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The Role of Health Literacy in Osteoporosis Knowledge and Disease Self-Management Behaviors Among Patients with Osteoporosis

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Abstract

Objective: The aim of this study was to investigate the relationship between health literacy and osteoporosis knowledge and disease self-management behaviors among patients with osteoporosis.

Methods: This descriptive cross-sectional correlational study was conducted over a six-month period in the physical medicine and rehabilitation department of a university hospital in Türkiye. The study sample consisted of 320 patients diagnosed with osteoporosis. Data were collected using a Patient Information Form, the Health Literacy Scale (HLS), and the Revised Osteoporosis Knowledge Test (R-OKT). Descriptive statistics (number, percentage distribution), Pearson's correlation analysis, one-way ANOVA, Kruskal-Wallis analysis, independent samples t-test, and multiple regression analysis were used for data analysis.

Results: The mean age of the participants was 56.34±9.69 years, and 90% of the participants were female. Female gender, higher educational level, younger age, shorter duration since diagnosis, and absence of additional chronic diseases explained 20.5% of the variance in health literacy among patients with osteoporosis. Furthermore, health literacy levels were found to have a significant effect on patients' knowledge of osteoporosis and their disease self-management behaviors.

Conclusion: The findings indicate that health literacy is an important determinant of disease-related knowledge and self-management behaviors in patients with osteoporosis. Therefore, it is recommended that nurses and other healthcare professionals assess health literacy levels in individuals with chronic diseases and implement interventions aimed at improving patients' health literacy.

Keywords: Health Literacy, Osteoporosis, Knowledge, Self-Management, Patients

Öz

Osteoporoz Hastalarında Sağlık Okuryazarlığının Osteoporoz Bilgisi ve Hastalık Öz-Yönetim Davranışları Üzerindeki Rolü

Amaç: Bu araştırmanın amacı, osteoporoz hastalarında sağlık okuryazarlığı ile osteoporoz bilgisi ve hastalık öz-yönetim davranışları arasındaki ilişkiyi incelemektir.

Yöntem: Tanımlayıcı, kesitsel ve korelasyonel tipte tasarlanan bu çalışma, Türkiye'de bir üniversite hastanesinin fiziksel tıp ve rehabilitasyon bölümünde altı ay süreyle yürütülmüştür. Araştırmanın örneklemini osteoporoz tanısı almış 320 hasta oluşturmuştur. Veriler, Hasta Tanıtım Formu, Sağlık Okuryazarlığı Ölçeği (SOY) ve Revize Osteoporoz Bilgi Testi (R-OBT) kullanılarak toplanmıştır. Verilerin analizinde tanımlayıcı istatistikler (sayı, yüzde dağılımları), Pearson korelasyon analizi, tek yönlü varyans analizi (One-way ANOVA), Kruskal-Wallis analizi, bağımsız örneklemler t-testi ve çoklu doğrusal regresyon analizi kullanılmıştır.

Bulgular: Katılımcıların yaş ortalaması 56,34±9,69 yıl olup, %90'ı kadındır. Kadın cinsiyet, yüksek eğitim düzeyi, genç yaş, kısa tanı süresi ve ek kronik hastalığın bulunmaması, osteoporoz hastalarında sağlık okuryazarlığı düzeyindeki varyansın %20,5'ini açıklamaktadır. Ayrıca, sağlık okuryazarlığı düzeyinin osteoporoz bilgisi ve hastalık öz-yönetim davranışları üzerinde anlamlı bir etkisinin olduğu belirlenmiştir.

Sonuç: Araştırma bulguları, sağlık okuryazarlığının osteoporoz hastalarında hastalığa ilişkin bilgi düzeyi ve hastalık öz-yönetim davranışlarının önemli bir belirleyicisi olduğunu göstermektedir. Bu doğrultuda, hemşirelerin ve diğer sağlık profesyonellerinin kronik hastalığı olan bireylerde sağlık okuryazarlığı düzeyini değerlendirmesi ve hastaların sağlık okuryazarlığını geliştirmeye yönelik girişimler planlaması önerilmektedir.

