowledge) between studied group (p< 0.05), in which knowledge score increased in study group compared to control group post educational intervention.

Table 3 represents that there was a significant statistical difference in mean scores of Osteoporosis Health Belief Scale of the study group after implementation of the teaching guidelines in addition to a significant statistical difference between the two studied groups post teaching guidelines p< 0.05.

Table 4 shows that self-efficacy scores of the study group have been improved after implementation of the teaching guidelines compared to score of the control group, representing a statistical significant difference between mean scores of the two groups.

Table 5 shows that there was a significant increase in mean scores of bone mass density of the study group in Lt Femur and Lt Forearm, however, there was no significant increase in L1-L4 after implementation of the teaching guidelines compared to control group. Representing statistical significant difference between the two groups (P-value<0.05).

6. Discussion

Osteoporosis is a predominant metabolic disease worldwide, the most affected groups are postmenopausal women as a result of decreased estrogen level, which play a significant role in the control of BMD, and the deficiency contributes to bone weakening. Because bone loss happens asymptotically, women may not know that they have osteoporosis until their bones suddenly

collapse. Previous studies have shown that most women lack osteoporosis awareness or do not see themselves as at risk of bone loss or osteoporosis. It was important to examine and provide adequate education for promoting bone health which can enhance primary disease prevention [17,18].

Concerning demographic data of the study subjects; the results of the current study revealed that more than two thirds of the studied groups (study and control) aged between 50 and 60 years with average means 55 years. As regards to marital status, education, occupation, and residence; it was observed that around one half of the study group was married, illiterate, working, and was from urban areas.

Regarding patients' knowledge; the results of the current study revealed that knowledge score among the study subjects were low before applying the teaching guidelines; these low knowledge scores may be attributed to lack of public health education on osteoporosis. These results were similar to the results of Puttapitakpong et al [11]; and Endicott [19], they reported that women of all ages had lack of knowledge about osteoporosis. In post-test; the results of the current test revealed that the mean scores of osteoporosis knowledge test had been increased in the study group representing a significant statistical difference, This finding in agreement with Shahbo et al, [20] they registered a significant increase in post-intervention awareness of the woman compared to pre-intervention.

These results could be attributed to the positive effect of the teaching guidelines provided which may affected patients' health behaviors and in turn improved their health status. These findings are supported by many interventional studies which have consistently proven that level of knowledge in patients with osteoporosis all improved after the educational guidelines [21,22,23]; they all confirmed the effectiveness of the educational intervention in improving osteoporosis knowledge scores in post-test.

One of the important variables evaluated in the current study is the Osteoporosis Health Belief scores which have been used to evaluate the health-related behaviors toward osteoporosis. Health beliefs depend on the perception of individuals. Increasing awareness can change perception. The results of this study showed that women participated in both study and control groups had low health belief scores in the pre-test.

This result is consistent with Gopinathan [24] who said there was a large deficit in the osteoporosis awareness among postmenopausal Indian women. After implementation of the teaching guidelines; the results of this study represents a significant improvement in mean scores of osteoporosis health belief among the study group. This could be related to increasing awareness of the study subjects about risk factors of the disease and importance of prevention. This result in accordance with the results of Jeehooni et al [25], and Zohrehkhoshnood et al [26] who reported that health-based education had a positive effect on increasing the perceived benefits of calcium intake and protective habits with osteoporosis.

Concerning mean scores of Self-Efficacy Scale of the studied groups; the results of the current study showed that there was a significant statistical improvement in mean scores of osteoporosis self-efficacy scale of the study group related to exercises and calcium after implementation of the teaching guidelines compared to control group. This finding is supported by Evenson & Sanders [22] and Ozturk & Sendir [27] they revealed that their educational interventions had positively affected the osteoporosis self-efficacy scores.

These findings reflect the effectiveness of these programs and the importance of education for patients. However these results in contrast with Valerie [28] who found that, for the overall assessment, the OSES were statistically significant but were not significant for calcium and exercise subclasses. These differences may be related to the nature and different characteristics of the study subjects and/or the duration of the intervention.

As regards to body mass index of the study subjects, the results revealed that the mean scores of BMI in both study and control groups reflected moderate obesity. While there was a definite decrease with a significant statistical difference in the means of BMI of the study group after implementation of the teaching guidelines compared to the control group. This difference may be related to exercise intervention and healthy nutritional habits after applying the teaching guidelines.

This result is supported by Mishra et al [29] who found that higher scores of BMI was associated with osteoporosis, as osteoporosis and osteopenia are more likely to occur in overweight and obese women. However, it has been suggested by Salamat et al [30] that postmenopausal women with lower BMI have more bone loss than those with higher scores; those with lower BMI were at higher risk of low BMD. These conflicted views about relation between BMI and risk of getting osteoporosis could be related to the individuals' life style, dietary habits, and calcium deficiency rather than BMI scores.

Low bone mass density is an important factor in the diagnosis and fractures of osteoporosis. Traditionally, educational recommendations have been focused on

strengthening BMD in patients at risk or already diagnosed with osteoporosis (Cheung et al.) [31]. The results of the current study showed that there was a significant increase in mean scores of bone mass density of the study group in Lt Femur and Lt Forearm, however, there was no significant increase in L1-L4 after 6 months of implementation of the teaching guidelines compared to control group representing statistical significant difference between the two groups. This finding is a very good indicator of the effectiveness of teaching guidelines which could motivate patients' compliance and life style changes.

This finding is supported by Kim et al [32] who indicated that women with normal T-scores of BMD showed significant great knowledge about the benefits of exercise and improved benefits from exercise outcomes whereas older women had lower barriers to exercise. Ford et al [33] highlighted that efforts to raise awareness of osteoporosis are critical for those who have not reached peak bone mass and with adequate knowledge may increase the level at which their bone mass density may eventually reach.

7. Conclusion

The teaching guidelines significantly increased the osteoporosis level of knowledge, health beliefs scores, and in turn positively improved osteoporosis self-efficacy scores of the study subjects. Bone mass density of the study group was also increased after implementation of the teaching guidelines.

8. Recommendations

Based on the results of the study, the following recommendations are suggested:

1. Replication of the study on large sample size and different settings in order to generalize the results.
2. Standardized teaching guidelines should be applied at rheumatology out patients' clinics for women at risk for osteoporosis in order to help in disease prevention.
3. Further studies are needed in order to develop more accurate and realistic strategies for osteoporotic prevention.

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