ORIGINAL ARTICLE

The effect of combined Benson relaxation and isometric therapy on fatigue in hemodialysis patients

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ABSTRACT

Introduction: *Chronic fatigue is a common symptom of chronic kidney disease (CKD), a progressive and life-altering illness that severely reduces a patient's capacity to function normally and their overall quality of life. Although non-pharmacological interventions such as isometric exercises and Benson relaxation therapy have individually shown benefits in reducing fatigue among haemodialysis patients, evidence regarding their combined use remains limited. Further research is therefore needed to determine whether applying these strategies together offers additional benefit in managing fatigue.*
Objectives: *To examine the effect of combining isometric exercise and Benson Relaxation Therapy on fatigue among haemodialysis patients.*
Methods: *A quasi-experimental study with two nonrandomized groups (n=19 each) used a pre-test–post-test control design. Stage 5 CKD patients (≥15 years, haemodialysis ≥2/week) were included, excluding those with severe comorbidities, infections, or psychotropic use. The intervention group received a combined protocol of Benson Relaxation Therapy (15–20 minutes) and isometric exercises (15–20 minutes). Fatigue (FSS) was analysed using Wilcoxon signed-rank and Mann–Whitney U tests.*
Results: *Fatigue in the intervention group decreased from a median (IQR) of 45.0 (19.75) to 39.5 (18.25), Δ = −5.5, while the control group slightly increased from 50.0 (12.0) to 52.5 (11.0), Δ = +2.5. The difference between groups was significant ($p < 0.001$).*
Conclusions: *This study demonstrates that combining Benson Relaxation Therapy and Isometric Exercise effectively reduces fatigue in CKD patients undergoing haemodialysis, supporting the integration of holistic, evidence-based, non-pharmacological interventions into nursing practice to enhance physiological adaptation and overall patient well-being.*

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1. Introduction

Chronic kidney disease (CKD) represents a significant and rising global health concern, affecting over 10% of the world's population—amounting to more than 800 million individuals—a figure that has progressively increased through the last decades (Kovesdy, 2022). Global analysis of all-age, both-gender prevalence reveals a continuous upward trend between 1990 and 2021, with recent estimates placing the median prevalence of CKD at 9.5% (IQR: 5.9–11.7%) and a higher burden observed in countries with lower socioeconomic development (Jadoul et al., 2024; Xie et al., 2025). In Indonesia, based on data from the 2023 Indonesian Health Survey, 638,178 individuals were diagnosed with CKD, representing the total number of identified cases rather than an estimate of population-based prevalence. At the same time, registry data reveal a sharp rise in the burden of end-stage kidney disease, with the number of patients requiring hemodialysis increasing 35 times over the past decade, from 28 per million people in 2009 to 973 per million in 2019. This increase has been accompanied by rapid growth in national health

expenditure on dialysis services (Andhika et al., 2025; Sihombing & Nasution, 2025). Hemodialysis remains the predominant modality, with the majority of new end-stage renal disease (ESRD) cases being managed with this technique due to limited access to transplantation or peritoneal dialysis, leading to a continuous increase in the hemodialysis population (Andhika et al., 2025; Rafferty et al., 2025).

Fatigue is now recognized as the most prevalent and debilitating symptom experienced by CKD patients on hemodialysis, with international studies reporting moderate-to-severe fatigue in 60–78% of patients using validated tools such as the Fatigue Severity Scale (FSS) and FACIT-Fatigue (Kavala et al., 2025; Wahida et al., 2023). This symptom is strongly linked to a decline in independence for daily living activities and is a major factor predicting reduced health-related quality of life (QoL) among hemodialysis patients (Song et al., 2018). In a recent Indonesian multicenter study, nearly three out of four patients reported substantial limitations in their daily activities due to fatigue, with average FSS scores above the threshold for severe fatigue, and clear negative associations with functional and psychosocial outcomes (Nuryati et al., 2025).

