




ORIGINAL ARTICLE

The Relationship between The Thoughts of Hemodialysis Patients on Sleep Quality, and Depression and Anxiety Levels

Hemodiyaliz Uygulanan Hastaların Uyku Kalitesine İlişkin Görüşlerinin Depresyon ve Anksiyete Düzeyleri ile İlişkisi

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ABSTRACT

Background/aims: This study aimed to determine the level of sleep quality among patients undergoing hemodialysis, assess their awareness of, and examine the relationship between sleep quality and levels of depression and anxiety symptoms, as well as the demographic characteristics and clinical features of the disease.

Methods: In this descriptive study, the Pittsburgh Sleep Quality Index (PSQI), Beck Anxiety Inventory (BAI), and Beck Depression Inventory (BDI) were administered to 123 hemodialysis patients. Factors associated with sleep quality were analyzed using univariate analysis, considering age, sex, education level, disease duration, hemodialysis duration, and possible depression and anxiety as related variables. A correlation analysis was conducted to examine the relationship between sleep quality and anxiety and depression scores.

Results: The percentage of poor sleep quality among the patients was 47.2%, with 12.2% showing signs of possible depression and 30.1% indicating possible anxiety disorder. Notably, among those with poor sleep quality, only 40.0% perceived their sleep quality as poor. Patients with poor sleep quality had significantly higher levels of depression ($U = 850.500, p < .001$) and anxiety symptoms ($U = 820.500, p < .001$).

Conclusion: A significant proportion of hemodialysis patients experience poor sleep quality, yet nearly half of them are unaware of it. There is a strong relationship between diminished sleep quality and elevated mental health symptoms in this population. Routine sleep quality evaluation and collaboration with psychiatric professionals appear essential for this patient group.

Keywords: Anxiety, depression, hemodialysis, sleep quality

Öz

Amaç: Bu çalışmanın amacı hemodiyaliz uygulanan hastalarda uyku kalitesi düzeylerini, hastaların buna ilişkin farkındalıklarını belirlemek, uyku kalitesinin depresyon belirti düzeyi, anksiyete belirti düzeyi, demografik özellikler ve hastalığın klinik özellikleri ile ilişkisini incelemektir.

Yöntem: Bu tanımlayıcı çalışmada, 123 hemodiyaliz hastasında Pittsburgh Uyku Kalitesi İndeksi (PSQI), Beck Anksiyete Envanteri (BAI) ve Beck Depresyon Envanteri (BDI) uygulanmıştır. Uyku kalitesi ile ilişkili faktörler; yaş, cinsiyet, eğitim düzeyi, hastalık süresi, hemodiyaliz süresi ve olası depresyon ve anksiyete değişkenleri göz önünde bulundurularak tek değişkenli analiz ile incelenmiştir. Uyku kalitesi ile anksiyete ve depresyon skorları arasındaki ilişkiyi değerlendirmek için korelasyon analizi yapılmıştır.

Bulgular: Kötü uyku kalitesi düzeyi %47,2, olası depresyon %12,2, olası anksiyete bozukluğu %30,1 olarak saptanmıştır. Uyku kalitesi kötü olarak belirlenen hastaların sadece %40,0'ı uyku kalitesinin kötü olduğu görüşündedir. Bu grupta depresyon ($U=850,500, p<.001$) ve anksiyete belirti şiddeti ($U=820,500, p<.001$) daha yüksektir.

Sonuç: Hastaların önemli bölümünün uyku kalitesinin kötü olduğu, ancak bu hastaların yaklaşık yarısının uyku kalitesinin kötü olduğunun farkında olmadığı görülmüştür. Hemodiyalize giren hastalarda uyku kalitesinin azalması ile eşlik eden ruhsal belirtiler arasında kuvvetli bir ilişki mevcuttur. Bu gruptaki hastaların uyku kalitesi açısından rutin olarak değerlendirilmesi ve psikiyatri hekimleri ile işbirliği içinde çalışılması önemlidir.

Anahtar Kelimeler: Anksiyete, depresyon, hemodiyaliz, uyku kalitesi

Introduction

Patients with end-stage renal disease (ESRD) commonly experience sleep disorders (1). In the general population, the prevalence of insomnia is reported to be between 3-29%; however, in patients with ESRD undergoing hemodialysis, this prevalence increases significantly to 50-75%. Similarly, sleep apnea, which affects 3-7% of the general population, is seen in 25-45% of hemodialysis patients. The prevalence of restless legs syndrome, typically around 3% in the general population, rises to 20-30% among those undergoing hemodialysis (2-6). Additionally, sleep

quality in hemodialysis patients has been found to decline compared to the pre-hemodialysis stage (7). These patients also experience higher rates of daytime sleepiness than the general population (8).

