

Assessment of Preventive Behaviors of Osteoporosis in Postmenopausal Women in Fasa, Fars Province Based on the Health Belief Model

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Abstract

Background: Osteoporosis is the most common metabolic bone disease in postmenopausal women. It seems necessary to determine the factors affecting the adoption of preventive behaviors of osteoporosis in postmenopausal women using the patterns that identify the factors influencing behavior.

Objectives: To investigate preventive behaviors of osteoporosis in postmenopausal women in Fasa, Fars Province based on the Health Belief Model.

Methods: A cross-sectional study was conducted on 380 postmenopausal women aged over 50 under the coverage of Fasa health centers. Out of the 6 health centers in Fasa, 2 of them were selected based on cluster sampling method. Then, 190 postmenopausal women were selected from each health centers based on simple random sampling by the household number recorded in the health records. The required data were collected using questionnaire including demographic information, awareness inventory, the Health Belief Model scale, and diet and walking performance questionnaire. The data were statistically analyzed in SPSS 22.

Results: The construct of perceived susceptibility for diet and walking performance was predictive. In this study, walking performance had a significant relationship with perceived susceptibility ($P=0.001$, $r=0.76$), motivation ($P=0.001$, $r=0.65$), perceived benefits ($P=0.001$, $r=0.88$), and self-efficacy ($P=0.001$, $r=0.69$). In addition, diet performance presented a significant relationship with perceived benefits ($P=0.001$, $r=0.68$) and self-efficacy ($P=0.001$, $r=0.28$).

Conclusion: The study results showed that the higher the perceived susceptibility of individuals, the better the preventive behavior of osteoporosis they adopt. The Health Belief Model can be used as an appropriate framework for the design and implementation of educational programs in order to adopt the preventive behaviors of osteoporosis by postmenopausal women.

Key words: *Osteoporosis, Health belief model, Diet, Walking*

Introduction

Osteoporosis is the most common metabolic bone disease that begins with reduced bone mass and destruction of bone tissue and culminates in thin and brittle bones. Poor lifestyle and diet are one of the reasons for this condition [1]. Nowadays,

osteoporosis is a major health problem in developing and developed countries, as it is known as the silent disease of the century [2].

This disease may be asymptomatic and the fracture caused by it can impose physical and financial damages on patients and society [2]. The

period 2000-2010 was announced as the decade of joint bone diseases, including osteoporosis, by the World Health Organization. In addition, osteoporosis has been introduced as the fourth main enemy of mankind after myocardial infarction, stroke, and cancer and the major cause of bone fractures in the world [3]. Women are 8 times more at risk for osteoporosis than men and about 200 million women worldwide suffer from this disease. In all age groups, the bone mass of women is significantly less than men of the same age and race [4]. The study of the bone mass of the upper part of the femur bone in samples collected in the US during the last 200 years showed that present-day women more suffer from low bone mass than women in the past decades and centuries. It is probably due to reduced physical activity, loss of calcium in the diet, and smoking. The frequency of femoral fractures is predicted to increase by 6 times by 2050 [5].

The main risk factors for osteoporosis include gender, menopause, white race (the Caucasians in particular), skeleton size, smoking, abuse of caffeine, alcohol, reduced amount of estrogen, early menopause (before the age of 45), decreased calcium intake, and physical inactivity [6].

In a study conducted by Derakhshan, the prevalence of osteoporosis among postmenopausal women in Kurdistan Province was reported to be 34.4% [7]. In another study in Fars Province, the prevalence of osteopenia and osteoporosis in the neck, femur, and in the whole thigh of rural men was 42% and 24%, 46% and 10%, and 48% and 6%, respectively [8]. In a study conducted in Fasa, 34.1% of women visited health centers were suffering from osteoporosis [9]. The findings of various studies show that exercise and adequate intake of calcium and vitamin D play an important role in reducing the rate of loss of bone density and improving bone mineral density (BMD). In adults, proper nutrition, varied eating habits rich in calcium, and regular physical activity can maintain the muscle and bone mass and strength [10].

The prevention and treatment of osteoporosis are based on the understanding the attitude, lifestyle, and daily habits in order to improve the quality and efficiency of people [11]. Therefore, education of preventive behaviors such as

physical activity and correct nutrition, as a simple and efficient way, has a significant impact on disease prevention and health promotion and preservation. On the other hand, one of the main goals of the World Health Organization is to increase the number of women trained in osteoporosis [12].

