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Design and Implementation of Educational Interventions to Empower Female Students to Prevent Osteoporosis

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ABSTRACT

Introduction: Osteoporosis is a chronic disease which influences the life of people considerably, especially the women. Most women are not aware that osteoporosis is preventable. Although there is a higher risk of osteoporosis in postmenopausal women, but bone loss can begin at the age of 35. This research was conducted to design and implement educational interventions to empower female students to prevent osteoporosis.

Methods: This interventional study was a controlled trial. This study was conducted on female students of Shahrekord Islamic Azad University. A two-stage stratified random sampling was used for recruiting samples. The sample size was set at 150 (75 interventions and 75 controls). A demographic questionnaire and a self-made questionnaire of self-empowerment for the prevention of osteoporosis were used to collect information. Data were collected before the intervention and three months after the intervention. The educational intervention was conducted in two months with eight education sessions. For statistical analyses, the SPSS software version 23 was used.

Results: The mean age of the intervention group was 20.69 ± 2.24, and the control group was 20.29 ± 2.04, besides, there was no significant difference between the two groups (P= 0.26). The test indicates a significant difference in mean variance of the intervention group compared to mean variance of the control group in knowledge (P< 0.001), attitude (P< 0.001) and self-efficacy (P= 0.006). The difference in mean variance of the intervention group compared to the mean variance of the control group was not significant in life skills (P= 0.23).

Conclusion: The results generally reflect the effect of educational interventions in improving the abilities of female students to prevent osteoporosis. It is suggested to design and implement educational programs to empower women to prevent osteoporosis.

Keywords: Osteoporosis, Preventive, Knowledge, Attitude

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Introduction

Health is a huge investment in life [1]. Osteoporosis is a chronic disease which considerably influences the life of people, particularly women [2]. Osteoporosis is a chronic, progressive disease and a systemic skeletal disease that decreases bone density and bone tissue microstructure [3, 4]. The World Health Organization (WHO) estimates more than 2.5 standard deviations in BMD of young women as osteoporosis [5]. One of the important factors of osteoporosis is the lack of bones in childhood and adolescence [6]. Although achievement of peak bone mass usually begins in utero and completes at age 40, the greatest amount of bone mass is achieved in adolescents and young adults [7].

Studies have shown that over 200 million people worldwide have osteoporosis [8, 9]. The National Osteoporosis Foundation in 2014 estimated that 54 million adults aged 50 and older in the United States suffer from low bone mass and osteoporosis [3]. In Brazil, the number of osteoporotic fractures of the femoral head per year is 127 thousand which is estimated to increase to 140 thousand by 2020 [10]. In Thai women between the ages of 40 and 80, about 20% suffer from osteoporosis in the lumbar spine, and 14% suffer from osteoporosis of femoral head [11]. It is estimated that almost 13 million people in Japan suffer from osteoporosis [12]. Meanwhile, women are almost four times more susceptible than men [13, 14].

About half the population of women over the age of 50 is likely to develop osteoporosis [15]. Approximately in all three postmenopausal women, one person develops osteoporosis [13]. In Iran, osteoporosis is highly prevalent [16]. According to data, the number of people with osteoporosis is more than 6 million in Iran [17]. According to WHO reports, osteoporotic fractures lead to 2.8 million DALY (disability adjust life year) per year [13, 18]. In addition to the financial burden, osteoporosis has a significant impact on the quality of life and affects the social and psychological characteristics of individuals [19].

Most women are not aware that osteoporosis is preventable. Therefore, it is essential to develop a plan for the prevention of osteoporosis. Although there is a higher risk of osteoporosis in postmenopausal women, bone loss can begin at the age of 35. Therefore, in addition to postmenopausal women, prevention programs should also target young women [20].

Components of power including personal, environmental and behavioral factors are based on empowerment dynamics suggested by Tillford and Tones. Self-empowerment is a condition that gives a person the real power to choose [21]. Empowerment of people through the implementation of a designed educational program can be an effective strategy in the prevention of osteoporosis. Empowerment increases personal control and self-confidence, and it is followed by self-efficacy [22].

Self-empowerment is a situation in which a person has the real ability to choose. Each person has the following requirements to choose the right one knowingly: 1. Sufficient information about the subject (knowledge). Sufficient health literacy and the ability to use health resources and appropriate, reliable and accessible information is required to obtain this knowledge; 2. The trust of the individual in his ability to organize and carry out a series of necessary measures (self-efficacy), the acquisition of this ability is due to the components of "perceived locus of control" and "self-concept"; 3. After acquiring knowledge and self-efficacy, the individual must acquire the skills necessary to assess the status, decision-making, and action; 4. The person who has the necessary motivation, knowledge, control, self-efficacy, and skills requires environmental support to turn this collection into health-related behavior [21].