It has been reported that healthcare personnel working with hemodialysis patients often fail to recognize the symptoms and severity of sleep disorders in this population (9). However, unrecognized and untreated sleep problems in hemodialysis patients are associated with increased mortality and morbidity, accelerated

aging, and a heightened risk of cardiovascular disease (10-13). Additionally, these sleep disturbances are linked to higher levels of fatigue and depression (14-15). Identifying sleep problems and their contributing factors in hemodialysis patients is crucial, as addressing these issues can significantly reduce mortality and morbidity.

Sleep problems are known to be common symptoms of depression and anxiety. Hemodialysis patients experience higher rates of anxiety disorders and stress compared to the general population (15-16). However, there are limited studies that comprehensively examine the interplay between these psychological factors—such as anxiety and depression—and the clinical characteristics related to hemodialysis, which may contribute to the etiology of insomnia in this patient group.

This study aimed to determine the level of poor sleep quality among hemodialysis patients and assess their awareness of sleep issues. Additionally, it sought to explore the relationship between sleep quality and levels of depression and anxiety symptoms, as well as demographic and clinical characteristics.

Method

The population of this descriptive study comprised 190 individuals diagnosed with ESRD who were receiving hemodialysis at two dialysis centers affiliated with Selcuk University Faculty of Medicine. It was aimed to reach all patients ($n=190$) treated at the aforementioned centers. However, 28 individuals (14.7%) were excluded due to dementia, other severe psychiatric conditions, mental disabilities, or significant visual and hearing impairments. Additionally, 39 patients (20.6%) declined to participate in the study. As a result, the final sample consisted of 123 participants (64.7%).

Among the participants, seven (6.3%) were illiterate. These patients only completed the questionnaire administered through face-to-face interviews and answered the questions asked by the researchers to assess subjective sleep quality. They did not complete the self-report scales (PSQI, BAI, and BDI).

Additionally, three participants (2.4%) were excluded from the comparative analyses based on the PSQI due to missing data; one of these individuals also had incomplete responses on the BAI and BDI. As a result, the comparative analyses were conducted with data from 113 participants (59.5%). There were no significant differences in age or sex distribution between the 123

included participants and the 67 excluded individuals ($p = 0.78$ and $p = 0.86$, respectively).

Ethical approval for the study (approval numbers KA18/31 and 18/46) was obtained from the Non-Interventional Clinical Research Ethics Committee of Selcuk University Faculty of Medicine.

Measurements

The sociodemographic data were collected using a questionnaire prepared by the researchers. This form gathered information on age, sex, marital status, employment status, physical and mental illnesses, family history of illness, smoking, and alcoholic beverage use, duration since the diagnosis of chronic kidney disease, etiology of the disease, frequency of hemodialysis sessions, and duration of hemodialysis treatment. To assess participants' subjective perception of sleep quality, the question, "In the last month, how would you rate your sleep quality considering issues like difficulty falling asleep, waking up frequently and having trouble falling back asleep, waking up early, and feeling unrested?" was posed, with response options ranging from "very poor" to "very good."

A numerical rating scale from "0" to "10" was used to assess complaints of pain and itching over the last month. For bodily pain, the scale ranged from "0" (no pain) to "10" (unbearable pain), and for itching, it ranged from "0" (no itching) to "10" (very severe itching). The questionnaire was pre-tested with 20 patients with ESRD who were not in the study group and who applied to the outpatient clinic and revised according to the feedback. This questionnaire was administered to all patients through face-to-face interviews.

Sleep quality

The Pittsburgh Sleep Quality Index (PSQI), which was developed by Buysse et al. (1989), consists of 24 questions in total, 19 of which are self-reported and 5 answered by a spouse or roommate (17). It includes 7 components: Subjective Sleep Quality, Sleep Latency, Sleep Disorders, Sleep Duration, Habitual Sleep Efficiency, Sleep Medication Use, and Daytime Dysfunction. Each component is evaluated on a 0-3 scale and the sum of the seven components results in a total score ranging from 0 to 21. A total score greater than 5 indicates "poor sleep quality" (18). The Turkish validity and reliability study of the scale was conducted by Ağargün et al. In the current study, only the score derived from the first 19 items, which were

answered by the participants themselves, was used (19).

