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ORIGINAL RESEARCH

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The effect of health belief model-based short interviews in women in the postmenopausal period on the prevention of osteoporosis: A randomized controlled trial

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Abstract

Aim: This study was conducted to investigate the effect of health belief model-based short interviews on preventive behaviours for osteoporosis in postmenopausal women.

Design and methods: A randomized pretest, posttest and follow-up design was used. The study was conducted between June 2016 and June 2017 with an intervention ($n = 41$) and a control group ($n = 41$). The intervention group applied the Short Interviews Model for 12 weeks as a short interview programme that was created based on the health belief model. The study data were collected by the researcher using a descriptive information form, the Osteoporosis Health Belief Scale, the Osteoporosis Self-efficacy Scale and the Osteoporosis Knowledge Test.

Results: In the posttest and follow-up measurements, the mean scores of the intervention group on the total Osteoporosis Health Belief Scale and its self-efficacy and exercise sub-dimensions and the total Osteoporosis Knowledge Test and its sub-dimensions were significantly higher than those of the control group.

Conclusion: The short interviews held in this study provided evidence to guide women and nurses in the prevention of osteoporosis in postmenopausal women. It is recommended that the prevention of osteoporosis should be integrated into women's health programmes at the primary health-care level.

KEYWORDS
health belief model, nursing, osteoporosis, postmenopausal women, 5A model short interviews

Summary statement

What is already known about this topic?

- Osteoporosis is a critical public health problem that is common among women all over the world. It causes deaths, different disabilities and economic losses every year.
- Nurses can make important contributions to the prevention of osteoporosis through the health education that they will provide for women.

What this paper adds?

- Sending short messages to women to protect them against the risks of osteoporosis, holding short interviews to improve bone health, sending motivating messages to their phones and teaching them appropriate exercises increased their health beliefs, self-efficacy and knowledge in preventing osteoporosis.

The implications of this paper:

- This article brings a new perspective that holding health belief model-based short interviews with postmenopausal women is an effective method of preventing osteoporosis.
- It is recommended that nurses should conduct interventions to maintain and develop bone health by holding short interviews with women for whom they will provide health-care services and by using social media tools (giving booklets and sending text messages and videos about strengthening bones via WhatsApp) in the provision of primary health-care services.

1 | INTRODUCTION

Osteoporosis, which affects bone mineral density and quality, is an important public health problem that causes increasing disability, death and economic losses and affects a large part of society (Acıkgoz et al., 2020; Kalkim & Dağhan, 2017). According to the data of the International Osteoporosis Foundation (IOF), 200 million people are affected by osteoporosis globally. It is reported that osteoporosis will increase by 20% in the population aged 50 years and over in Europe by 2025, creating a burden on the health system, and that its cost will increase by 25% in 2025 (Hernlund et al., 2013). The most important complication of osteoporosis is that it causes fractures that increase with age. It is estimated that globally, one in three women who are affected by fractures is at risk for osteoporotic fractures and that around 20%–25% may experience fractures at some point in their lives. The mortality rate in patients with osteoporosis-bound hip fractures is 12%–20% in the first 2 years. Fifty percent of patients become dependent on others after fractures that increase with age. It has been reported that the presence of fractures in more than one body part increases mortality (Smeltzer & Qi, 2014). With the impact of public health and increasing treatment costs, studies on the prevention of osteoporosis rather than treatment have gained weight all over the world (Zhang et al., 2012).

There is limited research into the prevalence of osteoporosis in Turkey. A study, called FRACTURK, was conducted to update the epidemiology of hip fractures in Turkey. In the study, one-on-one interviews were conducted with 26 424 people aged ≥50 years from different regions. The 10-year hip fracture risk and major osteoporotic fracture risk were evaluated by the Turkish FRAX model. As a result of the study, it was found that the risk started at 7% in women aged 50 years who had experienced a fragility fracture before and increased to 31% through the age of 90 years and that the incidence of hip fracture was 73% (Tuzun et al., 2012). Although the rate of hip fracture in Turkey is low compared with European countries, its incidence has been reported to have increased in the last two decades (Kalkim & Dağhan, 2017). In another study conducted to identify the prevalence of osteoporosis and risk factors among Turkish women aged 18–49 years, the measurement of bone mineral density levels indicated that 33% of women were osteopenic and that 6.9% of these women were at medium–high risk of developing osteoporosis (Pinar et al., 2017). In studies conducted in Turkey, it is stated that fractures will increase because of the rapid increase in the elderly population and that there is a need for adult education and awareness studies to establish a national fracture record (Bahat et al., 2021).

