



## Educational Program and Osteoporosis Preventive Behaviors among a Sample of Iranian Women

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### ABSTRACT

**Aims:** Osteoporosis is a well-known public health problem that can be prevented, but it can lead to patients' disability and imposes a high financial burden on individuals and the community. Osteoporosis is a disease in which lifestyle play an important role in it's' prevention. The purpose of this study was to investigate the effect of an educational intervention on osteoporosis prevention among women over 40 years old referred to the Iranian Rheumatism Center.

**Method and Instruments:** The present study is a semi-experimental research, in which 67 women were selected convenience sampling method and non-random assignment. The training program was designed based on literature review and need assessment and implement by lecture and responded to the participants' questions. Data were collected by a questionnaire which was completed before the intervention and one month after the intervention and analyzed through descriptive/ analytical Spss16 tests.

**Findings:** Totally 67 eligible women took part in the study and completed the questionnaire. After intervention, there were significant improved knowledge ( $P = 0.001$ ), physical activity ( $P = 0.022$ ), calcium consumption ( $P = 0.001$ ), exposure time in sunlight ( $P = 0.035$ ). Moreover, there was a significant difference between the two groups. 94.1% of the hand and face were exposed to sunlight before the intervention, but after intervention 45% of the legs and trunk were exposed to sunlight.

**Conclusion:** This study showed that educational program, could increase the preventive behaviors of osteoporosis in women and help reduce musculoskeletal pain in them.

**Keywords:** Educational intervention, Osteoporosis, Preventive behavior

### Introduction

Osteoporosis is a most common chronic disease that is associated with bone loss [1] and break apart [2]. Although this problem is preventable and curable, it leads to disability in addition to costly physical and musculoskeletal problems [3]. The World Health Organization (WHO) has declared osteoporosis could be associated with cancer, stroke and cardiovascular disease as the main human factor in the world [4].

The risk of death from the disease during a woman's life is equal to the risk of breast cancer mortality [5]. In By 2020, approximately 61 million people in the world will suffering from osteoporosis or

bone loss [6]. Recent statistics in Iran indicate that 4.8% of men and 7.7% of women live with osteoporosis. The statistics show that about two million people are at risk of osteopeneconversion [7]. Osteoporosis is a constantly growing disease that has affected more than 200 million people around the world [8].

Osteoporosis risk factors include lack of exercise, cigarette smoking, excessive consumption of caffeine [9], skeletal size, alcohol consumption, estrogen reduction, early menopause (before age 40), and physical inactivity [10,11]. Inadequate intake calcium / vitamin D and family history of osteoporosis [9].

Osteoporosis is not a sign of

age. In fact, it is an old age-related illness that begins with anxiety [12]. Breast-feeding is the most important corrective factor in the development and maintenance of bone mass and prevention / treatment of osteoporosis. About 80% to 90% of the bones are made up of calcium and phosphorus minerals [13]. Vitamin D also absorbs calcium from the intestines and reabsorbs it by the kidneys. The main function of vitamin D is maintenance of calcium and phosphorus in the normal range, which results in health of nervous system, maintaining bone density and muscle contraction. The sun is the most important source of vitamin D, which can be part of prevalence of osteoporosis in women in different parts of Iran [5].

Epidemiological, clinical and experimental studies on exercise also indicate that physical activity and regular exercise are vital to maintaining bone mass and physical strength. Unfortunately, a large proportion of the population in Iran and many countries do not have physical activity [14].

In a previous study regarding the effects of osteoporosis preventive physical activity on increasing muscle and balance of 40-50 years old women showed after intervention, knowledge, physical activity, muscle strength, dynamic balance, a, the level of calcium intake and quality of life of women [14].

In the study by Shakeel (2010), which was conducted on 61 women regarding knowledge and prevention of osteoporosis, it was shown that knowledge of pre-emptive prophylaxis was increased after educational intervention [15].

In another study with the aim of investigating the relationship between health beliefs of osteoporosis in menopause and its effect on calcium intake and exercise, it was shown that two behaviors were highly effective

in preventing osteoporosis are calcium consumption and exercise [16].

