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Complementary Therapy Interventions for Sleep Disturbances in Chronic Kidney Disease Patients on Hemodialysis: A Systematic Review

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Abstract

Poor sleep quality is prevalent among chronic kidney disease (CKD) patients, particularly those undergoing hemodialysis, significantly impacting their quality of life, mental health, and mortality risk. Complementary therapies such as aromatherapy, guided imagery, music therapy, and progressive muscle relaxation have shown efficacy in reducing anxiety and improving sleep in chronic illness populations. This systematic review aimed to evaluate the effectiveness of various complementary therapies for managing sleep disturbances, anxiety, and quality of life in hemodialysis patients. Following PRISMA guidelines, we analyzed peer-reviewed English articles (2015–2025) sourced from Google Scholar, Scopus, Web of Science, and Crossref. Screening and data extraction were conducted by two independent reviewers to ensure rigor. The final synthesis of ten studies (six RCTs, two quasi-experimental, and two cross-sectional) indicates that non-pharmacological interventions, notably acupressure, offer a safe and holistic approach to enhancing sleep quality. These findings support Orem's Self-Care Deficit Nursing Theory by emphasizing patient empowerment in symptom management.

Keywords: *Chronic Kidney Disease, Hemodialysis, Sleep Disturbance, Complementary Therapy.*

INTRODUCTION

The high prevalence of chronic kidney disease and the intensive need for hemodialysis therapy place patients at risk for various complications, one of which is sleep disturbances (Özberk & Kocamaz, 2020). Sleep disturbances are prevalent among patients with chronic kidney disease (CKD), particularly those undergoing hemodialysis (Mahyuvi & Sari, 2023). Reported sleep disturbances include insomnia, restless legs syndrome, sleep apnea, and excessive daytime sleepiness (Mahyuvi & Tukirahmawati, 2022). Chronic kidney disease (CKD) is defined as a persistent structural or functional abnormality of the kidneys lasting more than three months. It is typically characterized

by sustained albuminuria, a reduced glomerular filtration rate (GFR), or other markers of renal impairment (Putro et al., 2024). Sleep disturbances in hemodialysis patients are often overlooked, despite their potential to worsen overall health status, increase cardiovascular risk, and reduce adherence to treatment (Wang et al., 2023).

Chronic kidney disease (CKD) is a prevalent and frequently underdiagnosed global health challenge. In 2020, the National Kidney Foundation reported that over 90% of the approximately 850 million individuals worldwide with CKD were unaware of their condition, contributing to nearly 600,000 deaths. In the United States, data from the USRDS indicates that more than 65% of patients with End-Stage Renal Disease (ESRD) undergo hemodialysis. Globally, the prevalence of ESRD remains high, affecting an estimated 119.5 million people, with figures continuing to rise rapidly (Mampesi et al., 2023). Findings from a longitudinal study conducted over 11 years involving 4,238 participants revealed that insufficient sleep duration is associated with a faster decline in kidney performance. In addition, individuals with chronic kidney disease (CKD) who experience shorter sleep times and more frequent sleep arousals per hour are at a 50% greater risk of mortality and tend to report a lower quality of life compared to those with fewer sleep-related disruptions (Chu et al., 2025). Insomnia is among the most prevalent sleep disorders, with reported prevalence rates ranging from 49% to 84.5%, depending on the population studied (Mahyuvi et al., 2021). Poor sleep quality has been demonstrated to adversely affect various dimensions of patient health, particularly health-related quality of life (HRQoL) (Hidayah et al., 2021), mental well-being (Harorani et al., 2020), social functioning (Rehman et al., 2018), and even long-term survival outcomes.

A person with chronic kidney disease (CKD) who has experienced a decline in kidney function typically requires renal replacement therapy, most commonly in the form of hemodialysis (Istiqomah & Mahyuvi, 2023). Hemodialysis is a long-term therapeutic procedure intended for patients with end-stage renal disease and functions as an artificial kidney by filtering waste products, excess fluids, and toxins from the blood (Jamilah, 2022). However, while hemodialysis sustains life, it does not cure the underlying kidney dysfunction, and thus patients are prone to a variety of complications, such as hypotension, nausea, muscle cramps, chest discomfort, and notably, sleep disturbances(Mahyuvi & Tukirahmawati, 2022) . Sleep disorders have emerged as one of the most frequent yet often overlooked complications in hemodialysis patients (Mahyuvi et al., 2023).