Osteoporosis is usually seen in women who are aged ≥50 years and are in postmenopause. It progresses without symptoms in many people and eventually emerges with fractures (Clynes et al., 2020). Advanced age, white race, female gender, genetic predisposition, and family history of osteoporosis are non-modifiable risk factors for menopause osteoporosis. The high level of decline in oestrogen production associated with menopause is responsible for increased bone turnover and constant bone loss in postmenopausal women. Osteoporosis can be prevented by reducing modifiable risk factors, such as a diet that is poor in calcium and vitamin D, inadequate physical activity, sedentary life, smoking, and excessive alcohol and coffee use. Some studies have shown that it is important to increase the awareness and knowledge of women at risk about osteoporosis and to develop lifestyle behaviours that protect and improve bone health (Aslan & Kılıc, 2017; Kalkim & Dağhan, 2016; Tan et al., 2013). Early diagnosis of osteoporosis risk factors and the development of effective prevention programmes are necessary to stop the progression of the disease. Nurses play an important role both in the prevention of osteoporosis and subsequent fractures in patients presenting with primary osteoporotic fractures (Fourie et al., 2015; Kalkim & Dağhan, 2017; Smeltzer & Qi, 2014). The health belief model (HBM) motivates individuals to acquire positive health behaviours and avoid negative ones (Kalkim & Dağhan, 2017; Kim et al., 2013).

When the HBM is considered within the scope of health behaviours, it is the first model adapted to reduce the probability of catching a disease and the severity of the disease and to prevent the disease as a result of the health behaviours shown.

Prevention of osteoporosis has an important place in primary health-care services. In the literature, there are studies on health education given to women in the postmenopausal period by nurses based on the HBM. In these studies, positive improvements were reported in the rate of women's calcium intake, exercise behaviours, self-efficacy and health beliefs (Acıkgoz et al., 2020; Kalkim & Dağhan, 2017). The components of HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, health motivation, and self-efficacy (Acıkgoz et al., 2020; Jeihooni et al., 2016; Nguyen, 2016).

Nurses may experience some restraints in allocating quality time to the groups that they serve for the provision of primary health-care services. They can motivate women in the postmenopausal period, who have the potential to often use family medicine, regarding their knowledge and behaviours about osteoporosis to protect them against this disease through HBM-based short interviews.

This study was carried out to determine the effect of HBM-based short interviews and subsequent short messages on the knowledge, attitudes and behaviours of postmenopausal women for the prevention of osteoporosis.

The research hypotheses are as follows:

1. The mean scores of the experimental group on the Osteoporosis Health Belief Scale (OHSB) applied during the follow-up period will be significantly higher than the scores of the control group.
2. The mean scores of the experimental group on the Osteoporosis Self-efficacy Scale (OSES) applied during the follow-up period will be significantly higher than the scores of the control group.
3. The mean scores of the experimental group on the Osteoporosis Knowledge Test (OKT) applied during the follow-up period will be significantly higher than the scores of the control group.

2 | METHODS

2.1 | Study design and sample selection

The study population was women aged 50-65 years old who lived in the region where the family center is located (n=1624).

These were women in the postmenopausal period registered at a FHC in the Asian side of İstanbul province in Turkey. The sample size of the study was determined with a power analysis performed on the PS version 3.0 software package. Accordingly, the sample size was calculated as 36 individuals based on the health belief score that Piaseu et al. (2001) reported (157.6 ± 14.8) in their study, assuming a 10-point variation, a Type 1 probability error of 0.01 alpha, and a Type 2 probability error of 0.90 beta. The randomization was carried out on the SPSS software by a research assistant independent of the study to assign volunteers to control and study groups. Considering some attrition, the study was initiated with approximately 20% more individuals than the number determined in the power analysis (n:36) (Buyukozturk, 2001). The sample size was determined as 88 individuals in total, including 44 in each group. While the study was in progress, six individuals, including three from the intervention group and three from the control group, quitted. These participants quitted the study because of address change or health problems. Ultimately, the study sample consisted of 82 women in the postmenopausal period, including 41 in the intervention group and 41 in the control group (Figure 1).

There was no significant difference between the intervention and control groups in terms of the independent variables of the study (age, education, marital status, alcohol use, daily tea and coffee consumption, family history of osteoporosis and bone measurement).

2.2 | Sample selection criteria

According to the 2015 data of the Turkish Statistical Institute (TURKSTAT), life expectancy at birth in Turkey is 80.7 years, and a woman spends approximately one third of this duration (26 years) in menopause. For this reason, the study included women between the ages of 50 and 65 years (Alswat, 2017; Sozen et al., 2017). The inclusion criteria were as follows:

- Woman in postmenopausal period,
- Volunteering to participate in this research,
- Aged between 50 and 65 years,
- Not having any mental illnesses or diseases that would prevent participation in the research,
- Not having any structured education on preventing osteoporosis.

