Relationship Among the Symptom Severity of Knee Osteoarthritis, Quality of Life and Sleep Quality

Diz Osteoartriti Semptom Şiddeti, Yaşam Kalitesi ve Uyku Kalitesi Arasındaki İlişki

Sevgi İkbali Afsar[1], Hüma Bölük[1], Selin Özen[1]

[1]Başkent University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara

Abstract

Objectives: Knee osteoarthritis (OA) is a widespread disease that increases in the elderly and is an important cause of morbidity. It is common knowledge that resting and nocturnal pain is rarely seen in patients with knee OA, however latest studies showed that it is not rare. Sleep disorders are thought to be related with nocturnal pain and it is shown that in patients with arthritis are more likely to develop sleep problems. Nocturnal pain is also related with depression and decreased quality of life. This study aims to evaluate sleep quality in patients with knee OA and to reveal the relationship between severity of knee OA, pain and sleep disorders and quality of life in female and male patients.

Materials and Methods: This cross sectional study includes 41 volunteer patients (27 female,14 male) between 40-65 years with knee OA, who suffer from knee pain for more than 6 months, and the study includes patients with grade 2 and 3 OA according to the Kellgren-Lawrence classification. Patients were evaluated using Visual Analog Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Lequesne Index, Pittsburg Sleep Quality Index (PSQI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Short form-36 (SF-36).

Results: VAS, WOMAC, Lequesne index, PSQI, BAI and BDI scores were significantly higher in female subjects than in male subjects. Prevalence of good sleep quality was significantly higher in male patients. There was a positive correlation between WOMAC scores and VAS, BAI and BDI scores, but there was no significant relationship between total PSQI scores. There was a positive correlation between Lequesne index scores and VAS, total PSQI, BAI and BDI scores. A negative correlation was found between WOMAC and Lequesne index and SF-36.

Conclusion: Severity of knee OA is found associated with pain, depression and anxiety, sleep quality and quality of life. It should be considered to manage knee OA to improve quality of life.

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

Öz

Amaç: Diz osteoartriti (OA), yaşla sıklığı artan yaygın bir hastalıktır ve önemli bir morbidite nedenidir. Diz OA'lı hastalarda istirahat ve nokturnal ağrının nadiren görüldüğü yaygın bir bilgidir, ancak son çalışmalar nadir görülmediğini göstermiştir. Uyku bozukluklarının noktürnal ağrı ile ilişkili olduğu düşünülür ve artritli hastalarda uyku problemleri gelişmesi daha olasıdır. Gece ağrısı aynı zamanda depresyon ve yaşam kalitesinin düşmesi ile de ilişkilidir. Bu çalışmada, diz OA'lı hastalarda uyku kalitesini değerlendirmek ve OA şiddetiyle ağrı ve uyku bozuklukları ile kadın ve erkek hastalarda yaşam kalitesi arasındaki ilişkiyi ortaya koymak amaçlanmıştır.

Materyal ve Metot: Bu kesitsel çalışma diz OA'sı olan 41 gönüllü hastayı (27 kadın, 14 erkek) kapsamakta ve 40-65 yaş arası 6 aydan fazla diz ağrısı olan ve Kellgren-Lawrence 'e göre 2. ve 3. derece olan hastaları kapsamaktadır. Hastalar Görsel Analog Skala (GAS), Western Ontario and McMaster Universitesi Osteoartrit İndeksi (WOMAC), Lequesne Indeksi, Pittsburg Uyku Kalitesi İndeksi (PSQI), Beck anksiyete envanteri (BAI), Beck depresyon envanteri (BDI) ve Kısa form-36 (SF-36) kullanılarak değerlendirildi.

Bulgular: VAS, WOMAC, Lequesne indeksi, PSQI, BAI ve BDI skorları kadınlarda erkeklere göre anlamlı olarak yüksek bulundu. Erkeklerde iyi uyku kalitesi prevalansı anlamlı olarak yüksek bulundu. WOMAC skorları ile VAS, BAI ve BDI skorları arasında pozitif bir korelasyon vardı, fakat toplam PSQI skoru arasında anlamlı bir ilişki yoktu. Lequesne indeks skorları ile VAS, total PSQI, BAI ve BDI skorları arasında pozitif korelasyon vardı. WOMAC ve Lequesne indeksi ile SF-36 arasında negatif korelasyon bulundu.

