



## Original Article

# Association of Restless Leg Syndrome with Sleep Quality and Fatigue in Chronic Kidney Disease Patients with and without Hemodialysis: A Cross-sectional Study

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## ABSTRACT

**Background:** Restless leg syndrome also known as Willis-Ekbom disease, is a neurosensory-motor illness that is characterized by a decrease in quality of life as well as unpleasant sensations that frequently manifest themselves when a person is sleeping or in late afternoon or evening. **Objective:** To determine the association of restless leg syndrome with sleep quality and fatigue in chronic kidney disease patients with and without hemodialysis. **Methods:** In this cross-sectional study data was collected from different hospitals of Lahore, Pakistan in six months after receiving approval of the synopsis from 151 individuals using non-probability convenient sampling. To be included in the study, participants aged between 18 to 75 years, undergoing dialysis at least two times a week and diagnosed with chronic kidney disease on medication or dialysis for at least 6 months. Participants with neurological or psychiatric diseases, compartment syndrome, varicose veins, lower limb surgery, active cancer, severe cognitive impairment or aphasia leading to difficulty in communication or being confined to bed or wheelchair. The mean and standard deviation were used to describe the variables. The chi-square test was conducted to determine if there was an association between restless leg syndrome, sleep quality and fatigue symptoms in hemodialysis patients and those who did not undergo it. **Results:** The study included 78 males (51.7%) and 73 females (48.3%). This table showed the mean and standard deviation of several different variables such as age, height, weight, body mass index, age at first dialysis (year), duration of dialysis, Pittsburgh sleep quality index and fatigue severity scale. It was indicated that patients on dialysis have higher scores as compared to those on medications as the p-value was found statistically significant. **Conclusion:** The association of restless leg syndrome with sleep quality and fatigue in chronic kidney disease patients with and without hemodialysis is significant. Furthermore, patients with this disease who are on hemodialysis have been found to have a higher prevalence as compared to those not on hemodialysis. This can affect sleep quality and fatigue in such patients and can exacerbate the symptoms.

<p>Access the article online</p>  <p>SCAN ME</p>	<p><b>*Corresponding Author:</b> Talha Ijaz, Government Mian Meer Hospital, Lahore</p> <p><b>Email:</b> ijaztalha13@gmail.com</p> <p><b>Keywords:</b> fatigue; hemodialysis; kidney disease; restless leg syndrome; sleep quality.</p>	<p><b>Citations:</b> Ijaz T, Syed S, Ashraf HS, Fatima M, Shehzadi H, Ahmed M. Association of restless leg syndrome with sleep quality and fatigue in chronic kidney disease patients with and without hemodialysis: A cross-sectional study. <i>The Healer Journal of Physiotherapy and Rehabilitation Sciences</i>. 2023;3(4):461-468.</p>
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## INTRODUCTION

Restless legs syndrome (RLS), commonly referred to as Willis-Ekbom disease, is characterized by uncomfortable or painful sensations in the legs in addition to an urge to move them in some way.<sup>1</sup> The manifestation of symptoms often takes place in the late afternoon or evening, and they are at their most severe throughout the night when a person is resting in a sedentary position such as sitting or lying in bed.<sup>2</sup> This syndrome is a neurosensory-motor condition that is related to a decrease in quality of life, as well as uncomfortable symptoms that most frequently manifest themselves when a person is asleep.

It might also be the consequence of a combination of these two factors (paraesthesia). In general, exercising the legs or going for a stroll may help to alleviate the sensations, which are generally worst at night and occur when a person is sleeping.<sup>3</sup> Its symptoms include mental haziness and agitation, which may impair a person's performance and family life; an increase in feelings of exhaustion interrupted sleep, stress and a deterioration in overall quality of life.<sup>4,5</sup> The number of patients who are affected by restless legs syndrome varies substantially from country to country.