2.3 | Data collection procedure and tools

The study data were collected by the researcher between June 2016 and June 2017 through face-to-face interviews using a descriptive data form (including age; education level; marital status and profession; family history; the status of sunbathing; consumption of tea, coffee, alcohol or tobacco; BMI and doing exercise and calcium-rich diet), the OHBS, the OSES and the OKT.

The data were collected at three different times through a pretest, a posttest and a follow-up test in the intervention and control groups The posttest was administered 12 weeks after the short interviews. During the 12-week follow-up period after the posttest, some short text messages were sent to the phones of the women two to three times a week. The application took a total of 24 weeks. To avoid interaction between experimental and control groups, they were invited to the FHC at different times.

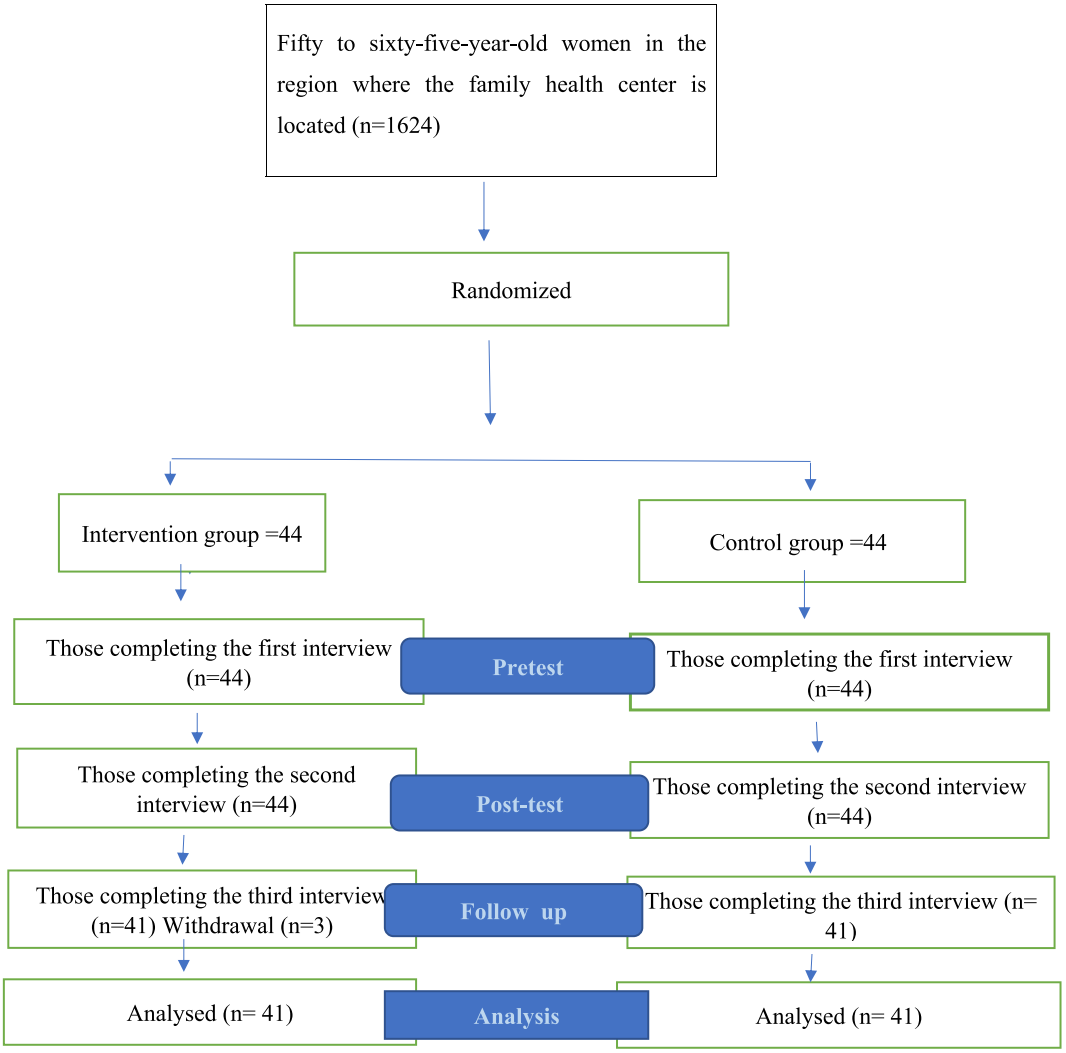

FIGURE 1 CONSORT study design and sample selection

2.3.1 | The OHSB

The OHBS was developed by Kim et al. (1991) to measure individuals' health beliefs regarding osteoporosis. The scale consists of a total of 42 items and seven subscales. The subscales are perceived susceptibility, perceived seriousness, perceived benefits of exercise, perceived benefits of calcium intake, perceived barriers to exercise, perceived barriers to calcium intake and health motivation. Turkish adaptation, validity and reliability studies of OHBS were conducted by Kılıc and Erci (2004). Scores that can be obtained from the OHBS range from 42 to 210. Since each sub-dimension consists of six items, the lowest and highest scores that can be obtained from each of them range between 6 and 30. High scores on the OHBS show that health beliefs directly affect individuals' health-protective and health-improving behaviours. Cronbach's alpha reliability coefficient in this study was found as 0.79 for OHBS, 0.80 for the perceived susceptibility sub-dimension, 0.82 for the perceived seriousness sub-dimension, 0.85 for the benefits of exercise sub-dimension, 0.75 for the benefits of calcium intake sub-dimension, 0.72 for the barriers to exercise sub-dimension, 0.71 for the barriers to calcium intake sub-dimension and 0.85 for the health motivation sub-dimension.

2.3.2 | The OSES

This scale was developed by Horan et al. (1998). The adaptation of the OSES to Turkish and its validity and reliability study was carried out by Kılıc and Erci (2004). The OSES Turkish Form is used to determine the perceived degree of confidence regarding calcium intake and physical activity for the prevention of osteoporosis. The evaluation of the OSES is performed by marking a number on a scale ranging from 0 (not confident at all) to 10 (very confident). A score between 0 and 100 is taken as a basis for each item. The overall OSES score ranges between 0 and 1200.The score of each subscale is between 0 and 600. Cronbach's alpha reliability coefficient in this study was found as 0.95 for the total OSES, 0.95 for the exercise sub-dimension and 0.96 for the calcium sub-dimension.

2.3.3 | The OKT

The OKT is a multiple-choice questionnaire developed by Horan et al. (1998) that is used to measure the level of knowledge about osteoporosis and consists of 24 questions. The questionnaire was revised by Atalay et al. (2011), and the number of questions was increased to 32. Questions 1-11 describe osteoporosis risk factors. Participants choose one of the following options: 'It is highly likely to be osteoporosis;' 'It is less likely to be osteoporosis;' 'It is not associated with the development of osteoporosis;' and 'I do not know.' The responses 'It is not associated with the development of osteoporosis' and 'I do not know' are accepted as incorrect and assigned 0 points.