Anahtar Kelimeler: Sağlık Okuryazarlığı, Osteoporoz, Bilgi, Öz-Yönetim, Hasta

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INTRODUCTION

The world population is ageing, and therefore the number of people who are chronically ill is increasing. One chronic disease which has an important effect on health is osteoporosis. This disease is seen in more than 200 million people worldwide (Panahi & Kazemi, 2018; Tavani, 2018). It also affects 75 million people in Europe, USA, and Japan (Tavani, 2018). In studies conducted in recent years, the prevalence of osteoporosis in Türkiye has been reported as 22.2% in males and 27.2% in females (Ulgü & Birinci, 2024). Osteoporosis causes complications of low-back pain, shortening of height, humpback, fracture, weakness and restriction of physical movement. One of the most important complications is fracture (Tavani, 2018). It is estimated that worldwide, one in three women and one in five men over the age of 50 will experience osteoporosis fractures in their remaining lifetimes (IOF, 2022).

Fractures cause immobility, a disruption of daily activities and a loss of self-confidence, and this has negative economic, individual and psychosocial effects (Hosking et al., 2016). Osteoporosis and its consequences can be avoided by education, prevention, on-time diagnosis, self care, and management of the disease (Tavani, 2018). Prevention and management of chronic disease is complex and necessitates support and many different health literacy skills (Hosking et al. 2016; Hosking et al., 2018a; Hosking et al., 2018b).

One of the key indicators of health is health literacy (HL), and many studies have emphasized that health literacy is an important variable affecting health (Billany et al., 2023; Chen et al., 2020; Panahi & Kazemi, 2018). HL is defined by the World Health Organization as 'the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health' (Liu et al., 2020).

Health literacy includes the ability to access the necessary sources in the management of health, and to understand and use health information (Gonçalves-Fernández et al., 2025). For persons with a chronic disease, health literacy includes capabilities in such situations as concerning themselves with their own health, the ability to use medicine correctly in daily life, knowing how to access and use the health authorities when necessary, understanding information relating to their disease, and the ability to make necessary decisions on self-care and disease management (Ozen et al., 2019).

Nurses play a key role in improving health literacy through patient education, counseling, self-management support, and the promotion of preventive health behaviors. In patients with osteoporosis, nursing interventions are particularly important for enhancing treatment adherence, encouraging lifestyle modification, preventing fractures, and supporting long-term disease management. Therefore, evaluating health literacy in individuals with osteoporosis may contribute to the development of effective nursing interventions and patient-centered educational strategies (Nutbeam & Lloyd, 2021).

Looking at levels of health literacy around the world, it is seen that they vary from country to country, but the general level is low (Perpétuo et al., 2025). A recent systematic review reported that the prevalence of inadequate or limited health literacy worldwide is approximately 48.5%, indicating that insufficient health literacy remains a major global public health concern (Gonçalves-Fernández et al., 2025). One in ten people in Europe have an inadequate level of health literacy (Ozen et al., 2019), while even in countries such as the USA and Australia, approximately 50% of adults have inadequate health literacy skills (Hill et al., 2015). In Türkiye, according to the Ministry of Health (2018), 30.9% of people have inadequate health literacy, and the health literacy of 38% is problematic (Alkaya & Terzi, 2019). Insufficient health literacy causes people to misunderstand health messages and use drugs wrongly resulting in poor disease management and therefore complications. Not accessing or making inappropriate use of health services results in more frequent hospital admissions and more frequent use of emergency services. Insufficient health literacy also causes less use of preventive health services such as screening and vaccination programs, an inability to make early diagnoses of diseases, and an increase in morbidity and mortality rates (Alkaya & Terzi, 2019; Ozen et al., 2019). For these reasons, inadequate health literacy increases health expenditure and has a negative effect on the country's economy.

In studies investigating health literacy in chronic diseases, it has been found that there is a significant correlation between inadequate health literacy and diabetes complications. Also, low level of health literacy in patients with chronic kidney failure results in inadequate self-management (Billany et al., 2023). The use of an inhaler by asthmatic patients is an effective indicator of literacy level, but inadequate health literacy is a cause of poor asthma management. Overall, inadequate health literacy increases hospitalizations and use of the emergency services (Dennison et al., 2011). In an examination of the literature by Athanasopoulou et al. (2024) it was reported that individuals with musculo-skeletal diseases with poor health literacy had little interest in the state of their diseases and were inadequate in managing the disease, and their rates of hospitalization and mortality were greater. It was concluded that patients with a high level of health literacy had better health knowledge and self-confidence.

