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Original Article

An Observational Analysis of Sleep and Quality of Life in Patients with End-Stage Renal Disease

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ABSTRACT

Background: While working with patients on hemodialysis, we often heard them complain about restless nights. Some couldn't fall asleep, others woke up too early, and many felt drained during the day. These weren't just occasional issues; they were affecting how people lived, interacted, and felt. And yet, in the middle of lab reports, dialysis schedules, and medication adjustments, these sleep problems were rarely addressed. That gap led me to ask a simple question: how often are ESRD patients struggling with sleep, and what impact is it having on their quality of life. **Objectives:** This study set out to find just how widespread sleep problems are among ESRD patients on regular hemodialysis. Beyond that, we wanted to understand the kinds of sleep issues they face and how these problems might be affecting the way they experience life day to day. **Material and Methods:** From August 2023 to March 2024, we carried out a study at Dharashiv District Government Hospital. After receiving ethics committee approval, we recruited 110 adult ESRD patients who had been on dialysis for at least three months. They were selected using convenience sampling, mostly based on who was available during clinic hours. For sleep assessment, we used the Pittsburgh Sleep Quality Index (PSQI). For quality of life, we turned to the KDQOL-36 questionnaire. Both are tools we trusted for being easy to use and widely accepted. Data analysis was done in SPSS version 25. To look for relationships, we used Pearson's correlation, and for comparing groups, t-tests and ANOVA came in handy. **Results:** Nearly every patient, about 95% reported poor sleep (PSQI>5). The bad sleep scores were seen in those between 51 and 60 years old**.** The link between bad sleep and low quality of life was strong and clear (r=-0.65, p<0.01**).** What stood out even more was that women and patients with diabetes had worse quality of life scores than others, which didn't surprise me based on what we saw in day-to-day interactions. **Conclusion:** This study confirms what many of us working with dialysis patients already suspect: poor sleep is everywhere, and it's hurting lives. It's not just about being tired-it's about feeling like you can't function, enjoy, or cope. We strongly believe we should start screening patients regularly for sleep problems. Even small steps like offering sleep hygiene tips or just listening more closely could help make patients feel better supported.

Keywords: End-stage renal disease, Hemodialysis, Sleep Quality, Health-related quality of life, Pittsburgh Sleep Quality Index, KDQOL-36

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INTRODUCTION

End-Stage Renal Disease (ESRD) marks the final and most severe phase of prolonged kidney disease (CKD), where the kidneys decrease their ability to function permanently. At this stage, patients rely on renal replacement therapy, usually hemodialysis, to remain alive. Unluckily, as ESRD cases continue to grow worldwide, especially in low- and middle-income countries, the limited access to kidney transplantation means that dialysis remains the primary treatment option for most individuals (Agarwal and Srivastava, 2009; Al-Jahdali *et al*., 2010). While hemodialysis can prolong life, it also carries with it a range of hardships-physical drowsiness, mental stress, financial burden, and emotional strain. These factors often combine to severely affect a patient's Quality of Life (QOL), making day-to-day living harder than it already is (Al-Jahdali *et al*., 2010).

One of the more silent yet deeply troubling issues in ESRD is sleep disturbance. It's surprisingly common-research suggests that anywhere from 50% to 80% of patients on dialysis struggle with poor sleep. These problems can appear in different ways: difficulty falling or staying asleep, restless legs, sudden limb movements, disrupted breathing during sleep, or even an entirely flipped sleep-wake schedule. The causes behind these issues are

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rarely simple-they can stem from uremia, shifts in body fluids, imbalanced blood chemistry, anemia, the timing of dialysis sessions, medications, and even mental health conditions like anxiety and depression. Sadly, many of these symptoms either go silent in patients or are unnoticed by healthcare providers (Bhandari *et al*., 2017; Buysse, 2014).

And sleep isn't just a small inconvenience; it plays an essential role in overall health. For people with ESRD, not getting quality rest can lead to chronic fatigue, memory-related problems, reduced ability to follow medical advice, and a greater risk of heart-associated difficulties or even death (Buysse *et al*., 1989). Beyond that, poor sleep can affect mood, relationships, and the ability to perform daily activities, ultimately affecting every part of a person's life. That's why addressing sleep-related issues should be seen as a key part of patient care, not just an afterthought (Buysse *et al*., 1989; Chen *et al*., 2006).

