

# The Effect of Cognitive-behavioral Counseling Provided by a Midwife on Preventive Behaviors of Osteoporosis in Middle-aged Women

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## ABSTRACT

**Background & aim:** The effectiveness of preventive interventions on osteoporosis have been already investigated, but there is little information on the impact of cognitive-behavioral counseling (CBC) on prevention of osteoporosis. The present study aimed to determine the effect of CBC, provided by a midwife, on preventive behaviors of osteoporosis in middle-aged women.

**Methods:** This randomized controlled trial was conducted in 2020 (Feb - June) on 62 middle-aged women (45-60 years old) referring to the health centers in Dezful, south of Iran. The participants were allocated into intervention (n=31) and control group (n=31) using block randomization design. For the intervention group, eight weekly sessions of CBC based on preventive behaviors against osteoporosis were held by a midwife. The control group received routine care. Data were collected using demographic and obstetric data questionnaire, Food Frequency Questionnaire (FFQ), and International Physical Activity Questionnaire (IPAQ), before and eight weeks after the intervention. Data were analyzed by SPSS software (version 22).

**Results:** Before the intervention, there was no significant difference between the two groups in terms of osteoporosis prevention behaviors. After the intervention, the frequency of consumption of dairy products (P=0.001), vitamin D (P=0.002), and calcium supplements (P=0.012); bone density measurement (P=0.001); and the amount of using sunlight (P=0.001) significantly increased in the intervention group compared to the control group. The mean index of energy consumed in the form of physical activity did not show a significant difference between the two groups (P=0.852).

**Conclusion:** CBC, as a non-pharmacological and safe method, can be used to promote preventive behaviors against osteoporosis.

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## Introduction

Osteoporosis is a chronic and the most common metabolic bone disease, which is associated with a decrease in bone mass and a disturbance in its structure (1). A bone with

osteoporosis breaks with a slight impact such as a fall or even on its own. The common places of fractures caused by osteoporosis include spine, wrist, femoral head, and pelvis, respectively (2).

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In Europe and America, 30% of women suffer from this disease, and it is predicted that 40% of postmenopausal women and 30% of men will suffer from fractures caused by osteoporosis in the near future (3-4). The latest available statistics from Iran show that about two million people are at risk of fractures caused by osteoporosis (5). A study in several provinces of Iran in 2011 showed that 47% of women and 44% of men over 50 years of age have decreased bone density, and the prevalence of osteoporosis in the hip and spine area in Iran is estimated at 9.18% (6).

Osteoporosis risk factors are divided into modifiable and non-modifiable categories. Age over 65 years, female sex, and genetic background are included in the non-modifiable category; and weight, smoking, low physical activity, long-term use of glucocorticoids, and insufficient intake of calcium and vitamin D are included in the modifiable category (7-8). Osteoporosis, even without fracture, significantly affects the quality of life in the domain of social activities; decreased social activities followed by isolation lead to a decrease in the quality of life and ultimately depression (9) and impose a heavy financial burden on the health system and families (10). A recent study showed that the most important risk factors for osteoporosis are related to people's lifestyle and can therefore be adjusted, and therefore it is necessary that health policy makers pay attention to preventive programs (11). It is reported that the level of awareness of Iranian women and girls regarding the osteoporosis preventive lifestyle is inadequate (12-13).

Counseling (14) and educational (15, 16) approaches have been used to encourage people to choose a healthy lifestyle to prevent osteoporosis. One of the counseling approaches is counseling based on cognitive-behavioral therapy. This treatment is based on two fundamental principles; firstly, identifying beliefs has a controlling effect on emotions and behavior, secondly, behaviors leave a strong effect on thought patterns and emotions (17). Cognitive-behavioral counseling encourages and strengthens the formation and application of conscious and adaptive thought processes such as logical thinking and problem-solving. This

approach is a combination of cognitive and behavioral therapy that helps clients to recognize distorted patterns and ineffective behaviors (18).

Since osteoporosis is largely preventable, and the important principle in prevention is knowing the way of thinking, lifestyle, and daily habits in order to improve the quality and efficiency of people (19), therefore, prevention of behavioral factors affecting osteoporosis needs to change in the behavior of individuals that is emphasized a lot in cognitive-behavioral counseling (20). Several studies have shown the positive effect of other educational interventions on the promotion of osteoporosis preventive behaviors (21-23).

