Health Education and Health Promotion (HEHP) (2014) Vol. 2 (1): (27-40)

The Survey of Osteoporosis Prevention Behaviors in Women Based on Health Belief Model

Ali Khani Jeihooni[1], Mohammad Hossein Kaveh[2]*, Ebrahim Hajizadeh[3], Alireza Askari[4]

Received: 31/05/2014 Accepted: 27/01/2015

Abstract

Aim: Investigating factors affecting the adoption of preventive behaviors in women with osteoporosis is necessary. This study aims at determining the preventive treatment of osteoporosis in women in Fasa using the Health Belief Model (HBM) during 2014.

Method: In this cross-sectional study, 401 women (aged 30-50 years) covered by the health centers in Fasa city were randomly chosen. Construct of HBM and the function of feeding and walking were determined to prevent osteoporosis in women.

Findings: The mean age of women was 40/9±6/2 years. The variables of perceived susceptibility (p=0.007), motivation (p=0.009) for walking behavior and variables of perceived sensitivity (p=0.020) for feeding behavior were predicted.

Conclusions: This study confirmed the power of HBM in predicting feeding and walking behavior for prevention of osteoporosis. Hence, this model can be used as a framework for designing and implementing educational interventions for prevention of osteoporosis in women.

Keywords: Feeding behavior, Health Belief Model, Walking, Women

1. Assistant Professor, Department of Public Health, Fasa University of Medical Sciences, Fasa, Iran
Email: khani_1512@yahoo.com
2. Associate Professor, Department of Health Education & Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran Email: kavehm@sums.ac.ir
3. Professor, Department of Biostatistics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
Email: hajitm@yahoo.com
4. Assistant Professor, Department of Ortopedic, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
Email: aaskari60@yahoo.com

Introduction

Brown VP and Josse RG define osteoporosis "a disease characterized by decreased bone density and loss of bone micro-architecture quality, which in turn lead to an increased risk of fracture" [1].

Nowadays, osteoporosis is considered an important health issue, and has been called the silent disease of the century. It is an asymptomatic disease, and its complications (fractures) can impose high and irreparable physical and financial losses to the society and patients [2]. This disease is a serious health problem in the health care facilities in both the developed and developing countries [3].

The years between 2000 and 2010 were entitled by the World Health Organization (WHO) as Bone and Joint Decade (BJD), which concerns bone and joint diseases such as osteoporosis [4] and the most common cause of fractures in the world [5].

Women are 8 times more at risk of osteoporosis than men [6] so that about 200 million women worldwide suffer from the disease [7]. Bone mass in women in all age groups is significantly less than in men of the same age and race [8]. In both sexes, the peak bone mass is achieved by age 30, and then the bone mass gradually decreases with the increase in age. Therefore, the purpose of prevention programs is to maintain bone mass in the 30- to 50-year age group [9]. This group of people assumes the responsibilities of life, and pay less attention to their health. They play a key role in managing their families' health; therefore, their mortality, disability and behavior affect different aspects of health and behavior of their families [10].

In Iran, the national program for prevention, diagnosis and treatment of osteoporosis reported that 70% of women and 50 % of men over 50 suffer from osteoporosis and osteopenia [11].

In a study in Fars province (Iran), prevalence of osteopenia and osteoporosis in a population based on T-score for spinal cord segments was recorded, respectively, as 42% and 24% in the back, 46% and 10% in femoral neck, and 48% and 6% in the entire femur [12]. A study carried out in Fasa demonstrated that 34.1% of women had osteoporosis [13].

Good nutrition and regular physical activity can maintain bone mass and strength in young people and adults. Varied and enjoyable diets that are rich in calcium can increase bone strength and improve the quality of life at any time [14].

Regular physical activity not only contributes to bone health but also increases muscle strength, creates balance and harmony in the body, and has a direct impact on the overall health of the body [16]. Exercise and physical activity are recommended as non-medical interventions that can increase bone density in young age, and

prevent loss of bone mass in the middle age. The disease is preventable and curable. An important point in preventing osteoporosis is to correct thinking, lifestyle and daily habits in order to improve the quality and efficiency of individuals [17]. Therefore, education preventive behaviors such as physical activity and correct nutrition as a simple and efficient method can help the disease prevention and the promotion and preservation of health. One of the most important global health goals is increasing the number of women trained in the area of osteoporosis [18].

