Original Investigation / Orijinal Araştırma

Osteoporosis Awareness and Effecting Factors: A Descriptive Cross-Sectional Study

Osteoporoz Farkındalığı ve Etkileyen Faktörler: Tanımlayıcı Kesitsel Bir Araştırma

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Abstract

Objective: Osteoporosis is a chronic metabolic bone disease characterized by bone fragility and increased fracture risk. The prevalence of osteoporosis has increased because of demographic changes and lifestyle modifications. Osteoporotic fractures are associated with a previous fragility fracture. This study aimed to determine patients' awareness levels regarding the prevention of new fractures and the necessary precautions for osteoporosis.

Materials and Methods: This descriptive cross-sectional study included 112 patients with osteoporotic fractures who met the inclusion criteria. The effect level was 0.632, the confidence interval (α) was 0.05, and the power of the test (1-β) was 0.95 for 110 samples. The patient information form and osteoporosis awareness scale (OAS) were used for data collection.

Results: Eighty-three patients (74.1%) were unaware that their fractures were osteoporotic, and 35.7% (n=40) had a history of previous fractures. The mean OAS total score of patients diagnosed with osteoporosis before fracture, those who had a family member diagnosed and treated with osteoporosis, and those who received education about osteoporosis was significantly higher. It was found that there was a moderate positive correlation between educational status and OAS total score (r=451; p<0.001). There was no difference in the OAS total score between patients with and without previous fractures (p=0.817). It was found that 53.5% of patients diagnosed with osteoporosis before the fracture still needed education about osteoporosis.

Conclusion: The results showed that patient education successfully increased awareness but did not help develop positive preventive attitudes in patients. Repeated training is necessary for individuals at risk. Bone mineral densitometry scan rates are low even in patients with a history of fragility fractures. The awareness of orthopedic specialists regarding osteoporosis education and diagnosis should be increased. The dissemination of screening tests for early diagnosis of osteoporosis should be part of the public health agenda.

Keywords: Osteoporosis, awareness, osteoporotic fractures, education of patients

Öz

Amaç: Osteoporoz, kemik kırılganlığına ve kırık riskinin artmasına neden olan kronik bir metabolik kemik hastalığıdır. Demografik değişiklikler ve yaşam tarzı değişiklikleri nedeniyle osteoporoz prevalansı artmıştır. Osteoporotik kırıklar önceki bir kırılganlık kırığı ile ilişkilidir. İlk kez kırılganlık kırığı geçiren bir hastada kırıkların tekrarlama riski çok yüksektir. Kurumumuz acil servis birimine, 65 yaş üstü bireyler, düşmelere ve düşük enerjili travmalara bağlık sıklıkla kalça kırığı nedeniyle başvurmaktadır. Bu çalışmada hastaların yeni kırıkların önlenmesi ve osteoporoz konusunda gerekli önlemlerin alınması konusunda farkındalık düzeylerinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Tanımlayıcı ve kesitsel olan bu çalışmaya osteoporotik kırığı olan 112 hasta dahil edildi. Verilerin toplanmasında hasta bilgi formu ve osteoporoz farkındalık ölçeği (OFÖ) kullanıldı.

Bulgular: Hastaların 83'ü (%74,1) kırıklarının osteoporotik olduğundan habersizdi ve %35,7'sinde (n=40) daha önce kırık öyküsü vardı. Kırık öncesi osteoporoz tanısı alan, ailesinde osteoporoz tanısı alıp tedavi edilen ve osteoporoz konusunda eğitim alan hastaların OFÖ toplam puan ortalaması anlamlı olarak yüksek bulundu. Eğitim durumu ile OFÖ toplam puanı arasında orta düzeyde pozitif korelasyon olduğu belirlendi (r=451; p<0,001). Daha önce kırığı olan ve olmayan hastalar arasında OAS toplam skoru açısından fark yoktu (p=0,817). Kırık öncesinde osteoporoz tanısı alan hastaların %53,5'inin halen osteoporoz konusunda eğitime ihtiyaç duyduğu belirlendi.