Different effects of using cognitive-behavioral counseling on health problems and health-related behaviors have been reported. The positive effect of this method has been shown in improving the health-promoting lifestyle of middle-aged and menopausal women (24), improving diabetes distress and HbA1C levels (25), improving self-care behaviors and disease perception in women with type 2 diabetes (26), improving psychological well-being in women with breast cancer (27), and improving the quality of life in cardiovascular patients along with drug treatment (28). However, in another study, cognitive behavioral counseling did not have a specific positive effect on the activity of inflammatory bowel disease (29).

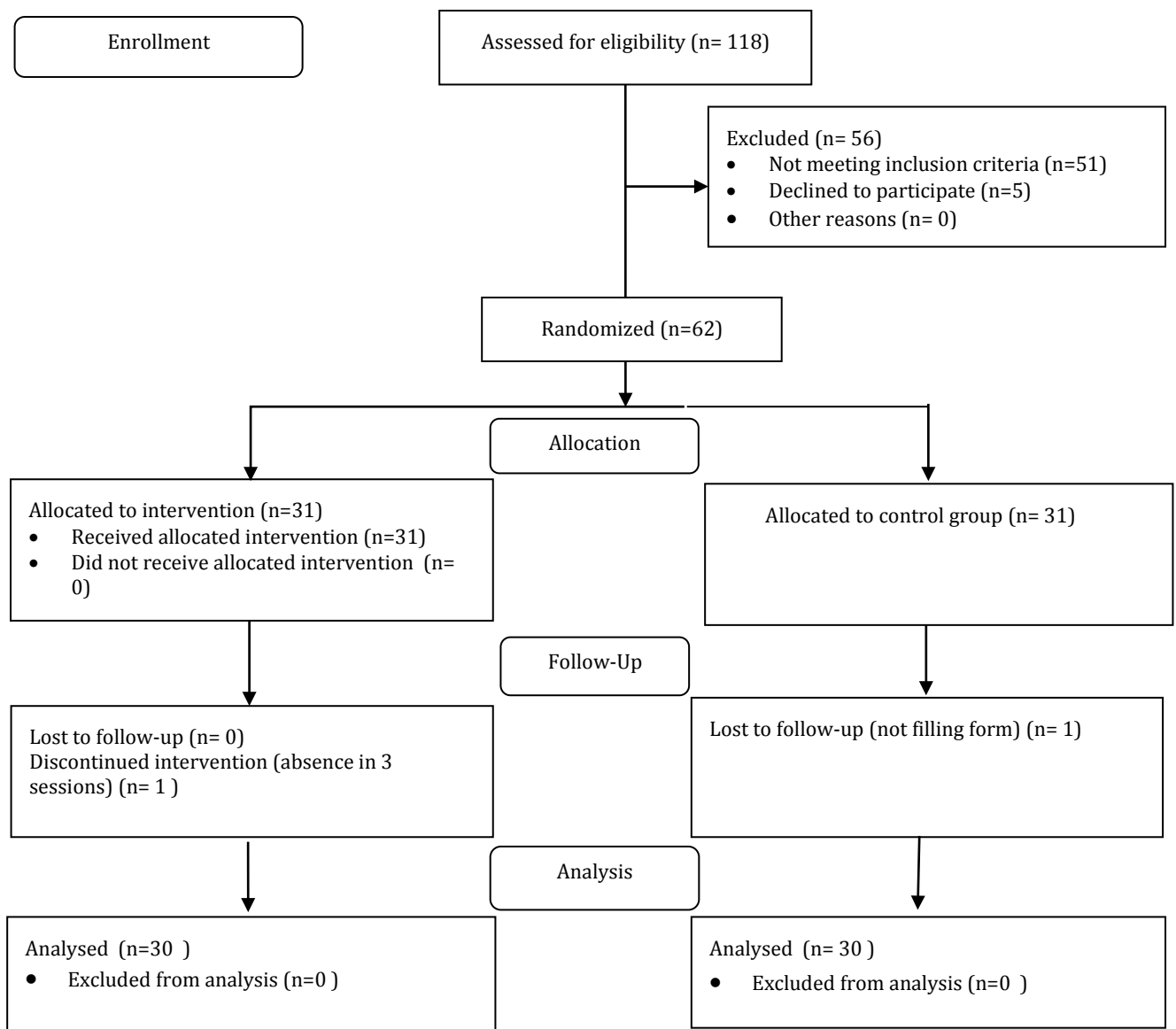
Based on the searches, no study has been conducted on the effect of cognitive-behavioral counseling on osteoporosis preventive behaviors. Moreover, in previous studies, counseling was mainly provided by counselors or psychologists. Since midwives have the first and most contact as providers of health care services to women in Iran's primary health care system, therefore, the present study was performed to investigate the effectiveness of cognitive-behavioral counseling provided by a midwife on osteoporosis preventive behaviors in middle-aged women.