To this end, 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. Researchers have used such models to change their subjects' behavior. Among the models effective in health education and promotion are the Health Belief Model (HBM) and Social Cognitive Theory [18]. A common reason for non-compliance to osteoporosis prevention is the erroneous belief that osteoporosis is not serious. According to HBM, people are most likely to make health behavior changes when they perceive that the disease is serious, and are less likely to practice healthy behaviors if they believe that the disease is not severe. To demonstrate the severity of this disease, negative outcomes associated with the disease including death, crippling and fractures were presented. Osteoporosis results in reduced quality of life, avoidance of social interaction due to low self-esteem, and physical pain of daily activities. Emotional suffering and anxiety regarding fear of fracture and depression about being dependent on others are other negative outcomes associated with osteoporosis [19]. HBM is a conceptual framework used to understand health behavior and possible reasons for non-compliance with the recommended health action. It can provide guidelines for program development allowing planners to understand and address reasons for non-compliance [18].

Osteoporosis is preventable and the easiest and cheapest ways to deal with it include education of preventive behaviors, increasing calcium intake. This model has a very good fit for the design and implementation of educational interventions for prevention of the disease. Therefore, removing barriers and adopting preventive educational behaviors should be paid serious attention.

The structures of HBM include perceived severity, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action, and self-efficacy.

Perceived susceptibility was used in this study to evaluate the women's perception about the extent to which they are at risk of osteoporosis.

In addition, their perceived severity of osteoporosis complications was measured. The sum of these two factors is the women's perceived threat of the disease. Other constructs include perceived benefits and barriers (i.e. individuals' analysis about the benefits of adopting preventive behaviors of osteoporosis such as diet and walking) and potential barriers to preventive behaviors of osteoporosis. Hence, women's perceived ability to carry out preventive behaviors and cues to action (incentives that affect women within and outside the family such as friends, doctors, health care providers, media and educational resources, their fear of osteoporosis complications, and a sense of inner peace achieved in seeking preventive behaviors) can direct the women towards complying with the preventive behaviors of osteoporosis [20, 21].

According to what mentioned above, the present study aimed to assess the HBM constructs and their relationship with eating behaviors and physical activity for prevention of osteoporosis among women.

Materials and Methods

This study is a cross-sectional research conducted during 2014. The sample included 401 women aged 30-50 years covered by the health centers in Fasa, Iran. Two centers out of the six urban health centers in Fasa were randomly selected (considering the population distribution in terms of economic and social characteristics).

Simple random sampling was used according to numbers of maternal health records in the centers. The subjects were invited in a health center, and their informed consent was obtained. Women with disability, disease and problems that prevented them from participating in the study were excluded. The prevalence of osteoporosis in the study population was 34.1 [13]. Therefore, with significance level set at 0.05 and a confidence level of 95%, 401 individuals were chosen as the sample:

$$n = \frac{Z^2_{1-\frac{\alpha}{2}}}{d^2} p(1-p) = \frac{1.96^2}{0.0025} 0.2247 \approx 350$$

In this study, a questionnaire was developed by the researchers according to the HBM constructs. The questionnaire consists of the following parts:

The first part includes demographic questions including age, BMI, education level, marriage, occupation, household income, delivery times, breastfeeding, smoking, history of osteoporosis, history of osteoporosis in the family, history of a special disease, and history of bone densitometry.

The second section includes questions on the structures of the HBM: 23 questions on knowledge; 4 questions on perceived susceptibility (about the women's opinion of chances of getting osteoporosis); 6 questions

on perceived severity (about complications due to osteoporosis); 8 questions on perceived benefits (about the benefits of preventive behaviors of osteoporosis, such as physical activity and calcium intake); 7 questions on perceived barriers (including barriers to physical activity and consumption of calcium-rich foods), 4 questions on motivation (such as motivation to receive health advice and conduct periodic examinations for prevention of osteoporosis); 5 questions on self-efficacy (including the ability to do exercises and observe proper diet); questions on self-efficacy (1 question on external cues to action for prevention behaviors of osteoporosis including family and friends, doctors and health workers, mass media, books and magazines, Internet and other patients with osteoporosis); and 3 questions on internal factors including the fear of suffering from complications of osteoporosis and a sense of inner peace following preventive behaviors). All questions are based on the standard 5-point Likert scale ranging from strongly disagree to strongly agree (scores of 0 to 4). Scores of questions on external support are calculated as cumulative frequency.

