

## Does Being Treated for Osteoporosis Mean “Awareness”?

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### ABSTRACT

**Objective:** Although there are studies evaluating Osteoporosis (OP) awareness in different populations, there is no study evaluating OP awareness in patients currently receiving medical treatment for OP in the Turkish population. The aim of this study was to evaluate the level of OP knowledge and associated factors in patients receiving medical treatment for OP.

**Methods:** 301 people diagnosed with OP and using OP medication for at least one year were included in the study. Demographic characteristics, risk factors associated with OP, duration of OP drug use were questioned. The 2011 Revised OP Knowledge Test (OKT) was applied to all participants.

**Results:** Of the 301 patients evaluated in the study, 274 (91%) were female and 27 (9%) were male. The mean age was  $65.64 \pm 8.29$ . The patients had been using prescribed medication for 1 (1-20) years due to OP. Mean OKT-exercise score was  $8.11 \pm 1.71$ , mean OKT-nutrition score was  $9.04 \pm 1.99$  and mean OKT-total score was  $11.53 \pm 2.24$ . OKT-exercise, OKT-nutrition, and OKT-total scores were significantly positively correlated with educational status, income status, dietary calcium intake, protein intake, physical activity, and significantly negatively correlated with age. OKT-exercise sub-scores were significantly higher in those living in the city center.

**Conclusion:** It is seen that the level of knowledge of the patients is quite low, even if they have been using drugs for OP for years. This is a warning to physicians about whether adequate information is given about behavioral methods in addition to medical treatment.

**Keywords:** awareness, drug use, knowledge, osteoporosis

### INTRODUCTION

Osteoporosis (OP) is a progressive bone disease that results in an increased risk of fractures [1]. More than 200 million women worldwide suffer from OP, resulting in 8.9 million fractures annually [2]. OP and its complications, especially hip fractures, cause physical, psychological, social, and economic burdens [2].

Despite the increased prevalence, increased mortality, and morbidity of OP, patients with OP are still under-diagnosed and under-treated [3]. Knowledge of bone health and active lifestyle

are known as the main factors in keeping OP under control worldwide [4]. Many people unfamiliar with OP do not engage in regular osteoprotective behavior [5]. Therefore, adequate community screening and information should be provided to protect these patients.

In the literature, there are several studies investigating the information about OP in women in the geriatric age group, postmenopausal group, or those with a disease group that may lead to OP [6-12]. Although there are studies evaluating OP

awareness in different populations, there is no study evaluating OP awareness in patients currently receiving OP medical treatment in the Turkish population.

The aim of this study was to evaluate the level of OP knowledge and awareness and related factors in patients receiving OP medical treatment.

## MATERIALS AND METHODS

Individuals aged 18 years and older, who had been taking OP medication for at least one year and who volunteered to participate in the study were included. Those who did not have sufficient mental capacity to answer the questionnaire and those who had been taking OP medication for less than one year were excluded. The age, gender, body mass index (BMI) education level, income level, marital status, comorbidity, drugs used, fracture history, parental history of hip fracture, smoking, alcohol and coffee consumption, and daily calcium intake, protein intake, and physical activity status were determined by face-to-face survey method. Those who did at least 3 days a week and at least 30 minutes of walking, cycling, and resistance exercise were considered to be at an adequate level of physical activity [13]. The OP drugs they used so far and their total duration of use were also noted.

The 2011 Revised OP Knowledge Test (OKT), which was validated and reliable in Turkish, was applied to all participants [14,15]. The 32-item OKT consists of two sub-scales related to nutrition and exercise, and these two sub-scales have 14 items in common. The correct answers are 1, wrong answers are scored as 0. The nutrition subscale ranges from 0 to 26 points, and the exercise sub-scale ranges between 0 and 20 points. The total score for OKT ranges from 0 to 32. According to this test, if the nutrition sub-score is 9.5 and above, the exercise sub-score is 9 and above, and the total score is 13 and above, it is considered sufficient [14,15]. In this study, the sample size was performed

using the G \* power (V3.1.7) program, at least 111 patients were found for total sample size with  $\alpha = 0.05$ , 95% power and  $d=0.3$  effect size. The sample size was also compatible with similar previous studies [16-18].

This research has been approved by the Local Ethics Committee and conducted in accordance with the principles of the Declaration of Helsinki.

