ORIGINAL ARTICLE

The Relationship Between Restless Leg Syndrome, Sleep Quality and Quality of Life Among Patients Undergoing Hemodialysis

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ABSTRACT

Introduction: Hemodialysis (HD) burdens patients with poor sleep quality and quality of life, with restless leg syndrome (RLS) affecting 15-20% of end-stage renal failure patients. Understanding RLS's connection can help healthcare professionals improve patients' self-care practices. This study aimed to explore the relationship between restless leg syndrome, sleep quality and quality of life among patients undergoing hemodialysis in Indonesia. **Materials and methods:** A cross-sectional research design was employed to recruit patients who receive HD three times a week for at least six months at two hemodialysis centers in Indonesia. International RLS Study Group Scale (IRLSSG), Pittsburgh Sleep Quality Index (PSQI), and the Kidney Disease Quality of Life Short Form (KDQOL-SFTM v1.3) was used to measure study variables. The linear regression method was used to evaluate the parameters that significantly correlated with the QOL. **Results:** Of 194 participants were recruited in this study. the mean age was 55.50 ± 10.72, 55.7% male, 51.6% had education level above senior high school, 90.7% married, and 69.1% unemployed. length of haemodialysis (B=2.047, SE=0.614) were significant positively associated with quality of life in HD patient ($p<0.05$). In addition, number of comorbidities (B=3.915, SE=00.142) and sleep quality (-3.928, SE=0.831) were significant positively associated with QOL ($p<0.05$). While, RLS (B=-4.872, SE=0.126) was significant negatively associated with QOL ($p<0.05$). **Conclusion:** The study revealed a negative correlation between higher scores on RLS and poor sleep quality, and the overall quality of life. Measures should be performed to treat RLS symptoms, enhance sleep quality, and increase QOL in HD patients.
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Keywords: Restless leg syndrome, RLS, Sleep quality, Quality of life, Hemodialysis

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INTRODUCTION

Hemodialysis (HD) is the most common renal replacement therapy procedure to manage symptoms and prolong their lives (1). Chronic kidney disease (CKD) prevalence in developing nations was 14.3% in the general population and 36.1% in the high-risk population (2). There are an estimated minimum of 2.9 million persons in need of dialysis in Asia, yet only around 66% of them have access to it (3). In Indonesia, the prevalence of CKD was 0.5% (4).

HD is a significant burden for many patients, leading to poorer quality of life compared to those with diabetes or malignancies (5). The concept of quality of life (QOL) has gained recognition within the field of nephrology as a noteworthy patient-reported outcome measure (PROM) (6). The QOL experienced by those receiving dialysis is impacted by various elements, including physical, biological, psychological, social, and cultural aspects (7,8). Patients with HD must spare four hours a day, three days a week, irrespective of their schedules (9). Continuous HD requires holding three, two-liter bags of fluid daily, which becomes increasingly burdensome as patients become frailer. This not only causes inconvenience but also exacerbates the burden as individuals become frailer with longer dialysis durations, as the commencement of dialysis fails to halt the progression of the fundamental causes of chronic kidney disease (10). Indeed, maintaining employment poses a significant challenge for individuals undergoing dialysis, ultimately leading to a decline in their financial situation (11). Thus, it is common for CKD patients to be depressed and their overall QOL could be worse as their condition progresses (12).

Restless Legs Syndrome (RLS) is a neurological condition characterized by an intense urge to move the legs, often exacerbated by unpleasant feelings during inactivity and often disrupting the patient's sleep (13,14). RLS is prevalent in 15-30% of end-stage renal failure patients, especially during hemodialysis (15). Research suggests that RLS can negatively impact hemodialysis QOL, sleep issues, anxiety, depression, and increase the risk of cardiovascular disease (16,17). The impact of RLS on sleep may mediate its potential effect on QOL (18).