The third section includes questions on nutritional performance and exercise, i.e. walking. Performance questions consist of 10 questions about the type and amount of food, consumed during the past week (score from 0 to 14). Exercise questions include 7 questions on the duration and type of walking (easy, moderate and heavy) during the last week based on received guidelines (score from 0 to 21). The subjects' performance was assessed via self-report method. The content validity of the instrument was assessed based on an expansive literature review and the opinions of 12 experts of health education and health promotion, biostatistics and orthopedics. The ambiguities were corrected, and the final design was used. The overall reliability of the instrument based on the Cronbach's alpha was 0.87. Cronbach's alpha was 0.86 for knowledge, 0.71 for perceived susceptibility, 0.82 for perceived severity, 0.79 for perceived benefits, 0.82 for perceived barriers, 0.77 for motivation, 0.79 for self-efficacy, and 0.77 for cues to action. Since the alpha values calculated for each of the studied structures were higher than 0.7, their reliability levels are acceptable [22].

For ethical considerations, permissions were obtained from Ethics Committee of Tarbiat Modares University and Fasa Health Center. The aims and importance of the study were explained to the subjects, and their written consent was obtained. The sample was assured that the information would remain confidential.

Using the software SPSS 16 and through descriptive statistics (mean and SD) and analysis tests including Pearson's correlation,

multiple linear regression, one-way ANOVA and independent t-test, the data were analyzed, and the significance level of 0.05 was used.

Results

The mean age of women participated in the study was 40.9 ± 6.2 years, their mean BMI was 23.47±3.67, the average number of births was 2.93 ± 1.55, and the average family income was 7215960.01±3209890.79 Rials. Table 1 shows the demographic data, including education level, marital status, occupation, breastfeeding, smoking, history of osteoporosis, history of osteoporosis in the family, history of special diseases, and records of bone densitometry.

Table 1: Frequency distribution of the study sample in terms of demographics

Variable		Frequency	Percentage
Occupation	Employed	60	15
	Housewife	341	85
Education	Illiterate	6	1.5
	Primary	64	16
	Secondary	126	31.4
	High school	136	33.9
	College	69	17.2
Marital status	Single	17	4.3
	Married	367	91.5
	Divorced	8	2
	Widowed	9	2.2
Breastfeeding	Yes	56	14
	No	345	86
Smoking	Yes	6	1.5
	No	395	98.5
History of osteoporosis	Yes	93	23.2
	No	308	76.8
History of a special disease	Yes	78	19.5
	No	323	80.5
History of bone densitometry	Yes	37	9.2
	No	364	90.8
History of osteoporosis in the family	Yes	10	2.5
	No	391	97.5

The results showed that there were significant relationships between nutritional performance and age, number of births, occupation, education level, and breastfeeding (P<0.05). However, it had no significant relationship with marital status (P=0.36), smoking (P= 0.72), history of osteoporosis (P= 0.28), history of osteoporosis in the family (P=0.40), history of a special disease (P = 0.26), history of densitometry (P=0.29), average household income (P=0.36), and BMI (P=0.67).

The results showed that there were significant relationships between walking performance and BMI and history of osteoporosis (P <0.05).

However, it did not have a significant relationship with age (P=0.93), marital status (P= 0.26), smoking (P= 0.11), level of education (P=0.54), history of osteoporosis in the family (P= 0.88), history of special diseases (P=0.35), BMD records (P=0.97), average household income (P=0.39), occupation (P = 0.79), number of births (P=0.17), and breastfeeding (P=0.52).

The mean nutritional performance score in preventing osteoporosis was 9.46±3.28, and the mean walking performance score in preventing osteoporosis was 13.48±3.89. Other mean scores included 7.62±2.25 for knowledge, 11.71±.2.12 for perceived susceptibility, 16.56±4.43 for perceived severity, 24.49±4.49 for perceived benefits, 17.13±5.47 for perceived barriers, 13.02±2.19 for motivation, 15.72±2.68 for self-efficacy, 9.47 for cues to action, and 1.65 for internal cues to action.