It seems necessary to determine the factors affecting the adoption of preventive behaviors of osteoporosis in postmenopausal women using the patterns that identify the factors influencing behavior. The Health Belief Model is one of the most effective models in the education and promotion of health. Based on this model, people change their behavior when they feel that their disease is serious, otherwise they are less likely to turn to healthy behaviors [12]. Constructs of this model include perceived susceptibility, perceived severity, perceived threat, perceived benefits, perceived barriers, self-efficacy, and cues to action [13].

According to the Health Belief Model, perceived susceptibility is "women's opinion of chances of getting osteoporosis" and perceived severity means "women's opinion of how serious osteoporosis and its consequences are". These two constructs together form the perceived threat in women about this disease. Perceived threat with analysis of the benefits of adopting preventive behaviors of osteoporosis such as appropriate diet and walking, analysis of potential barriers to proper preventive measures along with perceived empowerment of women to carry out preventive behaviors, cues to action or stimuli that affect women from inside and outside including family and friends, doctors and healthcare providers, radio and television, and educational resources, fear of affliction with complications from osteoporosis or a sense of inner peace following the adoption of preventive behaviors direct women towards the observance of preventive behavior of osteoporosis [12].

In a review study conducted on osteoporosis using the Health Belief Model, the results showed that the higher the score of perceived severity, benefits, self-efficacy, and motivation, the fewer the perceived barriers and the better the preventive behavior of osteoporosis [14]. In a study conducted by Akinpetide (2014) on 153

postmenopausal women using the Health Belief Model, women had little knowledge about the prevention of osteoporosis with exercise and reported barriers to exercise and the use of dietary calcium [15]. In a study on postmenopausal women using the Health Belief Model, Tarshizi (2009) showed that behavior change, as the main purpose of education, has not been achieved [16]. In a cross-sectional study on 401 women aged 30-50 in Fasa, Fars Province, perceived susceptibility, motivation, social support, and self-regulation for walking and perceived susceptibility and self-regulation for nutrition were determined to be the predictive variables. The results of this study showed the significance of conducting similar studies on subjects of older ages [17].

Given the difficulty of changing behaviors at older ages and the significance of diet performance modification and walking at these ages, the present research aims to study preventive behaviors of osteoporosis in postmenopausal women in Fasa, Fars Province based on the Health Belief Model.

Methods

The present research was a cross-sectional, descriptive-analytic study in which 380 postmenopausal women aged over 50 under the coverage of Fasa health centers in 2016 were selected as the sample. Out of the 6 health centers in Fasa, 2 of them were selected based on cluster sampling method. Then, 190 postmenopausal women were selected from each health centers based on simple random sampling by the household number recorded in the health records. The subjects were briefed on the research objective and were assured that their information will be kept confidential. Women with a disability, disease or any other problem were excluded from the study.

Considering $\alpha=0.05$ and $\beta=0.2$ and based on the correlation coefficient of $r=0.20$ (Mahdavi et al, 2015) [18], the sample size was determined to be 378.

In this study, a three-part questionnaire based on the Health Belief Model was used for data collection [19]. The first part included

demographic questions such as age, educational attainment, the number of pregnancies, history of osteoporosis, etc. The second part of this questionnaire dealt with constructs of the Health Belief Model. In this part, 23, 4, 6, 8, 7, 4, 5, and 1 items, respectively, are related to awareness, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, motivation, self-efficacy, and cues to action. All items were scored based on a 5-point Likert scale from "Strongly disagree" to "Strongly agree" and the items relate to "cues to action" were scored as the cumulative frequency. The third part the questionnaire consisted of 10 items related to diet performance (the type and amount of food intake during the last week) (scored between 0 and 14) and 7 items related to walking (the time spent on walking during the last week) (scored between 0 and 21).

The validity of items was confirmed using the index score (above 0.15) and content validity (above 0.79). To assess the face validity, a list of items developed by women with demographic and socioeconomic characteristics similar to the target population was prepared and 12 experts in the field of health education and health promotion, orthopedics, and biostatistics were asked to make their comments and views about it. Based on Lawshe Table, any item that obtained a score of 0.56 for all the 12 experts was evaluated necessary and important and maintained for further analysis. In this study, most items obtained a score above 0.70.

