Original Article

Comparison of Sleep Quality and Quality of Life Indexes with Sociodemographic Characteristics in Patients with Chronic Kidney Disease

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Aims: Chronic kidney disease (CKD) is a serious health problem due to high mortality and morbidity, negative impact on the patients' quality of life (QOL), high diagnostic and therapeutic cost, and the burden on society. Sleep, which is one of the main needs of the human body, is important regarding the health and QOL in all ages. The objective of our study was to plan the quality of sleep and life quality in adults with CKD. **Materials and Methods:** Total 240 cases (91 healthy volunteers, 75 predialysis patients, and 74 hemodialysis (HD) patients) were included in our study. Our study was designed as a prospective survey with a face-to-face interview method. The sleep quality was evaluated with Pittsburgh Sleep Quality Index (PSQI). The WHO Quality of Life-short version (BREF) survey questions were used for QOL, and scoring was performed. **Results:** The analysis showed that the results of PSQI scores, QOL scores, and evaluation of the age variable were statistically significant ($P = 0.001$, $P < 0.001$, $P < 0.001$, respectively). Likewise, the PSQI scores were low in healthy volunteers but were the highest in predialysis patients. The scores of the HD patients were between the scores of predialysis and healthy volunteers. The score of the QOL increased with educational level. There was a positive correlation between Modification of Diet in Renal Disease (MDRD) level and QOL ($P < 0.001$; $r = 0.260$) and a negative correlation between MDRD level and PSQI score ($P < 0.001$, $r = -0.202$). **Conclusion:** Like in HD patients, close follow-up of predialysis patients with CKD is critical considering the resolution of the encountered problems. We believe that the increase in QOL and sleep in patients with CKD may decrease the morbidity.

KEYWORDS: *Chronic kidney disease, quality of life, sleep quality*

INTRODUCTION

Chronic kidney disease (CKD) is a serious health problem due to high morbidity and mortality rate, high impact on the quality of life (QOL) of patients, high diagnostic and therapeutic cost, and the burden caused in the society.[1-3] In kidney diseases with a chronic course, the renal functions deteriorate gradually with time, and with the exceeding of the critical level in the progressive loss of the nephrons, end-stage renal disease (ESRD) emerges.[1,4] At that stage, the lifespan of the patients can only be prolonged with renal replacement treatments such as hemodialysis (HD), peritoneal dialysis, and kidney transplantation.[5,6] Dialysis treatment prolongs the lifespan of patients. However, one of the main goals of the treatment of all chronic diseases is that the patient meets his or her own needs, life satisfaction, free-time for his or her social life, the desired level of emotional and physical condition, and increases his or her QOL with management of interpersonal relationships.[7] In previously published studies, it was reported that the

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QOL of the patients had a correlation with mortality and morbidity.[8,9] In light of this information, it appears that the concept of sufficient dialysis should be considered as the sum of the removal of the excess fluid and uremic toxins from the body, the control of the blood pressure, maintenance of the acid–base balance, establishment of an ideal nutritional condition, prevention of anemia, good control of symptoms and complications accompanying renal failure, and consequently the decrease in morbidity and mortality and increase in the QOL.[10-15] Some of the scales used for evaluation of QOL related to health question certain symptoms or clinical status, and some evaluate the functional skills of the patients, psychosocial wellness, and life satisfaction.[16] These evaluations can be used for different purposes such as planning of new health politics, selection of treatment suitable to an individual, duration of hospitalization, or decrease in cost.[7,17,18] Clinical measurement of QOL of the patients becomes important with respect to evaluation of medical interventions and side effects, comparison of QOL before and after treatment, and conducting medical research.[7,17,18]

Sleep is a reversible state of unconsciousness, but it is also a state of immobility, which enables the recovery of the body and an active regeneration period, which prepares the body for life.[19] Sleep is one of the basic activities of daily living, which affects individual's QOL and is a concept with physiological, psychological, and social dimensions.[20] It plays an important role in the management of health and QOL in all ages.[21] Sleep is a fundamental element in strengthening of the physical growth and academic performance. It was demonstrated that sleep deprivation increased daytime sleepiness and careless behavior. Sleep quality means that an individual feels him/herself energetic, fit, and ready for a new day. It is affected by several factors such as lifestyle, environmental factors, business life, social life, economic status, general health state, and stress.[22,23] Therefore, we designed our study to determine the quality of sleep and life in adults with CKD. For this purpose, we calculated the scores of the quality of sleep and life and compared these findings with the laboratory findings and sociodemographic characteristics. In this study involving patients with CKD, we aimed to provide the findings of QOL and sleep quality of Turkish people.