In recent years, more attention has been given to a concept known as health-related quality of life (HRQOL). Unlike lab tests or imaging results, HRQOL targets how patients feel physically, emotionally, and socially while living with a chronic condition like ESRD. In nephrology, this idea is gaining traction because it offers a more complete picture of a patient's well-being. HRQOL is now identified as an important predictor of outcomes like hospital admissions and even survival (Elder *et al*., 2008). Among the many factors that influence HRQOL in dialysis patients, sleep quality stands out. Numerous studies have found a clear link: the worse the sleep, the lower the quality of life (Hays *et al*., 1994).

Tools like the Pittsburgh Sleep Quality Index (PSQI) and the KDQOL-36 questionnaire are often used to understand how sleep and kidney disease affect people. The PSQI helps measure different aspects of how someone sleeps, like how long they take to fall asleep or how well they rest, while the KDQOL-36 looks at both general health and kidney-related concerns. These assessments are proven and useful, but surprisingly, they aren't often used in daily hospital practice, especially in government-run settings (Hays *et al*., 1994).

In India, and particularly in public hospitals with fewer resources, there's still not much data on how sleep problems impact patients who are on dialysis. Most of the research so far comes from larger hospitals or private clinics, leaving out people who receive care at district hospitals. But these centers serve a huge number of ESRD patients. Local factors-like different patient backgrounds, other health issues, and how dialysis is done-can change how sleep problems show up or how bad they get. That makes it harder to apply findings from bigger hospitals to these settings (Hays *et al*., 1997).

That's why this study was carried out to take a closer look at sleep issues in ESRD patients getting dialysis at a government hospital in Maharashtra. It not only looks at how common these sleep issues are, but also how they relate to patients' overall well-being, using tools like the PSQI and KDQOL-36. By spotting which patients are most affected and what might be causing their sleep problems, the study hopes to offer insight into improving care. These kinds of findings could lead to more focused support and a better quality of life for people living with chronic kidney disease in places that are often overlooked.

MATERIALS AND METHODS

Study Design and Setting

This study was carried out between August 2023 and March 2024 at the District Government Hospital in Dharashiv, Maharashtra, a public healthcare facility that serves a large number of dialysis patients from rural and low-income areas. The main objective was to explore how sleep issues affect the day-to-day lives of people receiving regular hemodialysis for End-Stage Renal Disease (ESRD).

Ethical Approval

Before starting, we obtained formal approval from the hospital's Institutional Ethics Committee**.** Each participant was fully informed about the study's aim, and written consent was taken. We made sure that joining the study was entirely up to the patient; no one was forced or pressured.

Participants

A total of 110 adult patients who had been receiving hemodialysis three times a week for at least three months were included. Patients were selected using a non-random (convenience) method. Those included were 18 years or older and diagnosed with chronic kidney failure. We excluded patients with acute kidney injury, those who had undergone kidney transplants, or those with serious mental or neurological illnesses, as these could affect sleep or mental well-being independently.

Data Collection Tools

We used two well-known tools to gather information.

Pittsburgh Sleep Quality Index (PSQI)

This is a self-reported questionnaire made up of 19 items. It looks at different aspects of sleep, such as how long people take to fall asleep, how many hours they sleep, and how often their sleep gets disturbed. A total score above 5 means the person is likely not sleeping well (Iliescu *et al*., 2003).

Kidney Disease Quality of Life-36 (KDQOL-36)

This is a special survey used for kidney patients. It includes general health questions from the SF-12 scale, along with 24 items that ask about symptoms of kidney disease, daily activities, emotional health, and how much the condition interferes with their life (Iliescu *et al*., 2003).

To make sure patients felt comfortable and understood everything, interviews were done in either Marathi or Hindi, depending on the patient's preference. Trained staff helped fill in the forms while patients were either at the dialysis center or attending follow-up clinic visits.

Procedure

We gathered data through personal interviews to reduce the risk of misunderstanding due to literacy issues. In addition to sleep and quality-of-life scores, we also collected basic details like age, gender, existing illnesses (like diabetes and hypertension), and how long they had been on dialysis.

Analysis

The data were entered into Microsoft Excel and analyzed using SPSS version 25. We used simple statistics like averages, percentages, and standard deviations to describe the population. To see if sleep quality affected quality of life, we used Pearson correlation. We also compared different groups (like men vs. women, older vs. younger patients) using *t*-tests and ANOVA. A *p*-value below 0.05 was treated as statistically significant.

