NURSING INFORMATION JOURNAL
Volume: 5, Issue : 2, 2026
Review Article
e-ISSN 2809-0152
DOI https://doi.org/10.54832/nij.v5i2.1248
Page 184-205

THE EFFECTIVENESS OF YOGA THERAPY AND EXERCISE THERAPY ON SLEEP QUALITY IN PATIENTS WITH CHRONIC KIDNEY DISEASE: A SYSTEMATIC REVIEW

Puteri Hirika Reptes[1*], Yulia[2], Chiyar Edison[3], Sri Yona[4]

[1] *Master of Nursing, Faculty of Nursing, Universitas Indonesia, Jakarta, Indonesia*
[2,3,4] *Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Jakarta, Indonesia*

***Correspondence: Puteri Hirika Reptes**
Email: hirikaputeri@gmail.com

ABSTRACT

Sleep disturbances are highly prevalent among patients with Chronic Kidney Disease (CKD), occurring both in the pre-dialysis stage and among individuals undergoing hemodialysis or peritoneal dialysis. These disturbances can significantly impair overall quality of life. Various factors contribute to sleep disorders in CKD patients, including the accumulation of uremic toxins, pain, pruritus, dyspnea, anxiety, and the side effects associated with dialysis therapy itself. Physical activity-based interventions, such as aerobic exercise and yoga, have shown substantial potential in improving sleep quality. The objective of this systematic review is to evaluate the effects of yoga and aerobic exercise interventions on sleep quality in patients with CKD. A comprehensive literature search was conducted using databases including ProQuest, PubMed, Scopus, the International Journal of Health Sciences and Research, Springer, and the Iranian Journal of Nursing and Midwifery Research. Only full-text articles published in English between 2019 and 2024 were included. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Thirteen studies were identified: 11 Randomized Controlled Trials (RCTs), 1 quasi-experimental study, and 1 qualitative study. Analysis of the 11 RCTs revealed that various interventions—particularly yoga, aerobic exercise, and cognitive behavioral therapy (CBT) were employed to improve sleep quality. Among these, yoga and aerobic exercise were found to significantly enhance sleep quality in CKD patients, especially those undergoing hemodialysis, with aerobic exercise demonstrating more consistent benefits. Conversely, CBT did not produce significant improvements in sleep quality compared to the control group, though it did show limited effects on reducing depressive symptoms and dysfunctional beliefs. The quasi-experimental study examined the impact of yoga exercise and found it to be a contributing factor to improved quality of life, including better sleep. The qualitative study employed a phenomenological approach to explore the subjective experiences of CKD patients with fatigue caused by poor sleep, aligning with the study's aim of understanding this phenomenon from the patient's perspective..

Keywords: Sleep Disorders; Chronic Kidney Disease (CKD); Yoga; Aerobic Exercise

© 2024 The Authors. Nursing Information Journal (NIJ) Published by Center for Research and Community Service - Banyuwangi College of Health Sciences
This is an Open Access Article distributed under the terms of the Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0), which allows others to remix, tweak, and build upon the work for any purpose, even commercially, as long as the original work is properly cited. Any new creations based on this work must be licensed under identical terms

Article History:
Received: 08 July 2025
Revised: 28 July 2025
Accepted: 01 August 2025

INTRODUCTION

Sleep disturbances are among the most common complaints experienced by patients with chronic kidney disease (CKD), both in the predialysis phase and among those undergoing hemodialysis or peritoneal dialysis. These disturbances can significantly impact overall quality of life. A qualitative study by Rydén et al (2022) described sleep disturbances have emerged as a significant and frequently reported symptom among patients with early-stage chronic kidney disease, reflecting a key aspect of their lived experiences that is often underrecognized in standard assessments This condition exacerbates the physical and psychological burden on patients, hindering recovery and adaptation to the disease.

Sleep problems in CKD patients can be attributed to various factors, such as the accumulation of uremic toxins, pain, pruritus, shortness of breath, anxiety, and side effects of dialysis therapy itself. Study by Bhuvaneswari G (2020) and Esmayanti et al., (2022) patients with chronic kidney disease undergoing hemodialysis often experience persistent sleep disturbances, including insomnia, which significantly affect their overall health and quality of life.

Globally, Bhuvaneswari G (2020) found that 100% of patients undergoing hemodialysis experienced insomnia prior to intervention, with a significant reduction to 36.6% after practicing Pranayama. Similarly, Herron et al (2023) reported that participants in the yoga group showed a clinically meaningful improvement in PSQI scores, decreasing from a baseline mean of 9.48 ± 3.41 to 6.50 ± 3.78 after the intervention.

As CKD progresses, metabolic changes and systemic inflammation occur, leading to various physiological disorders, including deteriorating sleep quality. Dialysis therapy, being invasive and repetitive, often triggers psychological stress and reduces quality of life (Kim et al., 2024).

A Study by Bhuvaneswari G (2020) demonstrated that the practice of Pranayama significantly improved sleep quality among hemodialysis patients, reducing the prevalence of insomnia from 100% to 36.6% following the intervention. Herron et al (2023) also found that a structured yoga program led to a substantial improvement in sleep quality among patients with chronic kidney disease, as evidenced by a reduction in PSQI scores from 9.48 to 6.50 after the yoga sessions. From a psychological perspective, mobile-based cognitive behavioral therapy (CBT) has also been shown to enhance emotional adaptation and sleep quality (Kim et al., 2024).

Yoga, as a complementary intervention, is increasingly being studied. Research by KauricKlein (2019) and Özer & Ateş (2021) showed that yoga, including laughter yoga, can reduce stress and pain, while improving sleep quality and increasing endorphin levels in hemodialysis patients. Specialized yoga programs are even being developed specifically for CKD patients undergoing dialysis to promote overall quality of life (Raghunandan & Saoji, 2024).

Given the high prevalence of sleep disturbances and their impact on the quality of life of CKD patients, effective and sustainable non-pharmacological interventions are urgently needed. A combined approach involving yoga and exercise appears promising, as both have been shown to improve sleep quality through physiological and psychological pathways. Carolina et al (2023) found that regular yoga exercise significantly improved sleep quality among participants, with 90% reporting fairly good sleep after the intervention, compared to only 25% before. Meanwhile, Vaishnav et al (2022) highlighted the importance of relaxation- and meditation-based interventions in reducing psychosomatic complaints that interfere with sleep in dialysis patients.

Therefore, a literature review on the effectiveness of yoga and exercise therapies on sleep quality in CKD patients is highly relevant. These interventions not only enhance physical condition, but also promote relaxation, reduce stress, and improve overall sleep patterns, thus holistically improving patients' quality of life. Given the high prevalence of sleep disturbances among CKD and hemodialysis patients—which are often underdiagnosed and undertreated—there is an urgent need to synthesize existing evidence to guide non-pharmacological, low-risk, and cost-effective interventions such as yoga into clinical practice. This review is essential to identify consistent findings, research gaps, and potential for integration of yoga-based therapies into routine nephrology care.

METHODS

Study Design

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Among the 13 selected studies, 11 were Randomized Controlled Trials (RCTs), 1 was a quasi-experimental study, and 1 was a qualitative study.