In studies on health literacy in osteoporosis patients,

lower literacy skills have been associated with an increased risk of osteoporosis and fractures (Hosking et al., 2016). It has been reported that health literacy plays an important role in patients' ability to access, understand, and use information when making decisions regarding osteoporosis treatment (Gonçalves-Fernández et al., 2025). In addition, health literacy has been identified as an important factor influencing the adoption of osteoporosis-preventive behaviors (Panaji & Kazemi, 2018). Recent studies conducted in Türkiye have also emphasized the importance of health literacy, osteoporosis knowledge, and health-related behaviors among individuals with osteoporosis and postmenopausal women (Okan & Okan, 2023; Saltık et al., 2023). However, evidence on health literacy among patients with osteoporosis remains limited overall (Hosking et al., 2018a; Athanasopoulou et al., 2024), particularly in the Turkish context.

Aims

The research aim was to determine the health literacy of osteoporosis patients and to investigate the relationship between health literacy and osteoporosis knowledge and management behaviors.

Research Questions

- What is the health literacy level of patients with osteoporosis?
- Which characteristics of patients affect the health literacy of patients with osteoporosis?
- Is there any relationship between the health literacy and osteoporosis knowledge of patients?
- Are there differences in health literacy according to the disease self-management behaviors of osteoporosis patients?

METHODS

Study design

This study employed a descriptive cross-sectional correlational design. The reporting of the study was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional studies.

Setting and Sample

This research was conducted between January and June 2019 at the Physical Medicine and Rehabilitation Department of a university hospital in the western part of Türkiye. The study population consisted of patients diagnosed with osteoporosis who attended the outpatient clinic during the study period.

A non-probability consecutive sampling method was used. Eligible patients who attended the outpatient clinic during the study period and met the inclusion criteria were consecutively invited to participate until the required sample size was reached.

The required sample size was estimated using the formula for populations of unknown size proposed by Lwanga and Lemeshow (1991). A 95% confidence level and a 5% margin of error were considered in the sample size estimation. A total of 320 participants were included in the study.

A post hoc power analysis was performed using G*Power version 3.1.9.7 for the multiple regression model. Based on the observed effect size ($f^2 = 0.258$), five predictors, a significance level of 0.05, and a sample size of 320, the achieved statistical power was 1.00, indicating that the study had sufficient statistical power.

Inclusion Criteria for The Research

Being 18 years of age or over, having been diagnosed with osteoporosis at least one year previously, being able to communicate in Turkish and agreeing to participate in the study.

Exclusion Criteria for The Research

Patients who did not want to participate in the research, could not fully answer the research questions and had communication barriers.

Data Collection Tools and Procedure

Data were collected by the face-to-face interview method using a Patient Identification Form, the Health Literacy Scale and the Revised Osteoporosis Knowledge Test (R-OKT). It took approximately 15 minutes to complete the questionnaires.

Patient Identification Form: This was developed by the researchers based on the literature (Chen et al.,2018; Hosking et al., 2018a; Hosking et al.,2018b; Hosking et al.,2016; Hill et al., 2015; Panahi&Kazemi, 2018), and consisted of 13 questions on sociodemographics (four questions such as age, gender, education and income status), clinical characteristics (three questions such as osteoporosis symptoms, diagnosed year, having the other chronic disease) and disease self-management behaviors (six questions). Disease self-management behaviors consisted of questions such as weekly exercise status, sunbathing during the day, calcium food consumption portion, calcium supplements, vitamin D supplements, using medicine.

Health Literacy Scale (HLS): It was developed by Toci et al., (2013) adapted for the Turkish language by Aras and Bayık Temel (2017). The scale consists of a total of 25 items and four subdimensions. The scale was adapted

to a five-point Likert-type scale, and participants were asked to assess their level of ability with regard to accessing, understanding, appraising, and applying health information on a scale ranging from 1 (unable) to 5 (able without any difficulty). An overall health literacy score was calculated for each participant, which could range from 25 (lowest possible score) to 125 (highest possible score). Higher scores correlated to higher health-literacy levels (Aras & Temel, 2017; Toci et al., 2013;) The Cronbach's alpha coefficient of the scale was 0.92 (Aras & Temel, 2017). In this study, the Cronbach's alpha of the scale was found to be 0.95.

