Prevalence, Severity, and Determinants of Restless Legs Syndrome Among Patients on Maintenance Hemodialysis: A Cross-Sectional Study

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Abstract

Background: Restless Legs Syndrome is a frequent neurological disorder in patients receiving hemodialysis. It causes sleep disturbance, fatigue, and reduced quality of life, yet data on its occurrence in Iraq are scarce.
Aim of the study: To determine the prevalence, severity, and associated factors of Restless Legs Syndrome among individuals undergoing chronic hemodialysis**.**
Subjects and Methods: A cross-sectional study was conducted from February to October 2025 at two hemodialysis centers in the Kurdistan Region of Iraq. Adult patients who had been on regular hemodialysis for at least three months were included, while those with neurological diseases or taking drugs known to trigger Restless Legs Syndrome were excluded. Diagnosis and assessment of severity followed the criteria of the 2014 International Restless Legs Syndrome Study Group. Demographic and clinical variables, including age, sex, body mass index, duration and adequacy of dialysis, and causes of kidney failure, were analyzed**.**
Results: Among 163 participants, 28.2 % had Restless Legs Syndrome (mean age 50.1 ± 14.2 years; 55.2 %female). The condition was more common in women, obese patients, those with dialysis duration exceeding five years, and those with inadequate dialysis. No association was found with age, frequency of dialysis, or cause of kidney disease. Of the affected patients, 11% had very severe symptoms, and 59% had moderate to severe symptoms**.**
Conclusion: Restless Legs Syndrome is common among hemodialysis patients, particularly women, obese individuals, and those with prolonged or insufficient dialysis. Early screening and management of risk factors may improve outcomes.

Keywords: Chronic Kidney Disease, Hemodialysis, Restless Legs Syndrome.

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Introduction

Restless Legs Syndrome (RLS), or Willis-Ekbom syndrome, is a neurological disorder that causes an uncontrollable urge to move the legs, often accompanied by discomfort. Symptoms typically worsen at rest, especially in the evening or night, and improve with movement, significantly affecting daily activities, sleep, and quality of life. Patients with chronic kidney disease, particularly those on maintenance hemodialysis, are at higher risk of RLS, which can increase fatigue, impair cognition, and reduce adherence to dialysis. Prevalence among hemodialysis patients ranges from 20% to 62%, influenced by patient

demographics, diagnostic criteria, and dialysis practices. [1-4]

Restless Legs Syndrome is primary or secondary. Primary often runs in families and affects those over 45, while secondary is linked to conditions like iron deficiency, pregnancy, uremia, and diabetes.[5]

Approximately 5-15% of the general population has RLS. [6] Patients with RLS may feel melancholy, low quality of life, excessive daytime sleepiness, and sleeplessness as a result of their restlessness. It may need long-term care if it worsens and becomes a debilitating, chronic illness. [7]

Several clinical and demographic factors are linked to RLS in hemodialysis patients. Female sex may increase risk due to hormonal, dopaminergic, and iron metabolism differences. Obesity (BMI ≥30 kg/m²) is associated with a higher prevalence, likely through metabolic dysfunction, nerve impairment, and inflammation. Dialysis-related factors, including longer duration and inadequate treatment, also contribute: patients on long-term or insufficient dialysis (Kt/V < 1.2) are more likely to develop RLS due to toxin buildup, metabolic stress, and vascular changes.[8]

Research utilizing the International Restless Legs Syndrome Study Group's (IRLSSG) criteria to evaluate the prevalence of RLS. The IRLSSG established and updated the fundamental criteria for diagnosing RLS in 2014. [9]

In patients with Restless Legs Syndrome, symptoms often begin at sleep onset, delaying sleep and reducing sleep quality. Sleep disturbances affect 50–80% of people with uremia, leading to fatigue linked to metabolic, endocrine, and hematopoietic imbalances, as well as fluid and electrolyte dysregulation. Overall, 60–97% of these patients experience persistent fatigue.[10]