MATERIALS AND METHOD

The study was approved by Clinical Research Ethics Committee of Ordu University Faculty of Medicine (issue date 07/12/2017, issue number: 2017/159). Patients who applied to the outpatient nephrology department of the Ministry of Health,

Ordu University Training and Research Hospital, and diagnosed with CKD between December 1, 2017, and May 31, 2018, HD patients of the Ordu State Hospital and Ordu University Training and Research Hospital, and healthy volunteers were included in the study. We distributed the subjects in three groups; healthy volunteers group (Group HV), predialysis group (Group PD), and HD group (Group HD).We enrolled 91 healthy volunteers, 75 predialysis patients, and 74 HD patients (total 240 patients) into the study. It is not usual for healthy individuals in our country to refer to health centers for check-up. We have included all the healthy volunteers who have applied to our hospital for advancement of our study and have not been able to limit the age (above 18 years). For this reason, a relatively younger population was included in the study compared to the predialysis and HD groups.

Our study was designed as a prospective survey with a face-to-face interview method. The following inclusion criteria were taken into consideration: diagnosis of CKD at least for 6 months, age between 18 and 75 years, acceptance of volunteer participation, and literacy in Turkish. The following exclusion criteria were considered: communication problems, inability to cooperate, no knowledge of Turkish, age younger than 18 years or older than 75 years, presence of peritoneal dialysis treatment, presence of neurological diseases (e.g. hemiplegia, hemiparesis), and presence of malign or benign tumors.

The clinical, demographic, and personal information of each participating patient were recorded in the "Case Report Forms." The recorded personal information included the name, surname, marital status, professional and educational status, demographic and clinical information such as age (year), gender, height (m), weight (kg), and body mass index (it was calculated with the following formula: body weight/height^2 (kg/m^2)). Glomerular filtration rate (eGFR) of patients was calculated using the Modification of Diet in Renal Disease (MDRD) formula.

The assessment of sleep quality

The sleep quality of the patients was evaluated with Pittsburgh Sleep Quality Index (PSQI).[23] This index was first developed by Buysue *et al.* in 1989 and evaluates the sleep quality of the patients and additionally enables examination of the problems related to daytime sleepiness. PSQI contains 24 questions and seven components (first component: subjective sleep quality, second component: sleep latency, third component: sleep duration, fourth component: habitual sleep efficiency, fifth component: sleep disturbances, sixth component: use of sleeping medication, seventh component: daytime dysfunction).

In every domain of the scale, scoring was performed within a range of 0–3. The sum of the scores of these seven components constitutes the total index score. High scores indicate that sleep quality is impaired. In this scale, the total value can be between 0 and 21 (interpretation: 0–5 = healthy sleep; 6–10 = poor sleep quality, >10 = long-term sleep disturbance).

Quality of life assessment

World Health Organization (WHO) had related the QOL of individuals to cultural life settings. The perception of life is also included in this context. The definition of WHO's QOL contains six domains: physical health, psychological state, level of independence, social relationships, environment, and spirituality/religion/personal beliefs.

Individual's QOL can be scored and evaluated with the help of several scales. The following topics are usually considered in the scales: physical functioning, social functioning, role limitations due to physical health problems, emotional functioning, mental health state, energy/tiredness, bodily pain, and general health perceptions.

WHO Quality of Life (WHOQOL) scale has two versions: WHOQOL-100 (long version) and WHOQOLBREF (short version). The original WHOQOL-100 scale contains 100 questions. The scale consists of six domains and 25 facets (there is a general facet and every domain has a different number of facets). Each facet consists of four questions. Questions have an ordinal 5-point Likert scale response. The scale does not have a total score. Every facet and domain has a maximal score of 20 or a score on the scale of 100. High scores indicate a good QOL. The Turkish version of this scale (WHOQOL-100 TR) includes three additional questions specific for Turkey, which constitute a separate "social pressure" facet. WHOQOL-BREF constitutes of 26 questions (two questions from the general facet of WHOQOL-100 and one question from each 24 remaining facets). WHOQOL-BREF contains four domains in contrast to the long version. There are no separate facets. The scale also does not have a total score. Every facet and domain has a maximal score of 20 or a score on the scale of 100. In our study, we used WHOQOL-BREF survey questions and scored accordingly.

