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COVID-19 pandemic: depression and sleep quality in hemodialysis patients

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ABSTRACT

Introduction: Depression and sleep disturbance are prevalent comorbidities in hemodialysis patients. This study aimed to investigate the relationship between depressive mood, sleep disturbance, and the fear of COVID-19 Scale in hemodialysis patients during the pandemic process.

Material and Method: 116 hemodialysis patients followed up in our clinic and volunteered were included in the study. The socio-demographic characteristics of the patients and the laboratory test results studied in their routine follow-ups were obtained from the file records. Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI), and the Fear of COVID-19 Scale (FCV-19S) were applied through face-to-face interviews.

Results: 116 patients (70 males, 46 females) with a hemodialysis duration of 40 months (13-295) and age of 60.2±13.3 years were included in the study. The patients were divided into two groups according to their PSQI score as good sleeper (PSQI ≤ 5, n=66) and poor sleeper (PSQI >5, n=50). When evaluated by gender 28 (56%) female patients were in the poor sleeper group (p=0.002). Dialysis time was longer, BDI score and FCV-19 scale were higher in the poor sleeper group than the good sleeper group. PSQI score was positively correlated with dialysis time (r=0.259 p=0.005), BDI score (r=0.279 p=0.002), and FCV-19 scale (r=0.304 p=0.001). In the Multiple Logistic Regression analysis established to evaluate the risk factors affecting sleep quality, BDI was determined as an independent risk factor for poor sleep (OR: 1.084, 95%CI [1.021-1.152], p=0.008). Subjects were divided into two groups according to their BDI scores as those with depressive mood (BDI score ≥ 17, n=47) (40.5%) and those without (BDI score < 17, n=69) (59.5%). Thirty-two of the cases with depressive mood were women (68.1%) (p<0.001). There was a female predominance in the depressed patient group. The economic status was worse in the depressed group compared to the non-depressed group, and the PSQI score and FVC-19 scale were higher. In addition, BDI score was positively correlated with age (r=0.225 p =0.015), female gender (r=0.473 p=0.001), poor economic status (r=0.576 p =0.001), FVC-19 scale (r=0.330 p =0.001), while negatively correlated with serum albumin level (r=-0.279 p=0.003) and serum creatinine level (r=-0.2455 p =0.008). In the Multiple Logistic Regression model established, female gender (OR: 7.857, 95%CI [2.463-25.065], p<0.001) and poor economic status (OR: 7.569, 95%CI [2,300-24,908], p=0.001) were determined as independent risk factors for depressive mood.

Conclusion: Nearly half of the patients had sleep disorders and depressive mood. Patients in the depressive mood and poor sleep group had a higher FVC-19 scale. We think it would be beneficial not to ignore the increased frequency of depressive mood and sleep disorders in hemodialysis patients during the COVID-19 pandemic.

Keywords: Depressive mood, sleep disorder, fear of COVID-19 scale, hemodialysis

INTRODUCTION

The novel coronavirus disease (COVID-19) is an infectious disease that causes acute upper and lower respiratory tract disease by the SARS-CoV-2 virus and also affects many tissues such as the heart, digestive system, kidneys, blood, and nervous system (1). Social isolation, fears about the virus, boredom, and insufficient information can cause psychiatric disorders in sensitive individuals during the pandemic (2).

Initiation of hemodialysis treatment in chronic kidney patients causes physical and social changes in their lives, and neuropsychiatric complications develop in individuals over time. Depression is the most common psychological problem in hemodialysis patients and is associated with high mortality (3). Although the depression rate is as high as 60% in some studies, depression in patients may still be overlooked because it overlaps with uremic symptoms such as loss of appetite, sleep disturbance, and fatigue (4).

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Sleep disorders are observed quite frequently, between 20% and 70% in patients with chronic kidney disease (5,6,7). In a comprehensive study, the frequency of sleep disorders was defined as 49% (6). In this study; Comorbid diseases such as depression, pain, pruritus, coronary artery disease, congestive heart failure, peripheral artery disease and diabetes, and high body mass index have been associated with poor sleep (6).

