ORIGINAL ARTICLE

DOI: 10.4274/nkmj.galenos.2025.07108
Nam Kem Med J 2025;13(3):200-208

The Impact of Higher Disease Activity on Sleep Quality in Patients with Rheumatoid Arthritis

Romatoid Artrit Hastalarında Yüksek Hastalık Aktivitesinin Uyku Kalitesi Üzerine Etkisi

Elif ALTUNEL KILINÇ, İpek TÜRK

Çukurova University Faculty of Medicine, Department of Rheumatology, Adana, Türkiye

ABSTRACT

Aim: Rheumatoid arthritis (RA) is an autoimmune disease that affects joints and surrounding tissues, significantly reducing the quality of life of individuals. This study aims to evaluate RA patients' sleep quality and reveal the relationship between this impairment and disease activity.

Materials and Methods: The study was cross-sectional and involved 66 RA patients and 30 healthy controls. RA patients underwent assessments using the disease activity score 28 (DAS28), visual analogue scale (VAS), health assessment questionnaire (HAQ), and Pittsburgh sleep quality index (PSQI). The RA group was divided into two subgroups based on PSQI scores: PSQI <5 and PSQI >5.

Results: PSQI scores of RA patients were significantly higher compared to the healthy control group ($p<0.001$). Correlation analyses showed positive relationships between PSQI scores and DAS28 ($r=0.444$, $p<0.001$), VAS ($r=0.277$, $p=0.024$), and HAQ ($r=0.244$, $p=0.048$). When RA patients were divided into PSQI <5 and PSQI >5 groups, significant differences were observed in age, DAS28, and VAS scores. DAS28 and age were identified as independent risk factors for the increase in PSQI scores.

Conclusion: This study demonstrated that the sleep quality of RA patients was significantly impaired compared to healthy individuals, with worse sleep quality associated with higher disease activity and older age among RA patients. Identifying DAS28 as an independent risk factor for increased PSQI underscores the importance of disease activation in negatively impacting sleep quality. It highlights the necessity of integrating sleep quality improvement into these patients' evaluation and treatment processes.

Keywords: Rheumatoid arthritis, sleep quality, visual analog scale

ÖZ

Amaç: Romatoid artrit (RA), otoimmün bir hastalık olarak, eklemler ve çevresindeki dokuları etkileyerek bireylerin yaşam kalitesini önemli ölçüde düşürmektedir. Bu çalışma, RA hastalarının uyku kalitesini değerlendirmeyi ve bu bozulmanın hastalık aktivitesi ile ilişkisini ortaya koymayı amaçlamaktadır.

Gereç ve Yöntem: Çalışma; 66 RA hastası ve 30 sağlıklı kontrol dahil edilerek yapılmış ve kesitsel bir çalışma olarak tasarlanmıştır. RA hastalarına; hastalık aktivite skoru 28 (DAS28), vizüel analog skala (VAS), sağlık değerlendirme anketi (HAQ) ve Pittsburgh uyku kalitesi indeksi ölçeği (PUKİ) ölçekleri uygulanmıştır. RA grubundaki hastalar PUKİ <5 ve PUKİ >5 olacak şekilde iki gruba ayrılarak incelenmiştir.

Bulgular: RA hastalarının PUKİ skorları, sağlıklı kontrol grubuna göre anlamlı derecede yüksek bulunmuştur ($p<0,001$). Korelasyon analizleri, PUKİ skorları ile DAS28 ($r=0,444$, $p<0,001$), VAS ($r=0,277$, $p=0,024$) ve HAQ ($r=0,244$, $p=0,048$) arasında pozitif ilişkiler göstermiştir. RA hastaları PUKİ <5 ve PUKİ >5 olarak ayrıldığında; yaş, DAS28, ve VAS skorlarında anlamlı fark olduğu görülmüştür. DAS28 ve yaş, PUKİ skorlarındaki artış için bağımsız risk faktörüdür.

Sonuç: Bu çalışma, RA hastalarının uyku kalitesinin sağlıklı bireylere göre belirgin şekilde bozulduğunu, uyku kalitesi kötü olan RA hastalarında, hastalık aktivitesinin daha yüksek olduğunu ve yaş ortalamasının daha fazla olduğunu ortaya koymuştur. DAS28'in PUKİ artışı için bağımsız risk faktörü olması; RA hastalarında hastalık aktivasyonunun uyku kalitesini olumsuz yönde etkileyen önemli bir faktör olduğunu, bu hastaları değerlendirme ve tedavi sürescinde uyku kalitesini iyileştirmeyi tedavi süreçlerine entegrasyonunun önemini göstermektedir.