The Revised Osteoporosis Knowledge Test (R-OKT): *It* was developed by Kim et al. (1991) and it was revised by Gendler et al. in 2011 and 2012. R-OKT was composed, which included 32 multiple-choice items (Gendler et al., 2015). It was adapted for Turkish language by Atalay et al., (2015). This test consists of two subscales, nutrition and exercise. The nutrition subscale consists of 26 questions (1-11 and 18-32), and the exercise subscale has 20 questions (1-11 and 30-32). The two subscales have 14 questions in common (1-11 and 30-32). The range of possible total scores for the test is 0 to 32, with higher scores indicative of greater knowledge. Reliability coefficients for internal consistency for R-OKT calcium and R-OKT exercise were found to be 0.71 and 0.76, and 0.76 for total R-OKT (Atalay et al., 2015). In this study, they were 0.78, 0.73 and 0.78 respectively.

Data Analysis

Data were analyzed using SPSS 21.0 (Statistical Package for the Social Sciences, Chicago, Illinois). Descriptive statistics (numbers, percentage distribution) were used to describe the patients' characteristics. The relationship between health literacy and osteoporosis knowledge was determined with Pearson's correlations. One way Anova, Kruskal-Wallis analysis and independent t test were used to assess differences between health literacy and patients' characteristics and disease management behaviors. Multiple regression analysis was used to examine the factors contributing to health literacy. The significance level was set at 0.05.

Ethical Considerations

Ethical approval for the study was obtained from the Ege University Medical Research Ethics Committee of the Faculty of Medicine (27/12/2018-E.377434). Institutional permission was also obtained from the university hospital where the study was conducted.

The study was conducted in accordance with the principles of the Declaration of Helsinki. The purpose of the study was explained to all participants, and written informed consent was obtained from those who agreed to participate.

Permission for the use of the Health Literacy Scale and the Revised Osteoporosis Knowledge Test was obtained from the studies reporting the Turkish validity and reliability analyses of the instruments.

RESULTS

The mean age of the participants was 56.34±9.69 years (min: 27, max: 82); 90% were female, 40% had graduated from high school (Table 1).

In terms of osteoporosis, participants had been diagnosed with osteoporosis for an average of 4.74 years (SD= 5.13), and 88.4% had other chronic disease (Table 1). The most commonly seen signs of osteoporosis in patients are back and lower back pain in 70%, reduction in height in 43.4%, and weakness in 42.2% (Figure 1). It was seen that 53.1% of the patients played less than 30 minutes of exercise in a week. The proportion of patients who spent less than 15 minutes a day in the sun was 67.5%, and 45.3% of the patients consumed one portion a day of food containing calcium. It was found that 71.3% of the individuals took calcium supplements, 74.1% took vitamin D supplements, and 80% regularly took medicine.

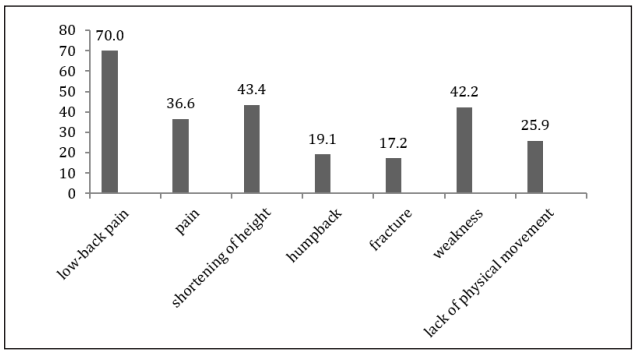

Figure 1. Patients' osteoporosis symptoms

The mean health literacy score of the patients was 94.93±18.81. Among the subdimensions of the Health Literacy Scale, the highest mean score was observed in the access subdimension, whereas the lowest mean score was observed in the understanding subdimension.

When the patients' health literacy scores and individual characteristics were compared, a statistically significant negative relationship was found between patient age ($r = -.355$, $p < .001$), years since diagnosis ($r = -.173$, $p = .002$), and health literacy. Health literacy scores were significantly higher among females ($p = .001$), participants with higher education levels ($p < .001$), and those without another chronic disease ($p < .001$). In addition, no significant relationship was found between income level and health literacy ($p > .05$, Table 1).

Multiple regression analysis performed using variables found significant in the bivariate analyses revealed that

female gender, higher education level, younger age, shorter duration since diagnosis, and absence of another chronic disease explained 21% of the variance in health literacy among patients with osteoporosis (p <.001, R^2 = .205) (Table 2).

