Evaluation of osteoporosis knowledge level of women who applied to the family medicine outpatient clinics of a university hospital

Bahar Birinci Ocak¹, Ayşe Gülsen Ceyhun Peker¹, Murat Dağdeviren²

¹Department of Family Medicine, School of Medicine, Ankara University, AnkaraTurkey
²Department of Endocrinology and Metabolism, Keçiören Training and Research Hospital, University of Health Sciences, Ankara, Turkey

ABSTRACT

Aim: This study aimed to assess the knowledge, attitude, and behavior of women aged 18–45 years toward osteoporosis.

Material and Method: A total of 368 females (average age:32.59±7.58) who applied to the family medicine outpatient clinics between 15 May 2016 and 15 August 2016 participated in this study. Participants completed the revised osteoporosis knowledge test, which contained 12 socio-demographic questions.

Results: The average score for participants in the exercise subgroup was found to be 9.56±3.62 out of 20; the average score for the nutrition subgroup was 12.86±4.17 out of 26, and the average total score was 15.08 ± 4.82 out of 32. In general, the average score of participants was found to be 50% percent or less of the maximum scores of each subgroup of the questionnaire. This result suggests that women have inadequate knowledge about osteoporosis. Participants' level of knowledge of osteoporosis was related to their education levels, occupational groups, and smoking status. High educational levels of participants correlated with high average scores ($p < 0.05$). Cigarette smoking correlated with low average scores ($p < 0.05$). Healthcare workers had higher average scores than non–healthcare workers ($p < 0.05$) but the scores were generally considered to be low for both groups.

Conclusion: We can infer that the osteoporosis knowledge level of our study participants is low. Education of whole communities, especially women, should be embarked on. The main focus of this activity should be on the risk factors that engender osteoporosis and basic preventive measures before the disease develops. Exercise and nutrition should be adopted as a lifestyle. Although this duty concerns all healthcare providers, it mostly relies on primary care physicians.

Keywords: Osteoporosis, osteoporosis knowledge test, women, patient education

INTRODUCTION

Osteoporosis (OP) is a metabolic bone disease that worsens over time, leading to decreased bone mineral density and strength, increased bone fragility, and an increased risk of fracture, resulting from deterioration in bone microarchitecture (1). OP should be considered a severe public health issue in climes where life expectancy is rising. Due to the increase in the average life expectancy in our country and because Turkish women possess many risk factors, osteoporosis poses a significant health issue that requires prompt diagnosis and preventive measures (2).

Since 80% of OP patients are women, it is considered a women's health issue in many climes (3). OP is a disease that can be prevented and its development can be delayed by decreasing the risk factors (4). There is a need to raise awareness about osteoporosis in every period of life. However, raising awareness, especially at young ages and in the pre-menopausal period, will have a greater impact on the preservation of bone health and the prevention of disease development (5). The most important approaches in prevention are the gaining of optimal bone mass during childhood and adolescence and the preservation of the gained bone mass afterward. Therefore, screening for osteoporosis risk factors in women and the creation of awareness regarding proper diet and exercise at an early age should be done regularly. These measures are seen as the most effective ways to lower the burden of osteoporosis on the health system (6,7).

The key, according to modern public health Philosophy, is to safe guard and enhance one's health while still being healthy. Prevention is the primary line of defense against osteoporosis. Nutrition is crucial, especially in the developmental age. Adequate intake of calcium and vitamin D contributes to bone metabolism. Also, performing exercises such as aerobics, weight training, and walking protects one from osteoporosis. Exercise is very important in maintaining and restoring the structural adequacy of bone mass. Physical activities and exercises reduce the loss of bone mass (8).

Since preventing osteoporosis is the main goal, education about nutrition, lifestyles, and risk factors is required for the entire population, especially risk groups. Within the context of preventive health services, it has become imperative to provide training on bone health and awareness–raising initiatives by family physicians. Raising awareness is one of the core competencies of family medicine, an inclusive approach, health promotion, and disease prevention strategies. Primary prevention practices are constantly emphasized and supported by family medicine.

