

01. Title: Sleep Disorders and Restless Legs Syndrome among Patients on Maintenance Hemodialysis in Pakistan: A Multicentre Cross-Sectional Study

Fatima Nazir¹, Ayesha Ahmad², Rameen Khalid¹, Farhan Nazir³, Muhammad Ahmad Khalid¹, Haseeba Mukhtar², Tabraiz Amin Malik⁴, Musfira Abu Bakar⁴, Muskan Kumari⁵, Faraz Iqbal Khaskheli⁵, Muhammad Younas⁶, Shaheryar Khan⁷

¹Rawalpindi Medical University, ²Khyber Medical University, ³Sargodha Medical College, ⁴CMH Kharian Medical College, ⁵Liaquat University of Medical & Health Sciences (LUMHS) - Jamshoro, ⁶Gomal Medical College, ⁷Bolan university of medical and health sciences, Quetta

Background: Sleep disorders are highly prevalent yet underdiagnosed among patients receiving maintenance hemodialysis, contributing to impaired quality of life, poor treatment adherence, and increased morbidity. Evidence from Pakistan is limited, especially across multiple provinces.

Aim: This study aims to determine the prevalence of insomnia, high obstructive sleep apnea (OSA) risk, and restless legs syndrome (RLS), and to identify their associated demographic and clinical predictors among hemodialysis patients in Pakistan.

Methods: This study was a multicentre cross-sectional study conducted between May 15th and November 25th, 2025, in 12 dialysis centres, public (n=8) and private (n=4), located across all four provinces. The participants were a total of 361 adults, estimated via OpenEpi (version 3.01), and an estimated prevalence of sleep disorders of 62.5%. Patients with hemodialysis for at least 3 months were included. Exclusion criteria consisted of having active psychiatric conditions, cognitive deficits, or an acute medical condition at the time of assessment. Data collection was performed by convenience sampling through structured interviews using tools: the Athens Insomnia Scale for insomnia, Berlin Questionnaire for OSA, and IRLSSG diagnostic and Rating Scale. Data were analysed using R version 4.5.0. Continuous data were compared using the Wilcoxon rank sum test; categorical data were compared using chi-square tests. A multivariable logistic regression model was used to determine which variables predicted insomnia, obstructive sleep apnoea, and restless legs syndrome (RLS). Adjusted odds ratios (AOR) and associated 95% confidence intervals were reported. Tukey's Honestly Significant Difference was used to adjust for multiple comparisons. The fit and discrimination of the models were evaluated using Nagelkerke's R^2 , receiver operating characteristic (ROC) curves, and corresponding Hosmer-Lemeshow tests.

Results: The median age was 47 years (IQR 36–59); 59.6% were male. The prevalence of sleep disorders was high: insomnia 63.2%, high OSA risk 46.0%, and RLS 67.0%. Among RLS cases, 45% had moderate and 21% had severe/very severe symptoms. Use of hypnotic medications (AOR 3.93, $p = 0.015$) significantly increased RLS likelihood. There was a greater likelihood of RLS for participants with lower educational attainment (i.e., completed years of schooling of ≤ 9 or 10–12) as compared to participants with ≥ 12 years of completed schooling. Age, gender, BMI, hypertension, and diabetes were not significant predictors. Severe RLS (AOR 4.72, $p < 0.001$), older age (AOR 1.02/year, $p = 0.028$),

overweight BMI (AOR 3.85, $p = 0.001$), and insulin use (AOR 3.86, $p = 0.010$) significantly increased the odds of insomnia. While for high OSA risk, older age was the strongest determinant (AOR 1.04/year, $p < 0.001$). Female sex showed a trend toward higher risk (AOR 1.53, $p = 0.068$). Education levels did not significantly influence risk after adjustment.

Model discrimination was acceptable (AUCs: insomnia 0.775, OSA 0.679, RLS 0.669), with excellent calibration across all models.

Conclusion: Sleep disorders are highly prevalent among hemodialysis patients in Pakistan, with RLS emerging as a major contributor to insomnia. Routine screening with validated tools and implementation of targeted, low-cost interventions are essential to improve patient well-being in resource-limited dialysis settings.

Key Words: Renal Dialysis, Restless Legs Syndrome, Insomnia, Obstructive Sleep Apnea, Sleep Disorders

Figure : Prevalence of Sleep disorders among hemodialysis patients

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

ISSN 2076-6327

This journal is published by [Pitt Open Library Publishing](https://pittopenlibrarypublishing.com/)