Anahtar Kelimeler: Romatoid artrit, uyku kalitesi, vizüel analog skala

Address for Correspondence: Elif ALTUNEL KILINÇ MD, Çukurova University Faculty of Medicine, Department of Rheumatology, Adana, Türkiye
E-mail: elifaltunel@hotmail.com **ORCID ID:** orcid.org/0000-0003-2501-2473
Received: 04.02.2025 **Accepted:** 23.04.2025 **Publication Date:** 07.10.2025

Cite this article as: Altunel Kılınç E, Türk İ. The impact of higher disease activity on sleep quality in patients with rheumatoid arthritis. Nam Kem Med J. 2025;13(3):200-208

INTRODUCTION

Rheumatoid arthritis (RA) is a systemic, autoimmune, and inflammatory condition that can affect various tissues and organs, including synovial joints and surrounding structures[1]. RA affects not only physical health but also the psychological and social lives of individuals. This condition leads to a decrease in patients' quality of life and difficulties in their daily activities[2].

More than half of RA patients report sleep disturbances[3]. Comprehensive phenotyping of sleep disturbances is important because associations with clinical outcomes (e.g., pain) may vary depending on the type of sleep disturbance. An experimental study showed that sleep restriction led to increased pain intensity and the number of painful joints the next day in patients with RA[4]. There is a well-established relationship between sleep disorders and overall well-being in RA. The presence of one can exacerbate the symptoms of the other. For example, inadequate disease management leading to joint pain can negatively affect sleep. Conversely, sleep disorders can reduce pain tolerance and increase arthritis-related symptoms[5-8]. Additionally, RA can also lead to psychological issues such as stress and depression, which can further negatively impact an individual's sleep quality. As a result, RA patients are more likely to experience sleep disorders than healthy individuals.

Sleep is critical to overall health and well-being. Sleep quality is a multidimensional phenomenon that affects both physical and mental health. Studies have shown that RA is closely related to sleep disorders[9-11]. These disorders affect not only the duration of sleep, but also its depth and restorative quality.

Sleep physiology is a complex process involving the regulation and quality of sleep. Sleep consists of rapid eye movement (REM) and non-REM (non-REM) stages; non-REM sleep contributes to physical repair and immune system strengthening, while REM sleep is critical for learning and emotional balance. Insufficient sleep can negatively affect pain perception, exacerbating existing pain and leading to chronicity. Additionally, sleep disorders can induce stress on the nervous system, thereby enhancing inflammatory responses. Therefore, maintaining a healthy sleep pattern plays a crucial role in pain management and improving the overall health of RA patients.

The aim of our study was to investigate the effects of high disease activity on sleep quality in RA patients and to provide a perspective on the importance of considering sleep factors alongside disease activity assessment when optimizing individualized treatment approaches to improve patients' overall quality of life.

MATERIALS AND METHODS

This cross-sectional study included 66 patients diagnosed with RA according to the 2010 American College of Rheumatology criteria who presented to the Rheumatology Outpatient Clinic of Rheumatology University Çukurova Balcalı Hospital between September and October 2024, along with a control group of 30 healthy individuals matched for sex and age[12]. The study was approved by the Ethics Committee of Çukurova University (decision no: 6/9/2024-147, date: 06.09.2024). All patients included in the study signed an informed consent form.

Technical Information

Case Selection and Description

The study included RA patients over the age of 18 with no fibromyalgia or serious neuropsychiatric disease and individuals over the age of 18 with no rheumatological disease and no diagnosis of fibromyalgia.

Demographic data (age, sex) of the patients, disease duration, smoking status, presence of extra-articular involvement, autoantibody status (rheumatoid factor and anti-cyclic citrullinated peptide antibody), disease activity score 28 (DAS28), visual analogue scale (VAS), health assessment questionnaire (HAQ), and Pittsburgh sleep quality index scale (PSQI) results were recorded. The medications used by RA patients were recorded as non-biological (conventional synthetic disease-modifying drugs-methotrexate, leflunomide, colchicine, hydroxychloroquine, steroids) and biological [anti-tumor necrosis factor (anti-TNF) alpha inhibitors, interleukin-6 (IL-6) inhibitors, IL-1 inhibitors, rituximab, JAK inhibitors, abatacept] were recorded and analyzed to evaluate the effects of treatment methods on sleep quality.

DAS28

It is a tool that evaluates 28 joints to measure disease activity in individuals diagnosed with RA. It is derived from a validated formula that considers multiple clinical parameters, including the number of swollen joints, the number of tender joints, VAS scores, and C-reactive protein levels. A DAS28 score above 5.1 indicates high disease activity, between 3.2 and 5.1 indicates moderate disease activity, and between 2.6 and 3.2 indicates low disease activity. A score below 2.6 indicates disease remission[13].

VAS

On a pain assessment scale, the patient is asked to mark numbers ranging from 0 to 10 at equal intervals on a page according to their pain sensation. 0 indicates no pain, while 10 indicates the most severe pain they have ever experienced[14,15].