Research on the ESRD population has shown that RLS is connected to a lower quality of life and a higher death rate. Even though restless legs syndrome (RLS) is linked to higher rates of illness and death in people with end-stage renal disease (ESRD), it is often ignored in dialysis centers. [11]

Because RLS has such a significant impact on the health and well-being of hemodialysis patients, it is essential to screen and intervene in specific ways. Recognizing modifiable risk factors, such as obesity and dialysis adequacy, can inform preventive strategies, improve patient management, and enhance quality of life. Accordingly, this study examines the prevalence and severity of Restless Legs Syndrome among Iraqi patients undergoing maintenance hemodialysis, using the International Restless Legs Syndrome Study Group (IRLSSG) rating scale, and explores associated demographic and clinical factors, including body mass index, dialysis duration, and dialysis adequacy. The findings are expected to provide region-specific evidence to inform clinical practice and support strategies aimed at

reducing the impact of RLS in hemodialysis populations. [12-14]

This study aims to determine the prevalence of Restless Legs Syndrome (RLS) among patients on maintenance hemodialysis, to explore associated demographic and clinical factors, and to evaluate symptom severity using the IRLSSG rating scale.

Patients and Methods

This cross-sectional observational study was conducted in two hemodialysis units (Qirga and Shar hospitals) in Sulaimani city, Kurdistan region, Iraq, from February to October 2025. Adult patients aged 18 years or older, undergoing maintenance hemodialysis for at least three months, who were able to provide informed consent and complete structured questionnaires, were consecutively recruited during regular dialysis sessions. Individuals experiencing acute kidney injury, undergoing temporary dialysis, or currently receiving medications known to induce RLS symptoms (e.g., antidepressants, antipsychotics, sedating antihistamines, dopamine antagonists such as metoclopramide) were excluded. Individuals exhibiting cognitive impairment, severe psychiatric disorders, or substantial comorbidities that obstructed participation were similarly excluded. Patients with clinical evidence or previous diagnoses of peripheral neuropathy, radiculopathy, Parkinsonism, or other movement or sensory disorders that could resemble or obstruct RLS were excluded. The RLS assessment included only patients without these illnesses or with well-managed neurological disorders.

To ensure accurate diagnosis of Restless Legs Syndrome (RLS) and mitigate the influence of other neurological disorders, all patients underwent a focused neurological assessment. People with diabetes mellitus or high blood pressure were given extra attention because they are more likely to get peripheral neuropathy or cerebrovascular problems. Demographic and clinical data were collected from patient medical records and direct interviews, including age, sex, body mass index (BMI), duration of dialysis, frequency of dialysis, session length, and adequacy of dialysis. The single-pool Kt/V method, which measures urea clearance during a dialysis session, was used to assess the dialysis's effectiveness. Blood samples taken before and after dialysis were used to measure serum urea levels. We used the Daugirdas formula to find Kt/V. This formula takes into account the post-/pre-dialysis urea ratio, the length of the dialysis session, the volume of ultrafiltration, and the weight after dialysis. A Kt/V of 1.2 or higher indicates that dialysis is adequate, while a Kt/V of less than 1.2 indicates that it is not effective. [15,16]

The diagnosis of RLS was determined based on the guidelines set by the 2014 International Restless Legs Syndrome Study Group (IRLSSG). Patients were classified as RLS-positive if they met all four diagnostic criteria: an urge to move the legs typically linked with

uncomfortable sensations, symptoms that commence or intensify during rest or inactivity, partial or complete relief through movement, and worsening of symptoms in the evening or night compared to daytime. Structured interviews were conducted during dialysis sessions, with responses verified by a qualified nephrology nurse to ensure accuracy. To make the diagnosis more specific, patients with disorders that looked like RLS were left out. [1,2]

The severity of RLS symptoms was measured using the 10-item IRLSSG rating scale (IRLS). This scale looks at how often, how bad, and how much RLS affects daily life and sleep. Each item gets a score from zero (no symptoms) to forty (very severe), so the total score can be anywhere from zero to forty. We found moderate-to-severe levels between 11 and 30, and very severe levels between 31 and 40. Trained professionals gave the scale, and patients talked about symptoms they had in the week before. [12,17]

The ethical committee of Sulaimani College of Medicine approved the project with document number 385 on 17/11/2024, and all participants signed a form indicating they understood what they were doing.

