

## Original Article

## Sleep Quality and Factors Affecting Patients with Knee Osteoarthritis

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### Abstract

**Purpose:** This research was intended to assess the quality of sleep and other factors affecting patients who have knee osteoarthritis (OA).

**Methods:** This was a descriptive study. This study was conducted on 90 patients with knee OA who came to the Physical Therapy and Rehabilitation outpatient clinic of a hospital in Ordu, Turkey. A questionnaire, the Pittsburgh Sleep Quality Index (PSQI), a visual analog scale for pain, and the SF-36 Life Quality Scale were used in the collection of data. In evaluating the data, a one-way Anova, independent t-test, and Pearson's and Spearman's correlation tests were used.

**Results:** The patients' mean global PSQI score was 7.6 (SD = 2.62; range = 1–16). The PSQI also revealed that 81.1% of patients (PSQI score > 5) had poor sleep qualities. Female patients with knee OA ( $t = 2.020$ ;  $p = 0.046$ ), those affected by the cold ( $t = 2.684$ ;  $p = 0.009$ ), and the quality of sleep of patients with comorbidities were significantly worse ( $t = 2.217$ ;  $p = 0.029$ ). Among the patients' sleep quality and pain scores there was a significant positive correlation. However, with physical health, and mental health, there was a significant negative correlation.

**Conclusion:** Patients with knee OA had poor sleep quality. Female patients affected by the cold and those with a comorbidity had a significantly worse quality of sleep. The patients had a significant relationship between sleep quality and pain and physical/mental health. As a result of this research, it is recommended that, in order to increase the quality of sleep in patients with knee OA, there should be more importance attached to females, comorbid patients, protection from the cold, pain reduction, and an increased physical and mental health.

**Keywords:** Knee osteoarthritis, quality of sleep, quality of life, pain

### Introduction

Osteoarthritis (OA) is a degenerative joint disorder accompanied by pain that causes a decrease in functional limitations and quality of life (Favero et al., 2015). The most affected joints in OA are the knees. It is noted that knee OA is quite common, more common in women, and the rate of incidence increases after the age of 50 years (Dulay, Cooper & Dennison, 2015).

Symptomatic knee OA is seen in 10% of men and 13% of women over 60 years of age (Pickering et al., 2016). In a study conducted in the west of Turkey, the prevalence of knee OA was 20.9% over the age of 40 years (Yesil et al., 2013),

while in the south, it was 14.8% over the age of 50 years (Kacar et al., 2005).

Sleep disorders are believed to be an important problem in patients with OA (Pickering et al., 2016). Sleep problems have been reported in the vast majority of patients with arthritis (Power, Perruccio & Badley, 2005). It has been stated that sleep disorders were reported in 76.4% of symptomatic knee and hip OA patients (Allen et al., 2008).

A study conducted in elderly people with knee pain and knee OA indicated that sleep disorders are common. In fact, 81% of the participants experienced significant problems in maintaining

sleep, 51% woke up early in the morning, and 31% started to sleep (Wilcox et al., 2000). In a study conducted in our country, patients with knee OA had broken sleep quality (Sariyildiz et al., 2013). It has been determined that 70.3% of

Taiwan patients with OA (Chen et al., 2014) and 66.7% of Canadian patients with OA have poor sleep quality (Taylor-Gjevre et al., 2011). It has also been shown that sleep disorders, which are seen in patients with OA, are related to pain (Parmelee, Tighe & Dautovich, 2015; Wilcox et al., 2000). Another study has indicated that the primary cause of sleep disorders in patients with knee and hip OA is night pain (Woolhead et al., 2010). In patients with knee OA, the night pain significantly disrupts the sleep quality and results in a deterioration of sleep quality with a decreased quality of life (Sasaki et al., 2014).

Sleep disorders have been widely observed in patients with painful OA, but the routine care of these patients has been neglected (Smith et al., 2009). It is thought to be important that, to treat sleep disorders, which are seen in patients with knee OA, the factors that affect sleep should also be determined to address treatment and care.

This study was intended to determine the quality of sleep and factors affecting patients with knee OA.

### **Research questions**

1. How is the sleep quality of patients with knee OA?
2. What are the factors affecting the quality of sleep in patients with knee OA?
3. Is there a relationship between sleep quality, pain, and quality of life in patients with knee OA?

### **Patient and Methods**

#### **Study design**

This was a descriptive study. This study was conducted on 90 patients with knee OA who came to the Physical Therapy and Rehabilitation outpatient clinic of a hospital in Ordu, Turkey.