The results showed a significant relationship between walking performance, and perceived susceptibility (r=0.136 and p=0.007), and motivation (r=0.120 and p=0.016). There was a direct relationship between nutritional performance, perceived susceptibility (r=0.068and p=0.003), and self-efficacy (r=0.039 and p=0.042); however, it had a significant inverse relationship with perceived barriers (r= -0.047 and p=0.05) (Table 2).

Table 2: The relationship of HBM structures with nutritional and walking performance of the participants

		Nutritional performance	Walking performance
Perceived susceptibility (0 - 16)	r	0.068	0.136
	p	0.003	0.007
Perceived severity (0 - 24)	r	0.047	0.026
	p	0.351	0.599
Perceived benefits (0 - 32)	r	0.029	0.012
	p	0.557	0.818
Perceived barriers (0 - 28)	r	-0.047	0.077
	p	0.050	0.121
Motivation (0 - 16)	r	0.005	0.120
	p	0.913	0.016
Self-efficacy (0 - 20)	r	0.039	0.026
	p	0.042	0.607
Internal cues to action (0 - 12)	r	0.008	0.040
	p	0.873	0.423
Knowledge (0 - 23)	r	0.003	0.047
	p	0.953	0.349

The subjects' external cues to action for nutritional behaviors to prevent osteoporosis include family 283 (70.6 %), books 171 (42.6 %), magazines and periodicals 134 (33.4 %), doctors and health care workers 100 (24.9 %), TV 96 (23.9 %), patients with osteoporosis 20 (5%), and Internet 6 (1.5%). Multivariate linear regression was used to predict how the subjects' performance can be predicted by the HBM constructs and other variables.

Generally, the variables predicted 29.1% of the variance in walking behavior and 20.2% of the variance in nutritional behavior for prevention of osteoporosis.

In addition, motivation had the highest predictive power for walking behavior, and perceived susceptibility had the highest predictive power for nutrition behavior (Table 3).

Table 3: Regression analysis of factors associated with nutritional and walking performance to prevent osteoporosis among women in Fasa

Variables	Dependent variable	P	B	Beta	Dependent variable	P	B	Beta
Occupation		0.122	0.794	0.086		0.249	-0.685	-0.063
Education		0.473	-0.026	-0.040		0.685	-0173	-0.022
Marital status		0.280	-0.066	-0.056		0.382	-0.621	-.044
Age		0.044	-0.05	-0.106		0.365	-0.29	-0.046
BMI		0.909	0.005	0.006		0.012	-0.134	-0126
Perceived susceptibility	Nutritional performance (R^2=20.2, R^2 Adjusted= 0.001)	0.020	0.10	0.085	Walking performance	0.007	0.252	0.137
Perceived severity		0.224	0.047	0.064		0.340	-0.043	-0.049
Perceived benefits		0.478	-0.02	-0.036	(R^2=29.1,	0.810	0.10	0.012
Perceived barriers		0.613	-0.01	-0.026	R^2 Adjusted=	0.366	-0.031	-0.046
Motivation		0.780	-0.02	-0.014	0.047)	0.009	0.235	0.132
Self-efficacy		0.445	-0.05	-0.040		0.583	0.040	0.028
Internal cues to action		0.807	0.026	0.013		0.304	-0125	-0.053
Knowledge		0.928	-0.007	-0.005		0.500	0.058	0.034

Discussion

This study showed that age, number of births, occupation, education and breastfeeding are associated with nutritional performance; and BMI and history of osteoporosis are associated with walking performance. These variables are important factors in the pathogenesis of osteoporosis and the prevention of the disease behaviors. The mentioned relationships are caused by lifestyle, nutritional status, and economical factors affecting bone density in women.