RESULTS

Participant Profile

The study included 110 patients diagnosed with End-Stage Renal Disease (ESRD) who were on maintenance hemodialysis. The average age of participants was around 54.6 years, with the majority falling in the 51-60 age group (about 41%). Among the total group, 71 were men (64.5%) and 39 were women (35.5%) (Iliescu *et al*., 2004; Jha *et al*., 2013).

When it came to other health issues, a large number of patients also had high blood pressure (85.4%), and almost half were living with diabetes (48.2%). These numbers line up closely with trends seen in other Indian studies involving ESRD patients.

Sleep Patterns and Disturbances

We used the Pittsburgh Sleep Quality Index (PSQI) to understand how well patients were sleeping. The results were striking: almost everyone, about 95% had poor sleep (based on PSQI scores higher than 5. The average score was 9.2 (±3.1), clearly indicating widespread sleep issues in this group (Kutner *et al*., 2000; Mapes *et al*., 2003).

Looking closer, people in the 51-60 age range had the highest average PSQI score (10.1), which means they were sleeping worse than younger groups. This difference was statistically significant (p=0.040) (Table 1).

Sleep quality also appeared to vary by gender: women in the study reported worse sleep (average score 10.4) compared to men (average 8.5), and this difference too was meaningful (p=0.020) (Merlino *et al*., 2006).

Health-Related Quality of Life (HRQOL)

We also evaluated each patient's quality of life using the KDQOL-36 scale, which is tailored for kidney disease. The average score came out to be 52.3 (±10.8), pointing toward moderate challenges in physical, emotional, and daily well-being (Merlino *et al*., 2006; Modi and Jha, 2006).

A key finding: patients who slept worse also had a lower quality of life. We found a strong negative correlation between PSQI and KDQOL-36 scores (r=-0.65, p<0.01), meaning that as sleep problems increased, overall well-being decreased (Figure 3).

Additionally, patients with diabetes had more difficulty coping, with an average KDQOL score of 49.1, while those without diabetes scored 55.2 (p=0.030).

As with sleep, female participants reported a lower quality of life (48.3) than male participants (54.5), a pattern also seen in other studies, and the difference was statistically meaningful (p=0.040) (Molzahn *et al*., 2010) (Table 2).

The bar diagram (Figure 1) shows the distribution of mean Pittsburgh Sleep Quality Index (PSQI) scores across different age groups among patients with End-Stage Renal Disease (ESRD) undergoing hemodialysis. It demonstrates a progressive increase in PSQI scores with advancing age, suggesting a worsening of sleep quality in older patients. The greater mean PSQI score of 10.1±3.3 was observed in the 51-60 years age group, while the lowest score was in the 18-30 years group (7.5±2.1). The age-related trend was statistically significant (p=0.04), indicating that older adults on dialysis experience higher sleep disturbances than their younger counterparts. This trend is consistent with earlier studies that report a higher prevalence of sleep disorders in previously ESRD patients, likely due to age-related comorbidities (e.g., diabetes, hypertension), polypharmacy, low melatonin secretion, and alterations in circadian rhythm (Parker, 2003a, 2003b). Aging also results in low sleep effectiveness, longer sleep latency, and greater nocturnal awakenings, which may exacerbate overall sleep dysfunction (Sabbatini *et al*., 2002).

Understanding these age-related patterns is crucial for clinicians, as they highlight the need for tailored, age-specific interventions to improve sleep quality in patients undergoing dialysis. For example, educating patients on sleep hygiene, adjusting the timing of dialysis sessions, and incorporating non-pharmacological approaches such as Cognitive Behavioural Therapy for Insomnia (CBT-I) may offer particular benefit for older adults (Sabbatini *et al*., 2005).

The pie chart illustrates the distribution of sleep quality among the study population:

- 94.6% (n=104) had poor sleep quality (PSQI>5).
- 5.4% (n=6) had good sleep quality (PSQI≤5).