HAQ

A widely used assessment for daily living activities and disability, with proven validity and reliability in musculoskeletal disorders, including regional pain syndromes and rheumatic disorders. The test consists of 20 questions. Daily living activities are divided into eight sections: dressing, standing, eating, walking, hygiene, reaching, grasping, and daily tasks. The questions are answered using a Likert scale (0=I can do it easily, 1=I can do it with some difficulty, 2=I can do it with considerable difficulty, 3=I cannot do it). A minimum of 0 and a maximum of 60 points are assigned in increments of 20, resulting in scores ranging from 0 to 3. In this assessment, a lower score indicates superior functional status[16]. The Turkish validation of the questionnaire was performed by Küçükdeveci et al.[17]

PSQI

This scale, which assesses sleep quality, consists of 18 questions and 7 components. The answers to the questions refer to sleep quality over the past month. The first 4 questions are open-ended and include temporal assessments.

The remaining questions are designed for participants to make categorical evaluations. Responses to questions evaluated in 4 separate categories are scored on a scale of 0-3. The component scores are summed to obtain the total PSQI score. The total PSQI score can range from 0 to 21. As the scores increase, sleep quality deteriorates. Those who score 5 or more out of a total of 7 components are considered to have poor sleep quality, while those with scores less than 5 are considered to have good sleep quality[18].

PSQI components are grouped as follows.

1. Subjective Sleep Quality: The participant's score for their own sleep quality. Answers range from very good (0 points) to very poor (3 points).

2. Sleep Latency: This is assessed using an open-ended question about the time it takes to fall asleep at night and a categorical question about whether this time is more than 30 minutes. The longer it takes to fall asleep, the poorer the sleep quality.

3. Sleep Duration: Measured by evaluating the participant's response to an open-ended question about their nighttime sleep duration. A score of 0 points is given for sleep duration of 7 hours or more, and 3 points for sleep duration of less than 5 hours.

4. Usual Sleep Activity: The value obtained by dividing the difference between the time of getting out of bed in the morning and the time of going to bed at night by the time spent asleep in bed is used. A score of 0 is given for values above 85.00%, and 3 points for values below 65%.

5. Sleep Disorder: Responses to 9 different questions such as waking up at night to use the restroom, feeling pain or cold during sleep are evaluated as none (0 points) during the week, less than 1 time per week (1 point), 1-2 times per week (2 points), and 3 or more times per week (3 points). The scores obtained from the 9 questions are added together to obtain the sleep disorder score.

6. Use of Sleep Medication: The use of sleep medication to help sleep in the last month is asked. It is evaluated on a scale from never used (0 points) to used 3 times or more per week (3 points).

7. Daytime Dysfunction: This is evaluated based on the total score obtained from the answers to 2 questions asking whether the respondent felt sleepy during a daytime activity in the past month and whether this feeling interfered with their work.

Statistical Analysis

Statistical analyses were performed using SPSS for Windows version 25.0. The normality of variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests.

A p-value greater than 0.05 in the Kolmogorov-Smirnov test indicates that the data are normally distributed. In our study, continuous quantitative parameters that showed normal distribution were evaluated using the t-test for two-group comparisons, the Mann-Whitney U test when not normally distributed, and the chi-square test for categorical variables. When there were three subgroups and the data did not follow a normal distribution, the Kruskal-Wallis test was used. Descriptive statistics included mean, standard deviation, median, min, and max values. Spearman's correlation test was used for correlation analysis, and the correlation coefficient was denoted as rho. A correlation coefficient less than 0.25 indicates no relationship or a very weak relationship; a coefficient between 0.25 and 0.5 indicates a weak to moderate relationship; a coefficient between 0.5 and 0.75 indicates a strong relationship; and a coefficient greater than 0.75 indicates a very strong relationship. A logistic regression analysis was conducted to assess the diagnostic power of the measurement parameters. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Our study included 66 RA patients (87.8% female, mean age: 55.6±11.12) and 30 healthy controls (83.3% female, mean age: 51.4±9.3). There was no difference between the groups in terms of age and sex distribution (p=0.865 and p=0.778). According to the Kolmogorov-Smirnov and Shapiro-Wilk tests, all continuous quantitative data showed a normal distribution, while the other parameters did not show a normal distribution (p=0.200, p<0.001 for all). The sample size was

determined based on the study by Taylor-Gjevre et al.[3], which recommended n=19 cases with a 5% margin of error, 80% power, and a standard effect size of 0.64[19].

Median disease duration of RA patients was 11.5 (min-max: 0-30 years). Fifty-one (77%) of the patients were non-smokers, while 15 (23%) were active smokers or had a history of smoking. Fifty-nine (89%) patients had no extra-articular involvement. Forty-five (68%) patients were seropositive. Mean DAS28 scores were 3.8±1.8, mean VAS scores were 1.61±2.4, median was 0 (range: 0-9), and median HAQ score was 0 (range: 0-2.6). Demographic data of RA patients are presented in Table 1. Twenty percent (n=6) of the healthy control group had a history of active smoking or smoking.

Of the 66 RA patients included in the study, 50 (76%) were receiving nonbiologic therapy, while 16 (24%) were receiving biologic therapy. Five (7.6%) of the 66 RA patients were using psychiatric medications. Of the 5 patients, 3 (60%) had a diagnosis of generalized anxiety disorder, and 2 (40%) had a diagnosis of depressive disorder. One patient was on essitalopram + mirtazapine + trifluperazine, one patient was on mirtazapine, one patient was on essitalopram, one patient was on vortioxetine, and one patient was on agomelatin.