Anxiety Level

Anxiety levels were measured using the Beck Anxiety Inventory (BAI). This self-report scale was developed by Beck in 1988 to assess the severity of anxiety (20). It consists of 21 questions, each scored on a scale of 0-3 points. The interpretation of the scores is as follows: 0-7 points indicate minimal anxiety symptoms, 8-15 points indicate mild anxiety symptoms, 16-25 points indicate moderate anxiety symptoms, and 26-63 points indicate severe anxiety symptoms. The Turkish validity and reliability study of the scale was conducted by Ulusoy et al (21).

Depression Level

The Beck Depression Inventory (BDI) is a self-report scale developed to assess depression symptoms (22). It consists of 21 questions, with each item scored between 0 and 3 points. The total score is the sum of the scores from all the items. A total score above 17 points is considered the cut-off for depression. The Turkish validity and reliability study of this scale was conducted by Hisli et al. (23).

Data analysis

Data analysis was performed using IBM SPSS Statistics for Windows v.26 (IBM Corp., Armonk, NY). Since the continuous variables (age, ESRD duration, hemodialysis duration, BDI, BAI, and PSQI scores) did not follow a normal distribution, pairwise comparisons were conducted using the Mann-Whitney U test. Pearson Chi-Square and Fisher's Exact tests were used to compare categorical variables. Spearman's rank correlation was used to assess the relationships between age, sleep quality, anxiety, and depression scores. A p-value of <0.05 was considered statistically significant.

Results

Of the 123 participants, 59.3% (n = 73) were male, with a mean age of 59.4 ± 14.1 years. More than half had a high school education or higher (n = 68, 55.3%). Most participants were married (n = 92, 74.8%), had children (n = 101, 82.1%), and lived in nuclear families (n = 96, 78.0%). Only a small proportion were employed (n = 19, 15.4%), with the rest being retired or unemployed.

The mean duration of living with chronic kidney disease was 10.5 ± 8.9 years, with 56.1% (n = 69) diagnosed more than six years ago. More than half (n = 67, 54.5%)

had been on hemodialysis for over three years, with an average hemodialysis duration of 6.3 ± 6.9 years. Additionally, 17% (n = 21) had previous renal transplant rejection history.

A diagnosed psychiatric illness was reported by 14.6% (n = 18) of participants. Specifically, four individuals were diagnosed with depression, one with an anxiety disorder, and one with a sleep disorder. Currently, 8.9% (n = 11) were taking psychiatric medications. The most common comorbid physical conditions were hypertension (32.0%), diabetes mellitus (31.0%), and coronary artery disease (4.8%).

In the past month, 41.5% (n=51) of the participants reported experiencing bodily pain, and 37.4% (n=46) reported experiencing itching in the last month.

Possible depression, anxiety disorders, and poor sleep quality in participants

The percentage of participants with possible depression (BDI score ≥ 17), possible anxiety disorder (BAI score ≥ 8), and the distribution of sleep quality, along with subjective opinions about sleep quality based on the cut-off scores of the scales are shown in Table 1.

Table 1. Distribution of Hemodialysis Patients by Possible Depression, Possible Anxiety, and Sleep Quality (Ankara, 2018)

n	%	
Possible Depression (n=115*)		
No (BDI<17)	100	87.0
Yes (BDI≥17)	15	13.0
Possible Anxiety Disorder (n=115*)		
No (BAI<8)	78	67.8
Yes (BAI≥8)	37	32.2
Sleep Quality (n=113**)		
Poor (PSQI>5)	58	51,3
Good (PSQI≤5)	55	48,7
Subjective sleep quality (n=123)		
Very poor	5	4.1
Poor	24	19.5
Fair	43	35.0
Good	26	21.1
Very good	25	20.3

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory, PSQI: Pittsburgh Sleep Quality Index

*Seven patients were excluded from the analyses due to illiteracy, and one patient was excluded for not completing the scales.

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Table 2. Sleep Quality of Hemodialysis Patients by Sociodemographic and Clinical Characteristics (Ankara, 2018)