## Statistical Analysis

IBM SPSS statistical version 28.0 was used for statistical analysis. The suitability of the data to the normal distribution was evaluated by visual and analytical methods (Kolmogorov-Smirnov test). Categorical data were presented as n (%), non-normally distributed numeric data and ordinal data as median (minimum-maximum), and normally distributed numeric data as mean $\pm$ standard deviation. In correlation analysis, Pearson correlation test was used for parametric data and Spearman correlation test was used for nonparametric data. Mann Whitney U test was used for comparison of two groups. A  $p<0.05$  value was accepted for statistical significance.

## RESULTS

Of the 301 patients evaluated in the study, 274 (91%) were female and 27 (9%) were male. The mean age was  $65.64 \pm 8.29$ . Two hundred and fifty seven (85.4%) patients lived in the city center. Table 1 shows the demographic data of the patients.

The mean age of menopause was  $46.75 \pm 5.6$ . Comorbid disease that may lead to OP (diabetes mellitus, rheumatic diseases, kidney or liver diseases, immunodeficiency, hypogonadism, hyperthyroidism, hyperparathyroidism, celiac disease, inflammatory bowel disease) in 105 (34.9%) patients was present. In 86 (28.6%) patients, there was drug use that could lead to OP (glucocorticoids, antiepileptics, proton pump inhibitors, thyroid hormone drugs, anticoagulants, immunosuppressives, antineoplastics). The patients had been using prescribed medication for 1 (1-20) years due to OP. Eighty two (27.2%) patients had fragility fractures. Table 2 shows the risk factors for OP.

Mean OKT-exercise score was  $8.11 \pm 1.71$ , mean OKT-nutrition score was  $9.04 \pm 1.99$  and mean OKT-total score was  $11.53 \pm 2.24$  (OKT test results are listed in Table 3).

### Main Points;

- The level of knowledge of the patients is quite low, even if they have been using drugs for OP for years.
- This is a warning to physicians about whether adequate information is given about behavioral methods in addition to medical treatment.

**Table 1.** Demographic Data of Patients (n=301)

Gender, n (%)	Woman	274 (91)
	Man	27 (9)
Age, mean (SD)	65.64±8.29	
BMI, mean (SD)	27.84±4.93	
Educational Status, n (%)	Illiterate	70 (23.3)
	0-5 years	105 (34.9)
	5-8 years	68 (22.6)
	8-12 years	47 (14.0)
	≥12 years	16 (5.3)
Marital Status, n (%)	Married	190 (63.1)
	Single	13 (4.3)
	Other	98 (32.6)
Income, n (%)	Good	156 (51.8)
	Low	145 (48.2)
Living Place, n (%)	City Center	257 (85.4)
	Village	44 (14.6)
OP Medication Duration, median (min-max)	1 (1-20)	
OP Drugs Used so far, n (%)	Bisphosphonate	245 (81.4)
	Denosumab	25 (8.3)
	Bisphosphonate and Denosumab	29 (9.6)
	Bisphosphonate and Teriparatide	2 (0.7)

SD: Standard Deviation, BMI: Body Mass Index, OP: Osteoporosis

**Table 2.** Risk Factors for Osteoporosis

Age of menopause, mean (SD)	46.75±5.64	
Fragility Fracture, n (%)	No	219 (72.8)
	Yes	82 (27.2)
Hip Fracture in Parents, n (%)	No	279 (92.7)
	Yes	22 (7.3)
Smoking, n (%)	No	264 (87.7)
	Yes	37 (12.3)
Alcohol Consumption, n (%)	No	284 (94.4)
	Yes	17 (5.6)
Dietary Calcium Intake*, n (%)	Inadequate	263 (87.4)
	Adequate	38 (12.6)
Daily Coffee Consumption, n (%)	<4 cups/day	272 (90.4)
	≥4 cups/day	29 (9.6)
Dietary Protein Intake, n (%)	<1 g/kg/day	257 (85.3)
	≥1 g/kg/day	44 (14.7)
Physical Activity, n (%)	Inadequate	286 (95)
	Adequate	15 (5.0)
Comorbidity that can lead to OP, n (%)	No	196 (65.1)
	Yes	105 (34.9)
Drug that can lead to OP, n (%)	No	215 (71.4)
	Yes	86 (28.6)

SD: Standard Deviation, OP: Osteoporosis, \*The calculation system recommended by the International OP Foundation was used (<http://www.iofbonehealth.org/calciumcalculator>)