Sonuç: Sonuç olarak, diz OA semptom şiddeti ile depresyon, anksiyete, uyku kalitesi ve yaşam kalitesi ilişkili bulunmuştur. Yaşam kalitesini iyileştirmek için diz OA'yı yönetmek düşünülmelidir.
Anahtar kelimeler: Diz osteoartriti, ağrı, uyku kalitesi, yaşam kalitesi

Correspondence / Yazışma Adresi:
Dr. Sevgi Ikbali Afşar
Başkent University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara
e-mail: ikbaliafsar@hotmail.com
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Introduction

Knee Osteoarthritis (OA) is one of the most common musculoskeletal disorders presented with pain and joint stiffness. The frequency of knee OA increases with age and obesity with a prevalance of 2% between the ages of 30-40, 8% between the ages of 41-50 and 21% between the ages of 51-74.[1] With an increase in life expectancy, knee OA has become a greater public health problem due to its detrimental effects on joint mobility and quality of life.

It is commonly known that resting and nocturnal pain is rarely seen in patients with knee OA. However, some studies have shown that nocturnal pain occurs frequently and has been reported in 81% of patients with knee OA.[2-5] Sleep disorders are thought to be related to nocturnal pain; it has been shown that inflammatory arthritic patients are more likely to develop sleep problems; however, it has also been reported that sleep disorders are associated with pain.[4] In another study, the nocturnal pain was present in 40% of patients with severe knee OA and it was shown that it affected sleep quality and decreased the quality of life.[6]

Studies to date have shown that OA patients also suffer from depression and a worsening of quality of life. In Turkey, the prevalence of depression in knee OA patients is higher than the population average at 41% and has been associated with pain and immobility.[7,8]

This study aims to evaluate the sleep quality in patients with knee OA and to reveal the relationship among severity of knee OA, pain and sleep disorders and quality of life in female and male patients.

Materials and Methods

Subjects

This cross-sectional study included 41 (27 female,14 male) patients between the ages of 40-65 with knee OA, admitted to Başkent University, Physical Medicine and Rehabilitation outpatient clinic between December 2015- April 2016 with an history of knee pain for more than six months. Patients with stage 2 and 3 OA according to the Kellgren-Lawrence (KL) grading scale, who were diagnosed with knee OA according to the American College of Rheumatology (ACR), were included in the study.[9,10] Patients with an history of ankle and hip problems or knee operations, rheumatic disease, metabolic bone disorders, chronic kidney or heart disease, neurological disease and chronic depression or those currently on antidepressants, those who received physical therapy or underwent intraarticular interventions within the last 6 months were excluded.

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The study was approved by the ethical committee of Başkent University School of Medicine prior to commencement. Informed consent was obtained from all patients.

Evaluation

The assessments of all the patients were made by the same physician in the outpatient clinic. Demographic and clinical characteristics such as gender, age, marital status, educational status, systemic disease presence were recorded. Physical examinations of the patients were performed, heighst and weights were measured, body mass indices were calculated as kg/m².

Radiological evaluation: Bilateral anteroposterior views of the participants were graded according to the KL scale. In this grading system; KL grade 1 is doubtful osteophyte, grade 2 is definite osteophyte, with normal joint space, grade 3 is definite osteophyte with narrowing of joint space and grade 4 is definite osteophyte with marked narrowing of joint space, severe sclerosis, and definite bone deformity.[9] The worse side was chosen for grading. Same physician made the classifications and only the patients with grade 2 and 3 knee OA were incorporated in the study.

Visual Analog Scale: 10-cm visual analog scale (VAS) was used by patients to perform a self-assessment of pain intensity associated with knee OA.[11]

Western Ontario and McMaster Universities Osteoarthritis Index: Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) were used to evaluate the intensity of pain, stiffness, and level of function associated with knee OA.[12,13] This index consists of 5 questions for pain, 2 questions for stiffness and 17 questions for physical function.