This study aims to assess the knowledge and awareness of osteoporosis among women between the ages of 18 and 45 years, who applied to our outpatient clinics. Following the questionnaire, it is planned to increase the knowledge level of people by providing individualized instruction on exercise and calcium-rich nutrition in the study universe.

MATERIAL AND METHOD

Before commencing the study, approval was obtained from the Ankara University Scientific Research and Publication Ethics Committee (Date: 28.03.2016, Decision No: 06-226-16). In addition, informed consent was obtained from all participants.

Our study is cross-sectional and descriptive. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Our study was conducted at the family medicine outpatient clinics of our hospital, which is a university hospital (tertiary center), between May 15, 2016, and August 15, 2016. The study comprised 368 female volunteers between the ages of 18–45, who applied to our outpatient clinics for any reason and consented to participate in the study. Those who declined to participate in the study were excluded from the study.

39 female patients who applied to the family medicine outpatient clinic underwent a pilot study since the revised 2011 osteoporosis knowledge test (OKT) had never been applied for the study. The sample size we required was at least 340 persons as established by the findings of the pilot study, which showed that the average in the groups was calculated as 14.3 and the standard deviation as 4.7, based on factors, and when the margin of error was taken as $\alpha=0.005$ and power=0.95.

The study, a questionnaire study aimed to compare the osteoporosis knowledge levels of the participants in subgroups. The original scales in the test were created in 1991 by Kim KK, Horan ML, and Gendler P (9,10). It was translated into Turkish by Kılıç D et al. (11) in 2004 and its validity and reliability study was performed. Later, it was revised by adding eight questions questioning the risk factors in 2011 and translated into Turkish by Şimşir Atalay et al. (12) in 2015 and its validity and reliability study was conducted.

The questionnaire has two parts and a total of 44 questions. The first part consists of 12 questions assessing socio-demographic characteristics, the second part consists of the revised 2011 OKT. The revised 2011 OKT has two subsections. Section 1, the nutrition subgroup, contains 26 questions (1–11 and 18–32). Section 2, the exercise subgroup, includes 20 questions (1–17 and 30–32). 14 questions of these two subgroups are common (1–11 and 30–32). This was factored into the overall score, which has a range from 0 to 32.

Questions 1–11 assessed knowledge of the risk factors for osteoporosis and the answers are considered valid if one of the options is ticked. A sample of one the options are: "There is a high probability of osteoporosis", "There is a low probability of osteoporosis", "It has nothing to do with the development of osteoporosis" and "I do not know." The answers "It has nothing to do with the development of osteoporosis" and "I do not know" are assessed as wrong and given 0 points. The answers "There is a high probability of osteoporosis" and "There is a low probability of osteoporosis" are considered correct and 1 point is given. Other questions contain four optional answers and 1 point is given when correct answers are marked.

The overall average score in the questionnaire is ranked between 0 and 32. The total score of the exercise scale part is between 0 and 20, and the total score of the nutrition scale part is between 0 and 26. A high score indicates that the participant's knowledge of osteoporosis is at a good level.

Statistical Analysis

Data analysis was done with the Statistical Package for Social Sciences (SPSS) 11.5 package program.

Shapiro–Wilk tests were performed to determine whether the numerical variables conformed to anormal distribution. Descriptive statistics were shown as average and standard deviation for normal distribution, median

Birinci Ocak et al. Osteoporosis knowledge level of women

J Health Sci Med 2023; 6(2): 250-256

(min-max) for non–normal distribution, and several cases (%) for nominal variables. The significance of the difference between the groups in terms of averages was assessed by t-test and one-way analysis of variance. The significance of the difference in terms of median values was assessed with the Mann–Whitney–U test and the Kruskal–Wallis test. Nominal variables were assessed with the Pearson Chi-Square or Fisher Exact test. While investigating the relationship between continuous variables, the distribution was assessed with the Spearman Correlation test when it was not normal and with the Pearson Correlation test when it was normal.

p<0.05 was considered statistically significant.