Pharmacological management of fatigue in CKD faces serious challenges, including risk of adverse effects, high cost, and limited efficacy in addressing the complex physical and psychological domains of this symptom (Wahida et al., 2023). Consequently, attention has shifted toward evidence-based, non-pharmacological interventions, such as relaxation therapies, intradialytic exercise, mindfulness, and structured physical rehabilitation (Alishahi et al., 2024; Tülüce et al., 2025). Existing studies demonstrate the effectiveness of Benson relaxation therapy and isometric exercises when applied individually in reducing fatigue, improving muscle function, and enhancing quality of life (Khalf-allah et al., 2024; Lee et al., 2024; Lu et al., 2024; Radiansah et al., 2024; Wahida et al., 2023). However, evidence supporting their combined application is still limited, with early findings suggesting that integrating relaxation techniques with simple intradialytic exercises may provide additional multidimensional benefits (Ghafourifard et al., 2021; Tülüce et al., 2025). Mechanistically, Benson relaxation therapy works through the activation of the parasympathetic nervous system, resulting in reduced sympathetic outflow, lower stress hormone levels, and improved subjective well-being. Isometric or resistance exercises, routinely applied during or outside the dialysis session, increase muscle strength, stabilize metabolic parameters, and counteract muscle atrophy so frequently observed in this population (Rafferty et al., 2025; Wahida et al., 2023).

Prior research has not looked at the combination of Benson relaxation treatment and isometric therapy, particularly in Indonesia, even though the efficacy of both interventions has been demonstrated independently (Albianto et al., 2025; Far et al., 2020; Jiang et al., 2025). Thus, in order to improve earlier research, more modifications or investigations are required in this study. It is anticipated that this combination will have a more optimal synergistic effect on lowering fatigue levels in hemodialysis patients with chronic kidney disease (Safruddin et al., 2025).

This study aims to investigate the effects of Benson relaxation therapy and isometric exercises on fatigue levels in CKD patients on hemodialysis at the Umar Wirahadikusumah Regional General Hospital in Sumedang. The precise goals are to compare the experimental group's fatigue levels before and after intervention with those of the control group of CKD patients receiving hemodialysis in order to determine any changes.

Despite accumulating evidence for each therapy's benefits, primary research in Indonesia and other lower-middle income countries examining their combined effects within routine clinical settings remains limited (Jusuf & Liputo, 2024). Building on recent primary studies (Kavala et al., 2025; Nuryati et al., 2025; Radiansah et al., 2024; Wahida et al., 2023), this present research aims to fill that gap, testing the synergistic impact of Benson relaxation therapy and isometric exercises on fatigue in Indonesian hemodialysis patients—potentially offering a scalable, cost-effective, and sustainable model for improving patient adaptation and daily functioning (Yunita et al., 2025). The implications of this work are significant: it will inform future practice guidelines, support curriculum development for nurse education, and may guide policy for incorporating structured non-pharmacological interventions into the standard of care at both hospital and national health system levels.

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2. Methods

This study employed a quasi-experimental pretest–posttest control group design to assess the combined effects of Benson Relaxation Therapy and Isometric Exercise on fatigue among patients with chronic kidney disease (CKD). This design was selected because it allows for evaluating intervention effectiveness while maintaining ethical feasibility in a clinical setting. The research was conducted in the Hemodialysis Unit of Umar Wirahadikusumah Regional General Hospital, Sumedang, West Java. A total of 38 stage 5 CKD patients undergoing routine hemodialysis at RSUD Umar Wirahadikusumah Sumedang were recruited using a two-stage sampling approach. Purposive sampling was first applied to identify patients who met the inclusion criteria: aged ≥15 years, receiving hemodialysis at least twice per week, attending all phases of the research (pre-test, intervention, and post-test), and providing informed consent. Subsequently, accidental sampling was used to select eligible patients who were present during the data collection schedule. Patients were excluded if they had severe comorbidities (e.g., heart failure), were undergoing psychotropic or antidepressant therapy, or had infectious diseases (e.g., hepatitis). The final sample consisted of 38 participants, with 19 assigned to the experimental group and 19 to the control group.

Fatigue levels were measured using the Indonesian version of the Fatigue Severity Scale (FSS), which was originally developed by Krupp et al. and later adapted and validated in Indonesia by Rifa'i et al. (2024). This scale consists of nine items assessed using a 1–7 Likert scale. The adaptation into Indonesian showed strong results in terms of validity with $r > 0.433$ and reliability with Cronbach's Alpha = 0.968. The intervention procedure was described according to the TIDieR guidelines. The experimental group received a combined protocol of Benson relaxation therapy and isometric exercises administered four times over two weeks. Benson relaxation therapy included diaphragmatic breathing, repetition of calming words or phrases, and maintenance of a passive posture for 15–20 minutes in a quiet environment. Isometric exercises involved muscle strength training by contracting muscles without moving joints, performed in 6–10-second contractions with short rest intervals for a total duration of 15–20 minutes. Intervention compliance was ensured through the research protocol, direct supervision during each session, and adherence monitoring. Safety was maintained by monitoring blood pressure before intervention, 15 minutes after initiation, and upon completion, avoiding movements involving the vascular access arm, and immediately stopping the activity if discomfort, hypotension, or cramping occurred. The control group received routine hemodialysis treatment without additional intervention.