Search methods

Articles were retrieved from six databases: ProQuest, PubMed, Scopus, SpringerLink, the International Journal of Health Sciences and Research (IJHSR), and the Iranian Journal of Nursing and Midwifery Research. Only full-text articles published in English between 2019 and 2024 were included. The search was conducted using a combination of keywords based on Boolean operators AND and OR, including ("sleep disorder" OR "sleep quality") AND (yoga OR exercise) AND ("chronic kidney disease" OR CKD OR "hemodialysis"); ("sleep disorder" AND "yoga" AND "CKD patient"); ("effect of yoga" AND "chronic hemodialysis"); ("sleep quality" AND "yoga" AND "CKD"); and ("sleep quality" AND "exercise" AND "CKD").

The number of articles retrieved from each database was as follows: ProQuest (n = 726), PubMed (n = 15), Scopus (n = 2), SpringerLink (n = 174), International Journal of Health Sciences and Research (n = 9), and Iranian Journal of Nursing and Midwifery Research (n = 8). In total, 934 articles were identified from the six databases. After removing 352 duplicates and irrelevant articles during the initial screening, 582 articles remained for further review. Following title and abstract screening, 163 articles met the initial inclusion criteria. Among them, 119 articles were available in full text and were assessed for eligibility. After a thorough evaluation, 13 articles were included in this systematic review.

Inclusion and Exclusion Criteria

Inclusion Criteria

Eligible studies included Randomized Controlled Trials (RCTs) and Quasi-Experimental studies that compared an intervention group (yoga or physical exercise) with a control group. Participants were adults (≥18 years) diagnosed with chronic kidney disease (CKD) at various stages (including pre-dialysis, hemodialysis, peritoneal dialysis, and kidney transplantation). Participants also experienced sleep disturbances such as insomnia, restless legs syndrome, or sleep apnea. Yoga interventions involved structured yoga programs, including modified or laughter yoga, with durations ranging from 6 to 24 weeks. Physical exercise interventions included aerobic exercise programs, pilates, or a combination of physical activities, also with intervention periods ranging from 6 to 24 weeks.

Exclusion Criteria

Excluded studies were observational, case-control, or cohort studies without a control group. Also excluded were patients with severe comorbid conditions such as stroke, acute myocardial infarction, or heart failure within the last 30 days, and studies involving unstructured or unsupervised exercise programs.

Data Extraction

Data were extracted from the included studies based on study characteristics, intervention details, outcome measures, and key findings related to sleep quality in patients with chronic kidney disease (CKD) and on hemodialysis. The extracted data included study design, sample characteristics, type and duration of intervention, measurement instruments, follow-up period, and statistical outcomes. Outcome measurements commonly use validated instruments such as the Pittsburgh Sleep Quality Index (PSQI) and the Kidney Disease Quality of Life Short Form (KDQOL-SF). Pre- and post-intervention data were collected consistently across studies to evaluate the effectiveness of yoga and exercise interventions on sleep quality and fatigue among CKD patients.

Quality Apprasial

The methodological quality of the included studies was assessed using three instruments from the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, each appropriate for different study designs: RCTs, quasi-experimental, and qualitative research.

JBI Critical Appraisal Checklist for Randomized Controlled Trials (RCTs): This checklist contains 13 items. Of the 11 RCT articles reviewed, most used true randomization methods, such as random number tables or computer-generated sequences, reducing selection bias. Some studies applied allocation concealment, although not all described the process in detail. All studies reported baseline group equivalence, supporting the validity of outcome comparisons. Due to the behavioral nature of the intervention, blinding of participants and intervention providers was generally not feasible; however, several studies implemented blinding of outcome assessors to minimize measurement bias. All groups were treated equally aside from the intervention itself. Retention rates were high, and intention-to-treat analyses were conducted. Measurement tools were consistent and reliable, and statistical analyses were appropriate for the study objectives. Any deviations from standard RCT procedures were clearly explained and analyzed.

JBI Critical Appraisal Checklist for Quasi-Experimental Studies: This checklist consists of 9 items. The quasi-experimental study by Carolina et al. (2023) demonstrated a clear causal relationship between intervention and outcome. However, the presence of a control group was not always explicitly described, limiting the interpretation of the intervention effect. Baseline comparability and consistency of treatment outside the intervention were not consistently reported. Outcome measurements were conducted before and after the intervention using validated instruments. Follow-up completeness was also not consistently described. Nevertheless, the statistical analyses, including paired t-tests, were appropriate for the pre-post study design.

JBI Critical Appraisal Checklist for Qualitative Research: This checklist contains 10 items. The qualitative study by Rydén et al. (2022) fulfilled all methodological quality criteria, indicating high reliability. The study demonstrated congruence between the philosophical perspective, methodology, data collection methods, analysis, and interpretation. Ethical considerations were clearly addressed, the researcher's positionality was acknowledged, and authentic participant perspectives were presented through direct quotations. Overall, the study demonstrated strong methodological rigor and trustworthiness, supporting its validity as qualitative evidence regarding fatigue and sleep disturbances in peritoneal dialysis patients.

Data Analysis

Data analysis in this systematic review was conducted using a narrative synthesis approach. The findings from the included studies were analyzed and compared based on study design, intervention characteristics, duration of intervention, outcome measures, and the effectiveness of yoga and exercise on sleep quality among CKD and hemodialysis patients. Quantitative findings from RCT and quasi-experimental studies were summarized descriptively according to changes in sleep quality scores, fatigue levels, and quality of life outcomes. Qualitative findings were analyzed thematically to identify common experiences and perceptions related to sleep disturbances and intervention benefits. Similarities and differences among studies were interpreted to provide a comprehensive understanding of the effectiveness of yoga and exercise interventions in improving sleep quality among CKD patients.

RESULTS

Search Outcome

Data were extracted from 12 quantitative articles and 1 qualitative study, all of which evaluated the effects of non-pharmacological interventions—including physical interventions (aerobic exercise, yoga, tai chi, pilates), meditation, and cognitive behavioral therapy (CBT) on sleep quality and/or quality of life in patients with chronic kidney disease (CKD) or those undergoing dialysis (hemodialysis). All selected studies employed either quasi-experimental or randomized controlled trial (RCT) designs, providing relatively high internal validity. Extracted data included: Author(s) and year, study objective, study design, participant characteristics, intervention protocol, measured outcomes, key findings related to sleep quality and/or quality of life. All data were organized into a systematic table to facilitate the identification of thematic patterns, variations in intervention protocols, and comparison of outcomes across studies.