## Materials and Methods

This randomized controlled trial was conducted in 2020 (Feb - June) on middle-aged women (45-60 years), who were referred to the health centers in the Dezful, south of Iran. The

sample size was determined as 62 women based on a previous study (14) with 95% confidence Committee, three centers from the health centers of Dezful, south of Iran (numbers 1, 3, 7) were selected according to the ease of access for the researcher. In each center, data system was checked to identify the initial eligibility criteria. Additional information was obtained

and 90% power, including 10% attrition. After approval of the study protocol in the Ethics from them through phone calls. A total of 185 files were examined and 118 women who met the criteria for entering the study were interviewed by the researcher in person and privately.



**Figure 1.** The CONSORT Flowchart of the study

Inclusion criteria were: minimum age of 45 and maximum of 60 years, literacy of reading and writing, and eligibility of client for cognitive-behavioral counseling, based on interview. Exclusion criteria were: non-attendance at three sessions of counseling program, receiving any medication or condition that distorts the entry into the study, and acute or chronic mental illnesses based on the individual's own report.

Demographic and obstetric information questionnaire: including age, marital status, education level, occupation, history of breastfeeding, number of pregnancies, menopause, history of taking calcium and vitamin D supplements, exposure to sunlight (daily putting hands and feet in exposure to direct sunlight, 10-20 minutes each time) and performing a bone density test at least once in the last two years (30).

Food Frequency Questionnaire (FFQ) in which the part related to dairy products was used. It contains 21 eight-part options for the consumption of milk, yogurt, cheese, and buttermilk. Scoring is based on the amount consumed per day, week, or month, based on the consumption of 3 dairy units (equivalent to 1000 mg of calcium) per day (30). According to Cronbach's alpha = 0.7, this questionnaire has had good validity and reliability in various studies in Iran (31-32).

International Physical Activity Questionnaire (IPAQ) (short version): which consists of 7 short answer options, including checking intense, moderate, and mild activity in the last seven days. The interpretation and grading of this questionnaire are based on the average energy consumption in the last 7 days in one of three groups: mild, moderate, and intense. According to the protocol, there are fixed numbers for calculating and converting the time spent in Met-min/week units for each activity level: 1. Walking (or walking alone), which is considered mild class: number of days × walking duration (minutes) × constant number 3.3, 2. Moderate physical activity: number of days × time of moderate physical activity (minutes) × constant number 4, 3. Intense physical activity: number of days × time of intense physical activity (minutes) × constant number 8. In this way,

activities whose duration is less than 10 minutes are not considered in the calculation (33). This international physical activity questionnaire has been used in various studies in Iran and its validity and reliability have been confirmed with Cronbach's alpha = 0.7 (34-35).

Finally, 62 women were divided into two groups of intervention (n=31) and control (n=31) using the block design random allocation method (Figure 1). Then, the demographic questionnaire, (FFQ), and (IPAQ) were completed by two groups with the guidance of the researcher. The approximate time to complete the questionnaires was 5, 15, and 5 minutes for demographic, FFQ, and IPAQ, respectively.

For the intervention group, in addition to routine care, cognitive-behavioral counseling was implemented according to the protocol (Table 1). Eight sessions of 60-90 minutes of group cognitive-behavioral counseling were conducted weekly in groups of 10-11 people. At the beginning of each session, homework was checked, a summary of the previous session was reviewed, and the participants' questions were answered. If the participants did not attend more than three counseling sessions (consecutive or non-consecutive), they were excluded from the study. The control group did not receive any special intervention, other than the routine care for middle-aged women (doing a pap smear, checking body mass index, measuring blood pressure, request for annual check-up tests such as sugar and fat).