Data were analyzed using JASP software. Descriptive statistics were used to present respondent characteristics, while inferential analysis employed the Wilcoxon Signed-Rank Test and Mann–Whitney U Test to evaluate differences in fatigue levels before and after the intervention. Prior to hypothesis testing, assumption checks were conducted using the Shapiro–Wilk test for normality and Levene's test for homogeneity to ensure the validity of the analytical approach.

3. Results and Discussion

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Group			
		Experiment		Control	
		F	%	F	%
Age	19-59 years old	12	63	12	63
	>60 years old	7	37	7	37
Gender	Male	9	47	4	21
	Female	10	53	15	79
HD Duration	<5 years	14	74	17	89
	>5 years	5	26	2	11

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Table 2. Wilcoxon Test Pre-Test and Post-test Data Fatigue Level

Group	F	*Pre-test*			*Post-test*			*P-value*
		Mean	SD	Median	Mean	SD	Median	
Experiment	19	42.36	14.02	45.00	38.18	13.36	39.50	0.001
Control		49.51	9.726	50.00	50.64	9.278	52.50	0.001

Table 3. Mann-Whitney Hypothesis Test for Fatigue Level

Group	F	*Mean Rank*	*P-Value*	*95% CI*	$r_{(}rb_{)}$
Experiment	19	54.91	0.001	0.430, 0.680	0.568
Control		98.09			