However, a previous study carried out in Turkey revealed that the prevalence of RLS was 3.19%.<sup>6</sup> The range of people affected by RLS ranges from 6.6 to 70%.<sup>7</sup> In a study on the relationship between restless legs

syndrome and sleeplessness, they discovered that 54.5% of hemodialysis (HD) patients suffer from RLS. About 55% of 260 patients on dialysis were found to have restless legs.<sup>8,9</sup> Patients diagnosed with HD who also have mood disorders are at an increased risk of experiencing catastrophic consequences as a result of this disease.<sup>10</sup> A significant body of evidence also implies that HD patients who suffer from RLS and severe periodic limb movement disorder have an increased chance of passing away.<sup>11</sup> Renal disease may eventually lead to renal failure, in which case the only means of life are kidney transplantation or dialysis.<sup>12</sup>

In 2022 Ali et al conducted a cross-sectional observational study to determine the prevalence of RLS and related risk factors in hemodialysis patients with end-stage renal disease.<sup>13</sup> There is a link between RLS and hemodialysis duration however further large-scale research involving several centers is needed to uncover and analyze the explanation.<sup>14</sup>

Matar et al. in 2022 concluded that RLS is a clinical entity characterized by sensory-motor features that are commonly encountered in individuals with the end-stage renal illness.<sup>15</sup> According to a study, RLS is a complicated disorder caused by several critical elements such as genetic predisposition, dietary choices and vitamin deficiency. There are several therapeutic alternatives available.

Alternatively, it might be adjusted to each patient's unique traits by assessing a range of criteria.<sup>16</sup> In 2022 Brzuszek et al. concluded that researchers have limited knowledge about the etiology of RLS and the existing therapeutic choices for patients with chronic renal impairment.<sup>17</sup>

Patients with stage 4 (CKD-4), stage 5 pre-dialysis (CKD-5ND), or stage 5 hemodialysis-dependent CKD-5D were included in questionnaire-based cross-sectional research.<sup>18</sup> It is shown that the prevalence of RLS, as determined by validated measurements, is higher than previously reported.<sup>19</sup> Previous literature conducted compared the levels of exhaustion and sleep quality reported by those who had RLS and those who did not in the general population.<sup>20</sup> These patients that are on hemodialysis are prone to restless leg syndrome. The goal of this research was to investigate the prevalence of RLS in patients with CKD who receive or do not receive hemodialysis at various treatment centers. As RLS can affect patients' sleep duration and level of tiredness. This study aimed to find out the association between sleep quality and fatigue with RLS. The study was designed to determine the association of RLS with sleep quality and fatigue in CKD patients with and without HD.

## METHODS

This study was designed as a cross-sectional study and data was collected from four hospitals located in Lahore, Pakistan: University of Lahore Teaching Hospital, Sheikh Zaid Hospital, Jinnah Hospital, and Pakistan Kidney Liver Institute. The study was conducted for six months after receiving approval for the synopsis of 151 individuals. The participants for this study were selected using a non-probability convenient sampling technique. To be included in the study, participants aged between 18 to 75 years,

undergoing dialysis at least two times a week and diagnosed with CKD on medication or dialysis for at least 6 months. Participants with neurological or psychiatric diseases, compartment syndrome, varicose veins, lower limb surgery, active cancer, severe cognitive impairment or aphasia leading to difficulty in communication, being confined to bed or wheelchair, or being unwilling to sign the consent were excluded.

The questionnaire included demographic information and scales to assess the severity of restless leg syndrome, sleep quality, and fatigue symptoms. The patients provided their consent and their information was kept private. The mean and standard deviation were used to describe the variables. The chi-square test was conducted to determine if there was a link between restless leg syndrome, sleep quality, and fatigue symptoms in hemodialysis patients and those who did not undergo it.

## RESULTS

In Table I, the study included 78 males (51.7%) and 73 females (48.3%). Among them, 76 individuals (50.3%) were from the upper class, 46 (30.5%) were from the middle class and 29 (19.2%) were from the lower class. Almost 6 individuals (4%) were not hypertensive and 145 (96%) were hypertensive. Almost 130 of the participants (86.1%) were on dialysis. According to the rest leg syndrome rating scale, the study included 18 individuals (11.9%) who had no RLS symptoms, 29 individuals (19.2%) who had mild symptoms, 19 individuals (12.6%) who had moderate symptoms, 50 individuals (33.1%) had severe symptoms and 35 individuals (23.2%) had very severe symptoms.