Poor sleep quality is a prevalent issue among HD patients, with a prevalence rate of 45-80% in individuals with end-stage kidney disease (ESKD) and approximately 50% in early stages of CKD (19). Inadequate sleep quality among patients presents substantial risks to their overall well-being and sustained survival, as it enhances the likelihood of experiencing fatigue, anxiety, memory loss, disruptive behaviors, depression, impaired immunity, cardiovascular diseases, and physiological disturbances (20). Furthermore, it is important to note that this phenomenon also increases the likelihood of fatality (21). According to Lin (22), there is a direct correlation between the deterioration of sleep quality and the loss in the overall QOL among those undergoing HD. Mixson (21) proposed that the timely recognition and diagnosis of a sleep disturbance in individuals with HD could potentially enhance their likelihood of survival.

By comprehending the correlation between restless leg syndrome, sleep quality, and quality of life in patients undergoing hemodialysis, healthcare professionals, particularly nurses, can evaluate and enhance patients' self-care practices. The results of this study can also serve as a valuable resource for healthcare practitioners in tailoring effective sleep interventions for patients, leading to enhancements in patients' restless leg syndrome symptoms, sleep quality, and overall quality of life. This study has the potential to serve as a foundational framework for future attempts in analytical and interventional research pertaining to the management of restless leg syndrome, sleep quality, and overall quality of life among hemodialysis patients in Indonesia. Furthermore, this may enhance healthcare administration awareness regarding this issue, leading to further studies and efforts to address it. Thus, this study aimed to explore the relationship between restless leg syndrome, sleep quality and quality of life among patients undergoing hemodialysis in Indonesia.

MATERIALS AND METHODS

Study design and setting

A cross-sectional research design was employed to examine the correlation between restless leg syndrome, sleep quality, and quality of life in patients undergoing hemodialysis at two hemodialysis centers in Indonesia. The statistics were gathered over the timeframe spanning from January to August of 2023. The selected dialysis centers serve around 750 patients with end-stage renal disease (ESRD) who require hemodialysis (HD) treatment. They offer high-definition sessions six days a week, accommodating over 80 patients per shift. The centers are closed one day a week, and in emergencies during non-working hours, it is recommended to seek immediate medical attention at the emergency department.

Sample

Participants in the RLS program must meet IRLSSG criteria, be over 18, receive HD three times a week for at least six months, have no mental or physical disabilities, be fully conscious, and have good hearing and speaking abilities. Exclusion is based on refusing to participate for three consecutive sessions. At HD centers, nursing personnel assisted in gaining study access and engaging participants. A prescreening process was implemented in order to evaluate interest. The study was presented to eligible patients by the researcher, who distributed an invitation letter, an information leaflet, and a consent form. Participants had a 48-hour window to express their willingness to participate, and upon consent, they were given a questionnaire for completion. The nurse staff assured that the participants' experience ran smoothly.

Instrument

Sociodemographic characteristics (e.g., age, comorbidities, duration of HD, IDWG, urea, and creatine), education level, length of HD, education level, age, and marital status were gathered on a data collection form.

The researchers employed the International RLS Study Group Scale (IRLSSG) to assess Restless Legs Syndrome (RLS) symptoms. The RLS severity scale was a set of ten items, each offering five potential responses. Each question was rated on a scale of 0 to 4 points. The severity of Restless Legs Syndrome (RLS) symptoms is assessed using a scale that spans from 0 to 40, where higher scores correspond to a greater degree of symptom severity. The Cronbach's alpha coefficient obtained in this investigation was 0.87.

The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse (23). The Pittsburgh Sleep Quality Index (PSQI) assesses the frequency and quality of an individual's sleep over the course of the preceding month, relying on self-reported data. The test comprises a total of 19 questions, which are categorized into seven distinct areas: (1) sleep quality, consisting of one question; (2) sleep latency, consisting of two questions; (3) sleep duration, consisting of one question; (4) sleep efficiency, consisting of three questions; (5) sleep disruption, consisting of nine questions; (6) sleep medication, consisting of one question; and (7) daily dysfunction, consisting of two questions. The highest attainable score is 21, which is categorized into two groups: 0 represents good sleep quality, with a cumulative score of 5,

while 1 signifies poor sleep quality, with a cumulative score ranging from 6 to 21. A lower overall score (5) is indicative of superior sleep quality, while scores towards the lower range of the scale (1) suggest inadequate sleep. The internal consistency of the Pittsburgh Sleep Quality Index (PSQI) has been shown to be good, as indicated by a Cronbach's alpha coefficient of 0.73 (23).