The data was collected between October 2016 and January 2017. Patients with knee OA who agreed to join the research and live in the Ordu center were accepted into the study. Patients were given appointments by phone by a researcher.

The researcher interviewed 96 patients by phone. However, the research data was conducted on

only 90 patients because 6 patients did not agree to join the study. The researcher collected data by going to the patients' homes and meeting them face to face. The patients' height and weight were also measured and recorded.

This research was conducted with a 95% reliability range and a 0.05 significance level, with an effect size of 0.55, and a power of 0.99 for correlation analysis.

#### **Ethical issues**

Ethics committee approval was received from the Ordu University Clinical Research Ethics Board for this research (No: 2016/77). The patients were informed about the research and their verbal consent was received.

#### **Outcome measurements**

A questionnaire, the Pittsburgh Sleep Quality Index (PSQI), a visual analog scale (VAS) for pain, and the SF-36 Life Quality Scale were used in the collection of data. The questionnaire consisted of 14 questions including clinical and demographic characteristics of patients.

The PSQI is a measure developed by Buysse and colleagues (Buysse et al., 1989). In our country, Agargun and colleagues have demonstrated its validity and reliability (Agargun, Kara & Anlar, 1996).

The scale shows whether a sleep disorder is in the last month or not, else the prevalence of sleep disorders. The scale consists of 19 questions and 7 components. The components are subjective sleep quality, sleep latency, sleep time, habitual sleep efficacy, sleep disorder, use of sleep medication, and daytime dysfunction.

Each component score ranges from 0 to 3. The scores of the seven components are calculated and a global PSQI score is determined. The total score of the scale varies between 0 and 21, and a high total scale score indicates the quality of sleep is poor. A total score below 5 (0–4) indicates that sleep quality is good and a total score above or equal to 5 (5–21) indicates that sleep quality is poor (Agargun et al., 1996).

The VAS (Visual analogous scale) is used to measure the variability of pain. The VAS consists of a straight line that shows the pain status. There is painlessness (0) at one end of the line, and the most severe pain level (10) that can occur at the other end of the line. The patients' pain levels were determined using this VAS (Akbay, 2014).

The SF-36 Life Quality Scale is the most common generic scale used to measure the quality of life related to health (Ware, 2000). The SF-36 examines 8 dimensions of health with 36 substances as physical function, physical role, pain, general health, energy, social function, emotional role, and mental health.

The scale has two brief components, which include physical health and mental health dimensions. Physical function, physical role, pain, and general health dimensions form the physical health brief component. Energy, social function, emotional role, and mental health dimensions form the mental health brief component.

The scale does not have a single total score. The total score of the eight sub dimensions or two brief dimensions are calculated, which ranges from 0 to 100. While a score of 100 points indicates a good health status, 0 points indicates a poor health status. The validity and reliability study for the SF-36 was done by Kocyigit and colleagues in our country (Kocyigit et al., 1999).

### Statistical analyses

Data were evaluated using the SPSS package program. A one-way Anova test was used to compare the people who lived together with patients in terms of the sleep quality score with their education and income status.

An independent *t*-test was used to compare patients' gender, family type, cold effect, fracture and comorbidities, marital status, working status, and drug use with the sleep quality score. A correlation was made to assess the relationship between the patients' ages, disease duration, body mass index, pain and life quality scores, and sleep quality score.

The Shapiro-Wilk test was used to determine whether the distributions were normal. In normally distributed data, Pearson's correlation tests were used. In other data that did not show a normal distribution, Spearman's correlation tests were used.

### Results

Of the patients who participated in this research, 53.3% were female, 53.3% were literate, 67.8% were married, 60% came from a nuclear family, 78.9% were not working, and the income of 64.4% was sufficient. Other findings included 35.6% of the patients lived with their spouse, 71.1% used an analgesic, 87.8% were affected by

the cold, 30% had a fracture story, and 72.2% had a comorbidity. The average age of the patients was 62.3 (SD = 12.91; range = 34–97) years, the average duration of the disease was 7.4 (SD = 6.05; range = 1–23) years, and the average body mass index was 29.3 (SD = 4.68; range = 19–42) kg/m<sup>2</sup> (Table 1).

The average global PSQI score of the patients was 7.6 (SD = 2.62; range = 1–16). Furthermore, 81.1% of patients (PSQI score > 5) had poor sleep quality.