Poor sleep quality in CKD patients is not just a matter of discomfort it contributes to impaired quality of life, reduced social adaptability, psychological distress, and even higher mortality risks (Hidayah et al., 2021). Studies have shown that inadequate sleep duration and frequent night-time arousals are associated with a faster decline in renal function and a 50% increased risk of death among CKD patients. Moreover, the prevalence of insomnia in this population is alarmingly high, ranging between 49% and 84.5%, highlighting the urgent need for clinical awareness and management strategies (Wu et al., 2018). Therefore, addressing sleep disturbances in hemodialysis patients is not only essential for improving comfort, but also for enhancing therapeutic outcomes and long-term survival (Istiqomah & Mahyuvi, 2023).

To address the issue of sleep disturbances in hemodialysis patients, a wide range of complementary therapies can be implemented as safe, non-pharmacological nursing interventions aimed at improving patients' quality of life. Complementary approaches such as aromatherapy (e.g., lavender for relaxation) (Setyaningrum et al., 2022), guided imagery (Ghavami et al., 2019), music therapy (Hidayah et al., 2021), (Pei et al., 2021), and progressive muscle relaxation (Mohamed et al., 2023), it has been proven that these methods can lower anxiety, improve sleep quality, and boost mental well-being for people

with chronic illnesses, including those on hemodialysis. These interventions fit a holistic nursing care model, which focuses not only on a patient's physical symptoms but also on their emotional and psychological well-being (Mahyuvi & Sari, 2024).

This systematic review aims to identify and analyze the effectiveness of various complementary therapies in managing sleep disturbances among hemodialysis patients. Furthermore, it evaluates their impact on sleep quality, anxiety levels, and health-related quality of life (HRQoL). The ultimate goal is to provide evidence-based recommendations for nursing practice, facilitating the development of integrated, individualized, and safe non-pharmacological interventions to improve patient outcomes.

METHODS

This study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a high standard of reporting. The review process involved several critical stages, including the systematic development of relevant keywords, comprehensive data retrieval through selected electronic databases, and a rigorous process of data cleaning and categorization to ensure accuracy, relevance, and consistency in the final dataset (Page et al., 2021).

Information Sources

We performed a thorough search of academic databases, including Google Scholar, Scopus, Web of Science, and Crossref, to find studies on using complementary therapies to improve sleep quality in hemodialysis patients. We focused on publications from 2015 to 2025 to include both older and newer research. Initially, we found 4,854 articles in English and other languages. We then removed duplicate entries and evaluated each study's title and abstract for relevance before applying our specific inclusion and exclusion criteria.

Subsequently, a rigorous screening process was conducted to ensure the inclusion of high-quality studies focusing specifically on the effectiveness of complementary therapies such as aromatherapy (e.g., lavender for relaxation), guided imagery, music therapy, and progressive muscle relaxation on sleep disturbances among hemodialysis patients. Priority was given to studies with experimental or quasi-experimental designs, appropriate patient populations, and clearly defined outcome measures such as improvements in sleep quality, reduction in sleep latency, decreased anxiety, and overall enhancement of patient well-being. The final group of selected studies was systematically analyzed to identify recurring intervention themes, patterns of effectiveness, and implications for clinical nursing practice. This systematic review is intended to offer evidence-based insights into non-pharmacological strategies for improving sleep quality and holistic care among individuals undergoing hemodialysis.

Search Strategy

The initial stage of this study involved developing a set of comprehensive keywords aimed at capturing relevant literature on sleep disturbances, dialysis treatment, and complementary therapies. The selected search terms included combinations such as “Sleep Disturbances OR Insomnia OR Sleep Quality” AND “ESRD OR CKD” OR “Dialysis OR Hemodialysis” AND “Complementary Therapy.” This structured and systematic keyword formulation was designed to ensure a thorough and effective search process, enabling the identification of high-quality and relevant studies from multiple academic databases.