Hemodialysis patients are in the high-risk group regarding COVID-19 infection and complications, as they have advanced age, immunosuppression, and many comorbidities such as cardiovascular disease, hypertension, diabetes, and lung disease (8). In addition, the physical proximity of patients during hemodialysis increases the risk of disease transmission (8). During the pandemic, hemodialysis patients generally face an increased risk of encountering covid-19 after and before entering the arena-type hemodialysis room. We think that this situation experienced by the patients is a risk factor for the development of fear of COVID-19. This study was planned to evaluate how depressive mood and sleep disorders were affected by the pandemic in this patient group.

MATERIAL AND METHOD

The study was conducted in compliance with the criteria of the Helsinki Declaration and it was performed between September 2021 and December 2021 after approval by the Health Sciences University Samsun Training and Research Hospital Ethics Committee (Date: 2021, Decision No: 16/10). Written informed consent was obtained from all participants who participated in this study.

The study included 116 patients (70 male, 46 female) undergoing hemodialysis for at least the last six months, over the age of 18, with no cognitive impairment, followed up in our clinic, aged 60.2±13.3 years and having a dialysis duration of 40 months (13-295). The socio-demographic characteristics of the patients and the laboratory test results studied in their routine follow-up were obtained from the clinical file records. Beck Depression Inventory (BDI), Pittsburg Sleep Quality Index (PSQI), and fear of covid-19 scale (FCV-19 scale) were applied through face-to-face interviews.

Beck Depression Inventory (BDI): It is a 21-item scale developed by Beck in 1961. Each question is scored between 0-3, and a total score is taken between 0-63. The results are interpreted as follows: 0-9- no/minimal depression, 10-16- mild depression, 17-29- moderate depression, and 30-63- severe depression (9). While the BDI Turkish version was being developed, crossover points were evaluated, and it was determined that scores of 17 and above determined 90% of the depression requiring treatment (10). The patients were divided into two groups according to their BDI scores. Patients with a BDI score of 17 and above were considered to have depression, and patients with a BDI score of 16 or less were considered to have no depression.

Pittsburg Sleep Quality Index (PSQI): It is a 19-item, retrospective self-report questionnaire developed by Daniel J. Buysse, designed to measure seven domains assessing sleep quality over the past seven days and sleep disturbances in the past month. Items are 1- sleep quality, 2- sleep latency, 3- sleep duration, 4- sleep efficiency, 5- sleep disturbances, 6- use of sleeping medication, and 7- daytime dysfunction. Component scores range from 0 to 21. > 5 points indicate sleep disturbance (11).

Fear of COVID-19 Scale (FCV-19 scale): It is a scale developed by Ahorsu et al. in 2020, aiming to measure the fear levels of individuals due to COVID-19. The scale is a five-point Likert type and has a single factor structure (1=Strongly agree; 5=Strongly disagree). It consists of seven items. There is no multiple-choice test-oriented item in it. An increase in the score obtained from the scale means an increase in fear of COVID-19. The reliability and validity study of the FCV-19 Scale in Turkey was conducted in 2020 by Ladikli et al. (12).

Statistical Analysis

SPSS 21.0.0.1 for Windows (SPSS; IBM) software was used for the analysis. Data distribution was determined using the Kolmogorov-Smirnov test. The homogeneity of the variables was determined using the one-way ANOVA test of homogeneity of variance. According to data distribution, continuous variables were reported as mean and standard deviation or as median and minimum-maximum. Categorical variables were reported as percentages. T-test or Man Whitney U test was used according to data distribution when comparing changes in laboratory parameters within the groups. The Chi-square test or Fisher's Exact test was used to compare categorical variables between the two groups. Logistic regression (Method: Backward: Conditional) test was used in risk factor analysis. A p-value of < 0.05 was considered statistically significant.

