

Insomnia in Chronic Hemodialysis Patients: Prevalence and Associated Factors

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Abstract

Original Research Article

Introduction: Sleep disorders (SD) are common in chronic hemodialysis (HD) patients. This study aims to determine the prevalence of insomnia and other SD in chronic HD patients and the factors associated with it. **Material and Methods:** This is a cross-sectional, analytical monocentric study including chronic HD patients. Insomnia and other SD were analysed by questioning and by the Insomnia Severity Index (ISI). We performed an analysis of independence using the Chi-square test between clinical and biological factors and insomnia. **Results:** 36 patients were included, with a sex ratio of 1.4. The mean age was 44 years (17-85). The mean duration of HD was 94 months (4-408). 21 patients (58.33%) had insomnia. It was mild in 2 cases, moderate in 4 cases and severe in 15 cases. Insomnia was of the sleep maintenance disorder type in 15 cases and difficulty falling asleep in 6 cases. Associated SD was restless legs syndrome in 5 cases and daytime sleepiness in 4 cases. Anxiety was reported in 4 cases and chronic pain in 14 cases. The factors studied were sex, age, length of time on HD, high blood pressure, phosphocalcic balance, thyroid balance and inflammatory balance. The threshold of acceptability is 3.84 for a degree of freedom equal to 1 and was consulted on the table of the Chi-square with a risk of 5%. The deviation of the Chi-square for our study is 4.83 for high blood pressure and vitamin D deficiency which exceeds the threshold of acceptability 3.84. Consequently, we identified high blood pressure and hypovitaminosis D as significant factors associated with insomnia. **Conclusion:** In our study, insomnia affects more than half of HD patients. Maintaining adequate blood pressure and correcting the phosphocalcic balance, particularly vitamin D levels, could reduce insomnia and improve the quality of life for these patients.

Keywords : Insomnia, associated sleep disorders, chronic hemodialysis, high blood pressure, vitamin D deficiency.

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INTRODUCTION

Sleep disorders are common among patients on chronic hemodialysis, affecting their quality of life and health. Insomnia is the primary sleep disorder, with a prevalence ranging from 69% to 80% in this population [1, 2]. However, it is often overlooked in favor of more obvious complications that directly impact patients' vital or functional prognosis [3]. Insomnia includes difficulties falling asleep, maintaining continuous sleep, early or nocturnal awakenings, and poor sleep quality. These patients also report irregular sleep schedules, nightmares, morning headaches, and daytime sleepiness [1]. Our study aims to determine the prevalence of insomnia and the associated factors among our chronic hemodialysis patients.

MATERIAL AND METHODS

We conducted a cross-sectional analytical study at the nephrology, dialysis, and renal transplantation

department of Ibn Rochd University Hospital in Casablanca, Morocco, in January 2025. The prevalence of insomnia was assessed using a questionnaire in French and/or translated into Moroccan dialect Arabic, based on the Insomnia Severity Index (ISI). This questionnaire consists of seven questions, rated from 0 to 4, with a total score ranging from 0 to 28. We defined insomnia as a minimum score of 15. We also recorded the rhythm, timing of insomnia episodes, and presumed explanations given by the patients. Those with a score of 14 or less were classified as not having insomnia.

We performed a Chi-squared independence analysis on various factors (sex, age, duration of hemodialysis, high blood pressure, hypocalcemia, hyperphosphatemia, vitamin D deficiency, hyperparathyroidism, thyroid function abnormalities, and inflammatory markers) in relation to insomnia. Following this analysis, we identified the factors associated with insomnia.

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RESULTS

36 chronic hemodialysis patients were included, with a mean age of 44 years (17 to 85 years). Patients aged 65 years or older represented 13.88% of the sample ($n = 5$). The sex ratio was 1.4, with 21 men and 15 women. The mean Body Mass Index (BMI) was 22.9 kg/m² (16.97 to 29.32 kg/m²). The average duration of hemodialysis was 94 months (4 to 408 months). The causes of end-stage renal disease (ESRD) were as follows: undetermined nephropathy (30.56%, $n = 11$), vascular nephropathy (38.89%, $n = 14$), diabetic nephropathy (11.11%, $n = 4$), polycystic kidney disease (2.78%, $n = 1$), lupus (8.33%, $n = 3$), and focal segmental glomerulosclerosis (8.33%, $n = 3$). (Table 1).