When the PSQI questionnaires of RA patients were analyzed; total sleep duration in hours was on average: 6.5±1.8, median: 7 (min-max: 2-9), sleep onset latency in minutes was on average: 31.3±38, median: 20 (min-max: 0-180), sleep efficiency in percentage, average: 81.2±19, median: 88 (min-max: 31-100).

Table 1. Demographic data of patients with rheumatoid arthritis

Number of patients, n	66
Age; year, mean ± SD	55.6±11.12
Female, n (%)	58 (87.8)
Disease duration, year, median (min-max)	11.5 (0-30)
Smoking*, n (%)	15 (23)
Extraarticular involvement, n (%)	7 (11)
Seropositive, n (%)	45 (68)
Treatment, n (%)	
csDMARD	50 (75.8)
Biologic	16 (24.2)
DAS28, median (min-max)	0.9 (0-7.2)
VAS, median (min-max)	0 (0-9)
PSQI, median (min-max)	4.75 (0-18)
HAQ, median (min-max)	0 (0-2.6)

*: Active smoker or smoking history, csDMARD: Conventional synthetic disease-modifying drug, DAS28: Disease activity score 28, PSQI: Pittsburgh sleep quality index, SD: Standard deviation, VAS: Visual analogue scale, HAQ: Health assessment questionnaire

The question about difficulty falling asleep within 30 minutes was answered as "never" by 24 (66%) patients, "less than once a week" by 13 (19.6%) patients, "once or twice a week" by 11 (16.6%) patients, and "three or more times a week" by 18 (27%) patients. The question about sleep medication use was answered as follows: 60 (89.5%) patients reported "none in the past month", 2 (3%) patients reported "once a week or less", 1 (1.5%) patient reported "once or twice a week", and 4 (6%) patients reported "three or more times a week". Subjective sleep quality (SSQ) was reported as "very good" by 6 (9.5%) patients, "fairly good" by 36 (54.5%) patients, "fairly poor" by 16 (24%) patients, and "very poor" by 8 (12%) patients (Table 2).

The average PSQI score for RA patients was 6.1±4.7, median: 4.75 (min-max: 0-18), while the average PSQI score for the healthy control group was 3.2±1.8, median: 3 (min-max: 0-9). There was a significant difference between the two groups (p<0.001). A comparative evaluation of the total sleep duration, sleep onset latency, sleep efficiency, inability to fall asleep within 30 minutes, use of sleep medication, and SSQ results between RA patients and the healthy control group is presented in Table 3.

In the correlation analysis conducted in RA patients, PSQI scores were positively correlated with DAS28 (r=0.444, p<0.001), VAS (r=0.277, p=0.024), age (r=0.262, p=0.035), and HAQ (r=0.244, p=0.048), while no correlation was found with disease duration (p=0.241). When DAS28 scores were categorized as low disease activity (Group 1) for scores <3.2, moderate disease activity (Group 2) for scores between 3.2 and 5.1, and high disease activity (Group 3) for scores >5.1, 15 patients were assigned to Group 1, 15 to Group 2, and 36 to Group 3. Analysis between subgroups revealed significant differences in PSQI scores (p=0.008). PSQI scores were higher in Group 3 than in Group 2 (p=0.049) and higher in Group 2 than in Group 1 (p=0.002) (Table 4).

RA patients were divided into two groups: those with PSQI <5 (good sleep quality) and those with PSQI >5 (poor sleep quality). There were 33 patients in each group. The mean age of RA patients with good sleep quality was 52±2 years, while the mean age of RA patients with poor sleep quality was 60±1.7 years, which was statistically significant (p=0.044). The sex distribution was equal in both groups, with 29 (87.8%) women and 4 (12.2%) men. There were no differences between the two groups in terms of year of diagnosis, medication used (biological or conventional synthetic disease-modifying drug), autoantibody status (seropositive/seronegative), extra-articular involvement, and smoking status. (p=0.690, p=0.566, p=0.792, p=0.230, p=0.314, respectively). The DAS28 score was 2.2±0.8 in RA patients with good sleep quality, while it

was 5.3±1.1 in the RA group with poor sleep quality, and this difference was statistically significant (p<0.001). Similarly, VAS scores were 0.97±0.2 (median: 0, min-max: 0-8) in the RA group with good sleep quality and 2.1±0.5 (median: 0, min-max: 0-9) in the RA group with poor sleep quality, and this difference was statistically significant (p=0.042). There was no difference in HAQ scores (p=0.162).

Logistic regression analysis of RA patients evaluated according to PSQI scores is presented in Table 5.