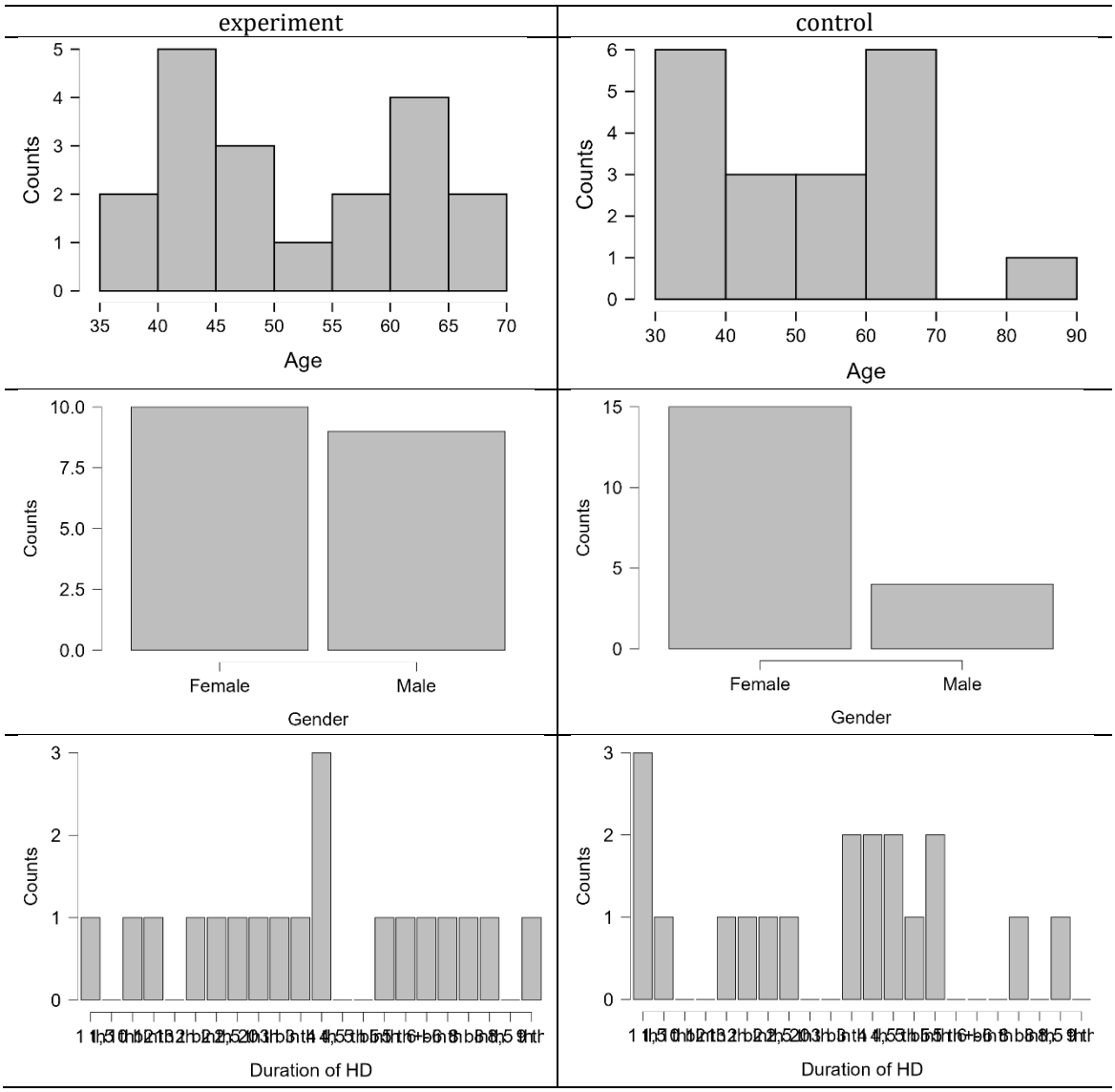

Figure 1. Histogram of Age, Sex, and Hemodialysis Duration in the Experimental and Control Groups

Figure 2. Raincloud Plot of Fatigue Scores in the Experimental and Control Groups

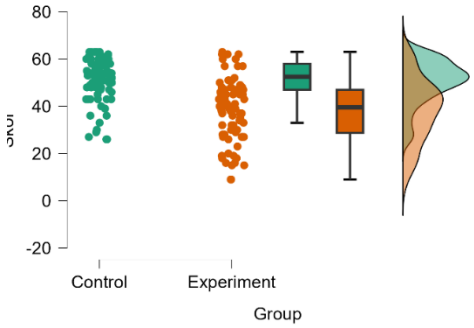

Figure 2. Raincloud Plot of Fatigue Scores in the Experimental and Control Groups

Most respondents in both the experiment and control groups were aged 19–59 years (63%), with more females in both groups. The majority had undergone hemodialysis for less than five years. The experiment group showed a decrease in mean fatigue scores from 42.36 pre-test to 38.18 post-test (p = 0.001), while the control group showed an increase from 49.51 to 50.64 (p = 0.001). The Mann-Whitney test indicated a significant post-test difference between groups, with mean ranks of 54.91 for the experiment group and 98.09 for the control group (p = 0.001; 95% CI: 0.430–0.680).

This study revealed that the demographic characteristics of patients included age, duration of hemodialysis, and sex. Most respondents were adults (19–59 years), aligning with Alshammari et al. (2024), who reported that increasing age correlates with greater fatigue severity in hemodialysis patients. Aging kidneys experience a physiological decline in function along with reduced muscle, cardiovascular, and metabolic reserves, making older adults more vulnerable to chronic fatigue (Burgh et al., 2021; Merchant & Vathsala, 2022). This study also found that female patients dominated the sample, consistent with evidence showing higher albuminuria, faster GFR decline, and earlier CKD progression among women (Fernandez et al., 2020).

The results demonstrated that the combination of Benson relaxation therapy and isometric exercise significantly reduced fatigue levels in CKD patients undergoing hemodialysis. These findings align with recent studies supporting multimodal, non-pharmacological interventions to address multidimensional fatigue (Bossola et al., 2023; Kavala et al., 2025; Lee et al., 2024; Radiansah et al., 2024; Wahida et al., 2023). Fatigue in CKD originates from a combination of physiological disorders—such as chronic anemia, muscle atrophy, and cardiovascular impairment—and psychological aspects such as anxiety, depression, and sleep problems (Bossola et al., 2023; Zhang et al., 2025). Benson relaxation promotes parasympathetic activation and improved sleep, while isometric exercises enhance muscle performance and circulation, consistent with Roy's Adaptation Model emphasizing regulator and cognator balance (Suci & Hidayati, 2023).