The Kidney Disease Quality of Life Short Form (KDQOL-SFTM v1.3) survey comprises two primary components, namely the general core and the disease-specific core. The instrument was comprised of 37 individual components. The set of inquiries pertaining to general health is categorized into eight distinct subscales, wherein a single item is dedicated to evaluating the individual's overall health status. The eight subscales encompassed in this study are role physical, physical functioning, emotional well-being, general health, social function, pain, role emotional, and energy/fatigue. The potential score range spans from 0 to 5, representing varying degrees of health ranging from suboptimal to improved. Higher scores are indicative of improved quality of life conditions for both fundamental components. Scores ranging from 0 to 100 were determined using the scoring methodology outlined in the user handbook. The highest quality of life is indicated by a total score of 100.

Procedure

During the process of data collection, the head nurses at the designated centers provided assistance in compiling a roster of potential participants who satisfied the relevant criteria and expressed a willingness to take part in the study. Following the initial introduction to the patients, the researchers proceeded to provide a comprehensive overview of the study's objectives and methodology. Before the commencement of the study's procedures, every participant provided written informed consent. The participants were informed of the voluntary nature of their involvement in the study and were given the option to withdraw at any point. The duration of the quiz did not exceed 10 minutes.

Data analysis

The IBM SPSS Statistics programme, Version 27 (IBM Corp., Armonk, NY, USA), was used to analyze the data. The mean and standard deviation (SD) were employed as statistical measures to depict continuous variables that follow a normal distribution. On the other hand, frequencies and percentages were utilized to describe categorical variables that also adhere to a normal distribution. The chi-square test was employed to ascertain the association between the independent factors and the quality of sleep. The application of linear regression was employed to further assess the parameters that exhibited a significant association with the quality of life among the individuals. The statistical significance was set up at $p < 0.05$.

Ethical Clearance

The study obtained ethical approvals from the research ethics committees of STIKep PPNI Jawa Barat (III/0123/KEPK/STIKEP/PPNI/JABAR/2022).

RESULTS

Of 194 participants were recruited in this study. the mean age was 55.50 ± 10.72, 55.7% male, 51.6% had education level above senior high school, 90.7% married, and 69.1% unemployed. The average length of HD was 9.87± 3.29, number of comorbidities was 1.41±0.32, IDWG was 5.10±2.26, Hb was 9.85±1.32 g/dL, urea was 69.35±16.94 mg/dL, and creatine was 7.91±3.91 mg/dL.

Bivariate analysis results in Table I shows correlation was found between demographic and clinical characteristics with quality of life in patients undergoing HD ($p>0.05$), except for length of haemodialysis ($p=0.001$), and number of comorbidity ($p=0.001$). Then, higher score of RLS and poor sleep quality was negatively associated with quality of life.

Table I: Bivariate correlations between baseline characteristic and KDQOL SF 36 Score among patients undergoing haemodialysis (n=194)

	Quality of life			
	Mean	**SD**	**r/t**	***p*-value**
Age, Mean ± SD			0.089	0.276[a]
Gender				
Male	69.86	23.77	2.321	0.118[b]
Female	70.18	25.55		
Education level				
Above the senior high school	70.07	23.17	1.634	0.452[b]
Below senior high school	77.69	24.82		
Marital status				
Married	73.51	22.05	1.821	0.312[b]
Single	76.32	21.13		
Working status				
Employed	74.64	20.43	2.567	0.124[b]
Unemployed	77.44	19.07		
Length of hemodialysis (months), Mean ± SD			0.303	0.001*[a]
Number of comorbidities, Mean ± SD			0.341	0.001*[a]
IDWG			0.173	0.263[a]
Hb, (g/dL) Mean ± SD			0.182	0329[a]
Ureum, (mg/dL) Mean ± SD			0.105	0.516[a]
Creatinine, (mg/dL) Mean ± SD			0.177	0.420[a]

Note: [a] p-value obtained from Pearson correlation test, [b] p-value obtained from independent t test.