Table 1. Health literacy scale mean score according to patients' characteristics

Patients' characteristics	n	x̄ ± SD	Statistic
Age	320	56.34 ± 9.69	*r*= – .355 ***p* < .001**
Diagnosed year	320	4.74 ± 5.13	*r*= – .173 ***p*= .002**
Gender			
Female	288	96.08 ± 17.96	*t*= 3.328 ***p*= .001**
Male	32	84.59 ± 23.05	
Education			
Illiterate[a]	22	80.50 ± 21.52	x^2 = 44.317 ***p* < .001** a < b < c < d
Primary-Secondary[b]	114	91.57 ± 18.79	
High school[c]	128	95.91 ± 16.46	
University[d]	56	105.20 ± 17.55	
Income status			
Income < expenditures	17	86.53 ± 29.19	x^2 = 0.850 *p* = 0.654
Income = expenditures	259	95.04 ± 18.19	
Income > expenditures	44	97.50 ± 16.97	
Having the other chronic disease			
Present	283	93.70 ± 19.11	*t*= 4.368 ***p* < .001**
Absent	37	104.35 ± 13.13	

SD: Standard deviation; t: Independent samples t-test; χ^2: Kruskal–Wallis test statistic; r: Pearson's product–moment correlation coefficient; p: significance level.

Table 2. Regression model predicting health literacy of patients with osteoporosis (n = 320)

Factors	Beta (β)	*t*-statistics	*p*-value
Gender (female)	-.106	-2.006	.046*
Education level (high school and university)	-.169	-3.218	.001**
Age	-.155	-2.306	.022*
Diagnosis year	-.222	-3.573	.000***
Other chronic disease (absent)	– .185	-3.688	.000***

*R^2 = .205 F (5, 320) = 17.455*** Durbin-Watson = 1.229*
β: Standardized regression coefficient; t: t statistic; F: Analysis of variance statistic for the regression model; R^2: Coefficient of determination; p: Significance level. *p < .05, **p < .01, ***p < .001.

The patients' osteoporosis knowledge mean score was 18.92±4.96. The exercise knowledge test mean score was 12.27±3.44 and the nutrition knowledge test mean score was 15.93±4.25 (Table 3).

A statistically significant positive relationship was found between health literacy mean score and osteoporosis knowledge test mean score (*r* = 0.522, *p* <.001), nutrition knowledge test mean score (*r* = 0.503, *p* <.001) and exercise knowledge test mean score (*r* = 0.507, *p* <.001) (Table 3).

Table 3. Relationship between HLS score and R-OKT score

R-OKT and subscales	Min-Max	x̄ ± SD	HLS total score 94.93 ± 18.81 (min: 25, max: 125)	
			r	*p*
Knowledge	5 – 30	18.92 ± 4.96	.522	**< .001**
Exercise Knowledge	3 – 20	12.27 ± 3.44	.507	**< .001**
Nutrition Knowledge	4 – 24	15.93 ± 4.25	.503	**< .001**

HLS: Health Literacy Scale; R-OKT: the Revised Osteoporosis Knowledge Test; SD: Standard deviation; r: Pearson's product–moment correlation coefficient; p: Significance level.

Table 4. Health literacy scale mean score according to osteoporosis self management behaviors of patients

Osteoporosis management behaviors	n	Health Literacy Scale x̄ ± SD	Test
Exercise Status (Weekly)			
I never do[a]	64	88.92 ± 20.54	x^2= 14.940
Less than 30 min. a week[b]	170	95.91 ± 17.35	***p*= .002**
30-60 min. a week[c]	73	95.97 ± 20.33	d > b
90 min. or more per week[d]	13	105.85 ± 11.44	
Sunbathing During the Day (at least 15 min.)			
Present	216	94.79 ± 18.79	*t*= 0.193
Absent	104	95.22 ± 18.94	*p*= .847
Calcium Food Consumption (portion)			
One portion	145	97.61 ± 17.13	
Two portion	97	92.94 ± 18.96	x^2= 7.321
Three portion	56	92.12 ± 22.16	*p*= .062
Four portion	22	93.13 ± 18.43	
Calcium supplements			
Present	228	94.26 ± 18.43	*t*= 0.996
Absent	92	96.57 ± 19.72	*p*= .320
Vitamin D supplements			
Present	237	95.01 ± 18.01	*t*= 0.142
Absent	83	94.67 ± 21.02	*p*= .887
Use medicine			
Regular	256	96.59 ± 17.33	*t*= 2.732
Irregular	64	88.27 ± 22.79	***p*= .008**
Limitation of physical movement			
Present	237	97.74 ± 15.79	*t*= 3.855
Absent	83	86.89 ± 23.88	***p* <.001**

HLS: Health Literacy Scale; SD: Standard deviation; t: Independent samples t-test; χ^2: Kruskal–Wallis test statistic; p: Significance level. a,b,c,d: Results of post hoc comparisons.