The overall reliability of this questionnaire using Cronbach's alpha was determined to be 0.87. In addition, the reliability of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, motivation, self-efficacy, and cues to action was obtained 0.71, 0.82, 0.79, 0.82, 0.77, 0.79, and 0.77, respectively. Since the reliability values obtained for all dimensions and constructs in this study were higher than 0.7, the reliability of the questionnaire was evaluated good and acceptable.

The obtained data and information were analyzed using descriptive statistics (mean and standard deviation) and inferential statistics (Pearson correlation analysis, linear regression analysis,

and independent t-test) in SPSS-20. Kolmogorov-Smirnov test also showed that dependent variables (diet and walking performance) followed a normal distribution. The level of significance in this study was determined to be 0.05.

Results

According to the study results, the mean age, BMI, and the number of pregnancies of women is equal to 58.25 ± 6.59 , 22.25 ± 3.01 , and 2.95 ± 1.74 , respectively. Table 1 shows demographic information of subjects including age, BMI, educational attainment, history of fracture, family history of osteoporosis, and history of special diseases.

Table 1: Demographic information of subjects

Variable	Frequency	Percentage	
Education	Illiterate	5	1.31
	Primary	60	15.78
	Secondary	120	31.57
	High school	135	35.56
	College	60	15.78
History of osteoporosis	Yes	85	22.36
	No	295	77.64
History of disease	Yes	111	29.21
	No	269	70.79
History of bone densitometry	Yes	80	21.06
	No	300	78.94
History of osteoporosis in the family	Yes	25	6.58
	No	355	93.42

The results showed that the mean score of diet performance and walking performance in the prevention of osteoporosis was 8.35 ± 3.01 and 12.24 ± 3.25 , respectively. In addition, the mean score of awareness, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, motivation, self-efficacy, and cues to action was 7.41 ± 2.01 , 10.24 ± 24.08 , 15.14 ± 14.15 , 22.15 ± 4.10 , 18.32 ± 4.95 , 12.2 ± 31.14 , 14.33 ± 2.21 , and 9.32 ± 1.22 , respectively.

In terms of the relationship between constructs of

the model and scores of diet and walking performance, correlation coefficients showed that there is a significant relationship between walking performance and perceived susceptibility ($P=0.001$, $r=0.76$), motivation ($P=0.001$, $r=0.65$), perceived benefits ($P=0.001$, $r=0.88$), and self-efficacy ($P=0.001$, $r=0.69$). In addition, diet performance presented a significant inverse relationship with perceived benefits ($P=0.001$, $r=0.68$) and self-efficacy ($P=0.001$, $r=0.28$) (Table 2).

Table 2: Relationship between constructs of the Health Belief Model and diet and Walking performance in studied women

Variable	Diet performance r (P value)	Walking Performance r (P value)
Perceived Susceptibility (0-16)	0.075 (0.095)	0.760 (0.001)
Perceived Severity (0-24)	0.068 (0.411)	0.025 (0.565)
Perceived Benefits (0-32)	-0.680 (0.001)	0.880 (0.001)
Perceived Barriers (0-28)	-0.034 (0.001)	0.067 (0.075)
Motivation (0-16)	0.415 (0.75)	0.650 (0.001)
Self-efficacy (0-20)	0.280 (0.001)	0.690 (0.001)
Internal Cues to Action (0-12)	0.068 (0.523)	0.045 (0.311)
Knowledge (0-23)	0.043 (0.752)	0.085 (0.312)

External cues to action for women in diet and walking performance in order to prevent osteoporosis included family (245), books (160), magazines and journals (75), physicians and

health care providers (125), television (85), patients with osteoporosis (35), and the Internet (15).

Multiple linear regression analysis was used to study the extent to which the constructs of the Health Belief Model and other variables predict women performance. In general, these variables and constructs can predict 31.5% of variances of walking performance and 28.4% of diet performance in the prevention of osteoporosis. Additionally, the predictive power of perceived susceptibility for diet and walking performance

was higher than other variables and constructs. According to the results of regression analysis, perceived susceptibility and BMI have a significant relationship with walking performance, and other variables were not significant. The results also showed that only perceived susceptibility was significant for diet performance (Tables 3 and 4).