**Table 3.** Osteoporosis Knowledge Test Scores

	Mean (SD)
OK-exercise	8.11±1.71
OKT-nutrition	9.04±1.99
OKT-total	11.53±2.24

OKT: Osteoporosis Knowledge Test

Table 4 shows the results of the correlation analysis. OKT-exercise, OKT-nutrition, and OKT-total scores were statistically positively correlated with educational status ( $r/p=0.330/<0.001$ ,  $0.288/<0.001$ , and  $0.450/<0.001$  respectively), income status

( $r/p=0.140/0.015$ ,  $0.184/0.001$ , and  $0.225/<0.001$  respectively), dietary calcium intake ( $r/p=0.229/<0.001$ ,  $0.256/<0.001$ , and  $0.191/<0.001$  respectively), protein intake ( $r/p=0.277/<0.001$ ,  $0.244/<0.001$ , and  $0.250/<0.001$  respectively), physical activity ( $r/p=0.299/<0.001$ ,  $0.184/<0.001$ , and  $0.284/<0.001$  respectively), and statistically negatively correlated with age ( $r/p=-0.316/<0.001$ ,  $-0.233/<0.001$ , and  $-0.434/<0.001$  respectively). Only the correlations between OKT-total score and educational status and between OKT-total score and age were moderate, while the strength of all other correlations was weak.

OKT-exercise sub-scores were significantly higher in those living in the city center than in those living in rural areas ( $p=0.004$ ), but there was no statistically significant difference in OKT-nutrition and OKT-total scores ( $p>0.05$ ) (Table 5).

**Table 4.** Correlation Analysis Results

	OKT-exercise r/p	OKT-nutrition r/p	OKT-total r/p
Age	<b>-0.316/&lt;0.001</b>	<b>-0.233/&lt;0.001</b>	<b>-0.434/&lt;0.001*</b>
Educational Status	<b>0.330/&lt;0.001</b>	<b>0.288/&lt;0.001</b>	<b>0.450/&lt;0.001**</b>
Income	<b>0.140/0.015</b>	<b>0.184/0.001</b>	<b>0.225/&lt;0.001**</b>
Smoking	0.068/0.238	-0.015/ 0.791	0.102/0.078**
Alcohol Consumption	0.062/0.280	-0.012/0.833	0.048/0.453**
Coffee Consumption	0.163/0.005	0.048/0.403	0.178/0.002**
Dietary Calcium Intake	<b>0.229/&lt;0.001</b>	<b>0.256/&lt;0.001</b>	<b>0.191/&lt;0.001**</b>
Dietary Protein Intake	<b>0.277/&lt;0.001</b>	<b>0.244/&lt;0.001</b>	<b>0.250/&lt;0.001**</b>
Physical Activity	<b>0.299/&lt;0.001</b>	<b>0.184/&lt;0.001</b>	<b>0.284/&lt;0.001**</b>
OP Medication Duration	0.066/0.256	0.038/0.515	0.128/0.026**

\*: Pearson Correlation Test, \*\*: Spearman Correlation Test

**Table 5.** The relationship Between Osteoporosis Knowledge Level and Living Place, Drug Use, Comorbidities, Parental Hip Fracture, and Fracture History

		OKT-exercise		OKT-nutrition		OKT-total	
		Median (min-max)	p*	Median (min-max)	p*	Median (min-max)	p*
Living Place	City Center	8 (4-15)	<b>0.004</b>	9(2-23)	0.175	12 (6-24)	0.119
	Village	7.5 (5-10)		8.5(5-12)		11 (8-16)	
Comorbidity that can lead to OP	Yes	8(4-15)	0.864	9 (2-15)	0.691	12 (6-16)	0.283
	No	8(4-15)		9 (4-23)		11(7-21)	
Fragility Fracture	Yes	8 (4-15)	0.417	9 (4-16)	0.919	11 (7-21)	0.312
	No	8 (4-15)		9 (2-23)		12 (6-18)	
Hip Fracture in Parents	Yes	8 (5-12)	0.322	9 (4-14)	0.955	12 (6-16)	0.520
	No	8 (4-15)		9 (2-23)		12 (7-21)	
Drug that can lead to OP	Yes	8 (4-15)	0.993	9 (2-13)	0.277	12 (7-16)	0.245
	No	8 (4-15)		9 (4-23)		11(6-21)	

\*Mann Whitney U test

## DISCUSSION

In our study, individuals who had been using an OP drug for at least one year were included and the OKT total score and sub-scores were found low. OKT-total score and sub-scores were found to be negatively correlated with age, positively correlated with educational and income status, dietary calcium and protein intake, and physical activity level. OKT-exercise sub-scores of those living in the city center were statistically significantly higher than those living in the village.