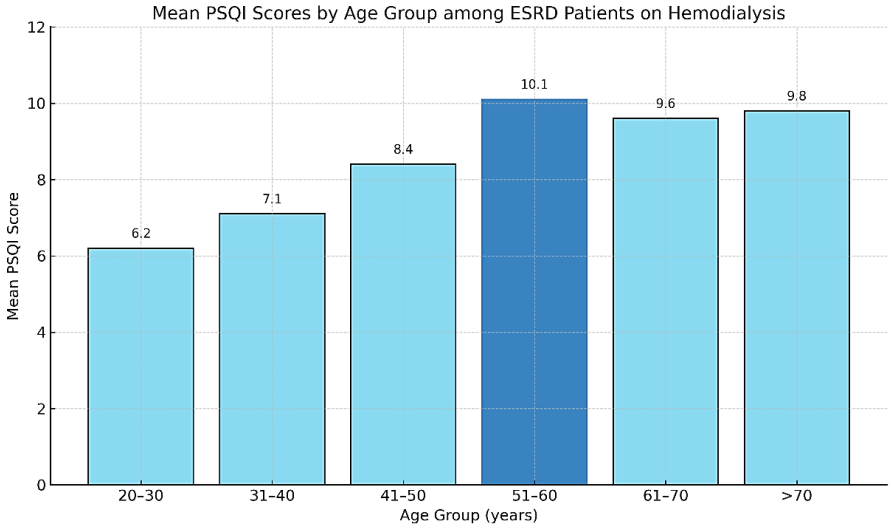

Figure 1: Mean PSQI Scores by Age Group. Bar Diagram: Mean PSQI Scores Across Age Groups.

This distribution visually emphasizes the overwhelming prevalence of sleep disturbances in ESRD patients undergoing hemodialysis.

The pie chart (Figure 2) illustrates the distribution of global sleep quality among patients undergoing hemodialysis using the Pittsburgh Sleep Quality Index (PSQI).

Out of 110 ESRD patients, a total of 104 individuals (94.6%) had PSQI scores>5, indicating poor sleep quality, whereas only 6 patients (5.4%) had PSQI scores≤5, reflecting good sleep quality. These findings underscore an alarmingly high prevalence of poor sleep among patients with ESRD.

This pattern aligns with findings from similar studies reporting prevalence rates of poor sleep quality between 70-90% in hemodialysis populations globally (Sabbatini *et al.*, 2005; Stack and Murthy, 2008). The high prevalence may be attributed to multiple dialysis-related factors, including uremia, metabolic imbalances, dialysis timing, restless leg syndrome, pruritus, and emotional stress related to chronic illness (Subramanian *et al.*, 2020; Tel, 2011).

The impact of poor sleep quality in this population is not trivial. Several studies have linked poor PSQI scores with reduced Health-Related Quality of Life (HRQOL), increased depressive symptoms, higher cardiovascular risk, and increased hospitalization in ESRD patients (Tzeng *et al.*, 2012).

This highlights an urgent need for routine sleep assessment in dialysis care and implementation of non-pharmacologic and behavioral interventions to improve sleep, such as sleep hygiene practices, relaxation therapy, and chronotherapy.

Highlights a notable inverse relation between Pittsburgh Sleep Quality Index (PSQI) and Kidney Disease Quality of Life (KDQOL) scores in individuals diagnosed with End-Stage Renal

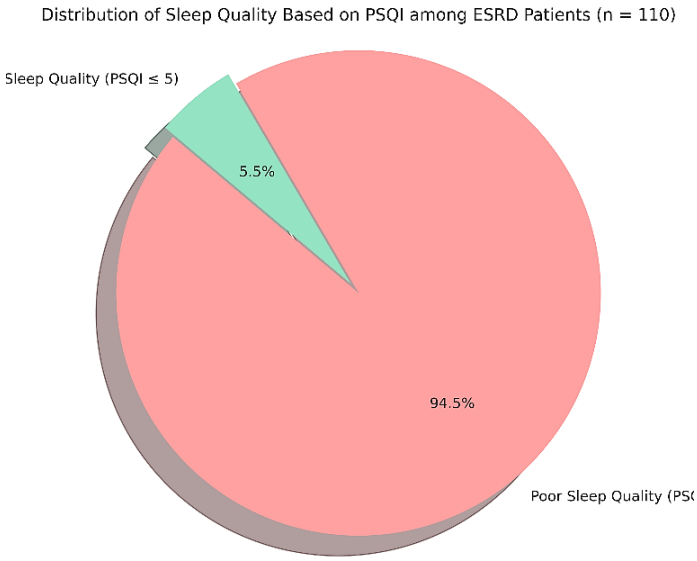

Figure 2: Proportion of Patients with Poor Sleep Quality. Pie Chart: Proportion of Patients with Poor vs Good Sleep Quality.