Physiologically, intradialytic isometric exercise improves muscle strength, functional capacity, and overall well-being (Khalf-allah et al., 2024; Lee et al., 2024). The significant reduction in fatigue scores can therefore be attributed to the synergistic effects of psychological relaxation and physical conditioning. These findings support recommendations for combining structured exercise with relaxation techniques as an effective fatigue-management strategy for CKD patients (Khalf-allah et al., 2024; Lee et al., 2024; Radiansah et al., 2024). This study thus contributes to evidence-based practice by showing that a simple, low-cost combined intervention can enhance both physiological and psychological adaptation in hemodialysis patients.

The control group receiving only routine hemodialysis exhibited minimal improvement, reaffirming that conventional therapy alone is insufficient for addressing chronic fatigue. This is consistent with studies reporting persistent fatigue over long-term dialysis, exacerbated by anemia and muscle deconditioning (Laksmana & Indriyawati, 2022; Shi et al., 2024; Sulistini et al., 2024; Tsirigotis et al., 2022). Social and cultural factors also influence intervention uptake,

particularly when relaxation practices carry spiritual meaning (Eroglu & Metin, 2022), while institutional resources and staff readiness affect implementation success (Radiansah et al., 2024).

Biologically, fatigue arises from reduced muscle mass, circulatory dysfunction, hormonal imbalance, and chronic inflammation (Bossola et al., 2023; Lee et al., 2024; Zhang et al., 2025). Socially, relaxation-based interventions align with cultural norms and family involvement, enhancing adherence (Kavala et al., 2025). At an organizational level, provider training and adequate resources support consistent implementation (Radiansah et al., 2024).

For nursing practice, integrating Benson relaxation and isometric exercise into routine hemodialysis care is essential, accompanied by individualized assessment and patient education to support continued practice at home. Nursing curricula should also incorporate training in non-pharmacological fatigue management following a holistic, evidence-based approach (Wahida et al., 2023). Policy-level support, including staff training and resource allocation, is needed to standardize the intervention within CKD care pathways (Lee et al., 2024; Radiansah et al., 2024).

This study adds value by providing empirical evidence on the combined effects of Benson relaxation and isometric exercise—an approach not widely examined in previous CKD fatigue studies. The two-week structured protocol during intradialytic sessions offers a practical, low-cost model suitable for routine clinical implementation.

Strengths of this study include the use of a quasi-experimental design with a control group, a standardized intervention protocol, and the integration of both physiological and psychological modalities based on Roy's Adaptation Model. Meanwhile, the limitations include the relatively short intervention duration and limited sample size from a single institution. Future research should examine longer interventions, broader samples, and additional predictors to strengthen generalizability.

Overall, this study reinforces global evidence that multimodal interventions combining relaxation and isometric exercise are effective, safe, and feasible strategies for reducing fatigue and improving adaptation among CKD patients undergoing hemodialysis. These findings support the refinement of evidence-based nursing practices and the development of holistic care policies for CKD management.

Conclusion

This study concludes that the combination of benson relaxation therapy and isometric exercise is effective in reducing fatigue among patients with chronic kidney disease undergoing hemodialysis. Patients who received the combined intervention experienced a noticeable improvement in fatigue levels, whereas those who did not receive any intervention tended to experience worsening fatigue over time. These findings indicate that fatigue in hemodialysis patients can be managed through structured non-pharmacological nursing interventions. From a theoretical perspective, the results support the development of non-pharmacological nursing care approaches, particularly those based on adaptation and holistic care concepts. Practically, the combined therapy offers a simple, safe, and feasible intervention that can be integrated into routine nursing care to help patients manage chronic fatigue and enhance their daily functioning. The findings also encourage nurses in hemodialysis units to actively incorporate relaxation and exercise-based interventions as part of supportive care. Future studies are recommended to involve a larger sample size, explore additional influencing variables, or combine other complementary therapies to further strengthen evidence-based nursing practice. Additionally, healthcare facilities may utilize these findings as a benchmark for formulating standard operating procedures for the regular application of Benson relaxation therapy and isometric exercise in hemodialysis services.

Ethics approval and consent to participate

The Health Research Ethics Committee of the Faculty of Health Sciences and Technology (FITKes) of Jenderal Achmad Yani University in Cimahi has granted ethical approval for this study. Its number is 100/KEPK/FITKes-Unjani/VIII/2025. Written and verbal explanations of the study were provided to each participant. Patients were told by the researchers that participation was

completely voluntary and that they could stop at any moment without it having an impact on their health. All information was kept confidential, and the research results were presented solely for academic purposes.

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