Öz

Sonuç: Hasta eğitiminin farkındalığı artırdığı ancak hastalarda olumlu koruyucu tutumlar geliştirememiş olması risk grubundaki kişiler için tekrarlanan eğitimlerin gerekliliğini göstermiştir. Kemik mineral dansitometrisi tarama oranları, kırılganlık nedeniyle kırık öyküsü olan hastalarda bile düşüktür. Ortopedi uzmanlarının osteoporoz eğitimi ve tanısı konusunda farkındalıkları artırılmalıdır. Osteoporozun erken tanısına yönelik tarama testlerinin yaygınlaştırılması bir halk sağlığı politikası olarak gündemde olmalıdır.

Anahtar kelimeler: Osteoporoz, farkındalık, osteoporotik kırıklar, hastaların eğitimi

Introduction

Osteoporosis is characterized by decreased bone mineral density and deterioration of the microarchitecture of bone tissue; it is the most common chronic metabolic bone disease that causes bone fragility and an increased risk of fractures (1). In the development of osteoporosis, there are non-modifiable risk factors such as age, race, gender, and hormone levels, as well as modifiable risk factors such as nutrition, sedentary life, exercise, alcohol, cigarette, and coffee consumption (2).

With the extension of life expectancy, the increasing proportion of the elderly population and lifestyle changes have significantly increased the prevalence of osteoporosis and will continue to do so. Osteoporosis does not cause clinical symptoms until a fracture occurs, and osteoporotic fractures, which are common in the older age group, are associated with increased dependency, morbidity, and mortality (1). While it was stated that 158 million people were at high risk of fracture in 2010, it is estimated that this number will double by 2040 due to demographic changes (3). It is estimated that one in three women and one in five men over 50 years of age will experience osteoporotic fractures in their lifetime (4). Additionally, studies have shown that osteoporotic fracture increases the risk of future fractures (5,6). The risk of suffering a subsequent fracture is highest in the two years following the first fragility fracture (7,8). Therefore, informing patients at risk of fracture before a fracture occurs and raising awareness in society are considered significant public health strategies to protect patients at risk (9). The report prepared by the International Osteoporosis Foundation Capture the Fracture® program in collaboration with leading Turkish osteoporosis experts emphasizes the need for action to stop the increasing number of fragility fractures. Recognition of osteoporosis as a chronic and progressive condition, establishment of more fracture liaison service to increase post-fracture screening, diagnosis, treatment rates, and follow-up, including falls prevention services, prioritization of fragility fractures within healthcare management, improve the education of healthcare professionals, management of frailty to prevent falls, work both centrally and regionally is recommended in the report (10).

This study aimed to determine the awareness levels of patients treated for osteoporotic fractures regarding preventing new fractures and taking the necessary precautions regarding osteoporosis.

Materials and Methods

The research was conducted in descriptive and cross-sectional types. The study was conducted after obtaining approval Medical School Dean's Office Clinical Research Ethics Committee and securing institutional permission from the hospital where the data was collected (date: 20.04.2022, decision no: 09). The study was conducted according to the principles of the Declaration of Helsinki.

This study, conducted between August 2022 and July 2023, included patients who applied to the Orthopedics and Traumatology outpatient and inpatient clinics of Uşak Training and Research Hospital due to osteoporotic fractures. The reference study (9) was examined, and the effect level for the osteoporosis awareness scale (OAS) was calculated as 0.632, the confidence interval (α) was 0.05, the power of the test (1-β) was 0.95, and the number of samples was determined as 110. Patients aged 18 years and over who applied for osteoporotic fractures, whose fracture occurred due to a fall in the same plane or similar low-energy trauma (osteoporotic fracture), and who were planned for surgical or conservative follow-up (n=349) were included in the study. Patients with active malignancy, speech or hearing impairment, Alzheimer's/dementia, or psychiatric problems and patients who did not agree to participate in the study were excluded. The study's sample comprised 112 patients meeting the inclusion criteria (Figure 1).