No study has been conducted so far using an empowerment model for prevention of osteoporosis. Since constructs of this model can promote public health by improving knowledge, attitudes, self-efficacy and life skills, this study was conducted to design and implement an educational intervention to empower female students to prevent osteoporosis by using a self-empowerment model.

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Methods

This interventional before-after study was a controlled trial; Study was conducted on female students of Shahrekord Islamic Azad University. This university was selected as the studied university since more than 5 thousand students study in the Islamic Azad University of Shahrekord. Two intervention and control groups were utilized considering the objectives determined. The intervention and control group were selected from the students of two separate faculties to avoid bias. These two faculties were randomly selected. The intervention group included students of agriculture, and the control group included students of general sciences. The intervention group received empowerment training for the prevention of osteoporosis. The control group received no intervention. Inclusion criteria included female students aged 18-30 who had at least five more semesters to graduate from the university. Exclusion criteria included the people who were reluctant to participate, had the intention of transferring to another university and were likely to drop out of university and also those who had osteoporosis. A random two-step stratified sampling method was used for sampling. To select the intervention group, a class from each group of agriculture faculty was randomly selected; then, from each class, 15 to 20 female students were randomly selected for intervention. To select the control group, a class from each group of general science faculty was randomly selected; then, from each class, 15 to 20 female students were randomly selected. The sample size was set at 130 by using the statistical measure Fleiss by considering 95% confidence and 90% testability using the software OpenEpi. However, the final sample size was set at 150 (75 interventions and 75 control) by considering the likelihood of sample size. Although the empowerment model has been used in various studies, including the empowerment of boys in smoking prevention [23], the effect of empowerment model on the quality of life of adolescents with diabetes [24], the empowerment of women through breast self-examination training [25], but no standard questionnaire has been developed so far. Therefore a researcher-made questionnaire has been used to achieve the study objectives based on self-empowerment for preventing osteoporosis. This questionnaire included four constructs including knowledge, attitude, self-efficacy and life skills. Knowledge involved 14 multiple-choice questions; the correct responses were given 1, and the incorrect responses were given zero. Attitude involved eight questions scored on a 5-point Likert scale (strongly disagree, disagree, neither agree or disagree, agree and strongly agree). Self-efficacy involved ten questions scored on a 5-point Likert scale (strongly disagree, disagree, neither agree or disagree, agree and strongly agree). Life skills involved six questions scored on a 5-point Likert scale (never, rarely, sometimes, often, and always). Total score given to the questionnaire ranged from 24 to 134.

The questionnaire was designed in three stages: 1) identification of dimensions; 2) production of questions; and 3) development of the questionnaire. Areas were identified reviewing all scientific texts and literature relevant to the considered subject and also the judgments of experts. Then, the questions of each area were designed. For the development of the questionnaire, necessary modifications were made in writing, the arrangement of questions and scoring. To assess the content validity, the self-empowerment questionnaire was provided to 10 experts. Then, content validity ratio (CVR) and content validity index (CVI) were calculated. Internal consistency and stability were calculated to determine the reliability of the questionnaire. Then the questionnaire was completed randomly by 30 female students of the Islamic Azad University of Shahrekord to determine the internal consistency of the questionnaire. The internal consistency was calculated using Cronbach's alpha test for knowledge (0.81), attitude (0.83), and self-efficacy (0.88), and life skills (0.71). Test-retest was used to determine the stability of the questionnaire. For this purpose, the questionnaire was filled again by the same students two weeks later. The interclass correlation coefficient was determined for the questionnaire. The calculated

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interclass correlation coefficient (0.776) confirmed the stability of the questionnaire.

Before the intervention, the consent form, demographic questionnaire (includes age, marital status, and family status) and the self-empowerment questionnaire was filled by both the intervention and control groups. To determine the content of the educational package, the information obtained from the filled questionnaires was carefully reviewed before the intervention. The content of the educational package was designed by an inclusive study on the prevention of osteoporosis. The intervention group received training based on the self-empowerment model (including knowledge, attitude, self-efficacy and life skills) regarding preventing behaviors of osteoporosis. Educational methods included lecture sessions, brainstorming, modeling and distribution of educational package. The training period was two months. The training sessions were weekly, and eight sessions were held in two months. Three months after the training, the self-empowerment questionnaire was filled again by both intervention and control groups. The information obtained from both groups was compared with each other and also with the information obtained before the intervention. At this stage, 71 subjects in the intervention group and 72 in the control group participated in this study. For statistical analyses, the SPSS software version 23 was used for Independent T-test and Chi-square test.