Disease (ESRD) who are receiving hemodialysis. As PSQI scores increase-indicating poor sleep patterns there is a marked decrease in KDQOL values, suggesting impaired Health-Related Quality of Life (HRQOL). The statistical correlation (r=-0.65, p<0.01) confirms that diminished sleep quality significantly affects physical health, emotional balance, and functional capacity.

This observation mirrors previous research, which has found that higher PSQI scores often coincide with symptoms such as tiredness, depressive states, and irregular attendance to dialysis sessions-each contributing to poorer quality of life (Tzeng *et al.*, 2012; Unruh *et al.*, 2006). Sleep-related problems in patients

Table 1: Sleep Quality Scores Across Age and Gender.

Demographic Group	Number (%)	PSQI Score (Mean±SD)	*p*-value
Age 18-30 years	6 (5.4%)	7.5±2.1	0.040*
Age 31-50 years	34 (30.9%)	8.7±2.8	
Age 51-60 years	45 (40.9%)	10.1±3.3	
Age>60 years	25 (22.7%)	9.6±2.9	
Male	71 (64.5%)	8.5±2.9	0.020*
Female	39 (35.5%)	10.4±3.2	

*Significant at $p<0.05$.

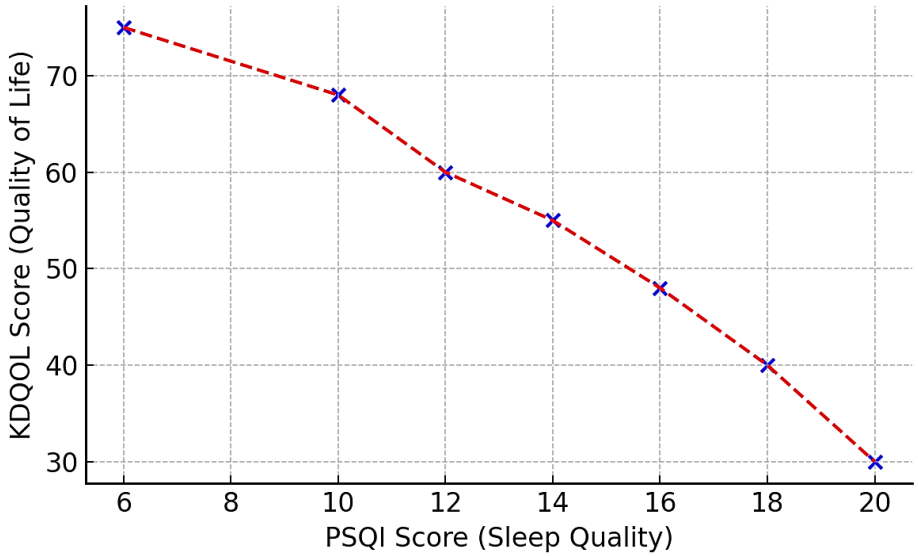

Figure 3: Correlation between PSQI and KDQOL Scores.

with ESRD are not just isolated symptoms-they are closely tied to broader health complications. Disturbed sleep can contribute to heightened inflammation, reduced cognitive function, and a heavier physical symptom burden, all of which interfere with day-to-day life and overall well-being (Unruh *et al.*, 2006).

When patients on dialysis struggle with poor sleep, it doesn't just affect their nights; it touches every part of their lives. That's why it's so important for healthcare providers to check in regularly about how well their patients are sleeping. Even small adjustments, like offering support through therapy, recommending melatonin, or finding a dialysis schedule that better suits the individual, can make a noticeable difference in how they sleep-and how they feel overall (Unruh *et al.*, 2006a, 2006b).

DISCUSSION

This study gives attention to a striking concern: lots of patients with End-Stage Renal Disease (ESRD) undergoing treatment of hemodialysis are struggling with poor quality sleep. 94.6% of the individuals in our sample had Pittsburgh Sleep Quality Index (PSQI) scores above 5, indicating that a change in sleep pattern is not just common, it's almost the norm. This isn't surprising when we consider the multiple challenges these patients face, such as

Table 2: KDQOL-36 scores by Health and Gender.

Variable	KDQOL Score (Mean±SD)	*p*-value
Diabetes (Yes)	49.1±9.5	0.030*
No Diabetes	55.2±11.1	
Male	54.5±10.3	0.040*
Female	48.3±11.0	

Significant at $p<0.05$.

the build-up of waste products in the blood (uremia), shifts in electrolytes, symptoms like restless legs or persistent itching, and the emotional strain of living with a lifelong illness (Unruh *et al.*, 2006; Chen *et al.*, 2006).