Table 3: Regression analysis of factors related to walking performance for prevention of osteoporosis in postmenopausal women of Fasa, Fars Province

Variables	Beta (%95 CI)	SE	P	Dependent variable
Age	-0.025 (-0.08772,0.03772)	0.032	0.165	Walking Performance R ² =0.315 R ² Adjusted=0.035
BMI	-0.124 (-0.22788,0.02012)	0.053	0.001	
Perceived Susceptibility	0.104 (-0.08828,0.28628)	0.093	0.001	
Perceived Severity	-0.019 (-0.1072,0.0692)	0.045	0.325	
Perceived Benefits	0.114 (-0.02972,0.19828)	0.043	0.725	
Perceived Barriers	-0.026 (-0.0946,0.0426)	0.035	0.265	
Motivation	0.112 (-0.06244,0.286442)	0.089	0.119	
Self-efficacy	0.128 (-0.01704,0.27304)	0.074	0.684	
Internal Cues to Action	-0.153 (-0.39016,0.08416)	0.121	0.126	
Knowledge	-0.019 (-0.1072,0.0692)	0.086	0.090	

Table 4: Regression analysis of factors related to diet performance for prevention of osteoporosis In postmenopausal women of Fasa, Fars Province

Variables	Beta (%95 CI)	B	P	Dependent variable
Age	-0.216 (-0.27088,0.16112)	0.028	0.025	nutritional performance R ² =0.284 R ² Adjusted=0.024
BMI	0.006 (-0.08416,0.09616)	0.046	0.909	
Perceived Susceptibility	0.105 (-0.0518,0.2618)	0.080	0.020	
Perceived Severity	0.045 (-0.03144,0.12144)	0.039	0.315	
Perceived Benefits	-0.024 (-0.09652,0.04852)	0.037	0.267	
Perceived Barriers	-0.125 (-0.1838,0.0662)	0.030	0.113	
Motivation	-0.011 (-0.16192,0.13992)	0.077	0.681	
Self-efficacy	-0.043 (-0.16844,0.08244)	0.064	0.135	
Internal Cues to Action	0/024 (-0.1818,0.2298)	0.105	0.136	
Knowledge	-0.024 (-0.171,0.123)	0.075	0.534	

Discussion

The findings showed that among the constructs of health belief model, construct perceived susceptibility to diet and walking to predict the performance was better. This study showed that age, parity, and education level with the diet and the mean BMI and history of osteoporosis associated with women walking performance.

The results of AkinPetide (2014) [15], Sayed-Hassan (2013) [20], Hsieh (2008) [21], Chang (2007) [22] are consistent with this study. The

results of this study showed that the performance of diet and walking with a family history of osteoporosis, history of a particular disease, history of bone densitometry, there is a significant correlation. In the study Hatmzadh (2011) (23), Hassan (2013) (20) significant relationship between these variables and function of diet and walking there but in the study of language (2011) (24) similar to the relationship between family history of osteoporosis diet to prevent osteoporosis and bone function relationship was

not significant. Factors influencing variables is osteoporosis.

The results of this study to the rather high level of data subjects in line with the findings of the studies Solimanha (2014) (25) and Turner (2004) (12) is. But in studies, research groups khorsandi (2013) (5), Mahamed (2009) (26) and Hannon (2007) (27) situation awareness of the condition is not good, but there have been differences in the groups under study. A relatively good state of knowledge of women from access to information is an educational and training classes in health centers. Yield (diet and walking), and there was a significant relationship between women and their perceived susceptibility to osteoporosis, felt vulnerable. High levels of perceived susceptibility, observations of people's perception of those affected by the disease (fracture) is the same at this age.

In the study Doheny (2010) More people perceived susceptibility was tested for BMD (28). In studies Edmonds (2012) (29) and the Elsabagh 2015 (30) individuals sensitive to calcium intake had little understanding. If people want to be successful in preventing bone loss than enough motivation to change, do have and maintain good behavior. In this study, there was a relationship between walking performance and motivation.

In the study, Piehowski 2010 (31) referred to the important role of motivation in behavior. The review Mcleod 2011, the motivation of the most effective factors in the prevention of osteoporosis treatment (14). The study showed a significant relation between self-efficacy and preventive behaviors. Many studies have noted the recent structure in line with the findings presented today, Oxus Khani study in 2014, the relationship between self-identified dietary behaviors (32). Studies also Swaim 2008 (33), Vahedian Shahroudi, in 2014 (34) and Mahdavi in 2015 (18) on preventive behaviors of osteoporosis in women positive correlation between self-efficacy and preventive behaviors were reported. In this study, a significant inverse correlation between nutritional behavior with perceived barriers there. In other words, the higher the perceived barriers people have worse performance.