This is consistent with the results of Lesan [23], Hatamzadeh [24], Sayed-Hassan [25], Hsieh [26] and Chang [27]. The results of this study showed no significant relationship between nutritional performance, walking performance, marital status, smoking, history of osteoporosis in family, history of special diseases, record of bone densitometry, and the average household income. This is consistent with the results of Hatamzadeh [24] and Sayed-Hassan [25]. Also the results of Lesan [23] showed no significant relationship between marital status, family history of osteoporosis and nutrition performance for

prevention of osteoporosis.

In this study, the women had a moderate performance in nutritional and walking exercise performance for osteoporosis prevention. The results of this study are consistent with other research findings [23, 28, 29]. The relatively good performance of women can be attributed to their high level of education. On the other hand, 30- to 50-year old women play a key role in managing the health of their families, and are mainly responsible for cooking for their family. They mostly have good physical condition for exercise.

Performance (nutrition and walking exercise) had a significant relationship with the subjects' perceived susceptibility. They felt susceptible to osteoporosis. In Doheny, the subjects had higher perceived susceptibility for BMD test [30]. In Edmonds' study, the individuals had low perceived susceptibility for calcium intake [31]. According to this model, by adoption of preventive behaviors, individuals must first be alarmed by the fact that when the person is convinced that he/she is responsible for the change, he/she will gain motivation to continue the program. People will be successful in preventing osteoporosis provided they have motivation to create change, and maintain appropriate behavior. In this study, there was a significant relationship between people's walking behavior and motivation. Baumeister's study pointed to the important role of motivation and self-regulation in improving a behavior [32]. The literature review by McLeod introduces motivation as an effective and important factor that improves behavior to prevent osteoporosis [33].

This study showed that the higher the subjects' self-efficacy, the better their nutritional practice. The findings of Rachelle, who examined the relationship between health beliefs in postmenopausal women and their osteoporosis prevention behaviors, showed that self-efficacy is positively associated with calcium intake [34]. Hsieh's study also found a significant relationship between nutritional performance and self-efficacy [26] because it has been shown that self-efficacy in overcoming barriers and resistance against them may be important factors of adopting healthy nutritional behaviors in women. Self-efficacy or the belief that women's perception of their ability to adhere to a proper diet causes the desired behavior to be useful.

In this study, there was an inverse association between nutritional performance and perceived barriers. In other words, the higher the perceived barriers, the worse the nutritional performance. Among the main obstacles in adopting healthy nutritional behaviors are the cost and availability of calcium-containing foods. With the increasing price of dairy products following the "subsidies", the

possibility of using these materials for the general population has been decreased.

Sayed-Hassan found that nutritional behavior and perceived barriers were significantly associated [25], but Edmonds found little perceived barriers to calcium intake [31].

In this study, the studied population received most of their external cues to action from their families. Family has an influential role as a source of information and support for correcting eating behaviors and exercises, and provides necessary resources and guidance for bone densitometry.

In general, the Health Belief Model (HBM) constructs predicted 29.1% of the variance in walking behavior and 20.2% of the variance in dietary behavior for prevention of osteoporosis. In Hyejin's study on female students, the HBM constructs predicted 6.7% of the variance in behavior for prevention of osteoporosis [35]. In another study conducted on students in Yazd, the HBM structures predicted 29% of the variance in behavior [36]. Hence, we can say that the HBM structures can be used as a reference framework for designing educational interventions to teach preventive behaviors of osteoporosis in women. Other studies also showed the effectiveness of HBM in prevention of osteoporosis [37, 38].

This study showed that perceived susceptibility and motivation are important predictor variables for walking and eating behaviors to prevent osteoporosis.

Based on the HBM, when people feel they are at risk of a disease, they have a better performance in preventive behaviors. Doheny's results showed that perceived susceptibility was an important predictor variable for the behaviors such as exercise [30]. Family and friends, and their provision of appropriate information and tools play an important role, and have positive effects on various aspects of self-care and self-regulatory activities.

In many other studies in the field of health behavior, the role of external support and incentives was positive [30, 39, 41, 42]. Reminders from other people, subjective norms and significant others had positive impact on the women's behaviors, and encouraged them to carry out osteoporosis prevention behaviors.

Conclusions

Due to the sensitivity and vulnerability of women and the importance of social support and self-regulation behavior, the need for providing a fundamental solution and proper planning to prevent osteoporosis is felt. Providing educational programs in this regard for family members, physicians and other health personnel and also offering training programs in radio and television broadcasting are essential.