Female patients with knee OA had a significantly worse sleep quality than male patients ( $t = 2.020$ ;  $p = 0.046$ ). The sleep quality was significantly worse in patients who were negatively affected by cold than those who were not ( $t = 2.684$ ;  $p = 0.009$ ). The sleep quality was significantly worse in patients with comorbidities than in those without comorbidities ( $t = 2.217$ ;  $p = 0.029$ ).

There was no significant difference determined with family type, the people who the patients lived with, a fracture story, education, marital status, income, working status, and analgesic usage between the sleep quality in patients with knee OA ( $p > 0.05$ ). Similarly, there was no significant correlation between age, disease duration, body mass index, and sleep quality ( $p > 0.05$ ).

A significant positive relationship was found between the sleep quality of patients with knee OA and pain scores ( $r = 0.303$ ;  $p = 0.004$ ). Furthermore, a significant negative relationship was found between the SF-36 physical health and sleep quality scores ( $r = -0.387$ ;  $p = 0.000$ ). A significant negative relationship ( $r = -0.470$ ;  $p = 0.000$ ) was also found between the SF-36 mental health and sleep quality scores.

### Discussion

With this research, patients with knee OA were found to have poor sleep qualities. The average PSQI score was 7.6 (SD = 2.62), was greater than normal cutting value 5 (16) and 81.1% of the participants were found to have a poor sleep quality. Similarly, in a study conducted in patients with knee OA in our country, the quality of sleep was also poor (7.07; SD = 4.24) and there was a decrease in the sleep quality of 63.5% of the patients (Sariyildiz et al., 2013). It has also been determined that the sleep quality of Taiwanese patients with OA was low (9; SD = 4.5) and 70.3% of the patients had poor sleep quality (Chen et al., 2014).

**Table 1. Demographic and clinical features and sleep quality of patients with knee OA (n=90)**

Features		Number (%)	X ± SD	Test value	P
Gender	Female	68 (53.3)	7.95±2.63	t=2.020	<b>0.046</b>
	Male	22 (24.4)	6.68±2.33		
Educational status	Literate	48 (53.3)	7.45±2.79	F=0.572	0.572
	Primary school	29 (32.2)	8.06±2.08		
	Secondary education	13 (14.4)	7.38±3.04		
Marital status	Married	61 (67.8)	7.62±2.77	t=-0.112	0.911
	Single	29 (32.2)	7.68±2.28		
Family type	Nuclear	54 (60.0)	7.24±2.42	t=-1.817	0.073
	Extended family	36 (40.0)	8.25±2.80		
Working status	Not working	71 (78.9)	7.87±2.61	t=1.619	0.109
	Working	19 (21.1)	6.78±2.50		
Income status	Insufficient	24 (26.7)	7.50±3.37	F=0.117	0.890
	Sufficient	58 (64.4)	7.74±2.12		
People you live with	Much	8 (8.9)	7.37±3.54	F=1.923	0.132
	Spouse	32 (35.6)	6.90±2.40		
	Spouse and children	29 (32.2)	8.41±2.98		
	Children	23 (25.6)	7.86±2.13		
Analgesic usage status	Alone	6 (6.7)	7.00±2.89	t=1.593	0.115
	Use	64 (71.1)	7.92±2.33		
Fracture story	Do not use	26 (28.9)	6.96±3.14	t=-0.561	0.576
	No	63 (70.0)	7.74±2.56		
Cold effect	Yes	27 (30.0)	7.40±2.76	t=2.684	<b>0.009</b>
	Affects	79 (87.8)	7.91±2.58		
Comorbid status	Does not affect	11 (12.2)	5.72±2.05	t=2.217	<b>0.029</b>
	Yes	65 (72.2)	8.01±2.65		
Poor sleep quality (PSQI > 5)	No	25 (27.8)	6.68±2.28	-	-
		73 (81.1)	-	-	-
		Minimum	Maximum	Mean ± SD	
Age (years)		34	97	62.32±12.91	<sup>a</sup> r=-0,036 0.738
Disease duration (years)		1	23	7.43±6.05	r=-0.001 0.995
Body mass index (kg/m <sup>2</sup> )		19	42	29.28±4.68	<sup>a</sup> r=-0.038 0.720
Pain (VAS)		2	10	7.08±1.88	r=0.303 <b>0.004</b>
Short Form SF-36 Physical health summary		0	84.44	36.42±19.62	r=-0.387 <b>0.000</b>
Mental health summary		8.25	86	43.72±20.54	r=-0.470 <b>0.000</b>
PSQI score		1	16	7.64±2.62	

(PSQI = Pittsburgh Sleep Quality Index; %= Percent; SD=Standard deviation; t= independent sample t-test; F= one-way Anova test; <sup>a</sup>r= Pearson's correlation test; r= Spearman's correlation tests )

Female patients with knee OA had a sleep quality significantly worse than men. In a study conducted in patients with OA, women had a worse sleep quality than men, similar to our results (Chen et al., 2014; Hawker et al., 2010).