The major barriers to performance can be expensive diet foods contain calcium, the

availability and the lack of materials and so on. In the study Hassan in 2013 (20) between feeding behavior and perceived barriers, there was a significant relationship. But the study Edmonds in 2012 (29) for calcium intake had the lowest perceived barriers. Khani findings Oxus (32) and Tsai 2008 (35), Estok 2007 (36) confirms the findings of this study. In this study, a significant relationship was found between perceived benefits and prophylactic. The results found by other researchers, the findings of this study supports (5, 37).

Endicott (38) and Priyanka Deo (39) also identified the perceived benefits as a predictor of behavior. In contrast, Tsai (35), Edmonds (29) and Estok (36) of the relationship between perceived benefits and preventive behaviors is reported that, contrary to the results.

Verbeke and Hoefkens (2013) believe that despite the strong emphasis of earlier studies on the benefits, its implicit and explicit benefits should be also taken into account because it can act as an important source of motivation for taking foods rich calcium and walking in a group of people. In fact, understanding of behavioral benefits is influenced by several factors which may be studied by researchers in a various way [41].

In the present study, family accounted for the majority of external cues to action. Family plays an important and crucial role as a bountiful source of information and support for people to do nutritional behavior and walking and provide the necessary resources and guidance for bone densitometry. In this study, 31.5% of the variance in general belief model constructs walking performance and 4/28 percent of the variance in performance predicted diet prevent osteoporosis. Min 2011 study on female students, health belief model constructs 7.6 percent of the variance in behavior can be predicted prevention of osteoporosis (42).

In another study on postmenopausal women was conducted by Jang, the constructs of the model to predict the behavior of 33% of the variance (43). This study showed that the most important variables predict perceived susceptibility walking and feeding behavior is to prevent osteoporosis. According to HBM, when people feel that they are at risk of the disease, preventive behaviors do

better. Doheny 2010 study results showed that perceived susceptibility, an important predictor of variables for behaviors such as exercise (28).

According to the study results, there is a need for a rigorous training program based on the Health Belief Model in order to increase perceived susceptibility and perceived severity of women about affliction with osteoporosis and also to raise the level of self-efficacy and perceived benefits. In addition, it is recommended that some educational programs be provided to family members, physicians, and other healthcare personnel. The present study was conducted on elderly women visited health centers of Fasa. Therefore, the findings cannot be generalized to all women and especially those with osteoporosis who do not visit a health center for treatment. Another limitation of this study was the self-reporting assessment of diet and walking performance.

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Conflicts of interests:

Authors declare no conflicts of interests.

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References

1. Ebadi Fard Azar F, Solhi M, Zohoor AR, Ali Hosseini M. The effect of Health Belief Model on promoting preventive behaviors of osteoporosis among rural women of Malayer. *J Qazvin Univ Med Sci.* 2012; 16(2): 58-64. [In Persian]
2. Munch S, Shapiro S. The Silent Thief: Osteoporosis and Women's Health Care across the Life Span. *Health Soc Work.* 2006; 31(1): 44-53.
3. Bayat N, Haji Amini Z, Alishiri Gh, Ebadi A, Hosseini M, Laluae A. Frequency Of Osteoporosis And Osteopenia In Post-Menopausal Military Family's Women. *Annals of Military and Health Science Research.* 2008; 6(1): 25-30. [In Persian]
4. Karimzadeh Shiraz K, Wallace LM, Niknami Sh, et al. A home-based, transtheoretical change model designed strength training intervention to increase exercise to prevent osteoporosis in Iranian women aged 40-65 years: a randomized controlled trial. *Health Educ Res.* 2007; 22(3): 305-17.
5. Khorsandi M, Shamsi M, Jahani F. The Survey of Practice About Prevention of Osteoporosis Based on Health Belief Model in Pregnant Women in Arak City. *J Rafsanjan Univ Med Scie.* 2013; 12(1): 35-46. [In Persian]
6. Ghaffari M, Tavassoli E, Esmailzadeh A, Hassanzadeh A. The effect of education based on health belief model on the improvement of osteoporosis preventive nutritional behaviors of second grade middle school girls in Isfahan. *J Health Syst Res.* 2010; 6(4): 714-23. [In Persian]
7. Derakhshan S, Salehi R, Reshad Manesh N. Prevalence of Osteoporosis, Osteopenia and their related factors in post-menopausal women referring to Kurdistan densitometry center. *Sci J Kurdistan Univ Med Sci.* 2006; 40(11): 59-67. [In Persian]
8. Tohidi M, Dabbaghmanesh MH, Fattahi MR, et al. Prevalence of Osteoporosis in Rural Men of Fars Based on Both Local and WHO Reference Data. *Iranian J Endocrinol Metab* 2010; 12: 393-400. [In Persian]
9. Khani Jeihooni A, Hidarnia AR, Kaveh MH, et al. Prevalence of Osteoporosis and its Related Factors in Women Referred to Fasa's Densitometry Center. *Scientific J Ilam Uni Med Sci.* 2013; 21(1): 150-58. [In Persian]
10. Kelley GA, Kelley KS. Exercise and bone mineral density at the femoral neck in postmenopausal women: a meta-analysis of controlled clinical trials with individual patient data. *Am J Obstet Gynecol* 2006; 194(3): 760-67.
11. Sedlak CA, Doheny MO, Estok PJ, Zeller RA. Tailored intervention to enhance osteoporosis prevention in women. *Orthop Nurs.* 2005; 24(4): 270-76.