RESULTS

The study included one hundred sixteen patients (70 males, 46 females) with HD duration of 40 (13-295) months and age of 60.2±13.3 years. Socio-demographic characteristics and laboratory parameters of the patients participating in the study are given in **Table 1**.

Table 1. Socio-demographic characteristics and laboratory parameters of 116 patients participating in the study

Variable	Mean±sd (range)
Age±sd, year	60.2±13.3 (23/87)
Gender (F/M) (%)	46/70 (%39.7/%60.3)
Dialysis time, months (median)	40 (13/295)
Marital status (married/single, widowed)(%)	71 (%61.2)/45(%38.8)
Economic status (good/medium, bad)	46/70
Calcium±sd (mg/dL)	8.6±0.7
Phosphorus±sd (mg/dL)	5.3±1.2
Albumin±sd (g/dL)	3.6±0.4
Hemoglobin±sd (g/dL)	10.7±1.3
CRP (median) (mg/L)	7.7 (0.7- 348)
PSQI (median) (min/max)	5 (1-12)
BDI (median) (min/max)	14 (2-34)
FCV-19 scale±sd	16.9±5.6

The patients were divided into two groups according to their PSQI score as good sleeper (PSQI ≤ 5, n=66) and poor sleeper (PSQI >5, n=50).). When evaluated by gender 28 (56%) female patients were in the poor sleeper group (p=0.002) and 48 (72.7%) of the male patients were in the good sleeper group, only 22 (44%) were in the poor sleeper group (**Table 2**). Dialysis time was longer, BDI score and FCV-19 scale were higher in the poor sleeper group than the good sleeper group (**Table 2**). In addition, PSQI score was positively correlated with dialysis time (r=0.259 p=0.005), BDI score (r=0.279 p=0.002), and FCV-19 scale (r=0.304 p=0.001).

Table 2. Comparison of Demographic and Laboratory Data in the good sleeper and poor sleeper patients

	Good Slepers (PSQI ≤ 5, n=66) (56.9%)	Poor Sleepers (PSQI >5, n=50) (43.1%)	P
Age±sd, year	58.8±14.3	62.1±11.8	0.200
Gender (F/M) (%)	18/48	28/22	0.002
Dialysis time, months (median)	34 (13-295)	47.5 (13-224)	0.040
Marital status (married/ single, widowed)(%)	42/24	29/21	0.537
Economic status (good/ medium, bad)	30/36	16/34	0.142
Calcium±sd (mg/dL)	8.8±0.7	8.5±0.6	0.059
Phosphorus±sd (mg/dL)	5.2±1.1	5.3±1.4	0.612
Albumin±sd (g/dL)	3.6±0.4	3.5±0.4	0.431
Hemoglobin±sd (g/dL)	10.6±1.1	10.9±1.3	0.231
CRP (median) (mg/L)	7 (0.7-326)	9 (1.7-348)	0.354
kTv±sd	1.13±0.2	1.15±0.2	0.590
BDI (median)	10 (2-34)	20 (4-34)	0.000
FCV-19 scale±sd	15.6±5	18.6±5.9	0.004

In the Multiple Logistic Regression analysis established to evaluate the risk factors affecting sleep quality, BDI was determined as an independent risk factor for poor sleep (OR: 1.084, 95%CI [1.021-1.152], p=0.008).

Subjects were divided into two groups according to their BDI scores as those with depressive mood (BDI score ≥ 17, n=47) (40.5%) and those without (BDI score < 17, n=69) (59.5%). Thirty-two of the cases with depressive mood were women (68.1%), and 15 were male (31.9%) (p<0.001). **Table 3** gave the depressive and non-depressive groups' socio-demographic, clinical, and laboratory parameters data and comparisons. As a result of the comparison between the two groups, there was a female predominance in the depressed patient group (**Table 3**). The economic status was worse in the depressed group compared to the non-depressed group, and the PSQI score and FVC-19 scale were higher (**Table 3**). In addition, BDI score was positively correlated with age (r=0.225 p =0.015), female gender (r=0.473 p=0.001), poor economic status (r=0.576 p =0.001), FVC-19 scale (r=0.330 p =0.001), while negatively correlated with serum albumin level (r=-0.279 p=0.003) and serum creatinine level (r=-0.2455 p =0.008).