Selection Process

Data for this study were obtained using targeted keywords through a rigorous screening and cleaning process, aligned with the focus on complementary therapies for enhancing sleep quality among hemodialysis patients. A sequential approach was employed, involving the removal of duplicate records, preliminary title and abstract screening for relevance, and the application of predetermined inclusion and exclusion criteria. Studies that did not directly evaluate the efficacy of complementary modalities such as aromatherapy, guided imagery, mindfulness, or relaxation techniques on sleep disturbances, anxiety reduction, or overall well-being in the dialysis population were excluded to ensure study precision and thematic consistency.

Following the initial screening process, the remaining articles were carefully evaluated to ensure alignment with the research objectives. This involved a detailed review of abstracts, titles, and keywords to determine the relevance of each article to the core research questions. Articles that lacked empirical data, had vague methodological descriptions, or did not specifically investigate the impact of complementary therapies on sleep outcomes among CKD or ESRD patients were excluded. From a total of 4.854 articles retrieved in RIS format, the initial screening process identified and removed duplicates, resulting in 2,099 unique records. After further review based on relevance and methodological rigor, 1,983 articles were excluded due to irrelevance or insufficient quality, leaving fifteen studies for full-text review and in-depth analysis.

These selected studies underwent a thorough data extraction and synthesis process to identify recurring themes, intervention effectiveness, and trends in the application of complementary therapies. The findings provide critical insights into how non-pharmacological interventions can enhance sleep quality, support emotional well-being, and contribute to more holistic care strategies for hemodialysis patients. The comprehensive screening and analysis procedures, illustrated in Figure 1, ensure the inclusion of high-quality studies, and reinforce the credibility and practical relevance of the results.

RESULTS

Study Selection

The identification process for articles in this systematic review began with a search across several databases: 2,240 articles from Google Scholar, 1,200 from Scopus, 279 from CINAHL, and 188 from PubMed, total is 3,907 records initially retrieved. At the first stage, initial screening was conducted by removing 1,879 duplicate records and 976 records for other reasons based on preliminary eligibility criteria. As a result, 1,052 articles proceeded to the screening phase. Of these, 650 articles were excluded based on their titles for not meeting the relevance criteria.

The remaining 402 articles underwent abstract screening, and 162 of them were excluded due to incompatibility with the inclusion criteria. During the eligibility assessment stage, 240 full-text articles were evaluated. Among them, 43 were excluded because they were study protocols, and 187 were review articles that did not present primary data. A total of 10 studies met the inclusion criteria and were included in this systematic review, reflecting a rigorous and systematic selection process to ensure relevant and valid analysis.

Study Characteristics

This review found varied research methods, with most using Randomized Controlled Trials (RCTs) as the strongest design for testing intervention effectiveness. Two studies used quasi-experimental methods, and two used cross-sectional designs, which show correlation but not causation. All studies focused on improving sleep quality

in hemodialysis patients, where sleep problems are common. Nearly all used the Pittsburgh Sleep Quality Index (PSQI) for consistent measurement and comparison. Interventions included both non-pharmacological and pharmacological approaches.

Non-pharmacological interventions such as acupressure (explored in studies by Shen, Wu, Arun, and Ezzati), massage therapy (Azimpour, Ghavami, and Ajorpaz), and lavender essential oil aromatherapy (Setyaningrum) demonstrated notable potential in enhancing sleep quality. Notably, Ezzati (2023) directly compared a non-pharmacological intervention (acupressure) with a pharmacological one (clonazepam) and found acupressure to be more effective in reducing PSQI scores and safer due to its lack of side effects.

Overall, most non-pharmacological interventions showed statistically significant improvements in sleep quality among hemodialysis patients. Even in Shen et al. (2017), where no statistically significant difference was found, there were no reported adverse effects, and patient responses to acupressure were positive. Some studies also evaluated additional dimensions beyond sleep quality, such as Restless Legs Syndrome (Azimpour), fatigue and daily activity levels (Özberk), and mental health aspects like anxiety and depression, although these were not the main outcomes. Despite promising findings, several limitations were identified. Some studies did not include long-term follow-up to assess the sustainability of intervention effects. Furthermore, the observational designs in two studies (Samara and Özberk) limited the ability to establish causality.