Lequesne Index: The Lequesne index was used to determine the severity of knee OA. This index analyzes pain, maximum walking distance, and activities of daily living. The score obtained increases with OA severity.[14] This survey has been shown to be valid and reliable in patients with knee OA and in Turkish patients.[15,16]

Pittsburgh Sleep Quality Index: Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI). This index consists of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep disorders, use of sleep medications and daytime dysfunction components. PSQI assesses the symptoms of the last 4 weeks. Higher scores show insufficient sleep and lower sleep quality.[17,18]

Short Form-36: Short form-36 (SF-36) was used to assess health-related quality of life. SF-36 is a brief and easily administered questionnaire. It consists of 36 questions and two subgroups; mental and physical assessment. Scores range from 0-100, 100 denotes the highest level of health, 0 denotes the worst. The SF-36 questionnaire was adapted for the Turkish population and found valid and reliable in osteoarthritis patients.[19]

Beck Depression Inventory: Beck Depression Inventory (BDI) was used to evaluate the characteristics of depression and anxiety. BDI consists of 21 questions, higher scores imply increased depression symptom severity.[20]

Beck Anxiety Inventory: Beck Anxiety Inventory (BAI) is a self-reporting scale which was performed to assess the anxiety frequency and severity in patients. The BAI consists of 21 questions. The high scores on the scale indicate that the severity of anxiety experienced by the individual is high.[21]

Statistical analysis

Statistical analysis was performed using SPSS for Windows version 20 (IBM SPSS Inc., Chicago, IL). Normal distribution of the data was evaluated using the Kolmogorov-Smirnov test. Normally distributed quantitive data were expressed as mean ± standard deviations (SD) and non-normally distributed quantitive data were shown as median (min-max). Values for categorical variables were given in numbers and percentages. The Mann Whitney U and student t-tests were used in order to determine data correlation between the two groups. Categorical data were compared using the Chi-square and Fisher's Exact Test. Correlation between severity of OA and BDI, SF-36 and total PSQI scores were determined using the Spearmen's correlation analysis. To determine the factors related to the severity of OA, stepwise multivariate logistic regression analysis was performed using the BDI, SF-36 and PSQI scores. Adjustment for non-normally distributed quantitive data including WOMAC, Lequesne index, VAS, PSQI, BDI and BAI variables was made prior to regression analysis. A *p* value less than 0.05 was considered to be statistically significant.

Results

Demographic and clinical characteristics of the patients are given in Table 1. There was no significant difference in terms of age and body mass index among male and female patients.

Table 1. Demographic and clinical characteristics of patients

Variables	Result
Sex (female), n (%)	27 (65.85 %)
Age, years (mean ± SD)	61.11 ± 12.02
BMI, kg/m² (mean ± SD)	27.63 ± 3.54
Marital status, n (%)	
Single/divorced/widoved	8 (19.51 %)
Married	33 (80.48 %)
Education level, n (%)	
Elementary school	8 (19.51 %)
High school	19 (46.34 %)
Collage graduate	14 (34.14 %)
Working status, n (%)	
Employment	11 (26.83 %)
Retired	15 (36.58 %)
Homemaker	15 (36.58 %)
Duration of knee OA (years)(min-max)	5.79 (1 - 31)
Presence of multiple drug use, n (%)	21 (51.22 %)
Physical activity, n (%)	
Not	18 (43.90 %)
Sometimes	18 (43.90 %)
Regular	5 (12.19 %)

Values are mean ± standard deviation, minimum to maximum, n (%).
SD: Standart deviation; BMI: Body mass index; OA: Osteoarthritis

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VAS (7 vs 5; p=0.008), WOMAC (51 vs 22.4; p=0.013), Lequesne index (13 vs 5.5; p=0.005), total PSQI (6 vs 2; p=0.001), BAI (17 vs 6; p=0.002) and BDI scores (11 vs 4.5; p=0.003) were significantly higher in female subjects than in male subjects (Table 2).

Table 2. Clinical characteristics of patients

	Patients n=41	Female n=27	Male n=14	p
VAS	6 (0-10)	7 (4-10)	5 (0-7)	0.008*
WOMAC	36.50 (2.11-93.79)	51 (11.49-93.82)	22.40 (2.12-59.42)	0.013*
Lequesne index	10 (1-20)	13 (5-20)	5.51 (1-16)	0.005*
PSQI	5 (1-14)	6 (1-14)	2 (1-6)	0.001*
SF-36	91.84 ± 8.34	90 ± 7.52	95.22 ± 9	0.055
BAI	13 (0-38)	17 (1-38)	6 (0-19)	0.002*
BDI	9 (0-40)	11 (0-40)	4.52 (0-15)	0.003*

VAS: Visual analog scale; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; PSQI: Pittsburgh Sleep Quality Index; SF-36: Short form-36; BAI: Beck anxiety inventory; BDI: Beck depression inventory.
Values are mean ± standard deviation, minimum to maximum, n (%).
*p<0.05 is considered to be statistically significant.