Eight weeks after the intervention, the questionnaires were completed again by both groups. One person from the intervention group was excluded from the analysis due to absence of more than three sessions and one person from the control group was excluded from the analysis due to not filling the form in the follow-up phase. Kolmogorov-Smirnov test, Mann-Whitney test (intergroup comparison), and Will-Coxon test (intragroup comparison) were used to check the data, and the data were analyzed with SPSS software (version 22). All the counseling sessions were held by the first author (master's degree of counseling in midwifery), who had completed the cognitive-

behavioral counseling training course. The content of the sessions is shown in Table 1.

In order to comply with the ethical principles, after the end of the intervention, the control group was given an educational CD

about osteoporosis and its prevention methods, and also, a two-hour intensive educational session about night sleep disorder was held for them based on their demand.

**Table 1.** Protocol of cognitive-behavioral counseling sessions

Session	Goal
First session	Introduction, communication, and education in the field of cognitive-behavioral therapy logic, expression and description of the principles of confidentiality, definition, underlying causes and complications of osteoporosis and conducting a pre-test
Second session	Explaining thoughts, feelings, and behavior and expressing their relationship and difference, expressing ineffective thinking styles and common cognitive errors, and the effect of ineffective thinking styles on osteoporosis preventive behaviors
Third session	Reconstruction of thoughts, explanation of the four main steps for reconstruction of thoughts (recognition of thoughts, evaluation of thoughts, change of thoughts, determination of the effects of modified thoughts) and explanation of thoughts reconstruction technique, explanation of how to use cognitive reconstruction to perform preventive behaviors against osteoporosis
Fourth session	Signs and chains, examining the chain of cause, response, and consequence of stating strategies to break the destructive chain (such as not using exercise, proper nutrition, and calcium and vitamin D supplements) to prevent osteoporosis and methods of creating new behaviors
Fifth session	Explanation of boldness, the definition of bold behavior, and suggested self-talk to increase boldness and providing suggestions for increasing bold behaviors to improve the client's health in order to prevent osteoporosis
Sixth session	Stress management and problem-solving, strategies for solving problems, expressing the destructive effects of stress, providing methods to deal with it to improve individual's health, and teaching muscle relaxation to deal with stress.
Seventh session	Defining self-esteem, stating how negative self-evaluations cause a lack of self-esteem, strategies to improve self-esteem in order to increase the quality of life
Eighth session	Planning to prevent relapse, expressing the necessity of practicing the skills acquired during the sessions, and evaluating the progress of work and acquired skills to increase the effectiveness of cognitive-behavioral counseling in this research

## Results

In total, the data of 60 participants were analyzed. Table 2 shows the demographic and obstetrics characteristics of the participants in the intervention and control groups. The two groups did not show statistically significant differences in terms of demographic variables.

The chi-square test showed that after the intervention, the frequency of dairy products consumption, vitamin D (50,000 units), bone density measurement, and calcium supplement

consumption was significantly higher in the intervention group (Table 3).

Due to the different standard deviations and large dispersion observed in the data of the energy consumed in the form of physical activity, the normality of the data was checked with the Kolmogorov-Smirnov test, which indicated the non-normal distribution of the data. Therefore, non-parametric Mann-Whitney (intergroup comparison) and Will-Coxon (intragroup comparison) tests were used to check the data. Mann-Whitney test was used to compare the two groups after the intervention

in terms of the energy consumed in the form of physical activity (P=0.929) and the difference in their scores; no significant difference was observed (P=852). However, a significant

difference was observed between the two groups regarding the use of sunlight and difference in changes (P=0.001) (Table 4).

**Table 2.** Frequency distribution of demographic and obstetric characteristics of participants by group

Variable	Intervention (N=30)	Control (N=30)	P-Value
	N (%)	N (%)	
<b>Educational level</b>			
Elementary	3 (10)	0 (0)	0.094
Secondary	7 (23.3)	3 (10)	
High school	15 (50)	17 (56.7)	
College	5 (16.7)	10 (33.3)	
<b>Occupation status</b>			
Household	26 (86.7)	21 (70)	0.117
Employed	4 (13.3)	9 (30)	
<b>Marital status</b>			
Single	0 (0)	1 (3.3)	0.313
Married	30 (100)	29 (96.7)	
<b>Experience of menopause</b>			
Yes	17 (56.7)	16 (53.3)	0.795
No	13 (43.3)	14 (46.7)	
<b>Breastfeeding</b>			
Yes	27 (90)	27 (90)	1
No	3 (10)	3 (10)	
Variable	Mean ± SD	Mean ± SD	P-Value
Age	52.20±4.04	50.36±10.07	0.359
Number of pregnancies	3.06±1.38	3.43±1.94	0.404
Body mass index	29.17±4.31	29.55±3.96	0.728