Table 3. Comparison of socio-demographic characteristics and laboratory parameters of depressed and non-depressed patients participating in the study

	Depressive Mood Group (BDI score ≥ 17, n=47) (40.5%)	Non-Depressive Mood Group (BDI score < 17, n=69) (59.5%)	P
Age±sd, year	62.9±11.2	58.3±14.4	0.065
Gender (F/M) (%)	32/15	14/55	0.000
Dialysis time, months (median)	46 (13-295)	13 (34-224)	0.434
Marital status (married/ single, widowed)(%)	29/18	42/27	0.928
Economic status (good/medium, bad)	6/41	40/29	0.000
Calcium±sd (mg/dL)	8.5±0.6	8.7±0.7	0.052
Phosphorus±sd (mg/dL)	5.1±1.3	5.4±1.1	0.141
Albumin±sd (g/dL)	3.5±0.4	3.6±0.4	0.120
Hemoglobin±sd (g/dL)	10.9±1.2	10.7±1.2	0.445
CRP (median) (mg/L)	7.7 (0.7/348)	7.75 (0.9/326)	0.775
kTv±sd	1.15±0.19	1.14±0.23	0.822
PSQI (median)	7 (1/ 12)	4 (1/ 12)	0.822
FCV-19 scale±sd	19.1±5.9	15.4±4.8	0.000

In the Multiple Logistic Regression model established, female gender (OR: 7.857, 95%CI [2.463-25.065], p<0.001) and poor economic status (OR: 7.569, 95%CI [2,300-24,908], p=0.001) were determined as independent risk factors for depressive mood.

DISCUSSION

The mean BDI score of our patients was 14, the PSQI score was 5, and the FCV-19 scale was 16±5.6. 43.1% of the patients had poor sleep, and 40.5% had depressive mood. Higher FCV-19 scale scores were associated with mild to moderate depressive mood and worsening sleep quality.

The coronavirus with high transmission potential (COVID-19), identified in China at the end of 2019, has been recognized as a pandemic by the World Health Organization. Insufficient information about the virus has caused fear in the population, and the situation remains unclear due to the lack of effective treatment in the study by Malta et al. And Ornel et al. (13, 14). It is expected that emotions such as fear and anger will arise due to many unknowns about the SARS-CoV-2 virus. Fear is an essential defense mechanism for survival, but when disproportionate, it can become harmful and even lead to the development of psychiatric disorders. During the pandemic, fear may increase the anxiety level in healthy individuals, so the risk of developing psychiatric disorders in the study by Shigemura et al. (15). Our study determined depressive mood and sleep disorders in nearly half of the hemodialysis patients during the pandemic and associated the FCV-19 scale with depressive mood and poor sleep. In addition, poor sleep was positively correlated with the duration of hemodialysis. This may be due to the higher risk of dying from COVID-19 infection due to increased comorbidity and immunosuppression in hemodialysis patients.

It is known that moderate depressive symptoms are present in 25% of patients with end-stage renal disease and major depression in 5-22% in the study by Cohen et al. (16). The etiology of dialysis-induced depression is multifactorial and is related to biopsychosocial mechanisms in the study by Chilcot et al. (17). While biological mechanisms include increased cytokine levels, genetic predisposition, and neurotransmitters affected by uremia, psychosocial factors include altered family and social relationships by hopelessness, loss, perception of lack of control, and job loss in the study by Chen et al. (18). The COVID-19 pandemic has detrimental effects on the general population's physical, mental and social health, such as fear, frustration, boredom, financial loss, and stress in the study by Brooks et al. (19). In the study by Umucu et al. (20) reported that participants with chronic diseases had moderate levels of stress, depression, and anxiety related to COVID-19. Conducted on hemodialysis patients during the COVID-19 pandemic, depression and sleep quality prevalence were 33.3% and 56.9%, respectively in the study by Naamani et al. (21) and in the study by Merlino et al. (22). We think that the high rate of depressive mood in our study may be related to the SARS-Cov-2 pandemic.