Prevalance of good sleep quality was significantly higher in male patients (40.69% to 92.88%; p=0.002). Prevalance of very good sleep latency (the subgroup of PSQI) was higher in male patients when compared to female patients (14.81% vs 85.72%; p<0.001); however, there was no difference in values between male and female patients for any other PSQI subgroups (Table 3).

Table 3. Distribution of sleep quality scores in patients with knee osteoarthritis

	Patients n=41	Female n=27	Male n=14	p
Total PSQI score	5 (1-14)	6 (1-14)	2 (1-6)	0.001*
Good sleep quality	24 (58.31)	11 (40.69)	13 (92.92)	0.002*
Poor sleep quality	17 (41.69)	16 (59.31)	1 (7.08)	
Sleep disturbances				
Very good	-	-	-	
Fairly good	25 (61.00)	14 (51.90)	11 (78.59)	0.133
Fairly bad	14 (34.11)	12 (44.39)	2 (14.31)	
Very bad	2 (4.89)	1 (3.69)	1 (7.10)	
Sleep latency				
Very good	16 (39.01)	4 (14.82)	12 (85.70)	
Fairly good	15 (36.61)	15 (55.61)	-	< 0.001*
Fairly bad	7 (17.09)	6 (22.19)	1 (7.10)	
Very bad	3 (7.29)	2 (7.38)	1 (7.10)	
Daytime dysfunction				
Very goog	24 (58.51)	13 (48.13)	11 (78.60)	
Fairly good	12 (29.31)	10 (37.03)	2 (14.31)	0.242
Fairly bad	3 (7.28)	2 (7.36)	1 (7.09)	

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Very bad	2 (4.90)	2 (7.38)	-	
Habitual sleep efficiency				
Very good	29 (70.66)	16 (59.32)	13 (92.89)	0.189
Fairly good	8 (19.54)	7 (25.93)	1 (7.11)	
Fairly bad	2 (4.89)	2 (7.35)	-	
Very bad	2 (4.89)	2 (7.35)	-	
Subjective sleep quality				
Very good	6 (14.59)	3 (11,10)	3 (21.39)	0.088
Fairly good	28 (68.31)	17 (63.0)	11 (78.61)	
Fairly bad	7 (17.10)	7 (25.90)	-	
Very bad	-	-	-	
Use of sleeping medication				
Very good	39 (95.12)	25 (92.61)	14 (100.00)	0.539
Fairly good	-	-	-	
Fairly bad	-	-	-	
Very bad	2 (4.88)	2 (7.39)	-	

Values are mean ± standard deviation, minimum to maximum, n (%).
*p<0.05 is considered to be statistically significant.

There was a positive correlation among WOMAC and VAS (r=0.372; p=0.017), BAI (r=0.492; p=0.001) and BDI (r=0.384; p=0.013) scores. There was a negative correlation between WOMAC and SF-36 scores (r=-0.458; p=0.003). There was no significant relationship between total PSQI scores and WOMAC scores (Table 4).

There was a positive correlation among Lequesne index scores and VAS (r=0.502; p=0.001), total PSQI (r=0.451; p=0.003), BAI (r=0.485; p=0,.01), and BDI (r=0.590; p<0.001) scores. There was a negative correlation between Lequesne index and SF-36 scores (r=-0.617; p<0.001) (Table 4).

Table 4. Relations between osteoarthritis severity and pain, depression, quality of life and sleep quality

	WOMAC		Lequesne index	
	r	p	r	p
WOMAC	-	-	0.581	<0.001*
Lequesne index	0.581	<0.001*	-	-
VAS	0.372	0.017*	0.502	0.001*
PSQI	0.226	0.154	0.451	0.003*
SF-36	-0.458	0.003*	-0.617	< 0.001*
BAI	0.492	0.001*	0.485	0.001*
BDI	0.384	0.013*	0.590	< 0.001*

VAS: Visual analog scale; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; PSQI: Pittsburgh Sleep Quality Index; SF-36: Short form-36; BAI: Beck anxiety inventory; BDI: Beck depression inventory.
*p<0.05 is considered to be statistically significant.