2.4 | Ethical considerations

At the outset, the permission of the related authors for using scales was obtained. The ethical approval of the ethics committee of the university health sciences institute (25.02.2016; Protocol No: 62), institutional permission of the universities where the study would take place and the written consent of the women participating in the study were obtained.

2.5 | Data analysis

Analysis of the data was performed on the SPSS 22.0 (Chicago, IL, USA). For descriptive data, numbers and percentages were used. The multivariate analysis of variance in repeated measurements was used to compare the scale and subscale scores of the intervention and control groups by group * time (Mallery, 2012). Parametric and non-parametric tests were used as some of the data fitted the normal distribution and others did not. Mann–Whitney *U* test and Friedman test were used to compare non-parametrically distributed mean scale scores. Details of the analysis of variance in repeated measurements are given below. In the analysis of parametric data, analysis of variance in repeated measurements was used. In cases where the group * time test result was significant, for further analysis, inter-group differences were tested by using the one-way analysis of variance and independent groups *t*-test in independent groups. The intra-group variances were tested by using the one-way analysis of variance in repeated measurements and Bonferroni correction (George & Mallery, 2012), and a *t*-test was used in dependent groups. Cohen *d* effect size analysis was used to determine the effect size of the significant difference. It was shown as η^2 in the tables. The effect size value was interpreted as follows: <0.30, weak effect; 0.30–0.49, small effect; 0.50–0.79, medium effect and >0.80, large effect (Ozsoy, 2002). In the study, all results were evaluated at a significance level of $p \leq 0.05$ and a confidence interval of 95%.

2.6 | Interventions

The 5A approach was applied to the intervention group with short interviews. The interventions were planned to maintain the regular calcium intake of women in the postmenopausal period, find out about their health beliefs regarding regular physical activity and osteoporosis, protect bone health, complete the information gap and impact their health positively. Data were collected simultaneously from the experimental and control groups. Interventions were carried out by the first author. After the research was over, the education booklet and the video containing the bone-strengthening exercises were also sent to the control group via WhatsApp.

2.6.1 | Short interviews (5A model)

Short interviews are called by many different names, such as simple suggestions, minimal intervention, short counselling or short-term counselling (Werch, 2007; Yildirim, 2015). They centre on raising awareness and simple suggestions for change.

The '5A model', which was developed to stop smoking based on the stages of change model, consists of five main steps: asking individuals about their health behaviour (ask), advising behaviour change (advice), evaluating the level of readiness to change (assess), assisting the individual to change (assist) and monitoring the status of the change (arrange) (Heather, 2011; Puschel et al., 2008) (Figure 2).