Results

First, the intervention group and the control group were compared regarding demographic variables and background variables by using Chi-square test and Independent T-test. No significant difference was found. The mean age in the intervention group was 20.69 ± 2.24, and in the control group, was 20.29 ± 2.04 (P= 0.26). The number of married people in the intervention and control group was 12 (16.9%) and 10 (13.9%) respectively, and the number of single people, widows, and divorced were 59 (83.1%) and 62 (86.1%) respectively (P= 0.61). In terms of family status, the number of low-income people in the intervention and control group was 62 (87.3%) and 60 (83.3%) respectively, and the number of people who had a high income was 9 (12.7%) and 12 (16 .7%) respectively (P= 0.50).

Intervention and control groups compares before the intervention by using independent T-test. The test showed no significant difference in knowledge (P= 0.80), attitude (P= 0.71), self-efficacy (P= 0.96) and life skills (P= 0.07) between the intervention group and the control group before the intervention.

Table compares the difference in the scores of the constructs of self-empowerment model before and after the intervention in the intervention group and the control group by using independent T-test. The test indicates a significant difference in mean variance of the intervention group compared to mean variance of the control group in knowledge (P< 0.001), attitude (P< 0.001) and self-efficacy (P= 0.006). The difference in mean variance of the intervention group compared to the mean variance of the control group was not significant in life skills (P= 0.23).

Table 1. The comparison of the difference in scores of constructs of self-empowerment model in intervention and control groups before and after the intervention (independent T-test)

Construct	Group	(Mean ± SD)	P
Knowledge	Intervention Control	4.75 ± 2.47 0.35 ± 2.54	<0.001
Attitude	Intervention Control	3.48 ± 3.09 -0.38 ± 4.67	<0.001
Self-efficacy	Intervention Control	1.55 ± 4.46 -0.96 ± 6.06	0.006
Life skills	Intervention Control	0.87 ± 2.94 0.18 ± 3.94	0.23

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Discussion

This study was conducted to evaluate the effect of the educational intervention based on self-empowerment model on the promotion of female students in preventing osteoporosis. The results generally showed an improvement in powers of the intervention group for osteoporosis prevention after the educational intervention. The results obtained for knowledge indicated the effect of the training program in increasing the awareness of people who received intervention compared to the control group for the prevention of osteoporosis. The mean of the variance in knowledge scores in the intervention group was significantly different from that of the control group. Sarter and Sabin found that the reduced gap between knowledge and practice significantly improved the osteoporosis risk assessment diagram by recommendations for calcium and vitamin D six months after educational intervention [26]. Kamjoo et al. evaluated the effect of osteoporosis prevention training on knowledge of female high school students living in Bandar Abbas. They showed that training sessions and sports significantly increased the mean knowledge of the subjects compared to the controls [27]. Sanaei Nasab et al. determined the effect of educational intervention by using the health belief model on awareness, perceptions, and self-efficacy of female high school students living in Tehran. They showed that educational intervention increased awareness on the prevention of osteoporosis [28]. As we have seen, various studies confirm the low level of community awareness of osteoporosis. Therefore, the implementation of appropriate empowerment training programs will be very effective in promoting information and awareness of individuals.

The results obtained from attitude indicated the effect of the training program in improving the attitude of people who received intervention compared to the control group for the prevention of osteoporosis. Noordeen et al. evaluated osteoporosis awareness and health beliefs of students aged 16-18 years who lived in Malé, Maldives. They showed that 71% of participants did not believe in their susceptibility to osteoporosis [29]. Sanaei Nasab et al. determined the effect of educational intervention by using the health belief model on awareness, perceptions, and self-efficacy of female high school students living in Tehran. The educational intervention increased awareness and perceived susceptibility and eliminated the perceived barriers to physical activity for the prevention of osteoporosis [28]. Improving attitudes is one of the most complex areas in the design and implementation of health education and health promotion programs. The findings of this study indicated that although there was a slight increase in the level of knowledge of individuals in the control group, the mean scores of attitude decreased. Mean variance in self-efficacy showed a significant difference in the intervention group compared to the control group before and after the intervention. Khorsandi et al. evaluated knowledge and self-efficacy in achieving osteoporosis preventive behaviors among female high school students. They found that the score of self-efficacy varied from 12 to 38 [30]. Kaveh et al. evaluated the effect of osteoporosis prevention training program on physical activities related to transition stages and self-efficacy among the students of Shiraz University. The mean score of self-efficacy in physical activities significantly increased in the intervention group after the program [31]. In the present study, the increase in the mean of self-efficacy scores in the intervention group before and after the educational intervention is not comparable with the increase in mean scores in the two knowledge and attitudes structures. It can be said that creating an effective self-efficacy in people is time-consuming. As in the Kargar et al. study, the mean of self-efficacy score increased immediately after intervention, but the mean scores decreased only one month after the study [32].