	Good Sleeper (PSQI<5)		Poor Sleeper (PSQI>5)		Total	p
Characteristics	n	%	n	%*	n	
Age (median [IQR] (years)	64[17]		58.5[21.5]		63[18]	0.22 ^a
Sex						
Female	16	40.0	24	60.0	40	0.17 ^b
Male	39	53.4	34	46.6	73	
Education Level						
Literate/Primary school	12	40.0	18	60.0	30	0.54 ^b
Middle school	8	53.3	7	46.7	15	
High school	10	43.5	13	56.5	23	
University/Master's degree	25	55.6	20	44.4	45	
Employment Status						
Unemployed	13	48.1	14	51.9	27	0.98 ^b
Employed:	9	47.4	10	52.6	19	
Retired	33	49.3	34	50.7	67	
Marital Status						
Single	7	46.7	8	53.3	15	0.77 ^b
Married	41	47.7	45	52.3	86	
Divorced/widowed	7	58.3	5	41.7	12	
ESRD duration (median [IQR], years)	7[16]		8[9.5]		8[10]	0.54 ^a
Hemodialysis duration (median [IQR], years)	4[5]		4[6.3]		4[6]	0.73 ^a
Wait-listed for transplantation						
Yes	31	49.2	32	50.8	63	0.89 ^b
No	24	48.0	26	52.0	50	
History of transplant rejection						
Yes	10	50.0	10	50.0	20	0.89 ^b
No	45	48.4	48	51.6	93	
Psychiatric history						
No	5	31.3	11	68.8	16	0.13 ^b
Yes	50	51.5	47	48.5	97	
Physical Comorbidity						
No	16	48.5	17	51.5	33	0.98 ^b
Yes	39	48.8	41	51.3	80	
Pain in the last month						
No	37	53.6	32	46.4	69	0.19 ^b
Yes	18	40.9	26	59.1	44	
Pruritus in the last month						
No	39	54.2	33	45.8	72	0.12 ^b
Yes	16	39.0	25	61.0	41	
Smoking status						
Smoker	10	41.7	14	58.3	24	0.56 ^b
Non- smoker	20	46.5	23	53.5	43	
Ex-smoker	25	54.3	21	45.7	46	
Alcoholic beverage consumption						
Occasional drinker	6	46.2	7	53.8	13	0.92 ^b
Never	32	47.8	35	52.2	67	
Former drinker	17	51.5	16	48.5	33	
BDI scores (median [IQR]	4[8]		11[10]		7 11	

Possible depression (BDI \geq 17)						
No	52	53.1	46	46.9	98	0.02 ^c
Yes	3	20.0	12	80.0	15	
BAI scores (median [IQR])	2[7]		9[8]		5[6]	<0.001 ^a
Possible anxiety disorder (BAI \geq 8)						
No	44	56.4	34	43.6	78	0.01 ^b
Yes	11	31.4	24	68.6	35	
Total	55	48.7	58	51.3	113	

IQR: Interquartile range BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory PSQI: Pittsburgh Sleep Quality Index, ESRD: End-stage renal disease * Row percentages Mann-Whitney U test, b: Chi-square test, c: Fisher's exact test

Univariate analysis: Comparison of groups with good and poor sleep quality

Participants were divided into two groups: those with poor sleep quality (PSQI > 5) and those with good sleep quality (PSQI \leq 5). No significant differences were found between the two groups in terms of age, sex, education, marital status, duration of ESRD, duration of hemodialysis, pain and pruritus complaints in the last month, and history of psychiatric disease. However, both depression scores (U = 850.500, $p < .001$) and anxiety scores (U = 820.500, $p < .001$) were significantly higher in the group with poor sleep quality. The comparison of hemodialysis patients with good and poor sleep quality by sociodemographic and clinical characteristics is shown in Table 2.

Patients' subjective views on sleep quality-related factors

As shown in Table 3, the group with poor sleep quality consistently reported more negative subjective assessments of their sleep. However, only 40.0% of the patients with poor sleep quality described their sleep quality as poor (very poor and poor).

Table 3. Sleep Quality of Hemodialysis Patients Measured with the PSQI by Subjective Sleep Quality Assessments

Subjective Sleep Quality	Good Sleeper (PSQI \leq 5)		Poor Sleeper (PSQI $>$ 5)	
	n	%	n	%
Very poor	-	-	4	6.9
Poor	1	1.8	19	32.8
Fair	14	25.5	25	43.1
Good	19	34.5	6	10.3
Very good	21	38.2	4	6.9
Total	55	100.0	58	100.0

PSQI Pittsburgh Sleep Quality Index

There was no significant difference in the proportion of "possible" depression between the groups reporting good and poor sleep quality ($\chi^2 = 1.363$, $p = .243$). On the other hand, the percentage of patients with

"possible" anxiety disorders was higher in the group with perceived poor sleep quality ($\chi^2 = 5.754$, $p = .016$).

Correlation between age, depression, anxiety, and sleep quality scores

There was a moderate, positive, and statistically significant correlation between anxiety and depression scores and sleep quality scores, with no correlation to age, as presented in Table 4.