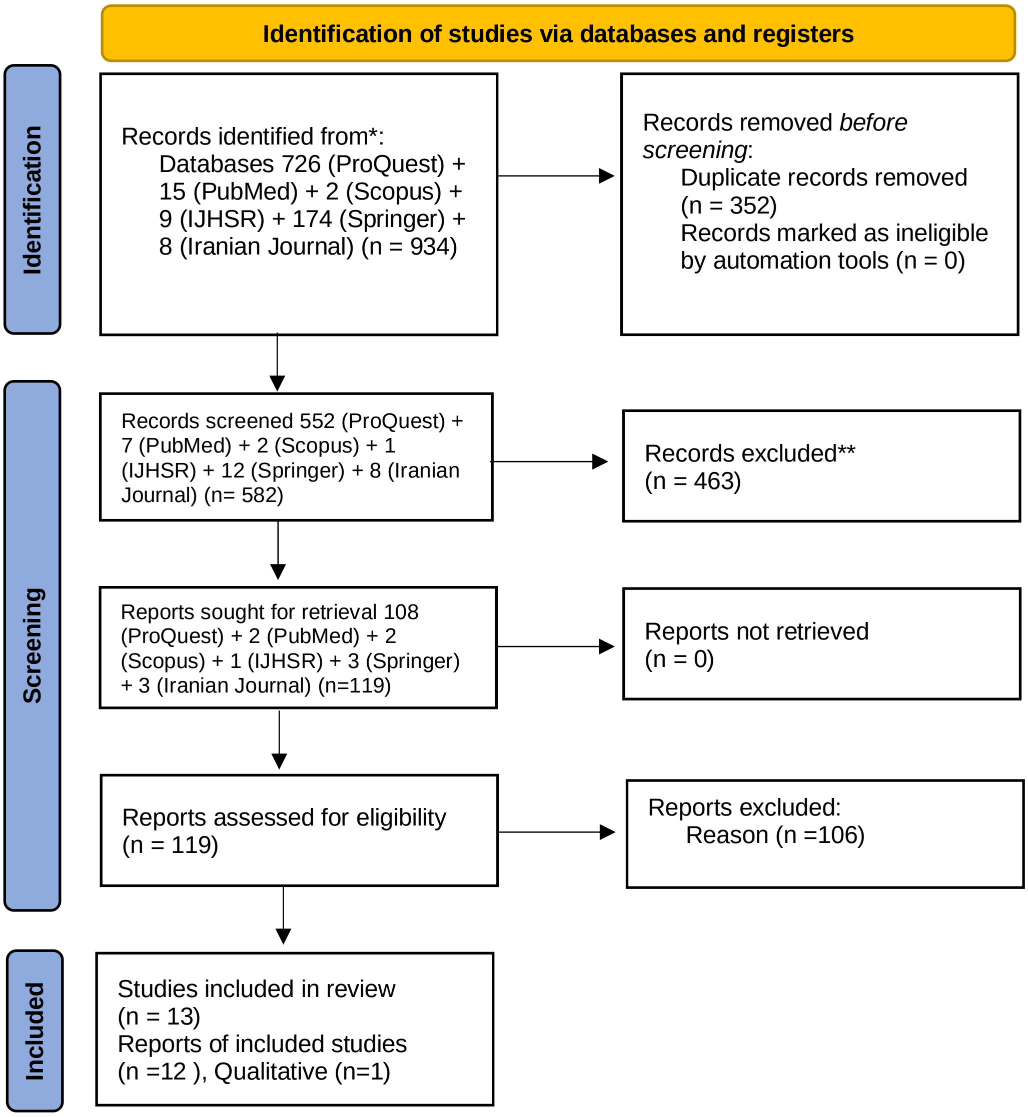

Figure 1. PRISMA Flowchart

Quality Assessment Results

The methodological quality assessment showed that the majority of the included studies had good methodological rigor and a relatively low risk of bias. Of the 13 included studies, 11 were Randomized Controlled Trials (RCTs), 1 was a quasi-experimental study, and 1 was a qualitative study. The appraisal was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist according to the respective study designs. Most RCT studies demonstrated strong methodological quality through the use of true randomization procedures, baseline group comparability, validated outcome instruments, and appropriate statistical analyses. Several studies also implemented allocation concealment and blinding of outcome assessors to reduce selection and measurement bias. Commonly used validated instruments included the Pittsburgh Sleep Quality Index (PSQI) and the Kidney Disease Quality of Life Short Form (KDQOL-SF). Retention rates across studies were generally high, and intention-to-treat analyses were frequently applied. However, due to the behavioral nature of interventions such as yoga and exercise therapy, blinding of participants and intervention providers was often not feasible.

The quasi-experimental study by Carolina et al. (2023) demonstrated acceptable methodological quality by showing a clear intervention–outcome relationship and using consistent pre- and post-intervention measurements with validated instruments. Nevertheless, the study lacked detailed reporting regarding control group comparability and follow-up completeness, which may limit interpretation of the intervention effects. Statistical analyses, including paired t-tests, were considered appropriate for the study design. The qualitative study by Rydén et al. (2022) fulfilled all methodological quality criteria for qualitative research. The study demonstrated congruence between the research philosophy, methodology, data collection, analysis, and interpretation. Ethical considerations were clearly addressed, and participant experiences were authentically represented through direct quotations. Overall, the qualitative study was considered trustworthy and methodologically rigorous.

Table 1. Data Extraction Table (Article Characteristics)

No	Authors	Aim	Design	Participants	Intervention Protocol	Outcome: Measured Outcomes	Outcome: Findings
1	Rathore et al (2025) Feasibility and Effect of Yoga on the Quality of Life of Patients with Chronic Kidney Disease on Peritoneal Dialysis. https://doi.org/10.25259/ijn_796_2024	To evaluate the safety, feasibility, and effect of a customized yoga intervention on quality of life (QoL) in CAPD patients.	Randomized Controlled Trial (RCT)	10 patients on Continuous Ambulatory Peritoneal Dialysis (CAPD) for ≥3 months; exclusion: prior yoga, Hb <8 g/dL, comorbidities, etc.	Customized 35-minute yoga program, 3×/week for 3 months; included loosening exercises (Sookshma Vyayama), yoga postures (Asanas), breathing (Pranayama), and meditation (Shavasana); delivered offline/online, followed by telephonic compliance checks.	KDQOL-36 (Kidney Disease Quality of Life)	KDQOL-36 scores improved from 67.4 ± 7.14 to 76.8 ± 5.18 ($p = 0.051$); Zarit burden score reduced from 17.5 ± 15.01 to 13.1 ± 12.31 ($p = 0.053$);
2	Kim et al (2024)The effect of a scenario-based cognitive behavioral therapy mobile app on end-stage kidney disease patients on dialysis. https://doi.org/10.1038/s41598-024-70986-3	To evaluate the effectiveness of the scenario-based mobile CBT application (Todac Todac) on depression in dialysis patients, as well as its	Randomized Controlled Trial (RCT)	65 patients with end-stage kidney disease (on dialysis for ≥3 months, aged 20–65 years), randomly assigned to either the Todac Todac	1. Two groups: Todac Todac (CBT-based application) vs. E-moods (daily mood tracking application) 2. Intervention duration: 3 weeks	1) Beck Depression Inventory (BDI) 2) State/Trait Anxiety, DAS-K 3) Insomnia (no specific instrument for sleep quality mentioned)	Depression (Beck Depression Inventory): Todac Todac: pre-intervention score 16.53 ± 9.46, showed a significant decrease post-intervention ($p < 0.05$; exact value not reported). E-moods: pre-intervention score 16.97 ± 8.72, also