RESULTS

The average age of 368 volunteers participating in the study was 32.56 ± 7.58.

When the educational levels of the participants were examined, there was no illiteracy. Characteristics of the study population are given in **Table 1**.

While 83 participants (22.6%) had a chronic disease, 285 participants (77.4%) did not. In 47% (n=39) of patients with chronic illness, disorders were causing secondary osteoporosis. The most prevalent diseases in this group included 23.07% (n=9) rheumatological conditions (Rheumatoid arthritis, Ankylosing spondylitis, Systemic Lupus Erythematosus) and 20.51% (n=8) diseases that are capable of causing malabsorption (Crohn's disease, Irritable bowel syndrome, and Gastroesophageal reflux).

There was chronic drug use in 20.4% (n=75) of the participants in the study. 50.7% (n=38) of the drug users were taking a drug that increased the risk of osteoporosis. Drugs containing levothyroxine sodium constituted 50% (n=19) of drugs in this group.

359 (97.6%) participants were in the pre-menopausal period.

When the responses given by the participants to the OKT questions were analyzed, the average score they got from the nutrition group was 12.86±4.17, and this average score was 49.46% of the maximum score that could be obtained for the nutrition group in the test. The average score of the exercise subgroup was 9.56±3.62, constituting 47.8% of the maximum score that can be obtained for the exercise group in the test. The average of the total score points was 15.08 ± 4.82 and this average constituted 47.1% of the maximum score that can be obtained for the total score of the test.

There was no correlation between the average OKT score and age (p>0.05).

There was a significant correlation between the educational status of the participants and their OKT average score (p=0.010). The average score of university graduates was higher than what was obtained by primary school and high school graduates. Also, there was a significant relationship between the place where the participants lived and their OKT scores (**Table 2**).

When the OKT scores of the participants were assessed based on whether or not they were health workers, both the total and subgroup average scores of health workers were noticeably higher. Considering the subgroups of health workers; the OKT scores of the doctors in all three departments were also significantly higher than the other healthcare worker groups. There was no significant difference between nurses and medical faculty students (**Table 2**).

When the OKT scores of the participants were analyzed based on whether they smoked or not; the scores of non–smokers were significantly higher (p<0.001) (**Table 2**).

Table 2. Comparison of OKT scores according to the variables						
Variables	**Exercise subgroup scores**	**p value**	**Nutrition subgroup scores**	**p value**	**Total scores**	**p value**
Educational level		0.01		0.003		0.007
Primary school	5.68±0.74		8.41±0.85		9.77±1.11	
High school	8.25±0.96		11.20±1.42		12.96±1.36	
University	10.24±1.21		13.69±2.01		16.10±3.24	
Place of residence		0.005		0.001		0.003
City center	9.77±1.82		13.12±2.44		15.36±4.23	
District center	7.85±0.85		10.73±1.78		12.75±3.24	
Occupation		<0.001		<0.001		<0.001
Health worker	10.60±1.96		14.19±3.12		16.54±4.12	
Not health worker	8.53±1.34		11.55±2.08		13,63±3.02	
Health care professionals		<0.001		<0.001		<0.001
Doctors	13.58±2.94		18.38±5.04		21.08±6.01	
Nurses	10.77±1.98		14.16±3.15		16.65±4.23	
Auxiliary health personnel	8.74±1.42		12.17±2.23		14.15±3.12	
Medical faculty students	11.78±2.02		15.22±3.42		17.75±4.38	
Smoking status		0.001		0.001		0.001
Smokers	8.51±2.36		11.78±2.12		13.77±3.90	
Non-smokers	9.97±2.94		13.29±3.22		15.60±4.56	