According to the rest leg syndrome ordinal scale, the study included 62 individuals (41.1%) who had mild RLS symptoms and

**Table I: Demographics**

Variables		Frequency	Percent
Gender	Male	78	51.7
	Female	73	48.3
	Total	151	100.0
Socioeconomic status	Upper class	76	50.3
	Middle class	46	30.5
	Lower class	29	19.2
Hypertensive	No	6	4.0
	Yes	145	96.0
Dialysis Status	On Medications	21	13.9
	On Dialysis	130	86.1
Rest Leg Syndrome Rating Scale	None	18	11.9
	Mild	29	19.2
	Moderate	19	12.6
	Severe	50	33.1
	Very Severe	35	23.2
Rest Leg Syndrome Ordinal Scale	Mild	62	41.1
	Moderate	6	4.0
	Severe	42	27.8
	Very Severe	41	27.2

**Table II: Means and Standard Deviations of Different Variables**

Variables	Mean	Standard Deviation
Age	60.52	7.59
Height	67.85	3.51
Weight	163.81	2.76
BMI	25.29	1.34
Age at first dialysis (years)	57.83	7.72
Duration of dialysis	2.68	1.68
Pittsburgh sleep quality index	4.96	3.54
Fatigue severity scale	27.35	12.89

**Table III: Association between Dialysis Status and Rest Leg Syndrome Rating Scale**

		Rest Leg Syndrome Rating Scale					Total
		None	Mild	Moderate	Severe	Very Severe	
Dialysis Status	On Medications	7	12	2	0	0	21
	On Dialysis	11	17	17	50	35	130
Total		18	29	19	50	35	151

**Table IV: Pittsburgh Sleep Quality Index and Fatigue Severity Scale Scores**

Group Statistics	Dialysis Status	Mean	Std. Deviation	Mean difference	p-value
Pittsburgh Sleep Quality Index	On Medications	2.2857	1.41926	-3.10659	0.000
	On Dialysis	5.3923	3.59046		
Fatigue Severity Scale	On Medications	14.7143	4.19694	-14.67802	
	On Dialysis	29.3923	12.66105		

6 individuals (4% of the sample) had moderate symptoms, 42 individuals (27.8%) had severe symptoms and 41 individuals (27.2%) had severe symptoms. Whereas Table II showed that the mean and standard deviation of several different variables such as age, height, weight, body mass index (BMI), age at first dialysis (year), duration of dialysis, Pittsburgh sleep quality index and fatigue severity scale.

Table III showed the relationship between dialysis status and the RLS rating scale by displaying the frequency counts for each combination of the two variables. It can be seen that seven patients who are on medications have no rating scale and 12 patients who are on medications have a mild rating scale. Similarly, 11 patients who are on dialysis have no RLS Rating Scale, 17 patients who are on dialysis have a mild RLS rating scale. In Table IV, it was indicated that patients on dialysis have higher PSQI and FSS scores as compared to those on medications as the p-value was found statistically significant.

## DISCUSSION

This study compared patients who were on medications to those who were on dialysis. The study measured two different outcomes and found that patients on dialysis had significantly worse outcomes than those on medications for both measures. Specifically, the mean PSQI score was 5.39 for patients on dialysis as compared to 2.28 for patients on medications. The mean FSS score was 29.39 for patients on dialysis when compared to 14.71 for patients on medications. The p-value for both measures was less than 0.05, indicating that the difference in means between the two groups is statistically significant.