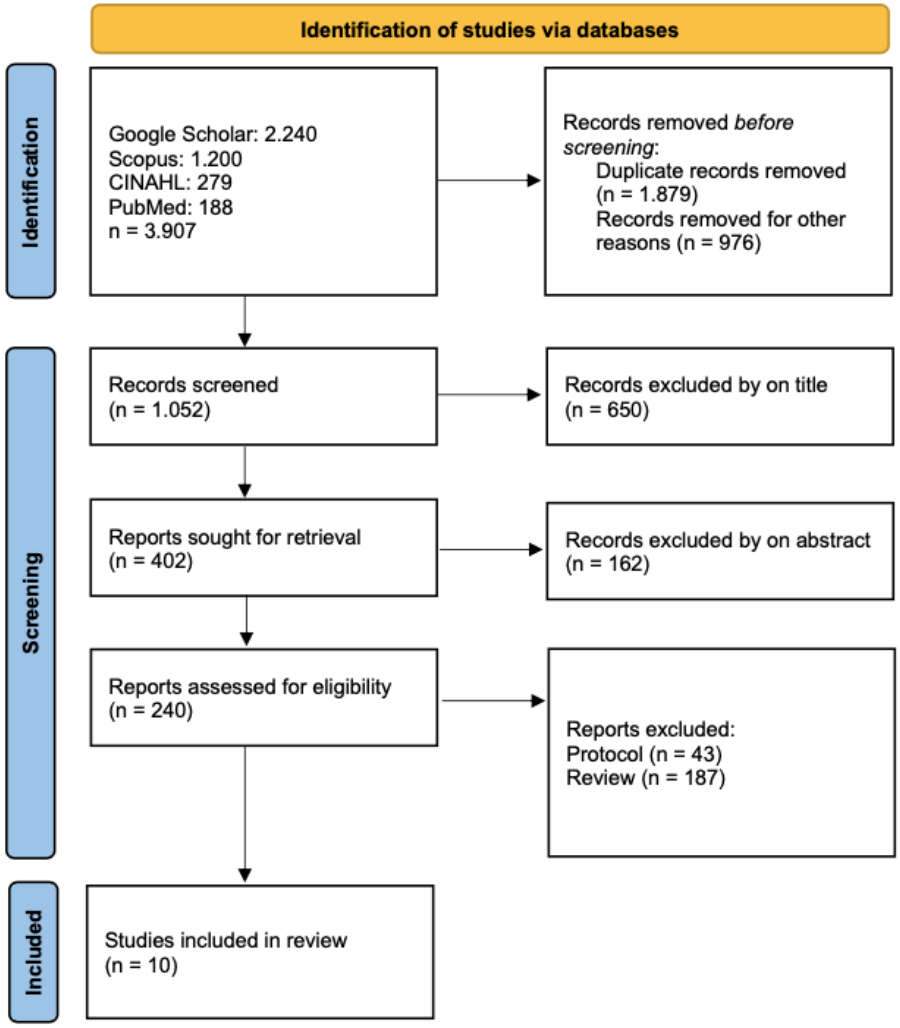

Figure 1. PRISMA Flowchart

Table 1. Study Characteristics

No	Author (Year)	Country	Main Objective	Population	Method	Result
1	(Shen et al., 2017)	Australia	To evaluate the efficacy, feasibility, and safety of acupressure on sleep quality among patients undergoing hemodialysis.	Patient ESRD reported poor sleep quality	RCT	Both groups had similar sleep quality and quality of life scores. No side effects were reported, and participants responded positively to acupressure.
2	(Wu et al., 2018)	China	To evaluate the efficacy and safety of Animal-Assisted Therapy (AAT) in enhancing sleep quality among Maintenance Hemodialysis (MHD) patients with insomnia.	Patient CKD with insomnia diagnosed	RCT	The main outcome measured is the clinical response rate, which is a reduction of at least 3 points in the global Pittsburgh Sleep Quality Index (PSQI) score after 8 weeks.
3	(Azimpour et al., 2019)	Iran	To compare the efficacy of massage and vibration therapies on sleep quality and Restless Legs Syndrome (RLS) severity among hemodialysis patients.	Patient CKD with presence of RLS (score of 11+)	Randomized Control Trial	Both vibration and massage improved RLS symptoms and sleep quality ($P<0.001$), but vibration was significantly more effective than massage ($P=0.001$).
4	(Arun & Venkateshan, 2019)	India	This study aims to evaluate sleep quality among hemodialysis patients and the efficacy of acupressure therapy in improving it.	Patient with chronic renal failure and undergoing hemodialysis treatment	Quasi-experimental study design	After 30 days of acupressure, patients showed a significant improvement in sleep quality ($p\leq0.05$). The average score improved from 10.9±2.7 to 3.0±1.0, a mean difference of 7.9.
5	(Samara et al., 2019)	Palestine	To examine the relationship between	Patient with chronic renal failure and undergoing	Cross-sectional study	43.1% of the participants experienced excessive daytime

No	Author (Year)	Country	Main Objective	Population	Method	Result
			regular hemodialysis (HD) and sleep quality, as well as daytime sleepiness, among patients undergoing HD.	hemodialysis treatment		sleepiness (ESS ≥9), and **76.65%** had poor sleep quality (PSQI >5). There was no significant link found between these scores and the patients' demographic or clinical characteristics.
6	(Ghavami et al., 2019)	Iran	To evaluate the efficacy of hot stone massage therapy on sleep quality among patients undergoing maintenance hemodialysis.	Patient with chronic renal failure and undergoing hemodialysis treatment	RCT	After the intervention, the treatment group's PSQI score improved to 5.7±3.06, while the control group's worsened to 10.7±3.6. This was a significant difference (P<0.001), even though both groups had similar scores at the start (P=0.92).