Three of our patients underwent 2 sessions of 5 hours of dialysis per week, while 33 patients were dialyzed 3 times a week for 4 hours per session. The average interdialytic weight gain (IWG) was 2.4 kg (0.5 to 4.5 kg). 10 patients had heart disease of various types, confirmed by transthoracic echocardiography, and 7 patients experienced intradialytic hypotension (IDH), defined as a sudden drop in blood pressure of at least 30% from baseline during or immediately after dialysis. 21 patients (58.33%) suffered from insomnia: classified as mild in 2 patients (9.52%), moderate in 4 patients (19.05%), and severe in 15 patients (71.43%) (**Figure 1**). Insomnia was of the sleep maintenance disorder type in 15 cases, while difficulty falling asleep was noted in 6 cases: 3 at the beginning of the night, 2 in the middle of the night, and 1 in the early morning (**Figure 2**).

Among those suffering from insomnia, 12 were dialyzed in the morning, 7 in the afternoon, and 2 alternated between morning and afternoon during the same week. Two patients dialyzed twice a week for 5 hours, while 19 were dialyzed three times a week for 4 hours. The sex ratio was 13 men to 8 women, with a mean age of 46 years (17 to 85 years) and an average duration of hemodialysis of 97.04 months (ranging from 12 to 408 months). Associated sleep disorders included 19.04% daytime sleepiness ($n = 4$) and 23.81% restless legs syndrome ($n = 5$) (**Table 2**). The causes of insomnia included anxiety in 19.05% of cases ($n = 4$), depression in 14.28% ($n = 3$), and nocturnal chronic pain of osteoarticular origin in 66.67% of patients ($n = 14$) (**Table 3**). Among the 7 patients suffering from anxiety-depressive disorders, 4 were women (57.14%).

Statistical analysis revealed that high blood pressure and vitamin D deficiency were significantly associated with insomnia, with a Chi-squared value of 4.83 exceeding the acceptable threshold of 3.84 at a 5% risk level) (**Table 4**).

The Chi-square values for duration of hemodialysis, calcium levels, phosphorus levels, thyroid function, hyperparathyroidism, and inflammatory markers were 0.382, 0.0869, 0.3957, 0.0131, 0.092, and 0.206, respectively. All were below the acceptability threshold of 3.84. Therefore, we did not consider these factors as dependent on insomnia.

Table 1: Causes of End-Stage Renal Disease (ESRD)

Cause of ESRD	Percentage (%)	Number of patients (n)
Daytime sleepiness	19.05	4
Restlegs syndrome	38.89	5
Diabetic nephropathy	11.11	4
Polycystic kidney disease	2.78	1
Lupus	8.33	3
Focal segmental glomerulosclerosis	8.33	3

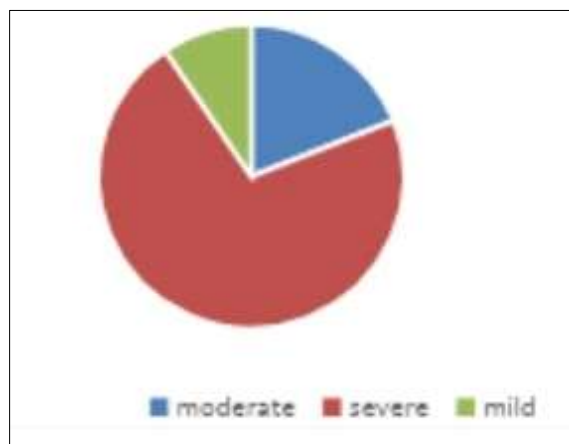


Figure 1: Classification of insomnia



Figure 2: Type of insomnia

Table 2: Associated sleep disorders (SD)

Associated sleep disorders	Percentage (%)	Number of patients (n)
Daytime sleepiness	19.05	4
Restless legs syndrome	23.81	5