One of the limitations of the study is that its findings are for 30-50-year-old women referring to the health centers in Fasa, and cannot be

generalized to all women, especially older women who have a higher rate of osteoporosis.

Conflicts of interest

Khani Jeihooni A, Hidarnia A, Kaveh M H , Hajizadeh E and Askari A declare that they have no conflict of interest.

References

[1] Brown VP, Josse RG. Clinical practice guidelines the diagnosis and management of osteoporosis in Canada. CMAG 2002; 107: 1-34.

[2] Shari M, Sarah S. The silent thief: osteoporosis and women's health care across the life span. Health Soc Work 2006; 31(1): 44-53.

[3] Cohen AJ, Roe FJ. Review of risk factors for osteoporosis with particular reference to a possible etiological role of dietary salt. Food Chem Toxicol 2000; 38(2-3): 237-53.

[4] Bayat N, Haji Amin iZ, Ali Shiri GH, Ebadi A, Hosseini MAS, Lalouei A. Frequency of osteoporosis and osteopenia in post-menopausal military family's women. J Army Univ Med Sci I.R. Iran 2008; 6(1): 25-30. [n Persian]

[5] Naemi S, Sadaghat L. Study of knowledge and practice of physiotherapists toward osteoporosis in Tehran in1999-2000. J Res Med Sci 2003; 27(1): 57-62.

[6] Raklyar I, Erlikh I, Pantone V, Bahtiyar G, Chandler L, Pabon L, Choudhry S, Ghadiri N, Gosukonda P, Muniyappa R, von-Gicyzki H, McFarlane SI. Differential effect of obesity on bone mineral density in white, Hispanic and African women: A cross sectional study. Nutr Metab (Lond) 2005; 2: 9.

[7] Shirazi KK, Wallace LM, Niknami S, Hidarnia A, Torkaman G, Gilchrist M, Faghihzadeh S. A home-based, trans-theoretical change model designed strength training intervention to increase exercise to prevent osteoporosis in Iranian women 40-65 years: A randomized controlled trial. Health Educ Res 2007; 22: 305-17.

[8] Scott J. Danforth's Obstetrics & Gynecology. 8th ed. Philadelphia: Lippincott Co. 2003; p: 682-4.

[9] Gangar EA. Gynecological nursing, a practical guid. Philladelphia: Churcill Livingstone 2001; p: 32-3.

[10] Khorsandi M. Shamsi M, Jahani F. The effect of education based on Health Belief Model about prevention from osteoprosise among pregnant mother refer to Arak health centers. Daneshvar Med 2011; 18(89):1-10. [In Persian]

[11] Pajouhi M, Komeylian Z, Sedaghat M, Baradar Jalili R, Soltani A, Larijani B. Efficacy of educational pamphlets for improvement of knowledge and practice in patients with osteoporosis. Payesh Health

Monit 2004; 3: 67-74. [In Persian]

[12] Adinepour A, Tohidi M, Dabbaghmanesh M, Jafari P, Fattahi M, Ranjbar Omrani Gh. Prevalence of osteoporosis in rural men of Fars based on both local and WHO reference data. Iran J Endocrinol Metab 2010; 12(4): 393-400.

[13] Khani Jeihooni A, Hidarnia A.R, Kaveh M.H, Hajizadeh E, Babaei Heydarabadi A, Nobakht Motlagh BF, Hemati R. Prevalence of osteoporosis and its related factors in women referred to Fasa`s densitometry center. J Ilam Univ Med Sci 2013; 21: 150-8. [In Persian]

[14] Sarah L, Morgan MD. Calcium and vitamin D in osteoporosis. Rheum Dis Clin North Am 2001; 27: 101-30.

[15] Borer KT. Physical activity in the prevention and amelioration of osteoporosis in women: Interaction of mechanical, hormonal and dietary factors. Sports Med 2005; 35(9): 779-830.

[16] Kelley GA, Kelley KS, Tran ZV. Resistance training and bone mineral density in women: A meta-analysis of controlled trials. Am J Phys Med Rehabil 2001; 80: 65-77.