In many studies, doing osteoporosis preventive behaviors has been reported by variables such as age, education, family income, and support for friends and family, family history of osteoporosis, occupation, belief, mass media and prevention information [15-17]. Today, it is believed practicing preventive behaviors such as physical activity, nutrition and vitamin D intake from sunlight have significant effects on the prevention of osteoporosis and also promotion and maintenance of health [22]. Based the importance of the osteoporosis prevention, this study aimed to investigate the educational impact of educational interventions on preventive behaviors of women aged over 40 years old.

### Method and Instruments:

This study is a semi-experimental research. The statistical population of this study was all women over 40 years of age who referred to Iran Rheumatism Center. The eligible women record and selected by convenience sampling method and non-random assignment. To do this, during 10 working day 67 people who referred to the Iran Rheumatism Center and meet the criteria for entry to the study including (being aged over 40 years, willingness to participate in the study, not suffering from any disability or mental problem and also any organ defect were recorded. However the women who referred to the center for measuring bone density were excluded from the study. Sample size was confirmed based on previous studies Rhein study (ref) through following formula.

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 pq}{d^2} = \frac{1.96 \times 20\% \times 80\%}{(0.05) \times (0.05)} = \frac{(1.96)^2 \times (0.16)}{0.0025} = 245$$

$$n = 245 \times 0.25 = 61.25$$

$$61.25 \times 0.10 = 6$$

$$61 + 6 = 67$$

Based on the above formula, the sample size was estimated to be 61.25 and the needed additional sample (as 10 percent), the final sample was calculated as 67 women. To do the study, the first of all, the goals and procedures of the study, were explained for the participants and then the pretest was done by distributing the questionnaires among the participants. Then the educational intervention was designed based on literature reviews and also the need assessment which was done from 25 women similar target group. This educational program included educational cognitional content and training skills which were educated and practiced through lecture, role play and behavior practicing with the participants. Furthermore, educational pamphlet and poster which were distributed among participants and where the participants examined. Pamphlet's educational content includes: introduction to osteoporosis, the importance of osteoporosis, risk factors for osteoporosis, signs and symptoms of osteoporosis, osteoporosis prevention through healthy nutrition and physical activity along with two suggested diets for calcium intake per day and the ways for vitamin D building / consuming. Through telephone counseling the questions of the participants were responded. After 1 month all participants were contacted and the post test questionnaires were completed through telephone calling.

The questionnaire includes two parts. The first part included demographic characteristics and the second part consists of 4 questions about knowledge, 15 questions about behaviors such as drinking tea, smoking, salt in taking, exposure to sunlight, physical activity and doing physical activity. The sources of calcium intake were specified on the number of times they consumed the

nutrient food per day. For the preventive behaviors, grades 1 through 3 were considered as undesirable to very desirable behavior. The expert panel evaluated the validity of the questionnaire through content validity. Test - retest was done to measure the reliability of the questionnaire. In addition to the descriptive statistics, the paired t-test was used to compare the knowledge and behavior score between before and after intervention. This division is performed according to the normal distribution curve and the use of the formula ( $\mu \pm 1\delta$ ). To analyze the prophylactic treatment of osteoporosis to calcium food intake during the day to mg and exercise minutes per week was calculated.

### Findings

Totally 67 eligible women took part in the study and completed the questionnaire. Demographic characteristics of the participants are presented in Table 1. Table 2 shows and compares the knowledge rates of the participants before and after intervention. This comparison shows significant knowledge improvement after intervention ( $P < 0.05\%$ ). The frequency of daily physical activity of the participants at two time points of the study are shown in Table 3. According to this Table, physical activity was improved after intervention significantly ( $P < 0.05\%$ ). Daily calcium intake was compared between before and after intervention in Table 4 which improved significantly after intervention ( $P < 0.05\%$ ). Table 5 shows the duration of exposure to direct sunlight at two time points of the study. This finding revealed that more participants increased their sunlight duration after intervention ( $P < 0.05\%$ ). Furthermore, more participants after intervention exposed whole body to sunlight ( $P < 0.05\%$ ).