Table 3: Causes of Insomnia

Causes of insomnia	Percentage (%)	Number of patients (n)
Anxiety	19.05	4
Depression	14.28	3
Chronic osteoarticular pain	66.67	14

Table 4: Factors associated with Insomnia: Chi-Square Test

Insomnia	Insomnia	No clinically significant insomnia	Total
Vitamin D level			
Vitamin D deficiency	16 12.83	6 9.17	22
Normal level of vitamin D	5 8.17	9 5.83	14
Total	21	15	36

DISCUSSION

Sleep disorders, including insomnia and restless legs syndrome, are increasingly recognized as very common in patients with chronic kidney disease. These disorders are associated with an increased risk of morbidity and mortality, as demonstrated by a study conducted by Elder *et al.*, which included 11,351 patients across 308 dialysis centers. A team from Montpellier also established a link between these disorders and cardiovascular risk in chronic hemodialysis patients. Moreover, several studies have proven the negative impact of sleep disorders on the quality of life of patients [4; 5].

Insomnia is the primary sleep disorder, characterized by a subjective feeling of difficulty achieving quality sleep. This may manifest as trouble falling asleep, frequent awakenings (difficulty maintaining sleep), or early morning awakenings occurring earlier than desired. Insomnia is a major cause of sleep disorders in chronic hemodialysis patients [1].

The study by Théofilou revealed that insomnia and its symptoms affect quality of life, regardless of the dialysis method used [6]. Despite the significance of these disorders, their management is often neglected, as

the focus is generally on the complications of renal insufficiency and the management of comorbidities. Currently, it is widely recognized that the prevalence of sleep disorders is high in dialysis, with similar rates in hemodialysis and peritoneal dialysis. In our study, 58.33%, or more than half of our patients, suffered from insomnia. The causes of insomnia and its associated disorders are multifactorial, linked to the kidney disease itself, treatments, and psychosocial factors.

In chronic hemodialysis patients, additional factors have been identified as contributing to insomnia. One study showed that anemia was an associated factor [7,8]. Another study found that a duration of treatment in hemodialysis exceeding one year was associated with a higher incidence of insomnia [9]. In our study, we did not retain anemia and the duration of hemodialysis as dependent factors for insomnia. Kao observed that patients with less than one year of treatment were less likely to suffer from depression, which is surprising given the usual correlation between insomnia and depression [10]. Tahiry *et al.*, found that anxiety-depressive disorders were associated with insomnia in 75% of chronic hemodialysis patients [11].

Hyperphosphatemia is known to be a factor in pruritus in chronic hemodialysis patients and may be accompanied by calcitriol deficiency. Kouotou *et al.*, demonstrated the correlation between pruritus and insomnia in chronic hemodialysis patients [12]. In our study, we retained vitamin D deficiency as a dependent factor for insomnia.

Razeghi revealed in his study that high CRP levels were correlated with insomnia [13]. In our study, we did not retain the inflammatory profile with elevated CRP levels as a dependent factor for insomnia.

Furthermore, low levels of physical activity were significantly linked to insomnia [14]. Some authors have also investigated the seasonal rhythm of sleep disorders in hemodialysis. Other risk factors have frequently been implicated, such as dialysis timing and uremia, malnutrition, calcium levels, and phosphate levels. Finally, some authors do not associate insomnia with any specific risk factors [15]. In our work, the factors associated with sleep disorders retained in our population were high blood pressure and vitamin D deficiency.

CONCLUSION

Insomnia affects more than half of chronic hemodialysis patients and negatively impacts their quality of life. Maintaining adequate blood pressure and correcting the phosphocalcic balance, particularly vitamin D levels, could reduce insomnia. Special attention should be paid to sleep disorders, which are often predictive of poor quality of life in chronic hemodialysis patients. Management should address both somatic and psychological aspects.

At the top of every case in the table, we find the observed frequencies. At the bottom of every case in the table, we find the theoretical frequencies for the Chi-Square Test. $E = 4.83 > 3.84 \Rightarrow$ Dependence
The same results have been found for high blood pressure.

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