Sleep-related complaints are common in patients with end-stage renal disease. It is stated that the rate of sleep complaints in hemodialysis patients is 45%-80% in the study by Bilgic et al. (23). In this group of patients, sleep disturbance is associated with metabolic changes, itching, bone pain, and low hemoglobin levels (23). Our study found no such relationship between sleep index and hemoglobin, calcium, and phosphorus values. The small sample size may be the reason for this situation. Huang et al. (24) determined the frequency of poor sleep was 18.2% in the general population during the COVID-19 epidemic. Our results also showed that the FCV-19 scale was associated with worsening sleep quality. Due to the increased burden in hemodialysis patients, it is expected that depressive mood and poor sleep have increased after the COVID-19 pandemic.

Besides, it should be considered that sleep problems in hemodialysis patients may be related to psychological factors and metabolic changes in the study by Bilgic et al. (23). As is known, insomnia lowers a person's energy, makes him irritable, and takes all the joy out of life. Poor general condition and decreased appetite due to insomnia are also associated with malnutrition (23). In our study, poor sleepers had a statistically significant higher depression score, and their serum albumin levels were negatively correlated with the depression score. However, no correlation was found between serum albumin levels and sleep scores. The pandemic has placed significant burdens on mental health. The decrease in sleep duration and quality also increases the risk of viral infection in the study by Gamaldo et al. (25), in the study by Xiao et al. (26). The groups most affected by the pandemic are women, those with a history of psychiatric disorders and chronic comorbid diseases in the study by Özdin et al. (27). In our study, depression scores and poor sleep were also associated with the female gender.

A study conducted in Japan stated that the pandemic dramatically affected individuals not only psychiatrically but also economically in the study by Shigemura et al. (15). This study also determined that the economic status of the depressed patient group was poor.

The circadian rhythm facilitates daytime wakefulness and nighttime sleep. Melatonin is a hormone secreted by the pineal gland and exhibits anti-inflammatory, antioxidant, and immunomodulatory properties, and insomnia are more common in hemodialysis patients due to impaired circadian rhythm in the study by Koch et al. (28). Disruption of circadian rhythm increases susceptibility to infection. Chronic stress and sleep deprivation stimulate proinflammatory responses and reduce the levels and activities of protective immune cells in the study by Dhabhar et al. (29) and in the study by Akbulut et al. (30). Quarantine significantly alters sleep-wake rhythms and reduces sleep quality in the study by Akıncı et al. (31). In our study, poor sleep was present in 43.1% of the patients and positively correlated with the FCV-19 scale.

The main limitations of our study were the small sample size, the single-center design, and the use of PSQI to measure sleep quality. There is a need for more comprehensive studies using non-subjective sleep assessment methods such as polysomnography.

CONCLUSION

Most of the our patients had sleep disturbance and depressive mood. Patients in the depressive mood and poor sleeper group had a higher FCV-19 scale. We think it would be beneficial to keep depression and sleep disorders in mind to strengthen the immune system of hemodialysis patients and reduce the burden of disease in the COVID-19 pandemic. Considering the psychological consequences of epidemics as well as the physical effects is essential for the protection of mental health. Therefore, specific strategies should be adopted to deal with depressive mood, sleep disturbance, and fear of covid-19 by working closely with the psychiatric team.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was initiated with the approval of the Samsun Training and Research Hospital Ethics Committee (Date: 2021, Decision No: 16/10).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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