Table 2. Comparative evaluation of PSQI components in rheumatoid arthritis and healthy control groups

	Rheumatoid arthritis, n=66	Healthy control group, n=30	p-value
Total sleep duration, hours, median (min-max)	7 (2-9)	8 (5-12)	0.784
Sleep latency, minutes	20 (0-180)	15 (0-30)	<0.001*
Sleep activity, %	55 (31-100)	90 (50-100)	<0.001*
Inability to fall asleep within 30 minutes, n (%)			
None	24 (66)	22 (73.3)	0.654
Less than once a week	13 (19.6)	4 (13.3)	0.048*
Once or twice a week	11 (16.6)	2 (6.7)	<0.001*
Thrice or more in a week	18 (27)	2 (6.7)	<0.001*
Use of sleep medication, n (%)			
None	59 (89.5)	28 (93)	0.723
Less than once a week	2 (3)	1 (3.5)	0.882
Once or twice a week	1 (1.5)	1 (3.5)	0.098
Thrice or more in a week	4 (6)	0	0.03*
Subjective sleep quality, n (%)			
Very good	6 (9.5)	24 (79.9)	<0.001*
Quite good	16 (24)	2 (6.7)	<0.001*
Quite bad	36 (54.5)	2 (6.7)	<0.001*
Very bad	8 (12)	2 (6.7)	<0.001*

*p<0.05, PSQI: Pittsburgh sleep quality index

Table 3. Intergroup evaluation of PSQI score distributions

	Rheumathoid arthritis, n=66	Healthy control group, n=30	p-value
PSQI score, median (min-max)	4.75 (0-18)	3 (0-9)	<0.001*
PSQI components, median (min-max)			
Sleep quality	2 (0-3)	0 (0-3)	<0.001*
Sleep latency	0 (0-3)	0 (0-3)	<0.001*
Sleep duratipn	1 (0-3)	1 (0-3)	0.784
Normal sleep activity	2 (0-3)	0 (0-3)	<0.001*
Sleep disorder	1 (0-3)	0 (0-2)	<0.001*
Use of sleep medication	0 (0-3)	0 (0-2)	0.428
Daytime dysfunction	0 (0-3)	0 (0-2)	<0.001*

*: p<0.05, PSQI: Pittsburgh sleep quality index

Table 4. Evaluation of PSQI scores in patients with rheumatoid arthritis grouped according to disease activity

	n (%)	PSQI score mean ± SD	p-value*
Group 1	15 (28)	4.5±5	0.002[a]
Group 2	15 (28)	6.198±3	0.049[c]
Group 3	36 (46)	7.4±6.6	0.001[b]

*: The Kruskal-Wallis test, Group 1: Low disease activity, Group 2: Medium disease activity, Group 3: High disease activity, [a]: Group 1-Gruop 2, [b]: Group 1-Group 3, [c]: Group 2-Group 3, SD: Standard deviation, PSQI: pittsburgh sleep quality index

Table 5. Regression analysis results based on PSQI scores

	Age	DAS28	VAS	Psychiatric diagnosis/ treatment	RA drug use (biologic/non-biologic)
B	0.080	0.701	0.053	1.885	0.499
SE	0.034	0.243	0.123	1.160	0.587
OR (95% CI)	1.083 (1.014-1.158)	2 (1.252-3.243)	1.055 (0.828-1.343)	6.5 (0.679-64)	1.647 (0.521-5.2)
p-value	0.018*	0.004*	0.666	0.104	0.395

*p<0,05, B: Regression coefficient, DAS28: Disease activitty score 28, SE: Standard error, OR: Odds ratio, CI: Confidence interval, PSQI: Pittsburgh sleep quality index, VAS: Visual analogue scale, RA: Rheumatoid arthritis

DISCUSSION

In this study, we evaluated the sleep quality of RA patients by comparing them with a healthy control group. The results show that PSQI scores are significantly higher in RA patients than in healthy individuals. PSQI scores of RA patients correlated with factors such as DAS28, VAS, HAQ, and age. This correlation highlights the complex relationship between RA patients' quality of life, pain, disease activity, and sleep quality. When RA patients were grouped based on their PSQI scores into those with good and poor sleep quality, the group with poor sleep quality had higher DAS28 and VAS scores, as well as a higher average age. When looking specifically at the factors affecting PSQI scores, the recording of DAS28 and age as independent risk factors highlights the effects of these factors on sleep quality.

A review of the literature shows that the first studies on this subject date back to 2009. Kiper and Sunal[10] conducted a comprehensive study involving 150 RA patients and 150 healthy control subjects. In this study, it was determined that PSQI scores were associated with social and demographic factors such as female sex, marital status, education level, monthly income, exercise status, and smoking. However, they did not find any relationship with certain parameters such as age, disease duration, and medications used for treatment[10]. Similarly, in our study, no relationship was found between disease duration and medications used for treatment and PSQI scores. In contrast, while this study found a relationship with female sex and smoking, our study found a relationship with age and disease activity, which was not evaluated in this study. In Kiper and Sunal'study[10], the mean age of the RA group was determined as 49.5±12.44, while in our study, this mean was found to be 55.6±11.12. Considering that sleep quality may deteriorate in older individuals, the lack of association with age can be explained by the younger age of the patients included in the study. This supports the idea that age-related factors in RA patients need to be further investigated in terms of their effect on sleep quality[19]. In conclusion, while Kiper and Sunal' study[10] emphasized the relationship between demographic factors and PSQI scores, our study draws attention to the importance of different parameters such as disease activity. These differences may stem from demographic and clinical differences (seropositivity, extra-articular involvement, smoking, etc.) in the populations used in the studies. Therefore, future research conducting in-depth analyses on larger and more diverse patient groups could contribute to personalized treatment strategies aimed at improving the quality of life of RA patients.