Following the pretest in this study, a schedule was determined for the short interviews with the intervention group, and the frequency of participants' visits to the FHC at other times was evaluated. The women were called on their phones and invited to the FHC. Each individual was interviewed for 20–25 min in each session.

2.6.2 | Training booklet ('Osteoporosis and You')

A training booklet, named 'Osteoporosis and You', was handed out to participants to increase the effectiveness of the short interviews. For the evaluation of the booklet prepared in line with the literature (Babatunde et al., 2011; Huang et al., 2011; Kılıc & Erci, 2004), nine academicians, who were experts in the field of public health nursing, were consulted. The booklet was rearranged in line with the opinions of expert academicians. After the research was completed, these booklets were also given to the participants in the control group.

2.6.3 | Weight-bearing exercises

To increase exercise self-efficacy, the intervention group was shown weight-bearing exercises by a specialist working in a sports school. The training hall of the public health centre was used for the training. The practice of these exercises was demonstrated twice. In addition,

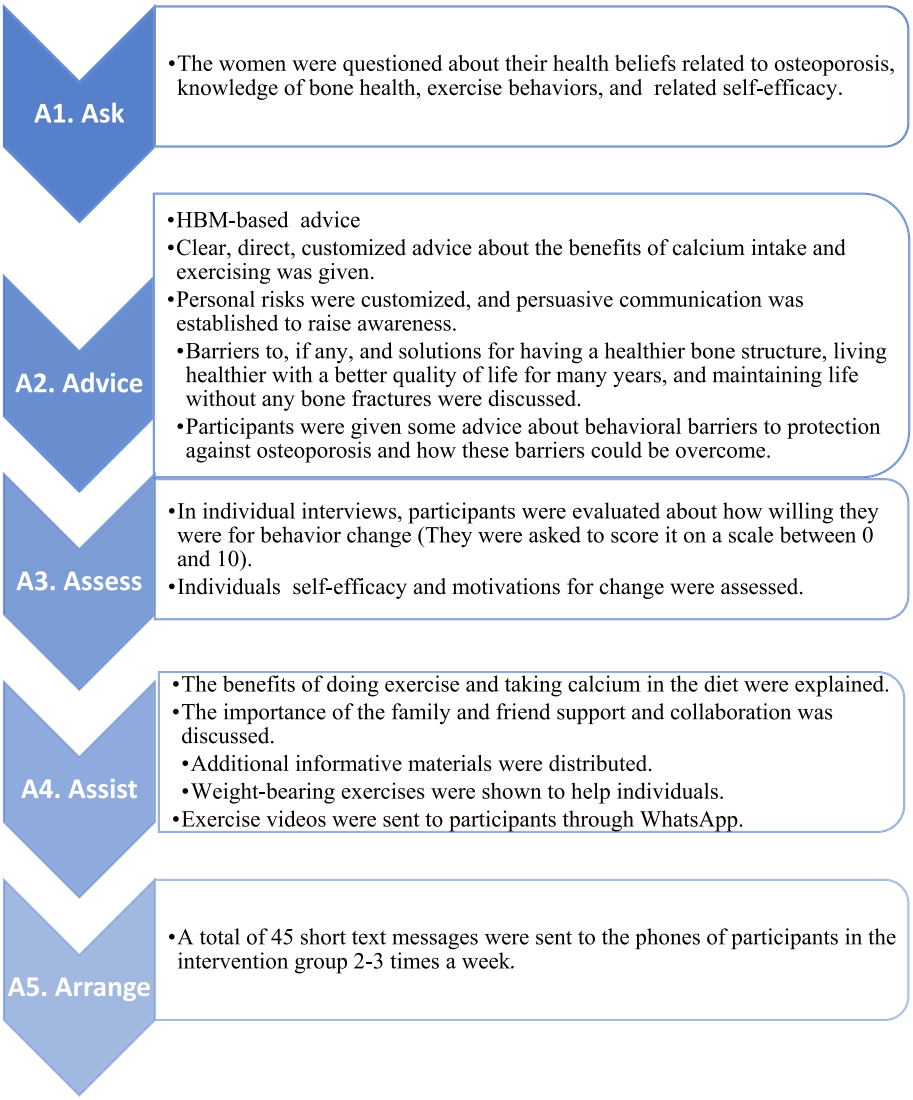

FIGURE 2 Short interviews (5A model)

the exercise video was sent to participants through WhatsApp so that they could do the exercises at home.

2.6.4 | Healthy bones deal

Immediately after short interviews, the participants in the intervention group signed a 'Healthy Bones Deal', which was intended to encourage them to maintain bone health. In this agreement, besides maintaining bone health, participants were asked to choose another health target within 3 months (such as going for a walk regularly every week; maintaining ideal body weight; avoiding habits such as smoking, alcohol and coffee; checking vitamin D and hanging the document somewhere at home that they can see).