Data were collected from patients who filled out the voluntary consent form through face-to-face interviews at the outpatient clinic where the fracture was diagnosed when they came for a check-up or at the bedside in case of surgical hospitalization. Patient Information Form and OAS were used for data collection.

Patient information form: The form prepared by the researchers consists of 21 questions and includes sociodemographic characteristics, as well as questions about general health conditions such as past diseases, habits, medications used, and health conditions related to the etiology of osteoporosis and their knowledge about osteoporosis.

OAS: "OAS", developed by Choi et al. (11) in 2008, consists of a total of 31 items and five sub-dimensions. The scale, adapted to Turkish by Aktürk et al. (12), was reduced to 27 items and consists of five sub-dimensions. The scale is evaluated on a 4-point Likert scale and is scored as "I know very well (4 points)", "I know (3 points)", "I know a little (2 points)", "I do not know at all (1 point)". Although there is no reverse item or cut-off point in the scale, it indicates that awareness of osteoporosis

Patients Included in the Study n=351
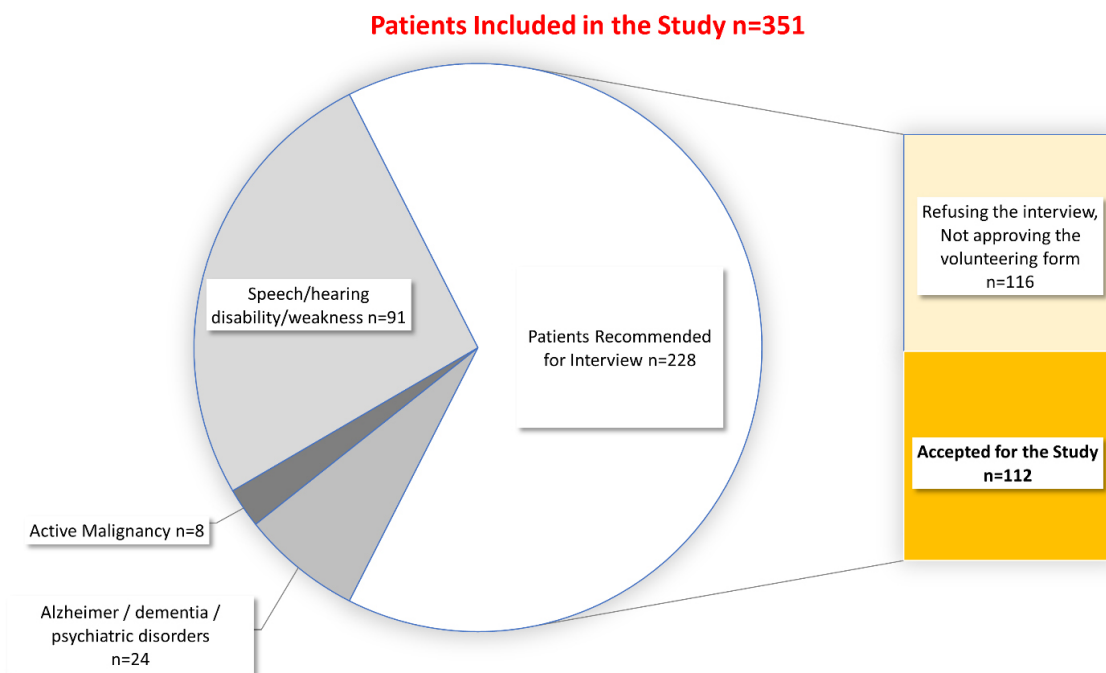
Figure 1. Flow chart

increases as the calculated score [minimum (min)] 27, maximum [max) 108)] increases. The scale includes "bone physiology" (items 22-27), "protective behaviors" (items 4, 5, 7, 8, 9, 10 and 21), "risk factors" (items 11-15), "exercise" There are sub-dimensions (items 1, 2, 3 and 6) and "features of osteoporosis" (items 16-20). The Cronbach alpha reliability coefficient of the scale is 0.949; cronbach's alpha reliability coefficient in this study was calculated as 0.916.