Statistical analyses were performed using SPSS version 24. Counts and percentages were used to show categorical data, while mean ± standard deviation or median (interquartile range) were used to show continuous variables. For categorical variables, Chi-square or Fisher's exact tests were used, and for continuous variables, independent t-tests or Mann–Whitney U tests were used. The prevalence was reported with 95% confidence intervals, and a p-value of less than 0.05 was considered statistically significant.

Results

This study included 163 patients on maintenance hemodialysis, comprising 90 females (55.2%) and 73 males (44.8%). Patients received treatment at two facilities in Sulaimani: Qirga (n = 101) and Shar (n = 55). The age distribution was as follows: 18–30 years (n = 29, 17.8%), 31–50 years (n = 47, 28.8%), 51–70 years (n = 81, 49.7%), and 71–80 years (n = 6, 3.7%). The average age of the cohort was 50.1 ± 14.2 years, with an age range of 18 to 80 years.

The distribution of body mass index (BMI) comprised underweight (n = 33, 20.2%), normal weight (n = 80, 49.1%), overweight (n = 50, 30.7%), and obese (n = 30, 18.4%). The median BMI was 24.7 kg/m², with a range of 16 to 38 kg/m².

The length of dialysis among patients was less than 1 year in 20.1%, between 1 and 5 years in 64.7%, and greater than 5 years in 15.2%. The median duration of dialysis was 3.2 years, with a range of 0.3 to 12 years. According to the availability of dialysis machines, the duration of dialysis sessions varied: less than 3 hours (24.0%),

between 3 and 3.5 hours (70.1%), and 3.5 hours or more (5.9%). The frequency of dialysis was once per week (5%), twice per week (45%), and three times per week (50%).

Using Kt/V to measure dialysis adequacy, 73.5% of patients had adequate dialysis (≥1.2), and 26.5% did not (<1.2). Adequate dialysis means that uremic toxins and fluids are being removed well enough to lower the risk of complications. Table 1 shows all of these results.

The primary etiologies of end-stage renal disease (ESRD) included diabetes mellitus, affecting 36 patients (22.1%), and hypertension, involving 31 patients (19.0%). Additional causes comprised glomerular diseases (22 patients, 13.5%), urological disorders (21 patients, 12.9%), inherited kidney diseases (10 patients, 6.1%), other causes (9 patients, 5.5%), and unknown etiology (34 patients, 20.9%). Refer to Table 2 for details.

Out of the 163 patients undergoing maintenance hemodialysis, 46 (28.2%) were diagnosed with Restless Legs Syndrome (based on the guidelines set by the 2014 International Restless Legs Syndrome Study Group). There was a much higher rate of female patients than male patients (37.5% vs 19.3%, p = 0.016). The prevalence of RLS was significantly higher in obese patients compared to non-obese patients (40.0% vs 18.4%, p = 0.004). The duration of dialysis was a significant factor: patients on dialysis for more than 5 years had a prevalence of 41.8%, compared to 18.0% among those with less than 1 year of dialysis (p = 0.015). Dialysis adequacy showed a strong link, with 38.3% of patients not receiving enough dialysis (Kt/V <1.2) and 17.5% receiving enough dialysis (p = 0.006), as shown in Table 3.

The examination of end-stage renal disease (ESRD) etiologies indicated a minor fluctuation in the prevalence of RLS among various categories. The prevalence of RLS in patients with diabetes mellitus was 33.3%, compared to 32.3% in those with hypertension. 23.8% of the cases were due to urological causes. The rate of this disease among people with glomerular diseases was 31.8%. Twenty percent of the patients had inherited kidney diseases, while thirty-three percent had other causes. 20.6% of people with ESRD who didn't know what caused it had the lowest prevalence. Table 4 shows the results.