Table II shows the results of Pearson correlation. The analysis showed that higher score RLS and poor sleep quality was negatively associated with quality of life with r ranged from -0.315 to -0.404 with p-value < 0.01.

Table II: Correlation matrix of RLS, sleep quality, and quality of life

Variables	1	2	3
1. RLS	1		
2. Sleep quality	-0.342**	1	
3. Quality of life	-0.315**	-0.404**	1

Note: * p<0.05; **p<0.001.

In liner regression model showed that length of haemodialysis (B=2.047, p=0.001), number of comorbidities (B=3.915, p=0.001) were associated positively quality of life. While RLS (-4.872, p=0.001) and sleep quality (-3.928, p=0.001) were negatively associated with quality of life (Table III).

Table III: Linear regression analysis results

Variables	B	SE	p-value
length of haemodialysis	2.047	0.614	0.001
Number of comorbidities	3.915	0.142	0.001
RLS	-4.872	0.126	0.001
Sleep quality	-3.928	0.831	0.001

DISCUSSION

This study found that poor sleep quality is associated with a lower QOL among patients undergoing hemodialysis. Findings of this study consistent with previous study which reported that impaired sleep quality among HD has strong correlation with declining QOL among patients undergoing hemodialysis (24,25). Other study done by Hashem (25) reported that poor sleep quality is a stronger predictor of low quality of life than sleep duration, and it affects 70% of hemodialysis patients. It's supported by another study showed that poor sleep quality can lower their quality of life and increase mortality rates in hemodialysis patients (26). Moreover, Edalat-Nejad and Abdalla (27,28) highlighted that poor sleep quality significantly impacts QOL, particularly in the mental dimension. The study suggests that sleep-related issues are significant for many HD patients, suggesting the need for a comprehensive care plan that includes an assessment of sleep quality, daytime sleepiness, and QOL into the comprehensive care plan for HD patients.

The present study revealed a significant negative impact of RLS on quality of life. Consistent with previous study reported that patients with HD who experienced RLS exhibit a further decline in both their QOL and sleep quality (29). Also, Sabbatini (30) found a correlation between RLS and disrupted sleep quality, increased incidence of insomnia, and lower overall quality of life among patients with HD. Moreover, Unruh (31) revealed a correlation between RLS and QOL using the SF-36 questionnaire. Recent research suggests a two-way connection between RLS and depression (32), which contradicts the traditional view of RLS as merely a risk factor for depression which affect QOL. The chronic nature of RLS necessitates long-term therapy and significantly impacts the quality of life.

Additionally, this study found a correlation between the length of HD and QOL. The findings of a study conducted by Sethi (33) indicate that there exists an inverse relationship between the duration of dialysis treatment and the QOL experienced by patients. The study indicates that patients with less than 12 months of HD treatment had higher QOL scores in all four domains compared to those with more than 12 months of HD treatment. In contrast, other studies found that quality of life did not change significantly from the first to the last year of dialysis (34,35). Patients with long-term HD may experience lower QOL due to their initial expectation of kidney recovery and no longer needing treatment, as they come to accept the necessity of continued dialysis. There are some limitations to our study. The utilisation of self-report questionnaires in the study may add a potential source of bias known as recall bias. Furthermore, as a result of the sensitive nature of the data, participants may have provided incomplete or inaccurate information regarding their quality of life. The inability to demonstrate causal links between two variables is attributed to the cross-sectional design employed in this study. Despite the larger sample size and the inclusion of a diverse research group, consideration should be taken in extrapolating the findings of this investigation to the entire population of Indonesia.

CONCLUSION

The study revealed a negative correlation between higher scores on RLS and poor sleep quality, and the overall quality of life. Therefore, it appears vital for the relevant authorities and healthcare providers to create and implement the appropriate interventions to enhance sleep quality, reduce RLS, and enhance QOL in HD patients. Measures should be performed to treat RLS symptoms, enhance sleep quality, and increase QOL in HD patients.

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