J Health Sci Med 2023; 6(2): 250-256

Birinci Ocak et al. Osteoporosis knowledge level of women

Table 1. Basic characteristics of the study population	
Variables	n (%)
Educational level	
Primary school	22 (6%)
High school	76 (20.7%)
University	270 (73.3%)
Place of residence	
City center	328 (89.1%)
District center	40 (10.9%)
Occupation	
Health worker	183 (49.7%)
Doctors	24 (13.1%)
Nurses	62 (33.9%)
Auxiliary health personnel	65 (35.5%)
Medical faculty students	32 (17.5%)
Not health worker	185 (50.3%)
Number of pregnancies	
No pregnancy history	172 (46.7%)
1 pregnancy	87 (23.6%)
2 pregnancies	73 (19.8%)
3 pregnancies	23 (6.3%)
4 and more pregnancies	13 (3.5%)
Smoker	105 (28.5%)
Alcohol user	28 (7.6%)
History of previous fractures	58 (15.8%)
Family history of osteoporosis	106 (28.8%)

There was no significant relationship between the participants' alcohol use, chronic disease, chronic drug use, and OKT scores (p>0.05). In addition, no significant difference was found between the scores of those with chronic diseases that can cause secondary osteoporosis and those with chronic diseases that do not cause secondary osteoporosis (p>0.05). Again, when the participants with chronic drug use were grouped as those who use drugs that cause secondary osteoporosis and those who do not, no statistically significant difference was found between them in terms of OKT scores (p>0.05).

When the participants were assessed according to their menopausal status (pre-menopausal or post-menopausal), family history (family history of osteoporosis), and bone fracture history; the scores of the groups were similar (p>0.05).

Among the 20 questions in the exercise subgroup, the most incorrectly answered question was about whether weight-bearing exercise is a better way to reduce the risk of osteoporosis than cycling and yoga. The correct answer rate for this question was 6.5% (n=24). Among the 26 questions that make up the nutrition group, the most incorrectly answered question was the amount of milk that should be drunk per day for the recommended amount of calcium intake. The rate of answering this question correctly was 6.8% (n=25).

Among the 11 questions in which the risk of developing osteoporosis is assessed, the most incorrectly answered question is the one that assesses the possibility of the occurrence of osteoporosis in overweight people. The correct answer rate for this question was 12% (n=44). In the three questions asked about diagnosis and treatment, more than half of the participants answered wrongly. This is the question that questions the best time for the formation of strong bones. The correct answer rate for this question was 14.1% (n=52).

DISCUSSION

In our study, the average total score of the OKT was 15.08±4.82, and this average constituted only 47.1% of the maximum score that can be obtained for the total score of the test. Although the total score of health workers was significantly higher than non–health workers, it comprised only 51.6% of the maximum score that was obtainable. Thus, in our study, we determined that the level of OP knowledge and awareness was not at the desired level, even among healthcare workers. However, the level of knowledge about osteoporosis increased significantly as the education level increased.

In our study, we found that the level of OP knowledge was not sufficient in women who were at greater risk for OP. This result once again indicated the necessity of providing counseling and education on OP to enhance the bone health of all women, whether or not they have an additional risk factor other than gender. Ungan M and Tümer M (13) in the Mediterranean Osteoporosis Study used the scale they created from available information on hip fractures and risk factors. Also, during the study they conducted with women in rural areas, they used the scale created by Gemalmaz et al. (14). It has been observed that Turkish women lack sufficient awareness of risk factors and it has been emphasized that women should be educated by family physicians or primary care physicians (14). Therefore, family physicians have important duties. Family medicine has been termed the cornerstone of preventive medicine. Primary protection takes the lead in primary health care services. With the precautions and education to be undertaken, the health expenses caused by osteoporosis can also be abated. This is due to the high cost of managing osteoporosis.