In studies conducted in elderly and Canadian patients with OA with knee pain and knee OA, gender did not affect sleep disorders (Taylor-Gjevre et al., 2011; Wilcox et al., 2000). In patients with knee OA, it is thought that women

should be given more importance when evaluating sleep.

Surprisingly, 87.8% of the patients with knee OA were adversely affected by the cold and the sleep quality of those affected by the cold was significantly worse compared to those who were not affected by the cold. In a study conducted in patients with knee OA, there was no correlation between sleep parameters and cold sensitivity (Petrov et al., 2015). In patients with knee OA, it is thought that sleep quality can be increased by taking precautions against the cold in patients who are adversely affected by the cold.

The sleep quality of patients with comorbidities was significantly worse compared to patients with no comorbidities. In a study conducted in elderly people with knee pain and knee OA, the sleep quality of the patients with comorbidities was worse than those with no comorbidities (Wilcox et al., 2000). Furthermore, the sleep quality of Taiwanese patients with OA and comorbidities was worse than those with no comorbidities (Chen et al., 2014). According to these results, it is thought that patients with knee OA should be given more importance when evaluating their sleep.

In this study, we determined there was no significant relationship between the disease duration, age, and sleep quality of patients with knee OA. Similarly, there was no correlation between the age of Canadian patients with OA and their sleep quality (Taylor-Gjevre et al., 2011). The study on elderly people with knee pain and knee OA also found there was no correlation between age and sleep quality (Wilcox et al., 2000). In Taiwanese patients with OA, there was a correlation between increased age and poor sleep quality (Chen et al., 2014). In patients with knee OA, there was no relationship between body mass index and sleep. Similarly, there has been no correlation between sleep and body mass index in other studies (Taylor-Gjevre et al., 2011; Wilcox et al., 2000). However, one study has stated there is a correlation between high body mass index and poor sleep quality (Hawker et al., 2010).

All patients who participated in the study had knee pain (VAS min. = 2, max. = 10). It was determined that there was a significant correlation between decreased sleep quality and increased pain scores in patients with knee OA in the current study. In previous research, there has been a correlation between increased pain and

poor sleep quality (Chen et al., 2014; Hawker et al., 2010; Taylor-Gjevre et al., 2011; Wilcox et al., 2000). It has also been stated that there is a correlation between night pain and sleep quality, which is seen in patients with knee OA (Sasaki et al., 2014). With pain treatment in patients with arthritis, sleep has been shown to be significantly improved (Power et al., 2005). These results show that, with effective pain control, the sleep quality of patients with OA can be improved.

Sleep problems are one of the major factors affecting one's quality of life (Lo & Lee, 2012), and the sleep disorders seen in patients with knee OA negatively affect their quality of life (Sasaki et al., 2014). In the current study, it was determined that there was a relationship between decreased physical health and mental health with poor sleep quality. A study conducted in patients with OA reported a relationship between poor sleep quality and decreased mental health, whereas physical health had no relationship (Taylor-Gjevre et al., 2011). In the study conducted in Taiwanese patients, there was a relationship between decreased quality of life and poor sleep quality (Chen et al., 2014). While evaluating sleep in patients with knee OA, it is thought that physical and mental health means more care for those with low quality of life.

## Conclusions

It was determined that patients with knee OA have poor sleep qualities and the sleep quality in women, those affected by the cold, and those with comorbidities were significantly worse. We determined a positive correlation between the sleep quality of patients with knee OA and pain, there was a negative correlation between physical and mental health. Education level, marital status, family type, working status, income status, cohabitants, analgesic use, fracture story, age, disease duration, and body mass index had no effect on the sleep quality of patients with knee OA. We determined there was no significant correlation between age, disease duration, body mass index, and the sleep quality in patients with knee OA.

As a result of this research, to improve the sleep quality in patients with knee OA, more importance should be attached to women and patients with comorbidities. Furthermore, there should be more protection for patients from the cold, and greater care for the reduction of pain and enhancement of physical and mental health.

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