In their study involving 55 RA patients and 20 healthy controls, Yiğit et al.[9] reported that PSQI scores were higher in RA patients than in the healthy control group, and that PSQI was correlated with DAS28. They also reported that sleep quality was better in patients using anti-TNF alpha inhibitors than in those not using them, although this difference was not statistically significant. HAQ scores were not evaluated in this study. Similarly, İnanır et al.[11] also found higher PSQI scores in the RA group in a study involving 20 RA patients and 20 healthy controls. In our study, similar results were obtained in terms of higher PSQI scores in RA patients compared to healthy individuals and correlation with DAS28. In contrast, Yiğit et al.[9] found that sleep quality was higher in patients using anti-TNF alpha inhibitors. When comparing the two studies, our study had a higher female sex ratio (87.8% vs. 72%), longer disease duration (11.5 years vs. 6.3 years), and higher anti-TNF inhibitor use (24% vs. 12%). These differences highlight the complexity of factors affecting sleep quality in RA patients and the importance of personalized treatment strategies. Future research may contribute to a better understanding and management of sleep disorders associated with RA, which could provide important steps toward improving patient quality of life. It is also important to highlight the association between an increase in DAS28 scores and worsening sleep quality, as revealed by this study. Pain, inflammation, and sleep are interconnected mechanisms that influence one another. High levels of pain and inflammation in RA patients can directly affect sleep quality. Pain, in turn, can negatively affect both the physical and psychological aspects of sleep, making it difficult for patients to achieve deep sleep. Insufficient sleep shortens sleep duration while also reducing sleep depth and restorative quality, creating a vicious cycle; because without adequate sleep, pain and inflammation

may increase[20]. On the other hand, the relationship between sleep disorders and inflammation has also been an important area of research. Sleep deprivation can lead to increased levels of pro-inflammatory cytokines [e.g., (TNF-alpha, IL-6)]. These cytokines can promote inflammation and increase disease activity. Many studies have shown that poor sleep quality has negative effects on inflammation markers and can increase the severity of inflammation and pain[21,22]. While the relationship between sleep and pain is a vicious cycle, a trend in the literature suggests that the temporal effect of sleep on pain may be stronger than the effect of pain on sleep. Therefore, sleep disorder is considered the starting point. From this perspective, in diseases accompanied by chronic pain, sleep disorders should be investigated and necessary measures should be taken, as they are expected to increase pain.

In terms of sleep duration, no differences were found between RA patients and healthy control groups in the studies by Kiper and Sunal[10], Yiğit et al.[9], and İnanır et al.[11]. Similarly, no differences were found in our study. This suggests that, despite adequate sleep duration in RA patients, other factors that negatively affect sleep quality, such as sleep fragmentation, difficulty falling asleep, or feeling unrested after waking, may be at play. Therefore, adequate sleep duration alone does not imply good sleep quality, and it is necessary to evaluate broader factors that affect sleep quality.

In the study conducted by Doğan et al.[22], 92 RA patients were divided into two groups based on low and high DAS28 scores. This study is important in terms of examining the relationship between DAS28 scores and PSQI scores, which assess sleep quality with higher VAS scores. The results show that VAS scores are also higher in the group with high DAS28 scores; in addition, higher values were found in this group for PSQI scores and sleep disorder subgroup assessment. However, it is noteworthy that the total PSQI scores were similar between the two groups, suggesting that many factors other than DAS28 may play a role in the assessment of sleep quality. When the demographic characteristics of the patients were examined, the female sex ratio was reported as 73.9% in the study. In addition, the rate of patients with a disease duration of more than 5 years was found to be 79.3%[22]. These results are important in understanding the effects of sex and disease duration on sleep quality. Although the study differs from ours in terms of methodology, it is interesting that the rate was lower than in our study, whereas female sex was expected to increase PSQI scores. Additionally, the high median disease duration of 11.2 years (range: 0-30) in our study is considered a potential factor contributing to the differences in results.

In a recent study by Yaseen et al.[23], 385 RA patients were examined for sleep disorders, and it was reported that only 9% of all patients had no sleep disorders, 38.9% had insomnia, and other sleep disorders such as sleep apnea and hypersomnia were present in lower proportions. When the PSQI scores in the study were examined, poor sleep quality was found in 75% of patients, and all sleep disorders were shown to be associated with DAS28[23]. Compared to our study, our demographic data were similar, but PSQI scores were higher than in our study. We believe that the fact that only 20% of the patients included in the study by Yaseen et al.[23] were in remission, the exclusion of fibromyalgia patients in our study, and the lower DAS28 scores may account for the difference in PSQI results.