In a cohort of RLS-positive patients (n = 46), 14 (30%) exhibited mild conditions, 27 (59%) presented with moderate-to-severe symptoms, and 5 (11%) experienced extremely severe RLS, as evaluated by the International Restless Legs Syndrome Study Group (IRLSSG) scale. This is shown in Table 5.

Discussion

Among this cohort of 163 maintenance hemodialysis patients, the prevalence of Restless Legs Syndrome (RLS) was 28.2%. Female sex, obesity (BMI ≥30), extended dialysis duration (>5 years), and insufficient dialysis adequacy (Kt/V <1.2) were strongly correlated with an increased prevalence, but age, dialysis frequency, and session length exhibited no consistent correlations. Among the affected individuals, 54% exhibited moderate-to-severe symptoms as per the IRLSSG scale, underscoring the clinical impact of RLS in this demographic. [1]

Our findings are consistent with regional data from Iraq. A study in Mosul found that 28.7% of hemodialysis patients had RLS, which is very close to our overall findings. Similar to our cohort, a greater prevalence of RLS was observed in female and obese patients, suggesting that sex and BMI are important risk factors in the Iraqi population.[15.16] These data underscore the need for routine screening, particularly in high-risk subgroups.

Studies from several Middle Eastern countries indicate that the prevalence of Restless Legs Syndrome (RLS) among hemodialysis patients varies. For example, in Mashhad, Iran, the prevalence was reported at 55%, with a higher incidence in males. These differences in prevalence are likely influenced not only by variations in study populations but also by differences in dialysis methodology. Differences in patient characteristics may explain variations in RLS prevalence. Older age, sex distribution, and the presence of comorbidities such as diabetes or peripheral neuropathy can influence susceptibility. Dialysis methodology can vary in several ways, including the duration of each session (shorter duration), less frequency of dialysis per week, type of dialysis membrane, blood flow rates, and overall higher percentage of inadequacy of dialysis measured by solute clearance (e.g., Kt/V). Such variations can affect uremic toxin accumulation and metabolic stress, both known contributors to RLS. Our findings, in agreement with studies from Iraq and Iran, suggest that both prolonged dialysis duration and inadequate dialysis—reflected by insufficient removal of toxins—are significant risk factors for the development of RLS. [5,8,17]

Meta-analyses reveal a global prevalence of restless legs syndrome (RLS) at around 27% among hemodialysis patients, with a higher incidence in females (29.7% versus 23.5%). The findings corroborate this trend, particularly concerning the elevated prevalence among female and obese patients, documented at 37.5% and 40%, respectively. 38.3% of people who didn't get enough dialysis had RLS, compared to 17.5% of those who did. This highlights the importance of adequate dialysis to reduce the risk of RLS. [18,19]

Our study demonstrates that modifiable clinical factors substantially influence the prevalence of RLS in hemodialysis patients. Excluding fluid overload, obese patients (BMI ≥30) exhibited a prevalence of 40%, compared to 18.4% in non-obese individuals, highlighting the potential influence of excess weight on peripheral nerve dysfunction and dopaminergic dysregulation. A 41.8% prevalence was observed in patients who had been on dialysis for more than five years, whereas only 18.0% of those on dialysis for less than one year had the condition. This shows that cumulative metabolic and neurological stress is a significant cause of RLS.

Insufficient dialysis (Kt/V <1.2) significantly increased the prevalence of RLS to 38.3%, compared to 17.5% in patients receiving adequate dialysis, highlighting the critical importance of dialysis adequacy in mitigating symptoms. Our data collectively identify obesity, dialysis duration, and insufficient dialysis as essential targets for intervention to alleviate the burden of RLS in the hemodialysis population.[8,15,17,19]

Conclusion

Around one-third of Iraqi hemodialysis patients have Restless Legs Syndrome (RLS), and it is more common in women, people who are overweight, and people who have been on dialysis for a long time or not enough. Regular screening and addressing modifiable risk factors are key to improving sleep, enhancing quality of life, and boosting treatment outcomes in this population.

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