		effects on anxiety and insomnia.		group (n=32) or the E-moods control group (n=33), at Soonchunhyang University Hospital Cheonan, South Korea			showed a significant decrease post-intervention ($p < 0.05$). No significant difference between the two groups ($p > 0.05$). DAS-K: Todac Todac: pre-intervention score 118.72 ± 29.01, significantly decreased post-intervention ($p < 0.05$). E-moods: pre-intervention score 117.7 ± 25.2, no significant change observed. Anxiety: No significant changes were observed in either group. Insomnia/Sleep Quality: No significant differences between groups; no meaningful improvement in sleep quality was reported.
3	KauricKlein (2019) Effect of yoga-based exercise program on pain, fatigue, sleep disturbance and biochemical markers in patients on hemodialysis. https://doi.org/10.1016/j.ctcp.2018.11.004	To evaluate the effects of an intradialytic yoga program on pain, fatigue, sleep disturbances, physical	Randomized Controlled Trial (RCT)	37 stable hemodialysis patients (19 in the yoga group, 18 in the control group), with a mean age of 39.5 years, majority	1. Intervention lasted for 3 months. 2. Yoga group: Yoga sessions conducted twice a week (15–30 minutes per	1) Visual Analog Scale (VAS) for pain 2) Fatigue 3) Sleep disturbances 4) Handgrip strength 5) Blood	Sleep disturbances: Sleep disturbance scores significantly decreased in the yoga group compared to the control group ($p = 0.04$). Pain: $p = 0.03$ Fatigue: $p = 0.008$ Handgrip strength: $p = 0.006$

		function, and biomarkers in hemodialysis patients.		female, and an average dialysis duration of 21.9 months, recruited from the hemodialysis unit of Uludag University Hospital, Turkey.	session) with a certified instructor, in addition to daily range-of-motion exercises at home. 3. Control group: Performed only daily range-of-motion 4. exercises.	biomarkers; measured pre- and post-intervention	Urea: p = 0.02 Creatinine: p = 0.007 Cholesterol: p = 0.02 Hematocrit: p = 0.03 No significant changes were observed in calcium, phosphorus, HDL, or triglyceride levels.
4	Herron et al (2023) The Impact of Yoga on Sleep, Psychological Stress, and Blood Pressure in Individuals with Chronic Kidney Disease: A Pilot Randomized Controlled Trial. https://doi.org/10.1016/j.ekir.2022.11.007	To assess the feasibility and effectiveness of a yoga intervention on sleep quality, stress, and blood pressure in CKD patients.	Randomized Controlled Trial (RCT)	18 participants with CKD stages 3–5; randomized into yoga group (n=9) and wait-list control group (n=9).	12-week yoga program (2×/week, 75-minute sessions); included asanas, pranayama, and meditation; sessions led by certified instructor; adherence tracked via logs and surveys.	Pittsburgh Sleep Quality Index (PSQI), Perceived Stress Scale (PSS), Systolic/Diastolic Blood Pressure	Yoga group showed significant reduction in PSQI scores (9.48 ± 3.41 to 6.50 ± 3.78); reduced perceived stress and systolic BP; high adherence and satisfaction indicated feasibility; suggested positive impact on sleep and psychological well-being.
5	Vaishnav et al. (2022). Study of effect of guided meditation on quality of life in patients of end stage renal disease (ESRD) on maintenance hemodialysis – a randomised controlled trial. https://doi.org/10.1186/s12906-022-03717-8	To evaluate the effects of guided meditation on the physical, emotional, and cognitive dimensions of	Randomized Controlled Trial (RCT)	Eighty hemodialysis patients (40 in the intervention group, 40 in the control group) at Shree Krishna	1) Double-blind, 6-week study. 2) Intervention: 30-minute guided meditation sessions during each dialysis	1) KDQOL (Kidney Disease Quality of Life) 2) Perceived Stress Scale 3) Faces Scale for Happiness	Guided meditation led to significant improvements in happiness scores (Faces Scale, p = 0.0027), a reduction in perceived stress (Perceived Stress Scale, p < 0.001), and an increase in total KDQOL

		well-being, as well as quality of life in hemodialysis patients		Hospital, Karamsad, India; aged 18–70 years, with end-stage CKD undergoing dialysis three times per week.	session (3 times per week).	4) Reflective diary Statistical analysis: Fisher's Exact Test; p < 0.05 considered significant.	scores (from 67.9 ± 6.2 to 70.2 ± 1.95, p = 0.0355). Significant improvements were also observed in the domains of Burden of Kidney Disease (p < 0.001), Effect of Kidney Disease (p = 0.0001), and Symptoms of Kidney Disease (p = 0.01461). Qualitative analysis revealed that 97.5% of participants reported better sleep, a sense of peace, inspiration, and reduced anger.
6	Raghunandan & Saoji (2024). Modified yoga program for Chronic Kidney Disease (CKD) patients undergoing hemodialysis: Study protocol for a randomized controlled trial. https://doi.org/10.1016/j.aimed.2024.08.013	To evaluate the impact of a modified yoga program on kidney function, cardiovascular health, and psychological aspects (including sleep quality) in CKD patients undergoing hemodialysis."	Randomized Controlled Trial (RCT)	Eighty patients with end-stage renal disease (stage 5 CKD), aged 18–60 years, at Rangadorae Hospital, Bengaluru, India. Participants were randomized 1:1 into a yoga group (n=40) and a control group (n=40, wait-list).	1) Parallel-group design; 60-minute yoga sessions 2) Conducted 3 times per week for 3 months, including modules on physical postures, pranayama, and meditation	1)Assessments conducted at baseline, 1 month, 3 months, and 6 months. 2)Primary outcome: estimated glomerular filtration rate (eGFR). 3)Secondary outcomes: kidney function, hemoglobin, C-reactive protein (CRP), blood	Yoga improved sleep quality (as measured by the Pittsburgh Sleep Quality Index/PSQI) and quality of life.

						pressure, and subjective measures (pain, depression, anxiety, fatigue). 4)Sleep quality assessed using the Pittsburgh Sleep Quality Index (PSQI); quality of life assessed using WHOQOL. Statistical analysis was performed according to data distribution.	
7	Bhuvaneswari G (2020). Effectiveness of Pranayama on Fatigue and Insomnia among Patients with Hemodialysis. https://doi.org/10.26452/ijrps.v	To assess the effectiveness of Pranayama in reducing fatigue and insomnia among hemodialysis patients.	Randomized Controlled Trial (RCT)	60 patients undergoing hemodialysis at Saveetha Medical College Hospital; selected via purposive sampling	Pranayama sessions for 15 minutes, twice daily, one hour after hemodialysis, over 15 consecutive days. Sessions were delivered individually using demonstration method.	Fatigue Severity Scale; Insomnia Severity Index	Mean fatigue scores reduced from 59.38 ± 8.18 to 19.09 ± 8.44 (p = 0.001); insomnia scores decreased from 25.55 ± 3.37 to 15.17 ± 4.85 (p = 0.001). Pranayama was found to be significantly effective in reducing both fatigue and insomnia.