The association between increased disease activity in RA patients, i.e., high DAS28 scores, and poor sleep quality, as well as the identification of poor sleep quality as an independent risk factor, are the most important findings of our study. There are studies in the literature that support this result[24,25]. When we look at the mechanism, we see that pro-inflammatory cytokines such as TNF-alpha and IL-6, which contribute to sleep regulation, are elevated in patients with RA. These cytokines increase pain sensitivity and contribute to nighttime joint pain, making it difficult for patients to fall asleep or stay asleep. This interaction between pain and inflammation probably explains the higher prevalence of insomnia in patients with high disease activity[18]. This situation emphasizes the importance of evaluating RA patients for sleep disorders and of a multidisciplinary approach.

The results of this study show that there is a strong relationship between sleep quality and disease activity in RA patients. The association between high DAS28 scores and poor sleep quality in RA patients can be explained by inflammation and pain mechanisms. Increased levels of pro-inflammatory cytokines such as TNF-alpha and IL-6 increase pain sensitivity, leading to fragmented sleep throughout the night and difficulty transitioning to deep sleep. Therefore, effective inflammation control and pain management strategies are necessary to improve sleep quality in RA patients. It is crucial to consider not only physical symptoms but also psychological and social factors in RA patients. Additionally, other studies in the literature indicate that poor sleep quality in RA patients has significant negative effects on quality of life and may be associated with other comorbidities. For example, insufficient sleep can increase the risk of psychiatric disorders such as depression and anxiety, which can further worsen patients' overall health[26]. In the treatment of RA, considering patients' psychosocial status as well as their physical health will increase the success of the treatment process and provide patients with more comprehensive care.

Study Limitations

This cross-sectional study has some limitations. First, the number of participants is limited. The assessments are based on the participants' own reports, which carries a risk of subjective bias; participants' ways of assessing factors such as pain and sleep quality may vary depending on their individual perceptions.

The wide confidence interval identified in the analysis evaluating the psychiatric medications used by the patients included in the study suggests that these medications are not reliable predictors of sleep quality. In addition, the number of patients using psychiatric medications (5 patients) is quite small, which makes it difficult to interpret the potential effects of psychiatric medications on sleep quality. In future studies, more comprehensive analyses of the effects of such drugs should be conducted with larger and more representative samples. An important limitation of this study is that potential confounding variables (e.g., medication use, comorbidities, and socioeconomic factors) that may affect sleep quality and disease activity were not sufficiently included in the analysis. In future studies, taking these variables into account will enable more comprehensive and reliable results to be obtained. Finally, the lack of evaluation of other biopsychosocial factors in addition to disease activity and treatment process variables limits the achievement of a broader perspective on the relationship between sleep quality and RA patients. It is important to take these limitations into account in the design of future studies and in the interpretation of results. The strengths of our study are that it is a rare recent study on this topic, that it includes scores such as VAS and HAQ to address sleep disorders from different perspectives, and that it aims to achieve more objective results by including a healthy control group.

CONCLUSION

Our study reveals that sleep quality is an important factor that negatively affects RA and that RA patients have significantly poorer sleep quality than healthy individuals. The identification of DAS28 and age as independent risk factors for the PSQI score strengthens the complex relationship between pain, disease activity, and sleep quality.

Therefore, we emphasize the necessity of considering sleep health in the treatment process of patients. This study contributes to identifying the negative effects of sleep quality on RA patients and suggests the need to develop strategies to improve sleep health. Future studies could enhance our understanding in this area by conducting more detailed investigations into the factors influencing sleep quality in larger sample groups and individuals with different demographic characteristics.

Ethics

Ethics Committee Approval: The study was approved by the Ethics Committee of Çukurova University (decision no: 6/9/2024-147, date: 06.09.2024).

Informed Consent: All patients included in the study signed an informed consent form.

Footnotes

Authorship Contributions

Concept: E.A.K., İ.T., Design: E.A.K., İ.T., Data Collection or Processing: E.A.K., Analysis or Interpretation: E.A.K., İ.T., Literature Search: E.A.K., Writing: E.A.K.