2.6.5 | Short text messages

A draft form was created for the text messages to be sent through the short message service (SMS) about topics, such as doing physical activities; taking enough calcium; the effect of sunbathing and excess consumption of tobacco, alcohol and caffeine on bone health; increasing self-efficacy and motivation for protection against osteoporosis.

3 | RESULTS

3.1 | Participant characteristics

The mean ages of the women in the intervention and control groups were 58.29 ± 4.09 and 56.12 ± 3.97 years, respectively. The proportion of married women in the intervention group was 65.9%, and 82.9% in the control group. It was found that 14.6% of the intervention group and 9.8% of the control group were alcohol users, 63.4% of the intervention group and 61% of the control group sunbathed, 34.1% of the intervention group and 39.1% of the control group had a family history of fractures and that 53.7% of the intervention group and 65.9% of the control group had a bone mineral density test. Also, 41.5% of the intervention group and 31.7% of the control group drank

TABLE 1A Comparison of individual characteristics of participants

Individual characteristics	Intervention group		Control group		Statistical analysis	
	n	%	*n*	%	X^2	*p*
Age	57.20 ± 4.58		56.12 ± 3.97			
Marital status						
Single	14	34.1	7	17.1	3.137	0.077
Married	27	65.9	34	82.9		
Education level						
Primary school	15	36.6	24	58.5		
Secondary	15	36.6.	11	26.8	4.163	0.125
College	11	26.8	6	14.6		
Smoking						
Yes	8	19.5	14	34.1	2.236	0.135
No	33	80.5	27	65.9.		
Alcohol						
Yes	6	14.6	4	9.8	0.456	0.500
No	35	85.4	37	90.2		
Sunbathing						
Yes	26	63.4	25	61.0	0.052	0.820
No	15	36.6	16	39.0		

TABLE 1B Comparison of individual characteristics of women ($n = 82$)

Individual characteristics	Intervention group		Control group		Statistical analysis	
	N	%	*n*	%	X^2	*p*
Osteoporosis family history						
Yes	14	34.1	16	39.0	0.210	0.647
No	27	65.9	25	61.0		
Bone density measurement						
Yes	22	53.7	27	65.9	1.268	0.260
No	19	46.3	14	34.1		
Daily tea consumption						
1–3 cups	17	41.5	13	31.7		
More than 3 cups	18	43.9	19	46.3	1.160	0.560
Sometimes–never	6	14.6	9	22.0		
Daily coffee consumption						
1 cup–sometimes	11	26.8	11	26.8	1.000	0.598
Never	30	73.2	30	73.2		
Milk daily						
1 glass a day	7	17.1	6	14.6		
1–2 glasses per week	12	29.3	13	31.7	0.117	0.943
Sometimes	22	53.6	22	53.7		

X^2 = chi-square test.

one to three cups of tea a day, 26.8% of the intervention and control groups drank a cup of coffee a day or occasionally and 53.6% of the intervention group and 53.7% of the control group drank milk occasionally. There was no significant difference between the intervention and control groups in terms of the independent variables of the study (age, education, marital status, alcohol use, daily tea and coffee consumption, family history of osteoporosis and bone measurement) ($p > 0.05$) (Tables 1a and 1b). No statistically significant difference

was found between the pre-interventional mean scores of participants in the intervention and control groups on the total OHBS, OSES, and OKT and subscale scores except for the 'barriers to exercise' subscale of the OHBS ($p > 0.05$) (See Supporting Information).

3.2 | OHBS, OSES and OKT

A statistically significant difference was found in OHBS scores regarding group * time interaction ($F = 9.547$; $p = 0.001$). Also, a significant difference was found according to time regardless of the group effect ($F = 21.758$; $p = 0.001$). However, there was no significant difference according to groups regardless of the time effect ($F = 0.026$; $p = 0.872$). According to the results of a one-way analysis of variance in repeated measurements to examine the comparison of mean OHBS scores over time, significant differences were found between the mean pretest, posttest, and follow-up test scores of the intervention group ($F = 19.153$; $p = 0.001$). No statistically significant difference was found between the mean pretest, posttest, and follow-up test scores of the control group ($F = 2.902$, $p = 0.065$). To determine the time causing the difference, the Bonferroni correction test was done for intra-group comparison, and a *t*-test was done in dependent groups (Mallery, 2012). According to the results of the advanced analysis, differences were found to exist between the mean pretest and posttest scores ($p = 0.001$) and between the mean pretest and follow-up test scores ($p = 0.001$) (Table 2).