Statistical Analysis

The research data were analyzed statistically using the Statistical Package for Social Science 26.0 (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). The descriptive data of the study were evaluated as mean ± standard deviation for numerical variables or percentage for categorical variables. In subgroup analyses, the Student's t-test was used for numerical variables, and the chi-square test was used for categorical variables. Pearson correlation analysis was used to evaluate the relationships between variables.

Results

The study included 112 patients admitted due to osteoporotic fracture, and data regarding the demographic and clinical characteristics of the patients are presented in Table 1. The average age of the patients is 77.25±9.75, and 68.8% (n=77) are women. Patients use an average of 3±2.59 (median 2; min 0-max 10) medications daily; 82.1% (n=92) had a chronic disease. Most of the fractures (83.9%) were hip fractures; the most common cause of fracture was reported as "falling while

walking" (58.9%), followed by "falling at home" (32.1%). It was determined that 38.4% of the patients had a bone scan (bone mineral densitometry) before the fracture, and 38.4% were diagnosed with osteoporosis before the fracture. When these data were examined, it was determined that 36 of the 43 patients who had a bone scan before the fracture and 7 of the 69 patients who were not scanned were diagnosed with osteoporosis before the fracture. It was found that 65% of patients with previous fractures did not have a bone scan. It was determined that 74.1% (=83) of the patients were not aware that their fractures were osteoporotic, and 35.7% (n=40) had a history of previous fractures (Table 1).

When behaviors related to the prevention of new fractures are evaluated, 27.7% (n=31) of the patients received education about osteoporosis, 26.8% (n=30) did regular physical activity, 40.2% (n=45) received regular sunlight and 62.5% (n=30) n=70) was determined to consume dairy products regularly. In the analysis investigating the relationship between receiving education about osteoporosis and these behaviors, no statistically significant difference was found between those who received education and those who did not (Table 2, p>0.05). Twenty of 43 patients (46.5%) diagnosed with osteoporosis before the fracture stated that they received education about osteoporosis (Table 2).

The average OAS total score was 42.69±11.45. The highest mean score (2.25±0.88) is in question number 4 of the scale (Anchovies and dairy products are good sources of calcium to prevent osteoporosis), the lowest mean score (1.16±0.48) is in question number 12, which is about the relationship between

Table 1. Demographics and clinical data		
	n	**Avg ± SD**
Age	112	77.25±9.75
BMI	112	26.07±5.00
Number of medications used	112	3.00±2.59
Frequency		
Gender	Female	77 (68.8%)
	Male	35 (31.3%)
Marital status	Married	62 (55.4%)
	Single/widowed/divorced	29 (25.9%)
Educational background	Illiterate	24 (21.4%)
	Literate/primary school graduate	74 (66.1%)
	Secondary/high school graduate	10 (8.9%)
	University graduate	4 (3.6%)
Working status	Working	5 (4.5%)
	Not working	107 (95.5%)
Presence of chronic disease	Yes	92 (82.1%)
	No	20 (17.9%)
Continuous drug use	Yes	91 (81.3%)
	No	21 (18.8%)
Smoking	Yes	9 (8%)
	No	103 (92%)
Alcohol usage	Yes	0 (00.0%)
	No	112 (100.0%)
Fracture location	Hip	94 (83.9%)
	Wrist	18 (16.1%)
Trauma pattern	Falling while walking	66 (58.9%)
	Falling inside the house	36 (32.1%)
	Falling while going up and down stairs	4 (3.6%)
	Falling while getting on/off public transportation	6 (5.4%)
Bone mineral densitometry before this fracture	Yes	43 (38.4%)
	No	69 (61.6%)
Diagnosis of osteoporosis before this fracture	Yes	43 (38.4%)
	No	69 (61.6%)
Awareness of having an osteoporotic fracture	Yes	29 (25.9%)
	No	83 (74.1%)
Family history of osteoporosis diagnosis and treatment	Yes	28 (25%)
	No	84 (75%)
History of previous fractures	Yes	40 (35.7%)
	No	72 (64.3%)
Previous fracture site	None	73 (65.2%)
	Hip	14 (12.5%)
	Elbow	7 (6.3%)
	Wrist	7 (6.3%)
	Shoulder	5 (4.5%)
	Tibia	3 (2.7%)
	Hand finger	2 (1.8%)
	Humerus	1 (0.9%)
BMI: Body mass index, Avg: Average, SD: Standard deviation		