The mean of variance in life skills in the intervention group before and after the intervention was not significant in comparison with the control group. To have an empowered and informed choice, one should acquire knowledge and self-

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efficacy; one must have the necessary skills to assess the situation, make decisions and take action [21]. Enjezab et al. described health-promoting behaviors among middle-aged women. The highest mean was related to spiritual growth and interpersonal relationships; the lowest mean was related to physical activity and responsibility [33]. In Shojaeizadeh et al. research, calcium intake was decreased in both experimental and control groups after the intervention [34]. To adopt a behavior, in addition to educational intervention, one should pay attention to some of the economic and social factors that can be effective in behavior.

Conclusion

In general, the results indicated the effect of an educational intervention based on self-empowerment model in improving knowledge, attitude, self-efficacy and life skills and consequently empowering female students of Islamic Azad University of Shahrekord for the prevention of osteoporosis. However, it was controversial to improve life skills. Considering the aging process of the population in the future, it is essential to design and implement empowerment programs for women, particularly younger women, for preventing the prevalence of osteoporosis. Future studies are recommended to consider social aspects which are effective in adopting osteoporosis preventive behaviors.

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Conflict of Interest

There are no conflicts of interest to declare.

References

1. Keshavarz-Mohamadi N, Hoseyni G. Health education and educational technology. 1st ed. Tehran: Dibagaran Publications; 2003. [Persian]
2. Ghaffari M, Tavassoli E, Esmaillzadeh A, et al. 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. Health System Research. 2011; 6(4): 714-723.
3. El-Tawab SS, Saba EK, Elweshahi HM, et al. Knowledge of osteoporosis among women in Alexandria (Egypt): A community based survey. The Egyptian Rheumatologist. 2016; 38(3): 225-231.
4. Sun T, Chen M, Lin X, et al. The influence of osteoprotegerin genetic polymorphisms on bone mineral density and osteoporosis in Chinese postmenopausal women. International Immunopharmacology. 2014; 22(1): 200-203.
5. Atan D, Atan T, Özcan KM, et al. Relation of otosclerosis and osteoporosis: A bone mineral density study. Auris Nasus Larynx. 2016; 43(4): 400-403.
6. Bachrach LK. Osteoporosis and measurement of bone mass in children and adolescents. Endocrinology and Metabolism Clinics. 2005; 34(3): 521-535.
7. Lane NE. Epidemiology, etiology, and diagnosis of osteoporosis. American Journal of Obstetrics and Gynecology. 2006; 194(2):S3-S11.
8. Reginster JY, Burlet N. Osteoporosis: a still increasing prevalence. Bone. 2006; 38(2): 4-9.
9. El-Tawab SS, Saba EK, Elweshahi HM, et al. Knowledge of osteoporosis among women in Alexandria (Egypt): A community based survey. The Egyptian Rheumatologist. 2016; 38(3): 225-231.
10. Costa AL, Silva MA, Brito LM, et al. Osteoporosis in primary care: an opportunity to approach risk factors. Revista Brasileira De Reumatologia. 2016; 56(2): 111-116.
11. Suwan A, Panyakhamlerd K, Chaikittisilpa S, et al. Validation of the thai osteoporosis foundation and royal college of orthopaedic surgeons of Thailand clinical practice guideline for bone mineral density measurement in postmenopausal women. Osteoporosis and Sarcopenia. 2015; 1(2): 103-108.
12. Iwamoto Y, Uchida K, Sugino N, et al. Osteoporosis, osteoporotic fractures, and carotid artery calcification detected on panoramic radiographs in Japanese men and women. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2016; 121(6): 673-680.
13. Khoshnoudi Z. Effect of training based on health belief model to mothers with osteoporosis and healthy mothers

[Downloaded from jhr.ssu.ac.ir on 2026-09-17]