8	Carolina et a (2023). Influence of Yoga Exercise on Sleep Quality of Yoga Participants at Huma Yoga Palangka Raya.	To determine the effect of yoga exercise on sleep quality among yoga participants.	Quasi-experimental,	20 yoga participants at Huma Yoga Palangka Raya	Yoga exercise sessions conducted 3 times per week, including physical postures and breathing techniques focused on relaxation and mental calmness. Duration per session not specified.	Subjective sleep quality assessed via questionnaire, categorized into very good, fairly good, fairly poor, and very poor.	Significant improvement in sleep quality post-intervention (Wilcoxon test p=0.000). Majority of participants improved from poor or very poor to fairly good sleep quality. Participants reported feeling calmer and more relaxed, with easier sleep initiation. Some physiological disturbances decreased in frequency but persisted.
9	Poorsaadet et al (2019). The effects of aerobic exercise on cognitive performance and sleep quality haemodialysis patients. https://doi.org/10.21767/amj.2017.3279	To evaluate the effects of aerobic exercise during hemodialysis on cognitive performance and sleep quality in patients	Randomized Controlled Trial (RCT)	Thirty-eight hemodialysis patients in Arak, Iran, were divided into an intervention group (n=27) and a control group (n=11)."	1) Stationary cycling exercise for 75 minutes 2) Conducted 3 times per week for 24 weeks, during the first two hours of the hemodialysis session	Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) at baseline, 12 weeks, and 24 weeks after the intervention. Statistical analysis was conducted using repeated measures and the Mann–Whitney U test.	Statistics: - The PSQI score in the intervention group significantly improved: baseline $22.9 \pm 7.7 \rightarrow$ 3 months $22.4 \pm 9.4 \rightarrow$ 6 months 20.0 ± 9.1 ($p = 0.001$). - In the control group: baseline $28.7 \pm 8.7 \rightarrow$ 3 months $31.4 \pm 10 \rightarrow$ 6 months 32.8 ± 7.7 ($p = 0.348$). - The between-group difference was statistically significant at 6 months ($p = 0.001$).

10	Ozer & Ates (2021). Effects of laughter yoga on hemodialysis patients' plasma-beta endorphin levels, pain levels and sleep quality: A randomized controlled trial. https://doi.org/10.1016/j.ctcp.2021.101382	To evaluate the effects of laughter yoga on plasma beta-endorphin levels, pain intensity, and sleep quality in hemodialysis patients.	Randomized Controlled Trial (RCT)	Sixty-eight hemodialysis patients from two dialysis centers in Istanbul, Turkey (33 in the intervention group, 34 in the control group); aged ≥18 years, undergoing hemodialysis at least twice per week, with a PSQI score >5 and a VAS pain score ≥5	1) Sixteen sessions of laughter yoga (30 minutes, twice per week) 2) Conducted over 8 weeks during hemodialysis."	1) Beta-endorphin (measured by ELISA), 2) Visual Analog Scale (VAS) for pain, 3) Pittsburgh Sleep Quality Index (PSQI) for sleep quality, assessed at weeks 1, 4, and 8. Statistical analysis: t-test, ANOVA, and Friedman test; $p < 0.05$ considered statistically significant	Statistics: The total PSQI score in the intervention group significantly decreased: Week 1: 10.27 ± 2.45 → Week 4: 5.21 ± 1.27 → Week 8: 2.61 ± 1.62 ($F = 232.522$; $p = 0.000$). No significant change was observed in the control group: Week 1: 10.74 ± 1.64 → Week 8: 10.76 ± 1.65 ($F = 1.168$; $p = 0.317$). A large effect size was found for sleep quality (Cohen’s $d = 4.98$). Significant improvements were observed in all PSQI subdimensions in the intervention group, including sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction ($p < 0.01$). No significant changes were found in plasma beta-endorphin levels.

11	Picariello et al (2019). Cognitive-behavioural therapy (CBT) for renal fatigue (BReF): A feasibility randomised-controlled trial of CBT for the management of fatigue in haemodialysis (HD) patients. https://doi.org/10.1136/bmjopen-2017-020842	To evaluate the feasibility, acceptability, and potential benefits of a fatigue-focused cognitive behavioral therapy (CBT) intervention in hemodialysis patients, including its impact on sleep quality."	Randomized Controlled Trial (RCT)	Forty adult patients (>18 years) undergoing outpatient hemodialysis at two NHS hospitals in the UK, with a clinical fatigue score (CFQ >18).	CBT intervention for 4–6 weeks	Skor Pittsburgh Sleep Quality Index (PSQI)	Pittsburgh Sleep Quality Index (PSQI) scores in the CBT group decreased from a mean of 9.5 (SD 4.1) at baseline to 8.1 (SD 4.2) post-intervention. In the control group, scores changed from 10.3 (SD 3.7) to 10.2 (SD 3.9). The between-group difference was −1.2 (95% CI −3.5 to 1.1), p = 0.29, indicating no statistically significant difference.
12	Gökhan Hakverir & Gündogdu (2024). The Effect of Progressive Muscle Relaxation Exercises on Sleep Quality in Patients Receiving Hemodialysis Treatment: A Randomized Controlled Study. https://doi.org/10.4274/jtsm.galenos.2023.81994	To evaluate the effect of Progressive Muscle Relaxation Exercises (PMRE) on sleep quality in patients receiving hemodialysis (HD) treatment due to chronic kidney disease.	Randomized Controlled Trial (RCT)	76 HD patients in a dialysis center in Konya, Turkey; 38 in intervention group, 38 in control group; aged ≥18 years, on HD ≥3 months, with PSQI ≥5, and no recent use of other relaxation techniques.	PMRE training was provided via video uploaded to patients' phones. Patients practiced PMRE twice daily (daytime and before bed) for 8 weeks. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) at baseline, week 4, and week 8. Control	PSQI global and subscale scores	PMRE significantly improved PSQI global score and all subscales (subjective sleep quality, latency, duration, efficiency, disturbance, daytime dysfunction) at week 8 except sleep medication use. Global sleep score dropped below 5 in the intervention group by week 8, indicating improved sleep quality (p<0.001). Results support integrating PMRE into HD patient education.

					group received standard care only.		
13	Rydén et al (2022). Understanding the patient experience of chronic kidney disease stages 2–3b: a qualitative interview study with Kidney Disease Quality of Life (KDQOL-36) debrief. https://doi.org/10.1186/s12882-022-02826-3	To explore the experiences of sleep disturbance in patients undergoing hemodialysis.	Qualitative study	17 participants: 13 hemodialysis patients (both genders), 2 nurses, and 2 family members from two hemodialysis centers in Iran.	In-depth semi-structured interviews were conducted with patients, nurses, and family members. Data were analyzed using conventional content analysis based on Graneheim and Lundman method.	Experiences and perceptions related to sleep disturbance.	Five main themes emerged: 1) Sleeping with suffering, 2) Seeking calmness, 3) The nightmare of dialysis, 4) Disturbance in family life, and 5) Strategies for better sleep. Sleep disturbances were experienced as painful, multifactorial, and impacting daily life.

Analytical Findings result

The analytical findings revealed that non-pharmacological interventions, particularly yoga and aerobic exercise, consistently improved sleep quality among patients with chronic kidney disease (CKD), especially those undergoing hemodialysis. Across the reviewed studies, aerobic exercise emerged as one of the most effective interventions for enhancing sleep quality, reducing fatigue, and improving overall physical function. Studies such as Poorsaadet et al. (2019) demonstrated significant improvements in PSQI scores among hemodialysis patients participating in regular aerobic exercise programs. Yoga-based interventions, including modified yoga, laughter yoga, and pranayama, also demonstrated positive effects on sleep quality, stress reduction, relaxation, and psychological well-being. Herron et al. (2023) reported clinically meaningful improvements in PSQI scores following a structured yoga intervention, while Özer & Ateş (2021) found significant reductions in sleep disturbance and improvements in multiple PSQI subdomains among hemodialysis patients practicing laughter yoga. Similarly, Bhuvaneswari G. (2020) reported substantial reductions in insomnia and fatigue after pranayama exercises.