gastrectomy and risk of osteoporosis. The values determined for the OAS sub-dimensions and total score are shown in Table 3. When subgroup analyses were conducted between men and women, the rate of awareness that their fracture was osteoporotic was higher in women (11.4% vs. 32.5%), and this difference was statistically significant (p=0.014). It was determined that the rate of men receiving regular sunlight was significantly higher (32.5% vs. 57.1%) (p=0.012). No difference was detected between the two genders in terms of other parameters.

OAS total scores were found to be significantly higher in those who were diagnosed with osteoporosis before the fracture than in those who were not, in those who had a family member diagnosed with osteoporosis and treated compared to those who did not, and in those who had received education about osteoporosis compared to those who had not. There was no difference in the OAS total score between patients with and without previous fractures (p=0.817) (Table 4). In addition, it was observed that the awareness rate of osteoporotic fracture was higher in those diagnosed with osteoporosis before the

fracture, in those who had a family member diagnosed and treated with osteoporosis, and in those who received education about osteoporosis (Table 5). It was found that 53.5% of patients diagnosed with osteoporosis before the fracture still needed education about osteoporosis.

The correlation analysis showed a moderately negative relationship between age and OAS total score (r=-341; p<0.001). In addition, a low negative correlation was found between educational status and the number of medications used (r=-218; p=0.021), and a moderate positive correlation was found between the OAS total score (r=451; p<0.001).

Discussion

Osteoporosis is a significant public health problem due to the increasing elderly population in the world and our country. Increasing awareness of osteoporosis is necessary for osteoporosis prevention and treatment programs (13). In this study conducted on patients treated for osteoporotic fractures, it was found that the patients' awareness levels regarding osteoporosis and the prevention of new fractures were relatively low.

Table 2. Information on preventing osteoporosis

	Education about osteoporosis		P-value
	Yes (n=31)	No (n=81)	
Regular physical activity	9 (29.0%)	21 (25.9%)	0.74
Regular consumption of dairy products	22 (71.0%)	48 (59.3%)	0.252
Regular sunlight exposure	12 (38.7%)	33 (40.7%)	0.844

Table 3. Distribution of OAS total and sub-dimension average scores

Sub-dimension	Minimum	Maximum	Avg ± SD
Bone physiology	6	21	8.82±2.9
Protective behaviors	7	28	12.26±3.6
Risk factors	5	15	6.68±2
Exercise	4	15	6.46±2.6
Features of osteoporosis	5	20	8.64±3.2
Total score	27	96	42.87±11.4

OAS: Osteoporosis awareness scale, Avg: Average, SD: Standard deviation

Table 4. Factors associated with OAS score

		n	OAS total score (Avg ± SD)	Median	P-value*
Diagnosis of osteoporosis before this fracture	Yes	43	45.46±10.2	46	**0.003***
	No	69	40.96±11.9	38	
History of previous fractures	Yes	40	42.5±10.03	40	0.817
	No	72	42.76±12.23	41	
Family history of osteoporosis diagnosis and treatment	Yes	28	48.57±15.94	47	**0.019***
	No	84	40.73±8.78	39	
Education about osteoporosis	Yes	31	49.61±14.37	47	**<0.001***
	No	81	40.04±8.87	38	