[17] Azam B, Jan ER, John AE, Tuan VN." Psychometric properties of the Persian version of the osteoporosis knowledge and health belief questionnaires". Maturitas 2005; 50: 134-9.

[18] Sedlak CA, Doheny MO, Estok PJ, Zeller RA. Tailored intervention to enhance osteoporosis prevention in women. Orthop Nurs 2005; 24(4): 270-6.

[19] Turner LW, Hunt SB. DiBrezzo R, Jones, C. Design and implementation of an Osteoporosis Prevention Program using the Health Belief Model. AJHS 2004; 19(2): 115-22.

[20] Ryan P. Integrated theory of health behavior change: Background and intervention development. Internet J Adv Nurs Pract 2008; 23(3): 161-70.

[21] Sharma M, RomasI. Theoretical foundations of health education and health promotion. Sudbury: Jones and Bartlet, 2010.

[22] Cook DA, Beckman TJ. Current concepts in validity and reliability for psychometric instruments: Theory and application. Am J Med 2006; 119(2): 7-16.

[23] 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.

[24] Hatamzadeh N, Jalilian F, Emdadi S, 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, Tabriaz, Iran, 2011. [In Persian]

[25] 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.

[26] 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.

[27] 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.

[28] Mossalanejad L, Shahsavari S. Calcium intake and bone mineral densitomery in patient referring to Shiraz bone densitometry center. J Rafsanjan Univ Med Sci 2005; 4(3): 146-51. [In Persian]

[29] Hernandez-Rauda R, Martinez-Garcia S. Osteoporosis-related life habits and knowledge about osteoporosis among women in El Salvador: A cross-sectional study. BMC Musculoskelet Disord 2004; 5: 29.

[30] Doheny MO, Sedlak CA, Hall RJ, Estoke PJ. Structural model for osteoporosis preventing behavior in men. Am J Mens Health 2011; 6(1): 25-32.

[31] Edmonds E, Turner LW, Usdan SL. Osteoporosis knowledge, beliefs, and calcium intake of college students: Utilization of the health belief model. Open J Prev Med 2012; 2(1): 27-34.

[32] Baumeister Roy F, Vohs Kathleen D. Self-regulation, ego depletion, and motivation. Soc Personal Psychol Compass 2007; 1(1): 115-28.

[33] Mcleod KM, Johnson SC. A systematic review of osteoporosis health beliefs in adult men and women. J Osteoporos 2011; 7(3); 76-82.

[34] Rachelle A. The relationship of calcium intake and exercise to osteoporosis health beliefs in postmenopausal women. Res Social Adm Pharm 2008; 4(2): 153-63.

[35] 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(2): 111-20.

[36] Mazlumi MS, Ruhani TN. The study of factors related to oral self-care with Health Belief Model in Yazds' high school students. J Birjand Univ Med Sci 1999; 3: 40-8. [In Persian]

[37] Sanaeinasab H, Tavakoli R, Karimizarchi A, Amini ZH, Farokhian A, Najarkolaei FR. The effectiveness of education using the health belief model in preventing osteoporosis among female students. East Mediterr Health J 2014; 19(Suppl 3):

S38-44.

[38] Laslett LL, Lynch J, Sullivan TR, McNeil JD. Osteoporosis education improves osteoporosis knowledge and dietary calcium: Comparison of a 4 week and a one-session education course. Int J Rheum Dis 2011; 14(3): 239-47.

[39] Wolf ME. An evaluation of an exercise adherence intervention using the social cognitive theory, The Ohio State University, 2008.

[40] Giangregorio L, Papaioannou A, Thabane L, DeBeer J, Cranney A, Dolovich L, Adili A, Adachi JD. Do patients perceive a link between a fragility fracture and osteoporosis? BMC Musculoskelet Disord 2008; 9 (1): 38.

[41] Giangregorio L, Dolovich L, Cranney A, Adili A, Debeer J, Papaioannou A, Thabane L, Adachi JD. Osteoporosis risk perceptions among patients who have sustained a fragility fracture. Patient Educ Couns 2009; 74(2): 213-20.

[42] Wen LK, Shepherd MD, Parchman ML. Family support, diet, and exercise among older Mexican Americans with type 2 diabetes. Diabetes Educ 2004; 30(6): 980-93.