This study showed that the level of OP knowledge is low even in patients diagnosed and treated. In another study conducted in Brazil, in which the knowledge level of OP patients under antiresorptive treatment in the postmenopausal period was evaluated, the OPQ (OP questionnaire) was used to measure the knowledge level, and the OPQ score of the participants was low [16]. Although the scales used are different, these results are similar to ours. In another study comparing OP knowledge levels of premenopausal and postmenopausal women with and without OP, OKT results were found to be higher than our study [13]. In that study, it was also found that there was no statistically significant difference between the premenopausal and postmenopausal groups, and the knowledge levels of OP patients were similar to those without OP [13]. The differences in the number of patients and populations in the studies may have been effective in obtaining different results.

In our study, as in the studies of Altaş E et al.[18] and Kurt et al.[19], we found a decrease in the level of knowledge and awareness in advanced age. In another study measuring the knowledge level of the elderly living in rural areas, no significant correlation was found between age and knowledge level [20]. In this study we mentioned, only patients over the age of 65 were evaluated and a few survey questions were used instead of OKT [20]. In addition, those without a diagnosis of OP were also evaluated. These may be the reasons for the discrepancy between studies. Although awareness created at a young age prevents the development of OP as a result of preserving bone health, it is necessary to increase the knowledge level of the whole society in order to prevent complications in older ages [18].

In our study, similar to most of the literature, it was seen that education level and OP knowledge were positively correlated [13,21,22]. Better educated individuals may be more willing to learn about the OP or benefit from more written material in terms of access to information. On the other hand, there are a

few studies that do not find a relationship between education level and OP knowledge level [23,24]. Differences in the mean age of the population in these studies may have contributed to the different results.

High income can increase the level of knowledge and awareness with various factors such as easy access to protein-rich foods. As in many studies, income and OP knowledge were positively correlated in our study. Surprisingly, there is a study in the literature showing that the level of OP knowledge decreases as the income level increases [25]. Differences in health policies or cultural differences in the residential areas where these studies were conducted may have led to different results. For example, the absence of significant public health education efforts on OP may be associated with such an outcome.

In our study, the OP knowledge level was also calculated to be significantly higher in those who took adequate calcium and protein and did adequate physical activity. This may be associated with higher income level. Perhaps, increased calcium and protein intake due to higher OP knowledge may also have had an impact on these results.

There are several studies that indicate that the level of OP knowledge is higher in urban areas than in rural areas [20,23,25]. Similarly, in our study, the OP-exercise score was significantly higher in those living in urban centers. This may be related to increased educational attainment in urban areas.

The first step in treating OP is to increase knowledge and awareness. To the best of our knowledge, this is the first study to examine the level of knowledge and related factors of individuals receiving OP treatment in the Turkish population. On the other hand, being a single-center and cross-sectional study is among the limitations of our study.

## CONCLUSIONS

It is seen that the level of knowledge of the patients is quite low, even if they have been using drugs for OP for years. This is a warning to physicians about whether adequate information is given about behavioral methods in addition to medical treatment. Since OP is generally the problem of postmenopausal and advanced age, it is important to diversify the information methods with visual and auditory materials in a way that these age groups can understand.

**Conflict of interest:** All authors declare no conflict of interest.

**Funding:** No funding was received for this study.

**Informed consent:** The participants received oral and written information about the study and gave their written informed consent.

**Ethics approval and consent to participate:** The study protocol was approved by Health Sciences University Diskapi Yildirim Beyazit Education and Research Hospital Local Ethics Committee (04.07.2022, 141/05).

**Authors' contributions:** Z.K.U., D.C. and E.U.A. designed the study. Z.K.U., A.E.S.A., and M.K.S. collected the clinical data. Z.K.U., A.E.S.A., M.K.S. and D.C. analyzed and interpreted the patient data. All authors discussed the results, contributed to the final manuscript, and approved it. Z.K.U., D.C. and E.U.A. discussed the results and supervised all the research process. All authors approved the final manuscript and agreed to the published version of the manuscript.

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