Our study was conducted in the family medicine outpatient clinics on the campus of a university hospital. Since almost half of the patients who applied to our outpatient clinics were health workers, it was possible to examine the knowledge levels of the health workers. This gave us the advantage of examining the OP knowledge level from a different perspective than other similar studies.

In our study, the exercise, nutritional, and total knowledge scores of the women were found to be only 50% or less than the maximum scores of the questionnaire. When

Birinci Ocak et al. Osteoporosis knowledge level of women

J Health Sci Med 2023; 6(2): 250-256

other studies conducted in Turkey are examined; In the study conducted by Altın et al. (15), when the answers given by the participants to the knowledge test were assessed, it was observed that the subgroup (nutrition and exercise) and total score averages remained at 50% of the maximum scores of the questionnaire. Similarly, in the study of Öztürk et al. (16) it was observed that the subgroups and total score averages were less than 50% of the maximum scores of the questionnaire. In the study of Okumuş et al.(17) on 100 women, it was found that the level of knowledge about osteoporosis was insufficient. Considering the studies abroad; In the study of Janistewska et al. (18) with 300 women aged 45–65, the average score of the participants in the OKT nutrition group was found to be 9.27, which was below the average we obtained in our study. However, the average score of the exercise group (13.93) and the average score of the total score (15.71) were higher than our study.

When the education levels of the participants in our study were examined; It was determined that 73.4% (n=270) had a university or higher education. We envisaged that this high rate was because the majority of the participants in the study consisted of civil servants and health workers working in the hospital, and the age range of the participants was from the young age group. We, therefore, realized from our study that as the level of education increased, the level of OP knowledge also increased. In a similar study conducted by Aksu et al. (2), more than half of the participants are university graduates and when the education level and osteoporosis knowledge level are examined, it is seen that the level of knowledge increases as the education level increases. Another study by Koç et al. (4) supports this situation. In a different study conducted by Magnus et al. (19) on 1,514 individuals between the ages of 16 and 79, knowledge of osteoporosis was found to be directly related to education level. All these data create the idea that people with low education levels should be given more training on OP.

As expected, there was a significant difference in favor of health workers in the exercise group, nutrition group, and total score averages between health workers and non–health workers. On the other hand, the scores of the health workers constituted only 50% of the maximum scores on the test. This situation shows that the OP knowledge level of health workers is insufficient. In occupational subgroups, the highest scores for all three groups were among physicians. This was highly expected. However, it was observed that the physicians could not answer all the questions correctly, although they answered approximately 70% of the questions correctly. In a different study conducted in England by mailing a questionnaire to 2,515 physicians, mostly general practitioners, they stated that they could not obtain

sufficient information about osteoporosis during medical education (20). In a study conducted by Eyigör et al. (21) with medical students, it was observed that medical students had insufficient knowledge about osteoporosis prevention and complications. This situation shows that medical students, who will undertake the primary task of informing the public during their medical school education, do not get enough information about ways to prevent osteoporosis and risk factors. We, therefore, suggest that health personnel, who should be the main source of information for society, should be thoroughly informed about this issue.

In our study, 22.6% (n=83) of the women participating had at least one chronic disease. 47% of these chronic diseases were diseases that could cause secondary osteoporosis. In our study, no significant difference was found between the presence of chronic disease and the average score of all three groups. In a study by Selçuk et al. (22), people with and without chronic disease were asked whether they knew the ways to prevent osteoporosis and treatment methods, and it was seen that those with chronic diseases answered both questions at higher rates. This is because people with chronic diseases are more concerned and sensitive about their health. In our study, on the other hand, it was observed that the presence of the chronic disease did not affect the level of knowledge of the individuals.

In our study, 28.8% of the women participating had a family history of osteoporosis. However, there was no significant relationship between family history and OKT scores. In the study of Koç et al. (4), the average scores of those with a family history of osteoporosis were found to be higher than the average scores of those without. In our study, the reason why we could not find a difference in terms of knowledge level between those with and without a family history of osteoporosis may be due to the much smaller sample size of women with a family history of osteoporosis.