12. Turner LW, Hunt SB, Dibrezzo R, Jones CH. Design and implementation of an osteoporosis prevention program using the health belief model. *Am J Health Stud.* 2004; 19(2): 115-21.
13. Sharma M, Romas JA. Theoretical foundations of health education and health promotion. 2nded. Massachusetts: Jones & Bartlett Learning; 2010.
14. Mcleod KM, Johnson SC. A Systematic Review of Osteoporosis Health Beliefs in Adult Men and Women. *J Osteoporosis.* 2011; 7: 76-82.
15. Akinpetide GO. Osteoporosis knowledge, beliefs, and bone promotion behaviors of postmenopausal African American (AA) women. [Dissertation]. Arizona: The University of Arizona. 2014: 152.
16. Torshizi L, Anoosheh M, Ghofranipour F, Ahmadi F, Houshyar-rad A. The effect of education based on Health Belief Model on preventive factors of osteoporosis among postmenopausal women. *Iran J Nurs.* 2009; 22(59): 71-82. [In Persian]
17. Khani Jeihooni A, Hidarnia A, Kaveh M H, Hajizadeh E, Gholami T. Survey of osteoporosis preventive behaviors among women in Fasa: The Application of the Health Belief Model and Social Cognitive Theory. *Iran South Med J.* 2016; 19(1): 48-62. [In Persian]
18. Mahdavi S, Karimzadeh shirazi K, Malekzadeh JM, Fararoei M. preventing of osteoporosis: Applying the Health Belief Model. *J Nurs Midwifery Shahid Beheshti Univ Med Sci.* 2015; 24(87): 15-22.
19. Khani Jeihooni A, Hidarnia A, Kaveh MH, Hajizadeh E, Askari A. The effect of an educational program based on health belief model and social cognitive theory in prevention of osteoporosis in women. *Int J Prev Med.* 2015; 6: 115.
20. Sayed-Hassan R, Bashour H, Koudsi A. Osteoporosis knowledge and attitudes: a cross-sectional study among female nursing school students in Damascus. *Arch Osteoporos.* 2013; 8: 149.
21. Hsieh CH, Wang CY, McCubbin M, Zhang S, Inouye J. Factors influencing osteoporosis preventive behaviours: testing a path model. *J Adv Nurs* 2008; 62(3): 336-45.
22. Chang SF, Hong CM, Yang RS. Cross-sectional survey of women in Taiwan with first-degree relatives with osteoporosis: knowledge, health beliefs, and preventive behaviors. *J Nurs Res.* 2007; 15(3): 224-32.
23. Hatamzadeh N, Jalilian F, Emdadi SH, Rezaei R, Mirzaee Ramhormozi S. Application of health belief model for predicting osteoporosis-protective behaviors among Iranian women. The First International & 4th National Congress on health Education & Promotion, Tabriz, Iran 2011.
24. Lesan SH, Mirheydari Z, Sotoudeh G, Khajeh Nasiri F, Koohdani F. Osteoporosis Related Food Habits and Behaviors: a Cross-Sectional Study among Female Teachers. *Hayat.* 2011; 16(3-4): 86-94. [In Persian]
25. Solimanha M, Asadi K, Shabani S, Mirblock A, Karimi A, Kazemnezhad lili E. Knowledge level of nurses employed in orthopedic units on osteoporosis disease. *Holist Nurs Midwifery.* 2014; 24(2): 25-32. [In Persian]
26. Mahamed F, Karimzadeh Shirazi K, Pourmahmoudi A, Mossavi A. The effects of education on preventive behaviors toward osteoporosis based on behavior intention model (BIM) on female students. *Armaghan Danesh.* 2009; 14(2): 117-25. [In Persian]
27. Hannon C, Murphy K. A survey of nurses' and midwives' knowledge of risks and lifestyle factors associated with osteoporosis. *Journal of Orthopaedic Nursing.* 2007; 11(1): 30-37.
28. Doheny MO, Sedlak CA, Hall RJ, Estok PJ. Structural Model for Osteoporosis Preventing Behavior in Men. *Am J Men Health.* 2010; 4(4): 334-43.
29. Edmonds E, Turner LW, Usdan S. Osteoporosis knowledge, beliefs, and calcium intake of college students: Utilization of the health belief model. *Open J Preventive Med.* 2012; 2(1): 27-34.
30. Elsabagh HM, Aldeib AF, Atlam SA, Saied SM. Osteoporosis knowledge and health beliefs among employees of Tanta University. *Am J Res Communication.* 2015; 3(12): 62-77.
31. Piehowski KE, Nickols-Richardson SM, Clymer EK, Roberto KA. Osteoporosis Health Beliefs in Women Differ by Menopausal Status