7	(Özberk & Kocamaz, 2020)	Turkey	This study aimed to evaluate fatigue, sleep quality, and activities of daily living (ADL) performance among patients with chronic renal failure.	Patient with chronic renal failure and undergoing hemodialysis treatment	Cross-sectional study	74.6% of patients reported poor sleep quality. Fatigue levels increased from an average score of 4.82±2.02 before hemodialysis to 8.79±1.67 after the procedure. Despite this, all participants remained independent in their daily activities, with an average Katz Activities of Daily Living Scale score of 17.03±0.57.
8	(Setyaningrum et al., 2022)	Indonesia	This study aimed to evaluate the efficacy of lavender essential oil aromatherapy on sleep quality among patients undergoing	Patient with chronic renal failure and undergoing hemodialysis treatment	Quasi-experimental study design	An independent samples test found a significant difference in average sleep quality scores between the groups (p=0.000). This indicates that hemodialysis patients in the intervention group

No	Author (Year)	Country	Main Objective	Population	Method	Result
			hemodialysis .			had improved sleep quality.
9	(Ezzati et al., 2023)	Iran	To compare the efficacy of acupressure and clonazepam on sleep quality among patients undergoing hemodialysis .	Patient CKD with PSQI score of 5 or higher indicating their sleep disturbance	RCT	Before treatment, the average PSQI scores for the acupressure group (15.83±1.51) and the clonazepam group (16.17±0.91) were not significantly different (P=0.75).Afterward , both groups showed significant improvement (P<0.0001), with the clonazepam group's score at 13.25±2.88 and the acupressure group's at 8.97±4.29. Although both treatments improved sleep quality, the percentage change in PSQI scores showed that acupressure was more effective for hemodialysis patients.
10	(Ajorpaz et al., 2024)	Iran	To evaluate the efficacy of Thai massage therapy on sleep quality among patients undergoing hemodialysis .	Patient CKD, with PSQI	RCT	After one month, the total sleep quality score was 8.15±2.52 for the treatment group and 10.09±3.01 for the control group. An independent t-test showed a statistically significant difference between the two groups (p=0.004).

DISCUSSION

Sleep Disturbance is Significant Problem

The synthesis of studies shows that sleep disturbances are a major issue for CKD patients undergoing hemodialysis, with most reporting high prevalence and poor PSQI scores.