**Table1.** Distribution of demographic characteristics of the participants

variables	Number	percent
Age		
Less than 50	14	20.9
51-60	35	52.2
more than60	18	26.9
BMI		
Slim	2	3
Normal	24	35.8
Overweight	21	31.3
Obese	20	29.9
Education		
Illiterate	3	4.5
Elementary	11	16.4
Guidance	6	9
Diploma	26	38.8
Academic	21	31.3
Marital status		
Married	61	91
Single	6	9
Occupational Status		
-	-	-
Housewife	43	64.2
Employee	7	10.4
Retired	17	25.4
Family history of osteoporosis		
Yes	43	64.2
No	20	29.9
Osteoporosis		
Yes	38	71.7
No	15	28.3

**Table 2.** Comparison of knowledge rate of the participants at two time points of the study

	Before intervention		After intervention	
Knowledge	Number	Percent	Number	Percent
Very good	34	50.7	56	90.3
Well	22	32.8	6	9.7
Medium	8	11.9	-	-
Poor	3	44.5	-	-
Very weak	-	-	-	-
Total	67	100	62	100
Mean	3.37		3.90	
Standard Deviation	0.814		0.298	
Paired t-test	T=-6.033		P=0.001	

**Table 3.** Comparison of physical activity at two time points of the study

	Before intervention		After intervention	
Physical Activity	Number	Percent	Number	Percent
Less than 3 times /week	5	17.2	7	13.2
Three to seven times /week	19	65.5	40	75.5
More than three hours /week	5	17.2	6	11.3
Total	29	100	53	100
Average	2		2.19	
Standard Deviation	0.620		0.483	
Paired t-test	P=0.022		T=-2.431	

**Table 4.** Comparison of calcium intake (mg) daily at two time points of the

	Before intervention		After intervention	
Calcium intake (mg)	Number	Percent	Number	Percent
Less than 500	17	25.4	3	4.8
500 to 1000	42	62.7	22	35.5
More than 1000	8	11.9	37	59.7
Total	67	100	62	100
Average	670.5		1133.4	
Standard deviation	259.3		390.2	
Paired t-test	T=-10.659		P=0.001	

**Table 5.** Comparison of exposure duration to sunlight at two time points of the study

Time	Before intervention		After intervention	
	Number	Percent	Number	Percent
Time exposure to the sun				
Daily less than 15 minutes	9	26.5	9	15
Daily 30-15 minutes	19	55.9	44	73.3
Weekly 30-15 minutes	6	17.6	7	11.7
Total	34	100	60	100
Average	2.35		2.73	
Standard deviation	0.848		0.741	
Paired t-test	T=-3.186		P=0.035	

**Table 6 .** The surface of body exposure to sunlight at two time points of the study

	Before intervention		After intervention	
	Number	Percent	Number	Percent
Body exposure to sunlight				
Hand and face	32	94.1	33	55
Legs and trunk	2	5.9	27	45
Total	34	100	60	100

## Discussion

The present study showed that the educational intervention caused preventive behaviors among the studied women. In this study, the mean score of women's knowledge about osteoporosis has increased. Although the recognition of the disease is not sufficient to change the related health behavior, the knowledge of most of the units was very good, but did not actually do well for the prevention of osteoporosis. Nevertheless, raising the knowledge is necessary for the success of preventive efforts. In the studies of Francis, Huang and Shik about osteoporosis, it was

shown that after the intervention, the level of knowledge in the experimental group was significantly increased [23, 24]. Also, studies conducted by Khorsandi and co-workers have also increased the awareness of the participants that are consistent with the results of this study [25,26].

In the present study, it was revealed that the physical activity (three times a week every 20-20 minutes) has increased after intervention. In a study by Karimzadeh who aimed to increase muscle and cognitive abilities of women aged 65-40, it was declared that increasing knowledge of the participants regarding



osteoporosis prevention caused improved physical activity, muscular strength in the lower extremities, and quality of life of women [14]. Although, the frequency and duration of physical activity (walking) increased in the intervention group, the incidence rate of doing this behavior did not reach the desired level [27]. In Huang studies, resilience and, consequently, increased physical activity in the intervention group were reported that are in agreement with the results of the study [24].

The results show that calcium intake increased after intervention. In the study of Karimzadeh Shirazi, calcium dietary intake increased after intervention [14]. Soum and co-workers also showed that after intervention calcium intake has grown in their research [28, 29, 30] that are consistent with the findings of the present study. According to the above-mentioned studies and the present study, it can be concluded that educational intervention has led to an increase in calcium intake.