Guided meditation and relaxation-based interventions also showed beneficial effects on sleep quality and emotional well-being. Vaishnav et al. (2022) demonstrated that guided meditation significantly improved quality of life, reduced stress, and promoted better sleep among patients undergoing hemodialysis. Progressive Muscle Relaxation Exercises (PMRE) were also associated with significant improvements in global PSQI scores and sleep-related subdomains. In contrast, app-based Cognitive Behavioral Therapy (CBT) interventions demonstrated limited effectiveness in improving sleep quality. Although studies such as Kim et al. (2024) and Picariello et al. (2019) reported reductions in depression and dysfunctional beliefs, no statistically significant improvements in sleep quality were observed compared to control groups.

The qualitative findings further highlighted that sleep disturbances in CKD patients were multifactorial and closely associated with persistent fatigue, psychological distress, and reduced quality of life. Patients described difficulties initiating and maintaining sleep, frequent nighttime awakenings, and chronic exhaustion that negatively affected daily functioning and emotional resilience. These findings emphasize the importance of integrating holistic and non-pharmacological interventions into CKD management to address both physical and psychological aspects of sleep disturbances.

DISCUSSION

Based on the analysis of 11 RCT articles, most studies, such as Özer & Ateş (2021), and Poorsaadet et al (2019), employed randomization methods such as random number tables or computerized allocation. This method ensures participants are assigned without bias, thus producing more valid results. Randomization guarantees that outcomes can be directly attributed to the intervention provided. Some articles, such as Kim et al (2024) and Raghunandan & Saoji (2024), mentioned the use of allocation concealment, a method where neither the researchers nor participants are aware of the group assignments prior to allocation. This is important to prevent selection bias. Most studies, such as Vaishnav et al (2022) and Poorsaadet et al (2019), reported that intervention and control groups had similar baseline characteristics. This ensures that differences in outcomes are not due to initial group imbalances.

Several studies, including Picariello et al (2019) ensured that participants were blinded to their group assignments. However, in behavioral interventions (e.g., yoga and exercise), blinding participants is often difficult because the type of intervention is apparent. In most studies, treatment providers (e.g., yoga instructors or exercise coaches) were unaware of group assignments, although this is not always feasible in behavioral interventions. Studies like Kim et al (2024) and Özer & Ateş (2021) ensured that outcome assessors were blinded to group assignments, which reduces potential measurement bias. All reviewed studies ensured that intervention and control groups received identical treatment except for the main intervention. This ensures that outcome differences can be attributed to the intervention itself. Most articles, such as Vaishnav et al (2022), reported high retention rates and analyzed group differences in follow-up completion.

All primary studies used analysis based on initial group assignment, employing the intention-to-treat principle to avoid bias from group shifts. All studies used the same measurement instruments for both intervention and control groups, such as the PSQI for sleep quality. The instruments used, such as the PSQI and KDQOL-SF, are validated and reliable for measuring sleep quality and other outcomes. All studies used appropriate statistical analyses (e.g., t-tests, ANOVA, multivariate analysis), according to their research aims and data types. All articles adopted standard RCT designs with individual randomization and parallel groups, and any deviations were explained and adequately analyzed.

From the analysis of 11 articles discussing various interventions on sleep quality, it can be concluded that several types of interventions significantly improved sleep quality in patients with kidney disease, especially those undergoing hemodialysis. One of the most consistently effective interventions was aerobic exercise. In studies by Poorsaadet et al (2019), both home-based and center-based aerobic exercise improved sleep quality in patients with chronic kidney disease. Aerobic exercise not only enhanced cardiopulmonary function but also positively impacted the sleep quality of hemodialysis patients. Study by Yadav & Shrivastava (2024) Aerobic exercise improves sleep quality in CKD patients by reducing sleep disorders like RLS, lowering stress and anxiety, and enhancing overall physical and psychological function. Increased physical activity based on a study from Choudhary et al (2024), associated with better sleep quality in hemodialysis patients, as those who are more physically active tend to experience improved sleep compared to less active patients Corrêa et al (2020) explains that, resistance training improved sleep quality in hemodialysis patients by enhancing nitric oxide bioavailability and reducing inflammation and oxidative stress.

Similarly, laughter yoga, as studied by Özer & Ateş (2021), improved beta-endorphin levels and sleep quality among hemodialysis patients. Although its effects were smaller than aerobic exercise, laughter yoga still benefitted patients' sleep. Study by Khalsa & Goldstein (2021) Yoga improves sleep quality in CKD patients by reducing psychological stress and promoting autonomic balance. Modified yoga programs, as studied by Raghunandan & Saoji (2024), were also effective in enhancing sleep quality in patients with chronic kidney disease. Modified yoga, though focused on flexibility and relaxation, produced similar positive effects as conventional yoga. Meanwhile, study by Bhuvaneswari G (2020) The practice of Pranayama demonstrated significant effectiveness in alleviating fatigue and improving sleep quality in individuals undergoing hemodialysis. In another study by Alishahi et al (2024) A mobile recreational therapy program reduced fatigue in hemodialysis patients through exercise, music, comedy, and interactive education-not just yoga alone.

Another intervention with a positive impact on sleep quality was guided meditation. In the study by Wu et al (2024) ,guided meditation improved sleep quality and overall quality of life in end-stage kidney disease patients on hemodialysis. Although not as physically intensive as aerobic exercise or yoga, guided meditation still resulted in significant improvements in sleep. A quasi-experimental study by Carolina et al (2023) regular yoga practice, particularly involving breath control and relaxation techniques, significantly enhances sleep quality by reducing stress and promoting mental calmness among individuals experiencing sleep disturbances. By including a group that did not receive the intervention but still received standard care, Kalita was able to compare the direct impact of the intervention. In contrast, Shahgholian’s study lacked clarity regarding the control group, which limits interpretation of whether observed changes were due solely to the intervention or to external factors. The study also failed to report on participant characteristic comparability, undermining the validity of between-group comparisons.

Regarding outcome measurement, Carolina et al (2023) performed repeated measurements before and after the intervention using the same instruments for all participants. The quality of life questionnaire was applied in both pre- and post-tests. The study also demonstrated that the measurement tools were reliable and validated, reporting high content validity and internal consistency (Cronbach's Alpha). However, the study lacked comprehensive reporting on follow-up failing to mention participant dropout or how it was handled. In terms of statistical analysis, Shahgholian used paired t-tests to compare pre- and post-intervention results in the experimental group. This analysis was appropriate for a pre-post design with a limited sample and was capable of detecting statistically significant differences.

In several interventions such as app-based Cognitive Behavioral Therapy (CBT), as studied by Kim et al (2024), no significant impact on sleep quality was found compared to the control group. Its effects were limited to reduced depression scores and dysfunctional beliefs. However, the app helped reduce anxiety and depression. In the qualitative study by Rydén et al (2022), Patients with chronic kidney disease undergoing hemodialysis often experience extreme fatigue as a direct consequence of persistent sleep disturbances, which are marked by frequent nighttime awakenings, inability to fall back asleep, and a constant sense of exhaustion that significantly disrupts their physical strength and emotional resilience. This study highlight how sleep deprivation in these patients contributes to a vicious cycle of tiredness, where the inability to achieve restful sleep not only undermines their daily functioning but also deepens psychological distress, leaving them in a state of continuous suffering and diminished quality of life.