Statistical analysis

The data obtained during the study were first tested with Kolmogorov–Smirnov test to control the normality hypothesis ($P < 0.05$). Student's *t*-test was used for correlation between PSQI scores according to gender and marital status, QOL score, hemoglobin (Hb), and creatinine values. One-way analysis of variance (ANOVA) and Tukey's replicate tests were used for investigation of the relationship of intergroup variables. Pearson's correlation quotient was used for correlation between PSQI score, QOL score, Hb, and creatinine variables. The results of the study were expressed in *n*, mean, standard deviation, and minimum and maximum values. The accepted limit of significance was $P < 0.05$. All statistical analyses were done with SPSS v.20 (IBM Corp., Chicago, USA).

RESULTS

We enrolled 91 healthy volunteers, 75 predialysis patients, and 74 HD patients (total 240 patients) into the study. In all, 115 of them were females and 125 males. The mean age of the participants was 43.27 years in Group HV, 58.49 years in Group PD, and 57.58 in Group HD. The overall mean age was 52.44 years. The sociodemographic characteristics of the cases are shown in Table 1. The PSQI scores, QOL scores, and mean ages of the groups are shown in Table 2. In the one-way ANOVA replicate comparison test, the differences between the groups were statistically significant for each group ($P = 0.001$, $P < 0.001$, and $P < 0.001$, respectively).

As shown in Figure 1, the QOL score had a dramatic fall in Groups PD and HD. Likewise, the PSQI score was low in Group HV but was the highest in PD group, and the PSQI score of HD group was between other two groups. Low score of PSQI indicated a healthy sleep, whereas high scores pointed to a poor sleep quality.

As seen in Figure 2, the lowest PSQI scores were encountered in Group HV, which was followed by Group HD. Group PD had the highest PSQI scores. Thus, Group PD was the group with worst sleep quality.
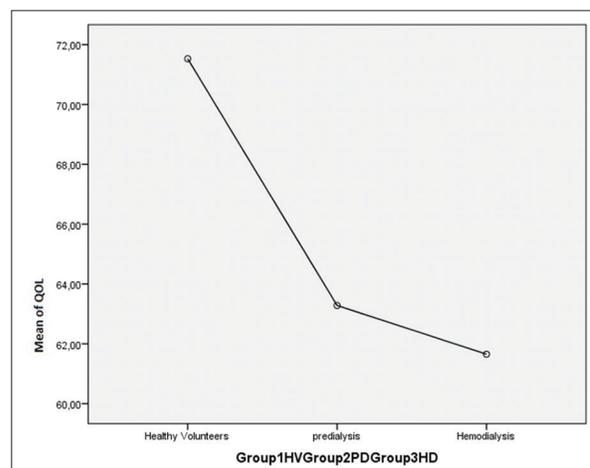

Figure 1: Quality of life scores between the groups

Table 1: Sociodemographic characteristics of the cases

	Healthy volunteers (*n*=91)	Predialysis group (*n*=75)	Hemodialysis group (*n*=74)
Age (years) (mean±SD)	43.27±1.1	58.49±3.4	57.58±4.8
Weight (kg) (average)	71±8.1	69±3.4	67±2.8
Height (cm) (average)	167±5.1	168±4.7	166±3.4
Gender (female/male)	42/49	33/42	40/34
CKD stage (Stage I/II/III/IV/V)	Ø	19/17/24/15 (Stage I/II/III/IV)	74 (Stage 5)
HD duration (years) (average)	Ø	Ø	4,8±1.1
Concomitant comorbidity (DM/HT/CAD/ COPD/CVD)	Ø	25/20/13/10/7	34/30/7/3
Marital status (married/single)	80/11	65/10	71/3
Educational level (illiterate/primary/high school/university/master's degree and above)	10/14/30/25/12	13/46/6/10	20/54

SD=Stadnard devaition; CKD=Chronic kidney disease; DM=Diabetes mellitus; HT=Hypertension; CAD=Coronary artery disease; COPD=Chronic obstructive lung disease; CVD=Cerebrovascular disease

Table 2: The quality of life score, PSQI score, and mean age of the participants

	n	Mean	Std. deviation	*P*
Quality of life score				
Healthy volunteers	91	71.5289	11.59652	
Predialysis	75	63.2805	14.34286	*P*<0.001
Hemodialysis	74	61.6523	11.90588	
Total	240	65.9060	13.32049	
PSQI score				
Healthy volunteers	91	6.9341	5.31414	
Predialysis	75	11.8267	6.93478	
Hemodialysis	74	9.8243	4.73795	*P*<0.001
Total	240	9.3542	6.04962	
Age				
Healthy volunteers	91	43.2747	12.89191	
Predialysis	75	58.4933	15.64934	
Hemodialysis	74	57.5811	16.11687	*P*<0.001
Total	240	52.4417	16.41399	