According to the results of the *t*-test analysis in independent groups conducted to examine the intra-group comparison of the mean OSES score, a significant difference was found between the mean posttest scores ($t = 5.180$; $p = 0.001$) and between the mean follow-up test scores of the groups ($t = 6.325$; $p = 0.001$) (See Supporting Information).

3.3 | Osteoporosis knowledge

According to the results of a one-way analysis of variance in repeated measurements performed to examine the comparison of the mean OKT scores according to time, a significant difference was found between the mean pretest, posttest and follow-up test scores of the intervention group ($F = 128.952$; $p = 0.001$). Also, there was a significant difference between the mean pretest, posttest, and follow-up test scores of the control group ($F = 13.643$; $p < 0.001$). To determine the time causing the difference, the Bonferroni correction test was done for intra-group comparison, and a *t*-test was done in dependent groups. In the binary analysis, the difference was found to arise between pretest and posttest scores ($p = 0.001$), pretest and follow-up test scores ($p = 0.001$) and posttest and follow-up test scores ($p = 0.001$) in the intervention group. The difference in the control group was determined between pretest and posttest scores ($p = 0.040$), pretest and follow-up test scores ($p = 0.001$) and posttest and follow-up test scores ($p = 0.035$) (Table 3).

TABLE 2 Comparison of health belief scale scores according to group, time and group * time

Group	[1]Pretest $\bar{x} \pm SD$	[2]Posttest $\bar{x} \pm SD$	[3]Follow-up test $\bar{x} \pm SD$	Statistics			Post hoc
				F	*P*	η^2	
Intervention	135.17 ± 13.19	145.75 ± 12.85	144.14 ± 15.46	19.153	**0.001**		2 > 1
Control	139.92 ± 13.23	142.00 ± 11.47	141.87 ± 11.28	2.902	0.065		3 > 1
		Group		**0.026**	0.872	0.001	
		Time		21.758	**0.001**	0.214	
		Group * time		9.547	**0.001**	0.107	

F = the multivariate analysis of variance in repeated measurements$t$-test dependent group.

TABLE 3 Comparison of mean osteoporosis knowledge test scores according to group, time and group * time

Group	Pretest $\bar{x} \pm SD$	Posttest $\bar{x} \pm SD$	Follow-up test $\bar{x} \pm SD$	Analysis			Advanced analysis
				F	*p*	η^2	
Intervention	17.63 ± 4.28	25.56 ± 2.62	27.17 ± 2.52	128.952	**0.001**		2 > 1; 3 > 1; 3 > 2
Control	16.95 ± 3.36	18.53 ± 3.86	19.90 ± 3.03	13.643	**0.001**		2 > 1; 3 > 1; 3 > 2
	$t = 1.771$	$t = 4.813$	$t = 3.772$				
	$p = 0.89$	$p = \mathbf{0.000}$	$p = \mathbf{0.000}$				
		Group		79.00	**0.001**	0.497	
		Time		117.53	0.001	0.595	
		Group * time		117.53	**0.001**	0.595	

*F = The multivariate analysis of variance in repeated measurements * t = test Independent groups * Dependent groups.

4 | DISCUSSION

The findings of this study indicated that the mean post-programme and during-follow-up scores of the women in the intervention group, who participated in the HBM-based short-interview programme with the 5A model, on the OHBS, OSES, and OKT were statistically significant compared with the scores of the control group. In many HBM-based studies, health education given to intervention groups has been found effective (Chan et al., 2007; Kalkim & Dağhan, 2017; Kılıc & Erci, 2004; Pinar & Pinar, 2020). Similarly, this study showed that the HBM-based short-interview programme with the 5A model was effective in reducing the risks of osteoporosis and changing the behaviour of women. These results confirm all the hypotheses of the research. Public health approaches are more important in the prevention of osteoporosis. For this reason, it is reported that taking preventive and bone health-enhancing measures for postmenopausal women, who are in the high-risk group in society, will reduce the burden on the health system stemming from this disease (Pinar & Pinar, 2020).

Similarly, it was observed in this study that the mean OHBS scores increased after the short interviews with the 5A model and the follow-up. In the literature, it was found that the perceived benefits of and sensitivity to exercise and taking calcium were improved in studies involving HBM-based health education (Huang et al., 2011; Jeihooni et al., 2016; Kalkim & Dağhan, 2017; Kılıc & Erci, 2004; Kılıc & Erci, 2004). Similarly, a review of the literature indicated that the individual barriers of women to preventing osteoporosis decreased after HBM-based education (Kılıc & Erci, 2004; Malak & Toama, 2015). However, no significant difference was found between groups regarding the perceived benefits of calcium intake and exercising in some studies (Babatunde et al., 2011; Sanaeinasab et al., 2014). Women in these studies were only given health education. However, in this study, a booklet containing information on protection against osteoporosis was given to women after HBM-based short interviews. During the follow-up period, motivational short messages were sent to them via WhatsApp. In addition, bone-strengthening exercises were shown to the women in cooperation with an expert, and a video showing these exercises was sent to their phones. They were asked to choose a goal within 3 months, and they signed a motivational healthy bones contract to maintain it (avoiding habits such as smoking, alcohol or coffee and taking a regular walk every week). In this study, we think that the awareness of women in the intervention group about their individual barriers may have increased and they may have developed solutions for this. In addition to the interventions applied to the intervention group, we think that the follow-up period and the evaluation of the variance over time in this study added a difference and contributed to the effectiveness of the study.