- and Across Age Cohorts. *Fam Consum Sci Res J*. 2010; 38(3): 345-55.
32. Khani Jeihooni A, Hidarnia A, Kaveh M, Hajizadeh E, Askari A. Survey of Osteoporosis Preventive Nutritional Behaviors Based Health Belief Model in Sample of Iranian Women. *Middle East J Sci Res*. 2014; 21(4): 595-601.
 33. Swaim RA, Barner JC, Brown CM. The relationship of calcium intake and exercise to osteoporosis health beliefs in postmenopausal women. *Res Social Adm Pharm*. 2008; 4(2): 153-63.
 34. Vahedian-Shahroodi M, Elaheh L, Esmaily H, Tehrani H, Hamidreza M. Prediction of Osteoporosis Preventive Behaviors using the Health Belief Model. *Iran J Health Educ Health Promot*. 2014; 2(3) :199-207.
 35. Tsai M. The relationship between osteoporosis knowledge, beliefs and dietary calcium intake among South Asian women in Auckland. [dissertation]. Auckland: Human Nutrition at Massey University. 2008.
 36. Estok PJ, Sedlak CA, Doheny MO, Hall R. Structural model for osteoporosis preventing behavior in postmenopausal women. *Nurs Res*. 2007; 56(3): 148-58.
 37. Hazavehei SM, Taghdisi MH, Saidi M. Application of the Health Belief Model for osteoporosis prevention among middle school girl students, Garmsar, Iran. *Educ Health (Abingdon)*. 2007; 20(1): 23.
 38. Endicott RD. Knowledge, Health Beliefs, and Self-Efficacy regarding Osteoporosis in Perimenopausal Women. *J Osteoporos* 2013; 2013: 853531. doi: 10.1155/2013/853531. Epub 2013 Sep 11.
 39. Priyanka D, Rajesh N, Jigar R. Women's Attitudes and Health Beliefs toward Osteoporosis Screening in a Community Pharmacy. *J Osteoporos*. 2013; 1-8.
 40. Iranagh JA, Rahman HA, Motalebi SA. Health Belief Model-based intervention to improve nutritional behavior among elderly women. *Nutr Res Pract*. 2016; 10(3): 352-58.
 41. Hoefkens C, Verbeke W. Consumers' health-related motive orientations and reactions to claims about dietary calcium. *Nutrients*. 2013; 5(1): 82-96.
 42. Min H, Oh HY. A Study on Osteoporosis Knowledge, Health Beliefs and Health Behaviors among Female College Students. *J Korean Acad Community Health Nurs*. 2011; 22: 111-120.
 43. Jang HJ, Ahn S. A predictive model of fall prevention behaviors in postmenopausal women. *J Korean Acad Nurs*. 2014; 44(5): 525-33.