**Table 3.** Frequency distribution of participants according to the consumption of dairy products, vitamin D supplements, calcium supplements, and bone density measurement in two groups before and after the intervention

Variable	Intervention (N=30) N (%)	Control group (N=30) N (%)	P-Value
<b>Sufficient dairy consumption</b>			
Before intervention	6 (20)	5 (16/7)	0.739
After intervention	24 (80)	4 (13/3)	0.001
<b>Vitamin D supplement consumption</b>			
Before intervention	14 (46/7)	14 (46/7)	1
After intervention	27 (90)	16 (53/3)	0.002
<b>Bone density measurement</b>			
Before intervention	7 (23/3)	6 (20)	0.754
After intervention	14 (46/7)	1 (3/3)	0.001
<b>Calcium supplement consumption</b>			
Before intervention	9 (30.0)9	5 (16.7)	0.222
After intervention	14 (46.7)	56 (16.7)	0.012

**Table 4.** Mean of the scores of the energy consumed in the form of physical activity and the index of using sunlight per week in two groups in the pre-and post-intervention phases.

Variable	Intervention group N=30	Control group N=30	*P-Value
	Mean±SD	Mean±SD	
<b>The energy consumed in the form of physical activity</b>			
Pre-test	659.75±597.90	513.60±637.03	0.1
Post-test	679.48±441.87	487.33±775.27	0.05
*P-Value	0.553	0.911	
Changes	19.73±68.67	-26.26±81.41	0.852
<b>Index of using sunlight</b>			
Pre-test	28.83±26.41	31.83±26.04	0.659
Post-test	62.16±35.07	32.66±27.4	0.001
*P-Value	0.001	0.867	
Changes	33.3±39.46	0.833±27.04	0.001

\*Mann-Whitney U test

\*\*Wilcoxon test

## Discussion

This study was conducted with the aim of investigating the effect of cognitive-behavioral counseling provided by a midwife on osteoporosis preventive behaviors in middle-aged women and the results showed that the frequency of consumption of dairy products, calcium supplements, vitamin D supplements, bone density measurement and the amount of sunlight use showed a significant increase after counseling in the intervention group. The energy consumed in the form of physical activity did not show a significant difference between the two groups.

In the present study, after the intervention, a significant difference was observed between the two groups in terms of consumption of sufficient dairy products, calcium, and vitamin D supplements. These results show that cognitive-behavioral counseling can be effective in improving osteoporosis preventive behaviors in middle-aged women. In a study conducted by Yazdizadeh, et al. (2016) group cognitive-behavioral therapy improved women's health-promoting lifestyle and was associated with good psychological and behavioral consequences, including consumption of dairy products (24). A similar study on the effect of cognitive-behavioral counseling on the quality of life in cardiovascular patients showed that this type of counseling by relaxation coping skills training, mental imagery, identification, evaluation, challenging automatic thoughts, and realistic responses, helps to understand

intermediate and fundamental beliefs related to the disease, confrontational self-talk, and assertive communication, reducing the level of disorders such as fatigue, lethargy, physical pains (chest), anxiety, depression and correcting the patient's lifestyle in addition to drug treatment greatly improves the quality of life (28).

In the present study, mean energy consumption in the form of physical activity did not show a significant difference between the two groups after the intervention. The reason may be external factors such as lack of access to facilities or suitable space for physical activity, which are not affected by counseling. While, the results of the study by Kalkim et al.(2017) showed that after 4 weeks of a group training program and 24 weeks of an osteoporosis prevention telephone counseling program, in the intervention group, there was a significant increase in the mean scores of the osteoporosis knowledge test and its subscales, the osteoporosis health belief scale and its subscales, the osteoporosis self-efficacy scale and its subscales, daily calcium intake and the duration of weekly exercise (36). The reasons for the different results in terms of increasing the duration of weekly exercises can be due to more number of counseling sessions (three times in our study) along with four training sessions. In another study, it was shown that training and intervention based on the preceproceed model can increase physical activity and ultimately prevent osteoporosis in women (37). It may be concluded that by adding

educational models and planning to counseling, more positive effects can be created in osteoporosis preventive behaviors.