Study by Salehi et al (2020) Fatigue negatively affects sleep quality in hemodialysis patients by causing physical discomfort and reducing overall restfulness. Overall, aerobic exercise appears to be the most effective and consistent intervention for improving sleep quality in kidney disease patients, alongside yoga-based interventions. Aerobic exercise can enhance sleep quality in CKD patients by easing restless legs symptoms and promoting relaxation. Other programs such as Pilates and guided meditation also showed positive effects, though possibly less pronounced than more intensive physical activities. Meanwhile, app-based therapies like CBT have not yet proven effective in improving sleep quality, although CBT does help reduce anxiety and depression (Yadav & Shrivastava, 2024).

The effective duration of interventions to improve sleep quality in kidney disease patients ranges from 6 to 24 weeks, depending on the type of intervention. Interventions such as aerobic exercise, Tai Chi, guided meditation, and laughter yoga demonstrated significant improvements in sleep quality. However, the optimal duration should be tailored to individual patient needs and conditions. Clinical practice recommendations include considering proven intervention durations, such as 6 weeks for guided meditation and laughter yoga, with adjustments based on patient response and tolerance.

IMPLICATION AND LIMITATIONS

Implication

This systematic review shows that non-pharmacological interventions such as yoga, aerobic exercise, guided meditation, and relaxation exercises can improve sleep quality in patients with chronic kidney disease (CKD), especially those undergoing hemodialysis. These interventions may also reduce fatigue, stress, and psychological problems while improving quality of life. The findings suggest that nurses and healthcare professionals can consider integrating exercise and yoga-based programs into routine CKD care because they are safe, low-cost, and easy to implement. Regular assessment using tools such as the Pittsburgh Sleep Quality Index (PSQI) is also important to monitor patient sleep quality and evaluate intervention outcomes.

Limitations

This review has several limitations. First, only 13 studies were included, which may limit the generalizability of the findings. Second, the included studies used different intervention types, durations, and outcome measurements, making comparisons difficult. Most studies also used self-reported questionnaires such as the PSQI, which may introduce response bias. In addition, many studies had small sample sizes and short intervention periods, limiting conclusions about long-term effects. Finally, this review only included English-language articles published between 2019 and 2024, so some relevant studies may have been excluded.

CONCLUSION

Based on the analysis of 11 RCT studies, 1 quasi-experimental study, and 1 qualitative study, non-pharmacological interventions were found to improve sleep quality in patients with chronic kidney disease (CKD), especially those undergoing hemodialysis. Most studies used strong methodologies and validated instruments such as the PSQI and KDQOL-SF. Aerobic exercise emerged as the most effective and consistent intervention for improving sleep quality and physical function in CKD patients. Yoga-based interventions, including modified yoga and laughter yoga, also showed positive effects on sleep quality, relaxation, and psychological well-being. Guided meditation contributed to better sleep and quality of life, although its effects were less consistent than physical exercise. In contrast, app-based Cognitive Behavioral Therapy (CBT) showed limited effects on sleep quality, despite helping reduce anxiety and depression. Overall, physical activity-based interventions such as aerobic exercise and yoga can be considered effective non-pharmacological approaches to improve sleep quality and overall well-being in CKD patients.

SUGGESTIONS

1. Consider Yoga as Alternative Interventions
   Modified yoga programs and Pilates have also shown positive effects in improving sleep quality among patients with chronic kidney disease. Studies by Raghunandan & Saoji (2024) indicated that these interventions enhance both sleep quality and general health. The effective duration of these interventions ranges from 8 to 12 weeks, with a frequency of 2 to 3 times per week and a duration of 30 to 60 minutes per session.
2. Conduct Regular Evaluation and Monitoring
   To ensure the effectiveness of the interventions, it is essential to carry out regular evaluations and monitoring of patients' sleep quality. The use of validated instruments, such as the Pittsburgh Sleep Quality Index (PSQI), can assist in measuring changes in sleep quality before and after the intervention.
3. Provide Ongoing Education and Support
   Educating patients about the importance of quality sleep and strategies to achieve it can increase the success rate of the intervention. Additionally, continued support through counseling or support groups can help patients address challenges encountered during the sleep improvement process.

ACKNOWLEDGMEN

The authors would like to thank the Faculty of Nursing, Universitas Indonesia, for the support and contribution to this research.

DECLARATION OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

Author Contribution

Author 1: conception and design of the study, data collection, data analysis, editing and drafting of the manuscript

Author 2: supervision, critical revision of the manuscript, and validation of the research methodology.

Author 3: supervision, critical revision of the manuscript, and validation of the research methodology.
Author 4: supervision, critical revision of the manuscript, and validation of the research methodology.

REFERENCES

Alishahi, M., Mazloum, S. R., Mohajer, S., & Namazinia, M. (2024). The effect of recreational therapy application on fatigue in hemodialysis patients: a randomized clinical trial. *BMC Nephrology*, *25*(1). https://doi.org/10.1186/s12882-024-03807-4

Bhuvaneswari G. (2020). *Effectiveness of Pranayama on Fatigue and Insomnia among Patients with Hemodialysis*. https://doi.org/10.26452/ijrps.v

Carolina, M., Puspita, A., Carolina, N., & Studi Sarjana Keperawatan STIKes Eka Harap Palangka Raya, P. (2023). Pengaruh Senam Yoga Terhadap Kualitas Tidur Peserta Yoga Di Huma Yoga Palangka Raya. *Jurnal Ilmiah Ilmu Kesehatan Dan Kedokteran*, *1*(2).

Choudhary, S., Rana, N., Kumar, A., Bajpai, N. K., & Gangadevi, P. (2024). Physical Activity and Quality of Sleep Among Patient with Chronic Kidney Disease on Hemodialysis: A Cross-Sectional Study. *Indian Journal of Nephrology*, *34*(4), 350–356. https://doi.org/10.25259/ijn_56_23

Corrêa, H. L., Moura, S. R. G., Neves, R. V. P., Tzanno-Martins, C., Souza, M. K., Haro, A. S., Costa, F., Silva, J. A. B., Stone, W., Honorato, F. S., Deus, L. A., Prestes, J., Simões, H. G., Vieira, E. C., de Melo, G. F., Moraes, M. R., & Rosa, T. S. (2020). Resistance training improves sleep quality, redox balance and inflammatory profile in maintenance hemodialysis patients: a randomized controlled trial. *Scientific Reports*, *10*(1). https://doi.org/10.1038/s41598-020-68602-1

Esmayanti, R., Waluyo, A., & Sukmarini, L. (2022). Terapi Komplementer pada Pasien CKD dengan Sleep Disorder. *Jurnal Keperawatan Silampari*, *5*(2), 1028–1035. https://doi.org/10.31539/jks.v5i2.3563

Gökhan Hakverir, H., & Gündogdu, F. (2024). The Effect of Progressive Muscle Relaxation Exercises on Sleep Quality in Patients Receiving Hemodialysis Treatment: A Randomized Controlled Study. *Journal of Turkish Sleep Medicine*, 169–177. https://doi.org/10.4274/jtsm.galenos.2023.81994