Table 4. Correlation Between Age, Depression, Anxiety, and Sleep Quality Scores (Ankara, 2018)

Variables	1	2	3	4
1. Age	1			
2. BDI	$r_s = -0.135$ $p = 0.147$	1		
3. BAI	$r_s = -0.179$ $p = 0.054$	$r_s = 0.660$ $p < 0.001$	1	
4. PSQI	$r_s = -0.094$ $p = 0.320$	$r_s = 0.451$ $p < 0.001$	$r_s = 0.433$ $p < 0.001$	1

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory PSQI: Pittsburgh Sleep Quality Index r_s : Spearman's correlation coefficient

Discussion

The most important finding of the study was that poor sleep quality was observed in nearly half of the patients (47.0%), a result consistent with previous studies in this field (7,16). However, only 39.5% of those identified as having poor sleep quality through the PSQI rated their sleep as poor or very poor. This discrepancy suggests that a large proportion of patients may not be fully aware of their impaired sleep quality.

We found that depression and anxiety levels were higher in females, aligning with previous research findings. While poor sleep quality was more common among women compared to males, this difference was not statistically significant. Previous studies have reported conflicting findings regarding the association between sleep quality and sex in patients undergoing hemodialysis. While some studies have found that poor sleep quality is more common in females

(15,17), others have reported no significant difference (7,8,12,16). Similar to previous studies on patients undergoing hemodialysis (7,16), our sample had a higher proportion of male participants. The lack of a significant difference in sleep quality between sexes in our study may be due to the relatively low number of female participants.

Our findings regarding the relationship between the duration of hemodialysis and sleep quality contrast with previous studies, which have reported that insomnia tends to increase with longer durations of hemodialysis (3,8,16). Pain and uremia-associated pruritus are other common factors in hemodialysis patients that are frequently implicated in insomnia (25-27). However, in our study, there was no significant relationship between pain and pruritus experienced in the last month and sleep quality. These contradictory findings may be attributed to differences in the sample characteristics and the methods used to assess pruritus and pain. In our study, 80.0% of patients with depression and 68.7% of patients with anxiety were found to have poor sleep quality. This finding is consistent with previous studies indicating that depression and anxiety are related to poor sleep quality (7,16,17). Therefore, screening for depressive symptoms is crucial for improving sleep quality and managing associated morbidity and mortality.

The literature presents conflicting findings regarding the relationship between anxiety levels and sleep quality (15). Our study indicates a significant relationship between anxiety levels and sleep quality, with a stronger association observed between possible anxiety disorders and subjective reports of poor sleep quality. In contrast, possible depression was not linked to patients' subjective opinions about poor sleep quality. These findings suggest that sleep issues related to anxiety symptoms may be more readily reported, while impairments in sleep quality due to depressive symptoms may go underreported. Given the high proportion of depression in the hemodialysis population and its impact on sleep quality, these results underscore the need for routine screening of depression symptoms. Furthermore, healthcare providers should not rely solely on patients' self-assessments to detect sleep problems.

This study has several limitations. First, the results cannot be generalized to the entire hemodialysis patients, as only patients from two dialysis centers affiliated with a specific institution were included. Additionally, being a descriptive study, it identifies factors related

to sleep quality but does not provide insight into the direction of these relationships. Third, the sample size may be limited to detect some significant differences. In addition, the entire target sample could not be reached. The use of self-reported inventories for assessing sleep quality, anxiety, and depression is another limitation, as it may lead to recall bias. We also did not assess other psychiatric disorders that may be associated with poor sleep quality. Another limitation is the assessment of sleep quality using self-report scales rather than objective measurement methods. Analytical studies with larger, more representative samples are necessary to establish causal relationships.

Conclusion

We found that a significant majority of patients with elevated depression and anxiety levels also exhibited poor sleep quality highlighting a heightened risk for comorbid mental health disorders in this population. Although objective methods (such as polysomnography and actigraphy) are considered the best approach for evaluating sleep problems in hemodialysis patients, the results of this study highlight the value of using self-report scales as well. This approach can help ensure that sleep issues in patients who do not actively report complaints are not overlooked by clinicians. Given that depression is commonly associated with impaired sleep, poor sleep quality in hemodialysis patients may serve as a potential indicator of underlying depression, suggesting that such screenings may contribute to the early detection of possible depression and anxiety disorders. In conclusion, this study underscores the importance of thorough assessment and inquiry, as insomnia in hemodialysis patients may go unnoticed without detailed evaluation.

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