[DOI: 10.18502/jchr.v7i4.266]

on preventive behaviors of their daughters. [Master thesis]. Iran, Tehran. Tarbiat Modares University; 2011. [Persian]
14. Tussing L, Champan-Novakofski K. Osteoporosis prevention education; behavior theories and calcium intake. Journal of the American Dietetic Association. 2005; 105(1): 92-97.
15. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bulletin of World Health Organization. 2003; 81(9): 646-656.
16. Pazhuhi M, Kalimian Z, Sedaghat M, et al . Effect of booklet training on the knowledge and performance of osteoporotic patients. Payesh, 2003; 3(1): 71-78. [Persian]
17. Abdoli S. Application of preventive factors of osteoporosis in postmenopausal women. [Master thesis]. Iran, Tehran. Tehran University of Medical Scieicnes; 2004. [Persian]
18. Berarducci A. Senior nursing students' knowledge of osteoporosis. Orthopaedic Nursing. 2004; 23(2): 121-127.
19. Black JM, Hokanson HJ, Knee AM. Medical surgical nursing. 6th ed. Philadelphia: W.B, Sanders Company; 2001; p: 566-572.
20. Huang CM, Su CY, Chien LY, et al. The effectiveness of an osteoporosis prevention program among women in Taiwan. Applied Nursing Research. 2011; 24(4): e29-37.
21. Rafieifar SH. Self-improvement system for self-health care. Health Department of the Ministry of Health and Medical Education, Tehran, Iran, 2005: 76-82.
22. Griffin RW, Moorhead G. Organizational behavior.10th ed.Canada: Nelson Education; 2011.
23. Solhi M, Abasi H, Hazavehei MM, et al. Effect of educational intervention on empowerment of high school student in prevention of smoking. Razi Journal of Medical Sciences. 2014; 21(118): 52-63. [Persian]
24. Heidari M, Alhani F, Kazemnejad A, et al. The effect of empowerment model on quality of life of Diabetic adolescents. Iranian Journal of Pediatrics. 2007; 17(Suppl 1): 87-94. [Persian]
25. Qorban Sabbagh M, Khanjani N, Fadakar MM, et al. Empowerment of women visiting the health centers of Kerman by teaching Self Breast Examination in the presence of Behvarz. Iranian Quarterly Journal of Breast Disease. 2014; 7 (1): 41-51. [Persian]
26. Sabin NJ, Sarter B. Osteoporosis prevention: narrowing the gap between knowledge and application. The Journal for Nurse Practitioners. 2014; 10(9): 749-753.
27. Kamjoo A, Shahi A, Dabiri F, et al. The effectiveness of education about osteoporosis prevention on awareness of female students. Bimonthly Journal of Hormozgan University of Medical Sciences. 2012; 16(1): 60-65. [Persian]
28. Sanaei Nasab H, Tavakoli R, Farrokhian A, et al. The effect of educational intervention with the health belief model on knowledge, perceptions and self-efficacy among adolescent of high school girls about osteoporosis in 2010. Urmia Medical Journal. 2013; 24(3): 163-169. [Persian]
29. Noordeen U, Simmonds J, Beeton K. Knowledge and health beliefs about osteoporosis amongst 16-18 year old students in male in the Maldives. Journal of Osteoporosis and Physical Activity. 2014; 2(2): 1-5.
30. Khorsandi M, Hasanzadeh L, Ghobadzadeh M. Assessment of knowledge and self-efficacy in achieving osteoporosis prevention behaviors among high school female students. Procedia-Social and Behavioral Sciences. 2012; 46(2): 4385-4388.
31. Kaveh MH, Golij M, Nazari M, et al. Effects of an osteoporosis prevention training program on physical activity-related stages of change and self-efficacy among university students, Shiraz, Iran: a Randomized Clinical Trial. Journal of Advances in Medical Education & Professionalism. 2014; 2(4): 158-164.
32. Kargar M, Jamali Moghadam N, Moattari M. The effect of osteoporosis prevention education by peers and health personnel on self-efficacy of adolescents with nephrotic syndrome. Iran Journal of Nursing. 2013; 26(81): 44-53. [Persian]
33. Enjezab B, Farajzadegan Z, Taleghani F, et al. Health promoting behaviors in a population-based sample of middle-aged women and its relevant factors in Yazd, Iran. International Journal of Preventive Medicine. 2012; 3(Suppl 1): S191- S198.
34. Shojaezadeh D, Sadeghi R, Tarrahi M, et al. Application of health belief model in prevention of osteoporosis in volunteers of Khorramabad city health centers, Iran. Health System Reserch. 2012; 8(2): 183-192.

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