Regarding the use of sunlight, similar to the present study, Mahmoudi et al. (2011) also implemented educational programs based on the health belief model, which could improve people's awareness and belief regarding disease preventive behaviors, especially improving the performance of the participants regarding the use of sunlight (38).

In the present study, doing bone density testing as a screening behavior significantly increased in the intervention group two months after the study, which indicates the effect of cognitive-behavioral counseling on improving bone density screening behavior. In other studies, the effect of educational interventions has been shown on the behavior of performing breast and cervical cancer screening tests with mammography and Pap smear (39, 40). According to another study, an intervention that was conducted during home visits and giving information to encourage women to perform cervical cancer screening, the rate of performing screening was higher in women who received face-to-face education along with educational brochures compared to women who only received brochures or were invited verbally (41). This finding can indicate the additional effect caused by the presence of the teacher.

Since changing health-related behaviors requires different methods based on the theoretical characteristics of behavior change models and their structures, the characteristics of the learners, the level of interaction between the teacher and the learners, and the different cognitive levels of human mind involved in educational activities to change behavior, therefore, researchers are trying to check the efficiency of the proposed methods by examining different methods and with different views on the theoretical fields and different dimensions of behavior change. In addition, education is different from counseling, and in counseling, in addition to cognitive levels, emotional levels are also involved in the process of behavior change, and therefore more success is expected in creating change and more stability of behavior change.

The positive effects caused by cognitive-behavioral counseling on osteoporosis preventive behaviors can be because the goal of cognitive-behavioral therapy is to help people achieve a correct and logical style of information processing (17).

It is noteworthy that the findings of this study, like some previous studies, showed that the psycho-educational intervention provided by a midwife had a positive effect on the variables related to women's health. Considering the emphasis of modern midwifery on the promotion of the concept of community-oriented midwifery, the importance of this finding becomes more evident, because the use of complementary medicine methods as cost-effective and preventive interventions which are easily provided by trained midwives can use the capabilities of midwives as the best environmental forces in providing health services to women. Similarly, the findings of the study by Yazdani et al. (2021) (42) and Yazdizadeh et al. (2016) (24) showed that the psychological-educational interventions provided by trained midwives to postmenopausal women had significant positive effects on the specific quality of life of menopause or lifestyle health-promoting lifestyle of these women.

The present study is the first research that investigated the effect of cognitive-behavioral counseling on osteoporosis preventive behaviors. The strength of the study is that it examined the preventive behaviors eight weeks after the intervention, which is significant in terms of examining the stability of the behavior; however, its results can only be generalized to the population of middle-aged women. It is suggested to evaluate the physical activity using different tools in future studies.

## Conclusion

Cognitive-behavioral counseling as a non-pharmacological, non-invasive, and safe method can be used to promote osteoporosis preventive behaviors. Considering the acceptance of cognitive behavioral counseling by the participants in the research, it is suggested to use this method in health care centers with regard to the presence of midwives as providers of health services to middle-aged women, to prevent osteoporosis and improve women's



health. In addition, due to the high efficiency, and short duration of this counseling method, it can be taught to midwives working in clinics and service centers for middle-aged women in the form of educational workshops.

## Declaration

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## Conflicts of interest

Authors declared no conflicts of interest.

## Ethical considerations

The study objectives, the optionality of participating in the study, as well as the assurance of confidentiality of data and the possibility of withdrawing from the study at any time during the study, were explained to the participants and written consent was obtained from them. In order to comply with the ethical principles, after the end of the intervention, the control group was given an educational CD about osteoporosis and its prevention methods, and also, a two-hour intensive educational session about night sleep disorder was held for them based on their demand.

## Code of ethics

The study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (ethics code: IR.AJUMS.REC.1398.471).

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## Authors' contributions

FH drafted the manuscript and data gathered; MJ performed the study concept and design; critical revision of the manuscript for important intellectual content; and study

supervision. MHH conducted statistical analysis and interpretation of data, and NSK provided consulting and supervision for CBC content and sessions. All authors reviewed the article and approved its content.

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