Considering the increase in calcium intake in some of the study population, this study is still inadequate, because reports from the ministry of health indicate that per capita consumption of calcium intake in Europe is 300 to 400 kg per year, but in Iran, per capita consumption of milk is 90 kg per person per year [5]. Of course, it should be noted that this amount was related to the time when the inflation was not high and people that high income. According to a qualitative study in this study, most farmers declared the reasons for not drinking milk, and in particular dairy products, because of the price of these products and their low quality. Paying attention to these problems and especially the financial problems of people need to plan national strategies to eliminate this barrier.

The results show that before exposure to the intervention, women were less exposed to sunlight, but after the intervention, the legs and feet were exposed to light. Given the lack of vitamin D, according to studies [17], sunlight can be one of the best sources of vitamin D.

However, the barriers to sunlight exposure are factors like , housing in apartment houses, and housekeeping. Thus, with all these issues, Exposure of whole body to direct sunlight for 15 minutes per day is strongly recommended.

## Conclusion

This study showed that educational program, could increase the preventive behaviors of osteoporosis in women and help reduce musculoskeletal pain in them.

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## Author's contribution:

**Ethical permission:** This study approved by ethicscommitteeofTarbiatModaresUniversity

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## References

1. Cortet B, Blotman F, Debiais F, Huas D, Mercier F, Rousseaux C, et al. Management of osteoporosis and associated quality of life in post menopausal women. *J Headache Pain*. 2011; 12(1):7.[ DOI: 10.1186/1471-2474-12-7 ]
2. Burge R, Dawson-Hughes B, Solomon DH, Wong JB, King A, Tosteson A. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *J Bone Miner Res*. 2007; 22(3):465-75. doi:10.1359/jbmr.061113
3. Moosavi H, Mirkarimi Z. Osteoporosis. *J Res Dev Nurs Midwifery*. 2006; 2(3): 46-52.
4. Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J. *Harrisons principles of internal medicine*. 18th ed. NEW YORK: McGraw-Hill CO 2012; 6(1):312.
5. Bagheri P, Haghdoust A, Dortaj Rabari E, Halimi L, Vafaei Z, Farhangnia M, Shyan L. Ultra analysis of prevalence of osteoporosis in Iranian women. *Int J Endocrinol Metab*. 2011; 13(3): 315-25
6. National Osteoporosis Foundation (NOF). *Physician's guide to Prevention and treatment of osteoporosis*. Washington: DC 2002.