The relationship between two variables such as dialysis status and RLS rating scale. The table displayed the frequency counts for each

combination of the two variables. It had found that dialysis can cause disruptions to sleep patterns and contribute to feelings of fatigue and exhaustion, which can negatively impact the quality of life. The relationship between dialysis status and the RLS rating scale is also of interest. The frequency counts for each combination of the two variables suggested that patients on dialysis could be more likely to experience RLS, as indicated by a higher frequency count for this group. Zhang F et al. in 2022 had shown that RLS could be a common side effect of dialysis and that it can contribute to sleep disturbances and further exacerbate feelings of fatigue and exhaustion.<sup>21</sup>

In 2013 Jhamb M et al. conducted a study on education level and socio-economic status and had also shown that higher levels of education are often associated with higher socio-economic status and better employment opportunities. In this sample, the high representation of individuals who had graduated or completed some form of higher education supports this relationship.<sup>22</sup>

Kesik G et al. (2023) previously conducted studies that had also shown that sleep quality and fatigue can be affected by socioeconomic status and education level. Individuals from lower socio-economic backgrounds and those with lower levels of education are often more likely to experience poor sleep quality and increased fatigue due to a variety of factors, including increased stress, job insecurity and financial burdens.<sup>23</sup>

Giannaki CD et al. (2017) in light of these previous findings, the results from this sample, indicating a relatively equal distribution of socio-economic status and education level, suggested that the impact of these factors on sleep quality and fatigue may not be as pronounced in this specific population as compared to other populations.

However, this conclusion should be made with caution, as the sample size is relatively small and may not be representative of the larger population.<sup>24</sup>

According to studies, people with CKD and RLS are more likely to have daytime drowsiness, as well as insomnia and other sleep disturbances. Furthermore, weariness may increase RLS symptoms and it may contribute to the general exhaustion that CKD patients suffer. Finally, there is a significant link between RLS and the quality of sleep and exhaustion described by CKD patients, especially those taking HD. It is critical for healthcare providers to be aware of this link and to screen for RLS, as early detection and treatment may improve sleep quality and

decrease tiredness.<sup>25</sup>

This study is observational, which limits the ability to establish causality between restless leg syndrome, sleep quality and fatigue in CKD patients. There may be difficulties in accurately measuring sleep quality and fatigue in this population. The use of medications for treating RLS and CKD may affect the results. Adequate sleep and hygiene practices such as avoiding stimulants before bedtime and creating a relaxing sleep environment are recommended. More research is needed to fully understand the underlying mechanisms of RLS in CKD patients and to develop effective interventions to improve sleep quality and reduce fatigue in these patients.

## CONCLUSION

In conclusion, the association of restless leg syndrome with sleep quality and fatigue in chronic kidney disease patients with and without hemodialysis is strong. Furthermore, patients with CKD who were on HD have been found to have a higher prevalence of RLS compared to those who were not on HD.

Additionally, RLS can affect sleep quality and fatigue in CKD patients and can exacerbate the overall fatigue experienced by these patients.

## DECLARATIONS

**Consent to participate:** Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

**Availability of data and materials:** Data will be available on request. The corresponding author will submit all dataset files.

**Competing interests:** None

**Funding:** No funding source is involved.

**Authors' contributions:** All authors read and approved the final manuscript.

## REFERENCES

1. Solak B, Acikgoz SB, Sipahi S, Erdem TJJ, nephrology. *Epidemiology and determinants of pruritus in pre-dialysis chronic kidney disease patients.* 2016; 48(4): 585-91.
2. Turk AC, Ozkurt S, Turgal E, Sahin FJSMJ. *The association between the prevalence of restless leg syndrome, fatigue, and sleep quality in patients undergoing hemodialysis.* 2018; 39(8): 792.
3. Trenkwalder C, Allen R, Högl B, et al. *Comorbidities, treatment, and pathophysiology in restless legs syndrome.* 2018; 17(11): 994-1005.
4. Ghasemi H, Khaledi-Paveh B, Abdi A, et al. *The prevalence of restless legs syndrome in patients with migraine: a systematic review and meta-analysis.* 2020; 2020.
5. Darvishi N, Daneshkhah A, Khaledi-Paveh B, et al. *The prevalence of Restless Legs Syndrome/Willis-ekbom disease (RLS/WED) in the third trimester of pregnancy: a systematic review.* 2020; 20(1): 1-7.
6. Silber MH, Buchfuhrer MJ, Earley CJ, et al. *The management of restless legs syndrome: an updated algorithm.* *Mayo Clinic Proceedings;* 2021: Elsevier; 2021. p. 1921-37.