VAS (β±SE = 3.174±1.390; p=0.028), SF-36 (β±SE =-0.913±0.388; p=0.024) and BAI (β±SE = 1.336±0.405; p=0.002) scores were determined as possible predictor variables for WOMAC scores (Table 5).

Table 5. Factors related knee osteorthritis severity

	β	SE	95% CI		p
			lower	upper	
WOMAC					
VAS	3.174	1.390	0.354	5.994	0.028*
PSQI	-2.405	1.211	-4.861	0.051	0.055
SF-36	-0.913	0.388	-1.701	-0.126	0.024*
BAI	1.336	0.405	0.544	2.189	0.002*
BDI	0.219	0.528	-0.852	1.290	0.680
	Adj R² = 0.405; p<0.001*				
Lequesne index					
VAS	0.581	0.267	0.039	1.122	0.036*
PSQI	0.792	0.232	0.323	1.260	0.001*
SF-36	-0.193	0.079	-0.352	-0.033	0.019*
BAI	0.096	0.070	-0.047	0.238	0.181
BDI	0.201	0.096	0.007	0.395	0.042*
	Adj R² = 0.514; p<0.001*				

VAS: Visual analog scale; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; PSQI: Pittsburgh Sleep Quality Index; SF-36: Short form-36; BAI: Beck anxiety inventory; BDI: Beck depression inventory.
β= Regression coefficient, SE:Standart error, 95% CI= 95% Confidence interval,
Adj: Adjusted
*p<0.05 is considered to be statistically significant.

VAS (β±SE = 0.581±0.267; p=0.036), BDI (β±SE = 0.201±0.096; p=0.042), SF-36 (β±SE = -0.193±0.079; p=0.019) and total PQSI scores (β±SE = 0.792±0.232; p=0.001) were determined as possible variables for Lequesne index scores (Table 5).

Discussion

The aim of this study was to investigate the relationship among OA severity, depression, sleep quality and quality of life in patients with knee OA. The results show that the females have worse pain, symptom severity, depression, and sleep quality scores in comparison to the male patient. On the other hand, there is no significant difference between male and female subjects when comparing the quality of life scores. Higher knee OA symptom severity scores are associated with worse pain, sleep quality, quality of life and higher depression-anxiety scores.

Prior studies revealed that depression, pain, and disability due to OA were worse in female patients than in male patients. The difference between genders is thought to be associated with different anatomical structures, sex hormones, and psycho-social factors.[22-25] Similarly in our study, pain, disability and depression scores, as defined by questionnaires, were higher in the female patients. In addition, according to our

findings, the prevalence of good sleep quality and good sleep latency was higher in males than in female patients. This is also the case in the general population.[26]

Previously, it has been reported that 49.3% of patients with knee OA have depressive symptoms.[6] Another study found a negative correlation between physical function and depression in knee OA patients.[25] The findings of this study were consistent with these previous findings, with a positive correlation between Lequesne scores, a questionnaire which is mostly associated with disability and depression. WOMAC scores were related to anxiety. However, in contrast to our findings, Creamer et al. showed that disability is related to anxiety more than depression in knee OA patients.[27]

There was no correlation between WOMAC scores and sleep quality; however, Lequesne scores were significantly associated with sleep quality. Previously, both pain and functional disability were associated with sleep disorders.[8] In the present study, our findings support the belief that disability is related to sleep disorders due to the correlation between Lequesne scores and sleep quality index scores. The study of Mesci et al. did not show WOMAC for symptom severity, and the physically active group did not show any difference in the comparison of sleep quality.[7] This is similar to our findings.

In a report that investigated the impact of neuropathic pain in knee OA, it has been shown that severity of knee OA, defined using WOMAC scores, were related to the worse quality of life in patients that were both detected to have neuropathic pain and those that did not.[28] The findings of this study concur with this finding.

There were several limitations to this study. The number of patients was limited and an age-matched control group was not included. Sleep quality index was self-reported, which could lead to the reporting of subjective sleep disturbances due to pain. Lastly, the demographic variation could result in different perceptions of pain.

In conclusion, in the light of these findings, knee OA severity is associated with pain, depression, and anxiety, as well as sleep quality and quality of life. Therefore management of knee OA should be considered with every effort in order to improve the quality of life.

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