PSQI=Pittsburgh Sleep Quality Index

Figure 2: The mean PSQI scores of the groups
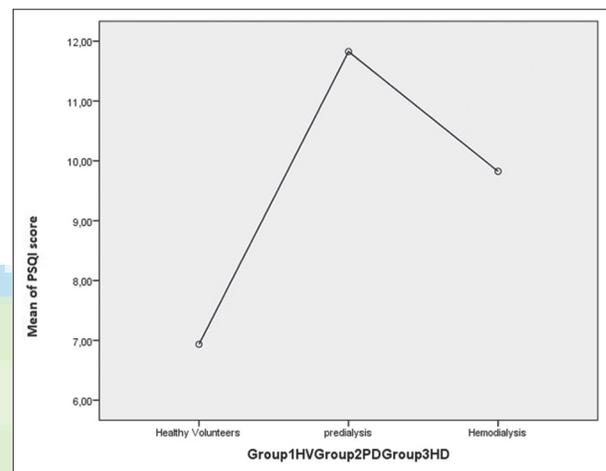
Table 3: The marital status, quality of life score, PSQI score, mean age of the participants, and *P*

Married or single	*n*	Mean	Std. deviation	*P*
Quality of life score				
Married	184	66.5935	12.88599	0.441
Single	56	63.6470	14.55233	
PSQI score				
Married	184	9.4348	0.22009	0.308
Single	56	9.0893	5.47150	
Age				
Married	184	53.8207	14.00294	<0.001
Single	56	47.9107	22.15998	

PSQI=Pittsburgh Sleep Quality Index

Regarding the educational level of the participants, 43 participants were illiterate, 114 primary school graduates, 36 high-school graduates, 35 university graduates, and 12 postgraduates. The QOL score increased with educational level. The QOL levels of university graduates, postgraduates, and high-school graduates were similar. But there was a statistically significant difference between these groups and primary school graduates and illiterates ($P < 0.001$, $P = 0.001$, $P = 0.001$, and $P < 0.001$, respectively). Similarly, the PSQI score decreased with an increase in educational level. In other words, the sleep quality increased with an increase in educational level. Marital status, scores of QOL and sleep, and mean age are listed in Table 3. There was no statistically significant difference between marital status regarding QOL ($P = 0.441$). There was also no statistically significant difference between marital status with respect to PSQI scores ($P = 0.308$). The mean age of the married subjects was higher than single subjects ($P < 0.001$).

The correlation between laboratory findings of the subjects and the scores of QOL and sleep was investigated. There was a positive correlation between MDRD level and QOL ($P < 0.001$; $r = 0.260$) and a negative correlation between MDRD level and PSQI score ($P < 0.001$, $r = -0.202$). In other words, with

an increase in MDRD, the QOL and sleep quality also increased. There was a positive correlation between Hb levels and PSQI scores and a negative correlation between Hb levels and QOL scores. In other words, both QOL and sleep quality increased with an increase in Hb levels ($P < 0.001$ and $P < 0.001$, respectively).

DISCUSSION

In this study, we determined that the QOL and sleep decreased significantly in patients with ESRD, who underwent renal replacement treatment, compared to healthy subjects.

The increasing prevalence of CKD became an international health problem and drew attention worldwide.[24] CKD is a serious health problem due to high morbidity and mortality, prominent impact on the patient's QOL, high diagnostic and therapeutic cost, and high burden caused in the society.[24-26]

In the past published version of the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (K/DOQI), it was recommended that patients with CKD, who had a GFR less than 60 mL/min/1.73 m², should be regularly followed up regarding renal functions and related complications. In addition, the evaluation of patients' QOL was recommended. QOL does not only provide information about the daily life of the CKD patients but also about their functional condition.[25]

Studies had shown that patients with CKD had lower QOL scores than the general population.[26,27] In our study, QOL score had a dramatic decrease in PD and HD patients.

Certain hypotheses were suggested for correlation of poor QOL and clinical condition. For example, a negative evaluation of individual's health causes a psychoneuroimmunological response or causes a delay in the protection and management of health.[28,29] It was demonstrated in some reports that QOL was correlating with certain factors such as cholesterol and Hb levels.[30,31] In our study, there was a positive correlation between Hb levels and QOL scores; QOL and sleep quality increased with an increase in Hb levels.

Although physical health is related to GFR, age, gender, or other clinical and biochemical parameters in patients with CKD, it is widely evaluated as a phenomenon, which is a mixture of several different diseases and psychological factors.[26,30,32] In a study, which was focused on patients with Stage 3a and 3b disease, it was suggested that anemia was more severe and the QOL score was lower in Stage 3a patients compared to Stage 3b patients.[33] In our study, there was a positive

correlation between Hb levels and QOL scores, which indicated that QOL increased with an increase in Hb levels.