7. Padmashali A, Babu G, Matkar AVJIJoIP. Prevalence of Sleep Disorders in Patients with Chronic Kidney Disease on Hemodialysis and Its Impact on The Quality of Life. 2019; 7(1).
8. Riar SK, Greenbaum LA, Bliwise DL, Leu RMJJoCSM. Restless legs syndrome in chronic kidney disease: is iron or inflammatory status to blame? 2019; 15(11): 1629-34.
9. Yatsu S, Kasai T, Suda S, et al. Prevalence of restless legs syndrome and its effects on sleep and health-related quality of life in patients with heart failure. 2019; 25(10): 837-42.
10. Akizawa T, Otsuka T, Reusch M, Ueno MJTA, Dialysis. Intermittent oral dosing of roxadustat in peritoneal dialysis chronic kidney disease patients with anemia: a randomized, phase 3, multicenter, open-label study. 2020; 24(2): 115-25.
11. Demir ÜFJJoS, Medicine. Sleep quality & prevalence of restless legs syndrome among healthcare professionals. 2020; 4(2): 144-7.
12. Manconi M, Garcia-Borreguero D, Schormair B, et al. Restless legs syndrome. 2021; 7(1): 1-18.
13. Brown LK, Unruh ML. Sleep disorders in chronic kidney disease. *Chronic Renal Disease*: Elsevier; 2020: 571-92.
14. Ali M, Junejo AM, Kumar V, Ejaz A, Iram H, Ahmed SJTPMJ. Restless leg syndrome and associated factors in patients with end-stage renal disease on haemodialysis. 2022; 29(07): 975-80.
15. Brusola G, Garcia E, Albosta M, Daly A, Kafes K, Furtado MJN. Effectiveness of physical therapy interventions on post-stroke spasticity: An umbrella review. 2023; (Preprint): 1-15.
16. Matar SG, El-Nahas ZS, Aladwan H, et al. Restless Leg Syndrome in Hemodialysis Patients: A Narrative Review. 2022: 10.1097.
17. Brzuszek A, Hazara AM, Bhandari SJIU, Nephrology. The prevalence and potential aetiological factors associated with restless legs syndrome in patients with chronic kidney disease: a cross-sectional study. 2022; 54(10): 2599-607.
18. Jhamb M, Liang K, Yabes J, et al. Prevalence and correlates of fatigue in chronic kidney disease and end-stage renal disease: are sleep disorders a key to understanding fatigue? 2013; 38(6): 489-95.
19. Brzuszek A, Hazara AM, Bhandari SJIU, Nephrology. The prevalence and potential aetiological factors associated with restless legs syndrome in patients with chronic kidney disease: a cross-sectional study. 2022: 1-9.
20. Kambampati S, Wasim S, Kukkar V, Awad VM, Malik BHJC. Restless leg syndrome in the setting of patients with end-stage renal disease on hemodialysis: a literature review. 2020; 12(8).
21. Zhang F, Wang H, Huang L, et al. Effect of exercise interventions for sleep quality in patients with chronic kidney disease: a systematic review and meta-analysis. 2022: 1-12.
22. Jhamb M, Liang K, Yabes J, et al. Prevalence and Correlates of Fatigue in CKD and ESRD: Are Sleep Disorders a Key to Understanding Fatigue? 2013; 38(6): 489.
23. Kesik G, Altinok Ersoy NJTA, Dialysis. The Effect of Nonpharmacologic Interventions for Muscle Cramps and Restless-Leg Syndrome in Hemodialysis Patients: A Meta-analysis of Randomized Controlled Trials. 2023.
24. Giannaki CD, Hadjigavriel M, Lazarou A, et al. Restless legs syndrome is contributing to fatigue and low quality of life levels in hemodialysis patients. 2017; 6(5): 236.
25. Chavoshi F, Einollahi B, Haghghi KS, Saraei M, Izadianmehr NJN-UM. Prevalence and sleep related disorders of restless leg syndrome in hemodialysis patients. 2015; 7(2).