On average, participants had a PSQI score of 9.2±3.1, which suggests that the sleep difficulties are not mild but moderate to severe. When we saw closer, women seemed to have a difficult time with sleep, scoring an average of 10.4 compared to 8.5 in men ($p=0.02$). This difference might be due to a mix of hormonal factors, psychological stress, or even how symptoms are experienced and reported (Bhandari *et al.*, 2017; Buysse, 2014. Interestingly, people aged 51-60 reported the worst sleep. This may reflect a combination of factors, like a longer time on

dialysis, more health conditions, or a general decline in physical resilience that comes with age (Buysse *et al.*, 1989).

The relation between sleep and overall quality of life was visible. As PSQI scores went up, meaning sleep got worse, KDQOL-36 scores dropped, with a significant negative correlation (r=-0.65, $p<0.01$). Those living with diabetes or female patients, in particular, reported poorer quality of life. This finding supports earlier research showing that additional health problems and gender-related stressors can have a strong influence on both physical and emotional well-being.

Given how common and impactful these sleep issues are, it's essential to screen regularly for them in dialysis units. Using simple tools like the PSQI could help identify problems early. More importantly, the focus shouldn't only be on medication. Non-drug approaches like teaching good sleep habits, providing psychological support, and offering personalized counselling could make a meaningful difference. Helping patients sleep better may not just improve how they feel day-to-day-it could also enhance their treatment experience and overall health outcomes (Hays *et al.*, 1994).

In our study, 94.6% of patients reported poor sleep quality, which is higher than previous Indian studies (70-85%) and consistent with international reports (70-90%). This suggests that sleep disturbances are a major yet under-recognized issue in Indian government hospital settings.

CONCLUSION

In this cross-sectional study of patients with ESRD undergoing conservation hemodialysis, poor sleep quality was observed in nearly all participants (94.6%) and showed a high link with reduced health-related quality of life. These results highlight the importance of increasing clinical awareness and incorporating routine screening for sleep disturbances in this group. Because the study was observational, based on convenience sampling, and did not account for potential confounding factors, causal relationships cannot be confirmed. Future prospective and interventional studies will be important to develop and test strategies that may improve both sleep quality and overall quality of life in individuals with ESRD.

LIMITATIONS

This study has certain limitations. Recruitment relied on convenience sampling, which could have led to selection bias and reduced the extent to which the findings can be generalized. Moreover, the cross-sectional nature of the design makes it impossible to establish causal links between sleep disturbances and quality of life. Another limitation is that the analysis did not adjust for potential confounding factors such as dialysis adequacy, coexisting depression, medication use, and socioeconomic status. In addition, as this was a single-center study, the findings may mainly reflect the characteristics of that specific patient population and may not be fully generalizable. Finally, reliance on self-reported questionnaires without objective sleep assessments introduces the possibility of recall errors and reporting bias.

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ABBREVIATIONS

ESRD: End Stage Renal Disease; **HD:** Hemodialysis; **PSQI:** Pittsburgh Sleep Quality Index; **HRQOL:** Health-Related Quality of Life; **KDQOL-36:** Kidney Disease Quality of Life 36.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICAL APPROVAL AND CONSENT TO PARTICIPANT

This study was conducted in accordance with the ethical standards of the institutional and national research committee, and with the 1964 Helsinki Declaration and its later amendments. Since the study centre did not have a formal Institutional Ethics Committee, official permission to conduct the research was granted by the Civil Surgeon, the Dean, and the Hospital Management of Dharashiv District Government Hospital, Maharashtra, India. Informed consent was obtained from all individual participants included in the study. Participation was voluntary, and confidentiality of responses was assured.

SUMMARY

This cross-sectional observational study assessed sleep quality and health-related quality of life among 110 patients with End-Stage Renal Disease (ESRD) undergoing maintenance hemodialysis at a tertiary care center in Maharashtra, India. Standardized instruments, the Pittsburgh Sleep Quality Index (PSQI) and Kidney Disease Quality of Life-36 (KDQOL-36), were used to evaluate sleep patterns and quality of life. Findings revealed a high prevalence of poor sleep quality and reduced health-related quality of life in this population, with significant associations between poor sleep and impaired physical as well as mental health domains. These results highlight the need for routine screening of sleep disturbances in ESRD patients and the integration of sleep management strategies into dialysis care programs to improve overall patient outcomes.

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