In the study conducted by Umay et al. (23), it was found that a history of fractures under 50 years of age was not a risk factor for osteoporosis. However, in the study of Nayak et al. (24), fracture history was fingered among the important risk factors for osteoporosis. In another study conducted by Pınar et al. (3), it was stated that osteoporosis was seen at a higher rate in individuals with a history of fractures due to falling and impact. In our study, there was no significant difference between the OKT scores of those with and without a history of fracture. It was also observed that those with a history of fractures answered only 50% of the questions correctly. These data suggest that people with a history of fractures are not sufficiently aware of osteoporosis and its prevention methods, even after their fractures.

J Health Sci Med 2023; 6(2): 250-256

Birinci Ocak et al. Osteoporosis knowledge level of women

The most important limitation of our study —our research population— consists only of participants who applied to the family medicine outpatient clinic in a single center for any reason. A significant part of the participants were health workers and their education level was above the general population average. This situation reduces the likelihood that the data obtained will reflect the general population. Therefore, more comprehensive and multi-center studies may be required for more detailed information about the general population. It would not be surprising to find a lower level of osteoporosis knowledge in population-based studies than we did. The fact that approximately five years have passed since the study data were collected can also be considered as a limitation. However, when the current literature is evaluated, it is seen that there are not many studies on this subject in this process and this study is one of the most comprehensive studies in the literature with this scale. In addition to these, an important aspect of our study is that it provides important data about the osteoporosis knowledge levels of health workers. Therefore, we think that our study will contribute to the literature.

CONCLUSION

Therefore, it is necessary to raise awareness about the risk factors, prevention, diagnosis, and treatment of osteoporosis, which is an important public health issue. Along with the elderly population, the OP knowledge level of young women should also be increased. In this way, it will be possible to take protective measures. It should be ensured that factors, such as exercise and nutrition, which are among the preventive measures, are adopted as a lifestyle. It is known that family physicians have an important role in the education of individuals, considering that physicians working in primary care provide continuous service to the same population.

According to the results obtained from this study, we can make the following recommendations;

- All societies, especially women, should be made aware of osteoporosis.
- Women should be informed about the need to reduce the risk factors that cause osteoporosis. Regular physical activity and a healthy and balanced diet should be encouraged.
- The knowledge of health workers who play the most important role in reaching society should be supported by continuous training. During health education, adequate and society-adaptive information should be provided regarding osteoporosis risk factors and preventive approaches.
- Public service announcements should be prepared for public information, and the masses should be reached

through visual and written media. With all these measures, we think that awareness of osteoporosis can be increased and that the frequency of the disease can be reduced.

REFERENCES

1. Cosman F, de Beur SJ, LeBoff MS, et al. Clinician's guide to prevention and treatment of osteoporosis. Osteoporos Int 2014; 25: 2359–81.
2. Aksu A, Zinnuroğlu M, Karaoğlan B, et al. Osteoporosis, education status and knowledge level research results. Turk J Osteoporos 2005; 11: 36–40.
3. Pınar G, Pınar T, Doğan N, et al. Osteoporosis risk factors in the women over 45-years old. Dicle Med J 2009; 36: 258-66.
4. Koç A, Aypak C, Yıkılkan H, Akbıyık D, Görpelioğlu S. Knowledge, attitude and behavior levels about osteoporosis among 18-35 years old women. Turk J Osteoporos 2016; 22: 11–6.
5. Bayındır Çevik A, Pekmezci H, Koçan S. Evaluation of osteoporosis risk factors and awareness in female students who receive health education. Health Science and Professions 2016; 3: 31-8.
6. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis prevention, diagnosis, and therapy. JAMA 2001; 285: 785–95.
7. Johnel O. Advances in osteoporosis: Better identification of risk factors can reduce morbidity and mortality. JIM 1996; 239: 299–304.
8. www.uptodate.com, Overview of the management of osteoporosis in postmenopausal women, https://www.uptodate.com/contents/overview-of-the-management-of-osteoporosis-in-postmenopausal-women?search=osteoporosis&sectionRank=3&usage_type=default&anchor=H40&source=machineLearning&selectedTitle=1~150&display_rank=1#H40, Section Editors: Clifford J Rosen, Kenneth E Schmader, Author: Harold N Rosen, last updated: Sep 15, 2022, access date:20.12.2022.
9. Kim KK, Horan ML, Gendler P. Osteoporosis knowledge test. Grand Valley State University; 1991.
10. Kim KK, Horan ML, Gendler P, Patel MK. Development and evaluation of the osteoporosis health belief scale. Res Nurs Health 1991; 14: 155–63.