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

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Briggs AM, Fary RE, Slater H, Ranelli S, Chan M. Physiotherapy co-management of rheumatoid arthritis: identification of red flags, significance to clinical practice and management pathways. Man Ther. 2013;18:583-7.
2. Martinec R, Pinjatela R, Balen D. Guality of life in patients with rheumatoid arthrıtıs - a preliminary study. Acta Clin Croat. 2019;58:157-66.
3. Taylor-Gjevre RM, Gjevre JA, Nair B, Skomro R, Lim HJ. Components of sleep quality and sleep fragmentation in rheumatoid arthritis and osteoarthritis. Musculoskeletal Care. 2011;9:152-9.
4. Irwin MR, Olmstead R, Carrillo C, Sadeghi N, Fitzgerald JD, Ranganath VK, et al. Sleep loss exacerbates fatigue, depression, and pain in rheumatoid arthritis. Sleep. 2012;35:537-43.
5. Finan PH, Goodin BR, Smith MT. The association of sleep and pain: an update and a path forward. J Pain. 2013;14:1539-52.
6. Wong ITY, Chandran V, Li S, Gladman DD. Sleep disturbance in psoriatic disease: prevalence and associated factors. J Rheumatol. 2017;44:1369-74.
7. Westhovens R, Van der Elst K, Matthys A, Tran M, Gilloteau I. Sleep problems in patients with rheumatoid arthritis. J Rheumatol. 2014;41:31-40.
8. Wolfe F, Michaud K, Li T. Sleep disturbance in patients with rheumatoid arthritis: evaluation by medical outcomes study and visual analog sleep scales. J Rheumatol. 2006;33:1942-51.
9. Yiğit Gökçe İ, Ünlü M, Solak Ö, Dündar Ü, Demirdal Ü S, Fidan F. Romatoid artrit hastalarının pittsburgh uyku kalite indeksi ile değerlendirilmesi. Turk J Phys Med Rehab. 2009;55.
10. Kiper S, Sunal N. Artritli hastalarda uyku kalitesinin değerlendirilmesi. KTD. 2009;10:33-9.
11. İnanır A, Okan S, İnanır S, Erkorkmaz Ü. Romatoid artritli hastalarda uyku kalitesinin değerlendirilmesi (The evaluation of the quality of sleep in patients with rheumatoid arthritis). Gaziosmanpaşa Tıp Dergisi. 2010;2:43-50.
12. Kay J, Upchurch KS. ACR/EULAR 2010 rheumatoid arthritis classification criteria. Rheumatology (Oxford). 2012;51 (Suppl 6):vi5-vi9.
13. Smolen JS, Breedveld FC, Schiff MH, Kalden JR, Emery P, Eberl G, et al. A simplified disease activity index for rheumatoid arthritis for use in clinical practice. Rheumatol. 2003;42:244-57.
14. Morrey BF. The elbow and its disorders. St Louis: Elsevier Health Sciences. 2009;6:626-56.

15. Fedorczyk JM. Elbow tendinopathies: clinical presentation and therapist's management of tennis elbow. In: Rehabilitation of the Hand and Upper Extremity. 2011;6:1098-1108.

16. Bruce B, Fries JF. The health assessment questionnaire (HAQ). Clin Exp Rheumatol. 2005;23:S14.

17. Küçükdeveci AA, Sahin H, Ataman S, Griffiths B, Tennant A. Issues in cross-cultural validity: example from the adaptation, reliability, and validity testing of a Turkish version of the Stanford Health Assessment Questionnaire. Arthritis Rheum. 2004;51:14-9.

18. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality ındex: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28:193-213.

19. Miyata S, Noda A, Iwamoto K, Kawano N, Okuda M, Ozaki N. Poor sleep quality impairs cognitive performance in older adults. Journal of Sleep Research. 2013;22:535-41

20. Tański W, Świątoniowska-Lonc N, Tomasiewicz A, Dudek K, Jankowska-Polańska B. The impact of sleep disorders on the daily activity and quality of life in rheumatoid arthritis patients - a systematic review and meta-analysis. Eur Rev Med Pharmacol Sci. 2022;26:3212-29.

21. Gouda W, Mokhtar M, Elazab SA, Alreefi R, Alomar T, Kushk F, et al. Sleep disorders in patients with rheumatoid arthritis: association with quality of life, fatigue, depression levels, functional disability, disease duration, and activity: a multicentre cross-sectional study. J Int Med Res. 2023;51:3000605231204477.

22. Doğan İ, Gök K, Apaydın H, Armağan B. Evaluation of quality of life scales according to disease activity in rheumatoid arthritis. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2022;13:374-8.

23. Yaseen A, Yasin S, Ul Haq Z, Ahmad I, Hussain M, Pervez N. Frequency of sleep disorders in rheumatoid arthritis patients. Cureus. 2024;16:e72417.

24. Sariyildiz MA, Batmaz I, Bozkurt M, Bez Y, Cetincakmak MG, Yazmalar L, et al. Sleep quality in rheumatoid arthritis: Relationship between the disease severity, depression, functional status and the quality of life. J Clin Med Res. 2014;6:44-52.

25. Austad C, Kvien TK, Olsen IC, Uhlig T. Sleep disturbance in patients with rheumatoid arthritis is related to fatigue, disease activity, and other patient-reported outcomes. Scand J Rheumatol. 2017;46:95-103.

26. Druce KL, Cordingley L, Short V, Moore S, Hellman B, James B, et al. Quality of life, sleep and rheumatoid arthritis (QUASAR): a protocol for a prospective UK mHealth study to investigate the relationship between sleep and quality of life in adults with rheumatoid arthritis. BMJ Open. 2018;8:e018752.