There was a statistically significant difference between health literacy and weekly exercise status (*p* = .002). Health literacy scores were statistically significantly higher among patients who did exercise for 90 minutes or more in a week than among patients who do exercise for 30 minutes or

less in a week (Table 4). The health literacy scores of those who regularly used medicine were found to be statistically significantly higher than the scores of those who did not (p = .008). In addition, there was no significant difference between the other osteoporosis preventive behaviors (daily calcium intake, D vitamin intake) and health literacy (p >.05, Table 4).

DISCUSSION

In this study, when the lowest and the highest scores for the scale were taken into consideration, the participants were seen to have health literacy which was likely to be sufficient to understand what they read about health. Looking at other studies which have been conducted in Türkiye, it was found that old people with chronic disease had a lower score (87.96±13.89) (Cimen & Temel, 2017). In a study with adult males, the score was 80.87±16.03 (Tayhan & Özmen, 2019). In a study conducted in the adult population, 71.4% were found to have an inadequate level of health literacy (Soylar & Kadıoğlu,2020). Looking at studies conducted in other countries, it was found that the level of health literacy was inadequate in 42.1% of osteoporosis patients and at the at risk level in 27.7% (Hill et al., 2015); it was inadequate in 42% of cardiac patients and marginal in 19% (Dennison et al.,2011). In the USA, health literacy in 24% of old people with at least one chronic disease was inadequate, and in 12% it was marginal (Shrestha et al., 2018).

Studies relating health literacy to an individual's age have reported that health literacy falls with advancing age (Chen et al., 2020; Hosking et al., 2018a; Tayhan & Özmen, 2019). It was also found in the present study that there was a correlation between osteoporosis patients' age and health literacy. Also, the health literacy scores of women were higher. In previous studies, it was also seen that women had better health literacy skills than men (Cimen & Temel, 2017; Fabbri et al., 2020). Differently, Toci et al. (2013) reported that males had higher health literacy than females. It is emphasized in the literature that education is one of the most important variables affecting health literacy, and studies have shown a correlation between education level and health literacy (Chen et al., 2020; Hosking et al., 2018a; Soylar & Kadıoğlu, 2020). It was found in the present study that the level of health literacy was higher in those with a high school or university education than in those who were illiterate or educated to primary school level. Low income was a reason for restricted access to information, and particularly in socioeconomically disadvantaged groups was a reason why health literacy did not develop (Ozen et al., 2019; Ozturk & Ayaz-Alkaya, 2020). No correlation was found in the present study between income level and health literacy. It is thought that this result may derive from the fact that the research was conducted not on the general population but on those attending a hospital, that is to say patients who were able to access health services and who mostly had a medium level of income.

It was found in the present study that as the number of years since diagnosis of osteoporosis increased, patients' health literacy levels fell. It is thought that this may be related to an increase in the individuals' ages. In one study however, a relationship was not found between the duration of the disease and health literacy (Cimen & Temel, 2017). Weak health literacy skills increase adverse health outcomes by 1.5 to three times. One chronic disease can cause another disease, and it was seen in this research that health literacy was low in individuals who had another disease. At the same time, similar to our findings, Fabbri et al. (2020), found in a study conducted with cardiac patients that health literacy was low in groups with a greater number of chronic diseases.

In this study, a relationship was found between health literacy and osteoporosis knowledge, nutrition and exercise knowledge. As health literacy levels rose, individuals' knowledge of osteoporosis increased. Similarly, Chen et al. (2020) in a study with cardiac patients and Malekmirzaei et al. (2023), in a study with DM patients found that knowledge about the disease was greater in those whose health literacy levels were high. This finding showed us that high health literacy skills in persons with a chronic disease helped them to have knowledge of their own diseases and to develop awareness in the diagnosis of their diseases. Also, patients with low health literacy are shy of asking questions about their health and may have difficulty in reading and learning information relating to health (Billany et al., 2023). This prevents them from having knowledge about disease. It is an important finding that an individual's lack of correct knowledge about a disease has a negative effect on disease self-management (Athanasopoulou et al., 2024; Mackey et al., 2016). Nurses have important role in the prevention of osteoporosis. They are expected to provide information on the complications, risks and prevention practices of osteoporosis (Sha et al., 2025).