Several studies demonstrated that low QOL score had a correlation in patients with ESRD, who underwent dialysis. De Oreo showed that the physical component of QOL had a strong correlation with mortality in HD patients, but there was not a correlation with mental component.[34] Knight *et al*. found out a strong correlation between physical QOL score and mortality in patients with ESRD.[35] Tsai *et al*. determined that there was a correlation between low QOL score and ESRD and mortality.[36] The cross-sectional design of our study was a limiting factor and is different from the studies in literature in this respect. Bah AO *et al*. evaluated the relation of QOL and MDRD in 69 patients with ESRD. They found that 32 patients had a good QOL and 37 a poor QOL score. However, they did not detect any difference between the groups with good and poor QOL regarding creatinine clearance. They also determined a correlation between good QOL and the decreased occurrence of comorbidity and physical pain.[37] In our study, we found a positive correlation between MDRD level and QOL score. Our results were compatible with the results of Bah OA *et al*. with respect to the detected correlation with age. A review published by Afsar B *et al*. was focused on the effect of exercise on QOL, cardiovascular outcome, and depression in patients with CKD. They reported that there was no correlation between the isolated CKD and morbidity and mortality, but between poor QOL and morbidity and mortality. The authors concluded that exercise increased QOL in patients with CKD.[38]

Shafi ST and Shafi T investigated sleep quality in patients with CKD with PSQI. They included 152 HD and PD patients (73 PD, 79 HD patients) in their study. They reported that PSQI scores were low in all subjects and concluded that the sleep quality was poor in these patient groups. The poor sleep quality score was 62% in HD group and 69.9% in PD group. They detected a significant correlation between PSQI scores and the age of the subjects, but they were not able to find out any correlation between high socioeconomic status and PSQI scores.[39] The findings of Shafi and Shafi were partially in concordance with our findings. Like in their study, we determined that PSQI scores were low in PD patients, which meant that the sleep quality in PD group was considerably poor. This finding is in total concordance with the study of Shafi and Shafi. This finding may be explained by the high anxiety level depending on HD, which is experienced by these patients during the adaptation process to the disease. Furthermore, the

anxiety caused by adverse processes, which continuously emerge in other organs of these patients, may also contribute to this condition. Similarly, regarding HD patients, factors such as the 4-h HD 3 days a week, the increased anxiety before HD, complications developing during the dialysis, hypotensive attacks after dialysis, and fluid and solid food restrictions may be related due to their negative perception by the patient. The reported age correlation also confirms our findings.[39] However, we determined additional correlations between educational level, high socioeconomic level, Hb level, high MDRD levels, and PSQI scores. In our study, the sleep quality increased with an increase in educational level, socioeconomic level, Hb level, and MDRD level. These different results may depend on the different geographic regions, where the studies were conducted.

Eslami AA *et al.* investigated the sleep quality in HD patients and found that 81% of the HD patients had sleep disturbance. They made evaluations with PSQI scale, but they also simultaneously investigated the spiritual wellness. They did not find any relation between educational level and sleep quality. Active business life, being married, and high socioeconomic level had a positive correlation with sleep quality. The results of Eslami AA *et al.* were partially comparable with our study's results.[40] In our study, there was no significant correlation between marital status and sleep quality, but sleep quality increased with an increase in educational level. Nevertheless, we also determined a positive correlation between high socioeconomic level and good sleep quality. Thus, our study was partially in concordance with the study of Eslami AA *et al*. Different results may depend on different geographic regions and also on the different patient groups included in our study (PD patients and healthy volunteers in addition to HD patients).[40] There were several studies in the literature focused on sleep quality in patients with CKD. Sleep quality and severity of the disease were also investigated in several other studies. Our study is among the leading studies focused on the sleep quality in patients with CKD.

CONCLUSION

In conclusion, chronic diseases severely impair QOL and sleep. The clinician should not only use physical examination and laboratory parameters for monitoring of disease progression in the follow-up of patients with chronic disease but also should absolutely question sleep quality and QOL. Especially sleep quality can be treated with pharmacological and non-pharmacological methods and even with complementary medical modalities. Exercise and social occupations may be recommended to

increase QOL. In our study, we stress that in follow-up of chronic diseases such as CKD, consultations on QOL and sleep quality should be requested, especially to increase sleep quality. Patients should be referred to sleep laboratories, dietitians, psychologists, psychiatrists, and complementary medicine clinics when necessary. We believe that an increase in QOL and sleep in patients with CKD may decrease the morbidity and mortality.

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Conflicts of interest
There are no conflicts of interest.

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