Sleep disturbances in CKD patients can be explained through the biopsychosocial theory, in which the interaction between biological factors (such as the accumulation of uremic toxins, anemia, pruritus, and pain), psychological factors (such as anxiety,

depression, and chronic stress), and social factors (such as activity limitations, social isolation, and changes in family roles) can influence patients' sleep rhythms and quality of rest (Wahyuni, 2024). Moreover, the hemodialysis process itself, which requires patients to undergo procedures for 3–4 hours several times a week, also disrupts normal circadian sleep-wake patterns (Setyaningrum et al., 2022).

Sleep disturbances should be recognized as an aspect that needs to be addressed in a holistic care plan (Wu et al., 2018). Non-pharmacological interventions such as sleep education, relaxation therapy, the use of aromatherapy, or acupressure have demonstrated effectiveness in improving sleep quality among hemodialysis patients (Pei et al., 2021). However, most of these interventions are still rarely integrated systematically into daily clinical practice. In fact, if managed using evidence-based approaches and incorporated into routine nursing services, sleep disturbances can be effectively controlled, thereby improving long-term clinical outcomes (Mahyuvi et al., 2023).

This issue should not be regarded as a secondary effect of the primary disease, but rather as a comorbid condition that requires active screening and multidisciplinary intervention. A combination of medical, psychological, and educational approaches involving both patients and their families is key to creating effective and sustainable interventions.Efektivitas Intervensi Non-farmakologis

Effect of Non-pharmacology Intervention

Besides the known issue of sleep disturbances in CKD patients on hemodialysis, studies also show the effectiveness of non-pharmacological interventions in managing this problem. Approaches such as acupressure, massage, and aromatherapy have been scientifically tested and proven to significantly improve sleep quality. Unlike pharmacological treatments, which often carry long-term side effects, these interventions are safe, easy to implement, and can be tailored to the individual needs and comfort of patients(Mahyuvi, 2021).

From the perspective of Orem's Self-Care Theory, interventions like acupressure and aromatherapy can be classified as supportive nursing strategies to help meet patients' universal therapeutic needs specifically, the need for rest and sleep (Sultani et al., 2023). When patients experience chronic sleep disturbances, they suffer from physiological imbalances that can affect physical recovery, emotional stability, and their ability to adhere to hemodialysis treatment. Therefore, interventions that promote relaxation and stimulate the autonomic nervous system are essential to restoring this balance (Chu et al., 2025).

Among all non-pharmacological therapies, acupressure has demonstrated the most consistent results (Mesya et al., 2025). By stimulating specific points on the body, acupressure is believed to influence neural pathways and the endocrine system, thereby inducing relaxation, reducing stress, and enhancing sleep quality (Pei et al., 2021). Studies comparing acupressure with clonazepam show that acupressure is more effective in reducing PSQI scores without side effects like drowsiness, dependence, or cognitive impairment often linked to long-term sleep medication use (Ezzati et al., 2023). These findings reinforce the potential of acupressure as a primary, evidence-based nursing intervention for managing sleep disturbances.

The authors also emphasize that patients' positive responses to natural and supportive therapies like acupressure demonstrate the importance of patient-centered care. Non-pharmacological approaches that involve comfort, personal preference, and active participation align closely with the principles of holistic nursing. In addition to improving clinical outcomes, these interventions enhance patient trust in nursing care and strengthen the therapeutic relationship between nurses and patients.

CONCLUSION

Sleep disturbances are common in CKD patients on hemodialysis, caused by biological, psychological, and social factors that disrupt sleep, lower quality of life, and affect treatment adherence. Despite its high prevalence, sleep disturbance is often under-addressed in routine care. Non-pharmacological interventions such as acupressure, massage, and aromatherapy have been shown to be effective, safe, and well-accepted by patients, with acupressure demonstrating the most consistent improvements in sleep quality without the side effects associated with pharmacological treatments. Grounded in Orem's Self-Care Theory, these interventions support patients' essential needs for rest and recovery and promote autonomy in managing chronic symptoms. Thus, applying evidence-based non-pharmacological strategies, particularly acupressure, in nursing practice provides a holistic approach to enhance sleep quality and overall outcomes in CKD patients on hemodialysis..

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