OAS: Osteoporosis awareness scale, Avg: Average, SD: Standard deviation, *Mann-Whitney U test, p<0.05

Table 5. Factors associated with osteoporotic fracture awareness		Awareness of having an osteoporotic fracture		P-value*
		Yes	**No**	
Diagnosis of osteoporosis before this fracture	Yes	20 (46%)	23 (53%)	**<0.001***
	No	9 (13%)	60 (87%)	
Awareness of having an osteoporotic fracture	Yes	13 (33%)	27 (68%)	0.234
	No	16 (22%)	56 (78%)	
Family history of osteoporosis diagnosis and treatment	Yes	14 (50%)	14 (50%)	**<0.001***
	No	15 (17.9%)	69 (82.1%)	
Education about osteoporosis	Yes	14 (45%)	17 (55%)	**0.004***
	No	15 (19%)	66 (81%)	
*Chi-Square test, p<0.05				

In our study, most of the fractures were hip fractures. In our country, the incidence of hip fracture increases exponentially with age. Around the age of 50, the probability of experiencing a hip fracture in the remaining lifetime is calculated to be 3.5% in men and 14.6% in women (14).

It was observed that only 38.4% of the patients had a bone scan before the fracture; even among patients with prior fractures, the proportion receiving a bone scan was similar (35%). This finding suggests that orthopedic specialists who first encounter fractures do not always think of the diagnosis of osteoporosis. In the study conducted to determine orthopedic doctors' awareness of osteoporosis (n=166), It was determined that while 36.1% of doctors evaluated patients over 65 with fractures, 63.9% did not assess these patients regarding osteoporosis (15). Another study on distal radius fractures (DRF) reported that 57.5% of patients had bone mineral density measurements after fracture. The authors stated that this rate is insufficient and that this measurement should be requested from every patient undergoing low-energy DRF (16). In a study conducted with 583 women in the risk group living in rural areas, 37.2% of the participants (17); in another study, including 70 patients with spinal cord injuries (9), it was determined that 30% of the patients had bone mineral measurements before the injury. These results show that we are inadequate in measuring bone minerals, and this will cause an increase in the incidence of osteoporotic fractures. It is essential for orthopedic specialists, who are usually the first to come across osteoporotic fractures, to investigate and diagnose the presence of osteoporosis, as noted by Matzkin et al. (18).

The results obtained in our study support Lo and Kok (19), who stated that behavioral change associated with osteoporosis is a complex cognitive process. So much so that the rate of implementing behaviors to prevent new fractures, other than regular dairy product consumption, was relatively low. Neglecting to educate diagnosed patients may explain this situation. However, there is no significant difference in behavior change between those who received training on osteoporosis

and those who did not. More is needed beyond this theoretical knowledge to achieve positive behavioral change.

It was observed that the average OAS total score of the patients was 42.69±11.45, where the lowest total score could be 27 and the highest total score was 108. This value corresponds to an average of 1.58 points (between "do not know at all" and "know a little") out of 4 for each question. This relatively low value shows that our patients' awareness of osteoporosis is insufficient. The study conducted in China with 368 participants over 18 determined that osteoporosis awareness was moderate (20). However, in a study conducted in Switzerland with 9065 patients, patients' awareness of osteoporosis was low (21).

Although the OAS total score averages did not show a significant difference between men and women, the rate of awareness that their fractures were osteoporotic was significantly higher in women. Studies by Özişler et al. (22) and Şahin et al. (16) investigated osteoporosis awareness and showed that gender did not significantly affect the rate of patients with awareness. However, in the study conducted by Büyükvural Şen et al. (9) on patients with spinal cord injury, it is emphasized that awareness is significantly higher in women than in men (59.8±11.4 vs. 52.5±11.7; p=0.031).