7. Osteoporosis Research Center. [Osteoporosis (Persian)] [Internet]. 2011. [Cited 2012 October 5]. Available from: <http://emri.tums.ac.ir/pages/mainpage.asp?I=S10M5P2C1>
8. Schurman L, Bagur A, Claus-Hermberg H, Messina OD, Negri AL, Sánchez A, 'et al'. Guidelines for the diagnosis, Prevention and treatment of osteoporosis, 2012. *Medicina* 2013; 73(1): 55-74.
9. Lesan Sh. Mirhaidari Z. Setodeh G. Khajeh-nasiri F. Kohdani F. Cross-sectional study of dietary habits and behaviors associated with osteoporosis in women teachers. *Hayat J.* 2010; 16(3,4): 86-94.
10. Ghafari M. Tavassoli E. Esmailzadeh A. Hasanzadeh 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 Serv Res.* 2010; 6(4): 714.
11. Delshad M. H., Tavafian S. S., Anoshirvan Kazemnejad. Determinants of Stretching Exercise Behavior among Office Employees using Health Promotion Model with Added Constructs. *J Liaquat Uni Med Health Sci.* 2019; 18 (02): 152-9. doi: 10.22442/jlums.191820619.
12. Ivory DM, Siva C, Velázquez C, Abdinoor AA . Screening for Male Osteoporosis at an Academic Medical Center: retrospective analysis of DXA usage Patterns over 5 years. *Am J Mens Health.* 2012; 6(1): 67 – 70.
13. Ilich J, Kerstetter J. Nutrition in Bone Health Revisited: A Story Beyond Calcium Nutrition in Bone Health Revisited: A Story Beyond Calcium. *J Am Coll Nutr.* 2000; 19(6): 715 –37.
14. Karimzadeh Shirazi K, Niknami Sh, Heydarnia A, M. Valas Torkman g, Faghihzadeh S. Effects of a TTM – based osteoporosis preventive physical activity education, on increasing muscle strength and balance in women aged 40-65. *Hakim Res J.* 2007; 10 (2): 34-42.
15. Shakil Amer, Gimpel Nora E, Rizvi Hina. Awareness and Prevention of Osteoporosis Among South Asian Women. *J Community Health.* 2010; 35: 392–7.
16. Swaim RA, Barner JC, Brown CM. The relationship of calcium intake and exercise to osteoporosis health beliefs in Postmenopausal women. *Res Social Adm Pharm J.* 2008; 4(2): 153-63.
17. Levers-Landis CE, Burant C, Drotar D, Morgan L, TraPl ES, Kwok CK. Social Support, Knowledge, and Self-Efficacy as Correlates of Osteoporosis Preventive Behaviors Among Preadolescent Females. *J Pediatr Psychol.* 2003; 28 (5): 335-45.
18. Alexandraki Krystallenia I , Syriou Vassiliki, Ziakas Panayiotis D, Apostolopoulos Nikolaos V, Alexandrakis Antonios I, Piperi Christina . The knowledge of osteoporosis risk factors in a Greek female population. *Maturitas .* 2008; 59: 38–45.
19. Babamohamadi H, Askari majdabadi H, kahooie M. Education based on health behavior about enabling volunteer health workers in Preventive from Osteoporosis. *Daneshvar Shahed Univ J.* 2005; 59: 18.
20. Khorsandi M. Shamsi M. Jahani F. The effect of education based on health belief model on osteoporosis preventive behaviors among pregnant women in arak city. *Daneshvar J.* 2010; 18(89): 23-32.
21. Mossalanejad L, Shahsavari S. Calcium intake and bone mineral densitometry in Patient referring to Shiraz bone densitometry center. *J Rafsanjan Univ Med Sci.* 2005; 4(3): 146-51.
22. Mahamed F. Karimzadeh Shirazi K. Pourmohamadi A. Mossavi AM. The effects of education on preventive behaviors toward osteoporosis based on behavior intention model (BIM) on female students. *Armaghane J.* 2009; 14(2): 117-25.
23. Francis K. L, Matthews B. L , Van Mechelen W , Bennell K. L , Osborne R. H. Effectiveness of a community-based osteoporosis education and self-management course: a wait list controlled trial. *Osteoporosis Int.* 2009; 20: 1563–70.
24. Huang CM, Su CY, Chien LY, Guo JL. The effectiveness of an osteoporosis prevention program among women in Taiwan. *Appl Nurs Res J.* 2010; 24(4): 29-37. d trial.
25. Nejati S, Rasoulzadeh N, Sadighiyani A. The effectiveness of education of prevention of osteoporosis among high school female students. *Hayat J.* 2009; 15: 59-65.
26. Kamjoo A, Shahi A, Dabiri F, Abedini S, Hosseini Teshnizi S, Pormehr Yabandeh A. The effectiveness of education about osteoporosis prevention on awareness of female student. *Hormozgan Med J.* 2012; 16(61): 60.
27. Tarshizi L, Anoooshe M, Ghofranipour F, Ahmadi F, Houshyarrad A. The effect of education based on health belief model on preventive factors of osteoporosis among postmenopausal women. *Iran J nurs.* 2009; 22: 71-82.
28. Cavalieri T.A, Brecher L.S, Pomerantz S.C, Snyder B.A, Janora D.M, Klotzbach-Shimomura K.M. Osteoporosis Prevention Project: A model multidisciplinary educational intervention. *J Am Osteopath Assoc.* 2002; 102(6): 327-35.
29. Sedlak CA, Doheny MO, Estok PJ, Zeller RA. Tailored intervention to enhance osteoporosis prevention in women. *Orthop Nurs J.* 2005; 24(4): 270 – 8.
30. Schrader S, Blue RE, horner A. Better Bones Buddies: An Osteoporosis Prevention Program. *j sch nurs.* 2005; 21(2): 106-14.