A high health literacy skill level in an individual enables good chronic disease management and adherence to medical treatment or regular use of medication (Dennison et al., 2011). Persons with limited health literacy have difficulty in understanding recommended treatment, and this hinders a better outcome for the disease (Cimen & Temel, 2017; Dennison et al., 2011). In the present study, it was found that osteoporosis patients who used their medicine regularly had higher levels of health literacy. Similarly, health literacy levels were reported to be higher in old people who took medicines than in those who did not (Cimen et al., 2017), and in those who took medicines regularly (Alkaya & Terzi, 2019). Zahedi et al. (2019) reported in a study with individuals with metabolic diseases that health literacy was a predictor variable in

medicine use. In patients with radius fracture, adherence to treatment for osteoporosis after the fracture was lower in persons with low health literacy, and rates of adherence to treatment were 53% in those whose health literacy was inadequate, but 71% in in individuals with an adequate level of health literacy (Roh et al., 2017).

Malekmirzaei et al. (2023), reported that health literacy was related to disease knowledge, and that patients' self-care activities increased with an increase in disease knowledge. Health literacy is an effective factor in achieving adherence to desired behaviors by increasing understanding and awareness of the benefits of positive behavior with regard to health (Panahi & Kazemi, 2018). Exercise plays an important role in maintaining bone health. The International Osteoporosis Foundation (IOF) recommends a person to carry out weight bearing and resistance exercises for 30 to 40 minutes three or four times a week (IOF, 2021). It emerged in our findings that there was a statistically significant difference between health literacy and weekly exercise status. Health literacy scores were statistically significant higher among patients who exercised for 90 minutes or more in a week than among patients who exercised for 30 minutes or less in a week. There is a strong positive relationship between physical activity and bone health throughout life (IOF, 2021). It is emphasized in the literature that health literacy is important in health development behaviors, and that weak health literacy results in fewer health choices and less self-management (Liu et al., 2020). Similar to our findings, in studies conducted with individuals with chronic diseases also, there was a correlation between the level of health literacy and patients' behaviors relating to disease management. Chen et al. (2020) found that self-care confidence and self-care management in cardiac patients were higher in a group with a high level of health literacy. In a study conducted with dialysis patients, adherence to recommended diet and liquid intake was affected by health literacy skills (Skoumalova et al., 2019). In individuals with metabolic diseases, it was found that losing weight was related to health literacy in disease self-management behavior (Zahedi et al., 2019). In another study, a correlation was found between sedentary behavior and health literacy, and sedentary behavior was more often seen in the group with poor health literacy (Hosking et al., 2018a). However, there was no significant difference in this study between the other osteoporosis self-management behaviors (daily calcium intake, being in the sun for at least 15 minutes a day, taking calcium supplements, taking vitamin D supplements) and health literacy.

CONCLUSIONS

In conclusion, health literacy levels were lower among male patients, individuals with lower educational levels, patients with longer disease duration, and those with another chronic disease. Higher health literacy was associated with better osteoporosis knowledge and more positive self-management behaviors, particularly regular medication use and exercise behaviors.

These findings indicate that health literacy may play an important role in osteoporosis management and the maintenance of health-promoting behaviors. Since osteoporosis requires long-term treatment adherence and self-management, patients with limited health literacy should be recognized as a risk group.

Nurses have an important role in improving health literacy through patient education and counseling. In osteoporosis care, nurses should assess patients' health literacy levels and provide individualized educational support, especially for older adults, patients with low educational status, and those with chronic comorbidities. In addition, health literacy-based interventions may contribute to improving osteoporosis knowledge and self-management behaviors.

Future studies should be conducted with larger and more diverse samples, and interventional studies evaluating the effectiveness of health literacy-based nursing interventions are recommended.

Limitations of The Study

This study has several limitations. First, the study was conducted in a single university hospital in one city in Türkiye; therefore, the findings cannot be generalized to all individuals with osteoporosis. Second, the cross-sectional design does not allow causal interpretations. Third, the data were collected using self-report questionnaires, which may have caused recall and social desirability bias. In addition, calcium intake, exercise behaviors, sun exposure, and medication adherence were evaluated based on participants' self-reports rather than objective measurements.

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