Osteoporosis awareness was found to be high in our patients who were diagnosed with osteoporosis before the fracture and who had family members diagnosed and treated for osteoporosis; this suggests that familiarity with the diagnosis leads to increased selective interest in the disease. In the study by Akyol et al. (23) in which they compared the level of osteoporosis knowledge and awareness in premenopausal and postmenopausal women, in the subgroup of postmenopausal women, no statistically significant difference was found between individuals with and without a family history of osteoporosis.

The high level of awareness among those who have received education about osteoporosis shows that patient education has achieved its purpose. Notably, 53.5% of patients diagnosed with osteoporosis before the fracture did not receive education

about osteoporosis, and it shows that patient education needs to be given more importance in healthcare institutions. The study conducted by Fahmy et al. (24) showed that the training program positively affects older patients' knowledge, attitudes, and beliefs regarding the prevention and treatment of osteoporosis. Additionally, more than half of the patients who received osteoporosis education (n=17, 55%) were unaware that their current fracture was osteoporotic, suggesting that the training should be repeated; this result supports the results of Fahmy et al. (24).

The fact that there was no difference in the OAS total score between patients with and without a previous fracture and that there was no difference in awareness of having an osteoporotic fracture between patients with and without a previous fracture suggests that a fracture does not increase awareness of osteoporosis. Kraus et al.'s (25) study emphasized that the awareness of osteoporosis risks was higher in patients who underwent elective hip replacement than in patients with proximal femur fractures. However, they were younger and at lower risk.

In our study, there was a moderate negative relationship between age and the OAS total score; it was found that there was a moderate positive correlation between educational status and the OAS total score. Considering that there is an increase in osteoporosis awareness as the education level increases (educational status x OAS total score r=451; p<0.001), It is understood that the relationship between age and OAS total score is related to the lower level of education in older adults rather than age. To check this result, when correlation analysis was performed separately within the educational status categories, no significant relationship was observed between age and the OAS total score in any education category. This result indeed shows that the age correlation emerges from educational attainment. Studies have shown that osteoporosis awareness is associated with graduate level (16,26).

One weakness of this study is that it was conducted in a single center and a limited community with similar cultural characteristics. Because of the cross-sectional design, we cannot make causal inferences about the association between the OAS and related factors. Moreover, not determining physician awareness in parallel with patient awareness is considered a limitation.

Conclusion

According to the results of the present study, the awareness of patients with osteoporotic fractures about osteoporosis needs to be increased. Still, the awareness of those who received osteoporosis education was significantly higher. It has been observed that osteoporosis education alone cannot develop positive protective attitudes in patients, and patients at risk need repeated education, whether they are educated or not. Orthopedic specialists encountering osteoporotic fractures for

the first time should be encouraged to diagnose the presence of osteoporosis. Bone mineral densitometry scanning rates are low even in patients with a history of fragility fractures, suggesting that expanding screening tests for early diagnosis of osteoporosis should be a public health policy priority. In addition, healthcare professionals should conduct frequent awareness programs in the community, which is crucial in sensitizing the general population about osteoporosis and its complications. Studies planned as multicenter and include health professionals in the same centers can be planned. In addition, prospective randomized studies on the possible effect of repetitive training on developing positive protective attitudes will contribute to literature.

Ethics

Ethics Committee Approval: The study was conducted after obtaining approval Medical School Dean's Office Clinical Research Ethics Committee and securing institutional permission from the hospital where the data was collected (date: 20.04.2022, decision no: 09).

Informed Consent: Data were collected from patients who filled out the voluntary consent form through face-to-face interviews at the outpatient clinic where the fracture was diagnosed when they came for a check-up or at the bedside in case of surgical hospitalization.

Footnotes

Authorship Contributions

Concept: O.G., Ç.K., Y.K., Design: O.G., Ç.K., Y.K., Data Collection or Processing: O.G., Ç.K., Analysis or Interpretation: O.G., Literature Search: O.G., Ç.K., Y.K., Writing: O.G., Ç.K., Y.K.

Conflict of Interest: No conflict of interest was declared by the authors.

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