It is easier to prevent osteoporosis than to treat it. Osteoporosis can be prevented with individually modifiable risk factors. For example, women's dietary intake of calcium and adequate exercise are modifiable risk factors. Knowing the risks of osteoporosis and providing appropriate education strategies for women is one of the steps to be taken for the protection of bone health. Babatunde et al. (2011) found that perception of self-efficacy is the best indicator for developing osteoporosis preventive behaviours. Weight-bearing exercises, daily walks and intake of calcium-rich foods in women are important interventions to increase bone mineral density (Kalkim & Dağhan, 2017; Pinar & Pinar, 2020). In this study, mean scores on the total exercise and calcium self-efficacy scale increased after short interviews in the intervention group, and this increase continued during the follow-up period. We think that explaining calcium-rich foods to women in the education booklet, providing information about the amount of calcium they should take daily and sending reminders and motivational short messages to their phones every week increased their calcium intake and exercise self-efficacy in this study. Similarly, some studies in the literature indicated that the amount of calcium intake increased in women after education (Jeihooni et al., 2016; Sanaeinasab et al., 2014). For example, Jeihooni et al. (2016) and Huang et al. (2011) found that the nutrition and walking behaviours of HBM were effective in increasing bone density. The results of these studies show that osteoporosis can be prevented, thereby contributing to the preservation of bone mineral density.

Some studies showed that positive health behaviours increased in HBM-based education programmes given to women in intervention groups to prevent osteoporosis (Elsabagh et al., 2015; Kalkim & Dağhan, 2017). However, no significant difference was found between the groups in some HBM-based studies (El-Sayed & Megeid Abdel, 2013; Khoshnood et al., 2015). Contrary to these studies, in our study, it was found that the knowledge of women increased after short interviews and continued to increase after the follow-up. It is known that as women's knowledge increases, their perceptions of utility and seriousness increase (Jeihooni et al., 2016; Kalkim & Dağhan, 2017; Kılıc & Erci, 2004; Malak & Toama, 2015). Therefore, studies aiming to increase knowledge of osteoporosis are important. In this study, the OKT results showed that the knowledge of the intervention group on calcium and exercise increased and that this increase continued during the 6-month follow-up period. In this study, the provision of women with a booklet containing information and positive health behaviours on the prevention of osteoporosis and sending motivational short messages to their phones during the 6-month follow-up period facilitated the retention of the information and made it permanent.

4.1 | Limitations of the study

The limitations and difficulties of the study included scheduling another appointment for participants who could not come to the short interviews scheduled mutually for various reasons and the collection of the study data based on self-report. Also, this study was conducted in a single centre; there was no statistically significant difference between the intervention and control groups in terms of their mean pre-intervention scores on the barriers to exercise subscale of the OHBS, and the content validity of the education booklet used as an educational tool in the research was not conducted. In addition, the results of this study are limited to only the women participating in this study.

5 | CONCLUSIONS AND RECOMMENDATIONS

Women's knowledge of osteoporosis health beliefs and self-efficacy increased in this study. The results of the study showed that the HBM-based short interview programme with the 5A model conducted by nurses was effective. These results provide evidence for studies to be conducted by nurses working in primary care to protect women against osteoporosis through short interviews with the 5A model. In line with these results, the following recommendations were made. Nurses should plan programmes that include short interviews with the5A model for women of different ages in primary health-care services. These programmes should be taken into consideration when programmes or strategies are developed to protect women's health and bone health. Models encouraging behaviour changes to protect women in society at risk for osteoporosis should be transformed into effective programmes that can reach a large number of women, and education booklets, videos and telephone reminders should be sent to them. The effectiveness of the short interviews programme with the 5A model, long-term follow-up and bone mineral density should be measured.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in the publication of this study.

ETHICAL STATEMENT

This work has not been published in any other form nor submitted for review by any other journal. We can also declare that this work is both original and without plagiarism. Ethics committee approval was obtained for the study.

AUTHORSHIP STATEMENT

All authors contributed to manuscript preparation, editing and finalization. The initial research design was developed by Nurcan Kolaç and Ayşe Yıldız. The co-design process outlined involved all authors, as did related consensus discussions.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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