Birinci Ocak et al. Osteoporosis knowledge level of women

J Health Sci Med 2023; 6(2): 250-256

11. Kılıç D, Erci B. The reliability and validity of the osteoporosis health belief scale, osteoporosis self-efficacy scale and osteoporosis knowledge test. Atatürk Üniversitesi Hemşirelik Yüsekokulu Dergisi 2004; 7: 89–102.

12. Şimşir Atalay N, Akkaya N, Şahin F. The psychometric properties of the Turkish version of revised 2011-Osteoporosis Knowledge Test. Turk J Osteoporos 2015; 21: 127–31.

13. Ungan M, Tümer M. Turkish women's knowledge of osteoporosis. Family Practice 2001; 18: 199–203.

14. Gemalmaz A, Oge A. Knowledge and awareness about osteoporosis and its related factors amoung rural Turkish women. Clin Rheumatol 2008; 27: 723–8.

15. Altın E, Karadeniz B, Türkyön F, et al. The comparison of knowledge level and awareness of osteoporosis between women and men. Turk J Osteoporos 2014; 20: 98-103.

16. Öztürk A, Sendir M. Evaluation of knowledge of osteoporosis and selfefficacy perception of female orthopaedic patients in Turkey. Journal of Nursing Healthcare Chronic Illnes 2011; 3: 319-28.

17. Okumuş M, Ceceli E, Akdoğan S, Kocaoğlu S, Taşbaş O, Borman P. Premenopozal ve postmenopozal kadınların osteoporoz hakkında bilgi ve eğitimleri. Osteoporoz Dünyasından, 2008; 3: 15-9.

18. Janistewaka M, Kulik T, Dziedzic MA, Zolniercezuk-Kieliszek D. Chosen risk factors for osteoporosis and the level of knowledge about the disease in periand postmenopausal women. Menopause Review/Przeglad Menopauzalny 2015; 14: 27–34.

19. Magnus JH, Joankimsen RM, Berntsen GK, Tollan A, Sögaard AJ. What do Norwegian women and men know about osteoporosis? Osteoporosis Int 1996; 6: 31–6.

20. Taylor JC, Sterkel B, Utley M, et al. Opinions and experiences in general practice on osteoporosis prevention, diagnosis and management. Osteoporosis Int 2001; 12): 844–8.

21. Eyigör S, Karapolat H, Durmaz B. Medical student's knowledge of osteoporosis in Ege University Faculty of Medicine. Archives of Rheumatology 2008; 23: 77-81.

22. Selçuk EB, Tetik BK, Sönmez B, Tekindal M. Assesment of the knowledge, attitudes and behaviours of postmenopausal women about osteoporosis. Ankara Med J 2015; 15: 114-9.

23. Umay E, Tamkan U, Gündoğdu İ, Umay S, Çakcı A. The effect of osteoporosis risk factors on bone mineral density. Turk J Osteoporos 2011; 17: 44–50.

24. Nayak S, Roberts MS, Greenspan SL. Factors associated with diagnosis and treatment of osteoporosis in older adults. Osteoporos Int 2009; 20: 1963–7.