Herron, A., Cavanaugh, K. L., Umeukeje, E. M., Ikizler, T. A., & Birdee, G. (2023). A Pilot Randomized Trial of Intradialysis Yoga for Patients With End-Stage Kidney Disease. *Kidney International Reports*, *8*(2), 357–359. https://doi.org/10.1016/j.ekir.2022.11.007

KauricKlein, Z. (2019). Effect of yoga on physical and psychological outcomes in patients on chronic hemodialysis. In *Complementary Therapies in Clinical Practice* (Vol. 34, pp. 41–45). Churchill Livingstone. https://doi.org/10.1016/j.ctcp.2018.11.004

Khalsa, S. B. S., & Goldstein, M. R. (2021). Treatment of chronic primary sleep onset insomnia with kundalini yoga: A randomized controlled trial with active sleep hygiene comparison. In *Journal of Clinical Sleep Medicine* (Vol. 17, Issue 9, pp. 1841–1852). American Academy of Sleep Medicine. https://doi.org/10.5664/jcsm.9320

Kim, D. S., Song, H. S., Lee, K. M., Lee, J. G., Yun, S., Lim, J., Heo, N. H., Kim, J. S., Cho, N. J., Park, S., Gil, H. W., & Lee, E. Y. (2024). The effect of a scenario-based cognitive behavioral therapy mobile app on end-stage kidney disease patients on dialysis. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-70986-3

Özer, Z., & Ateş, S. (2021). Effects of laughter yoga on hemodialysis patients' plasma-beta endorphin levels, pain levels and sleep quality: A randomized controlled trial. *Complementary Therapies in Clinical Practice*, *43*. https://doi.org/10.1016/j.ctcp.2021.101382

Picariello, F., Moss-Morris, R., MacDougall, I. C., Norton, S., Da Silva-Gane, M., Farrington, K., Clayton, H., & Chilcot, J. (2019). Cognitive-behavioural therapy (CBT) for renal fatigue (BReF): A feasibility randomised-controlled trial of CBT for the management of fatigue in haemodialysis (HD) patients. *BMJ Open*, *8*(3). https://doi.org/10.1136/bmjopen-2017-020842

Poorsaadet, L., Soltani, P., Ghassami, K., Kohansal, B., & Ahmadlou, M. (2019). The effects of aerobic exercise on cognitive performance and sleep quality haemodialysis patients. *Australasian Medical Journal*, *11*(5). https://doi.org/10.21767/amj.2017.3279

Raghunandan, V., & Saoji, A. A. (2024). Modified yoga program for Chronic Kidney Disease (CKD) patients undergoing hemodialysis: Study protocol for a randomized controlled trial. *Advances in Integrative Medicine*, *11*(4), 285–290. https://doi.org/10.1016/j.aimed.2024.08.013

Rathore, V., Pai, V., Keshri, V. R., Verma, M., Nirwan, M., & Rathore, M. (2025). Feasibility and Effect of Yoga on the Quality of Life of Patients with Chronic Kidney Disease on Peritoneal Dialysis. *Indian Journal of Nephrology*, *0*, 1–5. https://doi.org/10.25259/ijn_796_2024

Rydén, A., Nolan, S., Maher, J., Meyers, O., Kündig, A., & Bjursell, M. (2022). Understanding the patient experience of chronic kidney disease stages 2–3b: a qualitative interview study with Kidney Disease Quality of Life (KDQOL-36) debrief. *BMC Nephrology*, *23*(1). https://doi.org/10.1186/s12882-022-02826-3

Salehi, F., Dehghan, M., Mangolian Shahrbabaki, P., & Ebadzadeh, M. R. (2020). Effectiveness of exercise on fatigue in hemodialysis patients: A randomized controlled trial. *BMC Sports Science, Medicine and Rehabilitation*, *12*(1). https://doi.org/10.1186/s13102-020-00165-0

Vaishnav, B. S., Hirapara, J. J., & Shah, M. K. (2022). Study of effect of guided meditation on quality of life in patients of end stage renal disease (ESRD) on maintenance hemodialysis – a randomised controlled trial. *BMC Complementary Medicine and Therapies*, *22*(1). https://doi.org/10.1186/s12906-022-03717-8

Wu, Y. Y., Gao, Y. Y., Wang, J. Q., Zhang, C., Xu, P. J., Liu, J., Yu, R. Z., & Zhang, H. J. (2024). The influence of mindfulness meditation combined with progressive muscle relaxation training on the clinical efficacy and quality of life of patients with sarcopenia receiving haemodialysis: a randomised controlled trial. *BMC Complementary Medicine and Therapies*, *24*(1). https://doi.org/10.1186/s12906-024-04485-3

Yadav, A. K., & Shrivastava, T. (2024). Effectiveness of Aerobic Exercise on Physical Functions, Autonomic Functions, Sleep Quality, Depression, Anxiety, And Stress In Patients With Chronic Kidney Disease. *Educational Administration Theory and Practices*. https://doi.org/10.53555/kuey.v30i2.1293

BIOGRAPHIES OF AUTHORS

Puteri Hirika Reptes is a master's student in the Medical-Surgical Nursing Program at the Faculty of Nursing, Universitas Indonesia. Her research interests include chronic disease management, patient education, and integrative therapies for individuals undergoing hemodialysis. For more information about me, you can visit the database account below:

: https://orcid.org/0009-0001-8697-1339
: hirikaputeri@gmail.com

Yulia, S.Kp., MN., Ph.D., is a lecturer at the Faculty of Nursing, Universitas Indonesia (FIK UI), who has carried out one Community Service and Empowerment Program (PPM) from 2019 to 2024. The PPM program conducted by Yulia, S.Kp., MN., Ph.D., together with her team, focused on community empowerment through the Educational Ecology for Diabetes Awareness. The program was implemented in West Java Province. For more information about me, you can visit the database account below:

: 7Zx2c74AAAAJ&hl
: https://orcid.org/0000-0002-0555-0381
: 57151376000
: yulia-fik@ui.ac.id

Ns. Chiyar Edison., SKep., MSc is a lecturer in Medical Surgical Nursing Department who joined with Faculty of Nursing Universitas Indonesia (FoN UI) since 2010. His area teaching and research covers internal medicines diseases, emergency and disaster nursing and wound care. In period of 2018 -2022, he was assigned by FoN UI to take a role of a clinical care nursing manager in adult ward of Universitas Indonesia (UI) Hospital. In here, He leads nurses in adult ward to provide the best quality of nursing care. Not only managing the nursing care in isolation ward, Ns. Chiyar is also still active for teaching in both class and clinical setting, and finishing his doctoral program in FoN UI.

: euUNpMUAAAAJ
: https://orcid.org/0000-0002-8093-5134
: 57977074200
: chiyar.edison@gmail.com

Sri Yona, S.Kp., MN., Ph.D., is a lecturer at the Faculty of Nursing, Universitas Indonesia (FIK UI), who has carried out five Community Service and Empowerment Programs (PPM) from 2019 to 2024. The PPM programs conducted by Sri Yona, S.Kp., MN., Ph.D., together with her team, focused on community empowerment through reproductive health maintenance efforts and self-capacity development among adolescents. The programs were implemented across two provinces: West Java and West Nusa Tenggara. For more information about me, you can visit the database account below:

: 6Ku1IfQAAAAJ
: https://orcid.org/0000-0001-9766-8880
: 57201489383
: Ona.ismail15@gmail.com