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APPLICATION OF EVIDENCE BASED PRACTICE INTRADIALYTIC EXERCISE ON FATIGUE AND INTRADIALYTIC HYPERTENSION IN HEMODIALYSIS PATIENTS

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ABSTRACT
Long-term hemodialysis procedures can cause complications such as fatigue due to anemia, accumulation of uremic toxins, and hemodynamic changes. Furthermore, intradialytic hypertension due to fluid overload, sodium imbalance, and increased vascular resistance during dialysis can impact patients' quality of life. Therefore, non-pharmacological interventions such as intradialytic exercise are needed as evidence-based practice to address fatigue and intradialytic hypertension. This case study aims to apply evidence-based practice to reduce fatigue and blood pressure during hemodialysis. This evidence-based practice was implemented using a case study approach in five patients undergoing hemodialysis. The intradialytic exercise intervention was performed for 15–20 minutes in the first 2 hours after hemodialysis commences, twice a week for two weeks. Fatigue was measured using the Multidimensional Fatigue Inventory (MFI), and blood pressure was measured using a digital sphygmomanometer before and after the intervention. This case study shows that all participants were female (5 patients) (100%), so the characteristics based on gender are homogeneous. Based on age, the majority of respondents were in the 46–60 years age category (3 patients) (60%), while the 26–35 years and 36–45 years age categories each had 1 patient (20%). There were no respondents in the 17–25 years age category. After being given intradialytic exercise intervention, all respondents experienced a decrease in fatigue levels. The fatigue score before the intervention (pretest) was in the range of 58–82 and decreased after the intervention (posttest) to 38–52. These results indicate an improvement in fatigue levels in all patients after the administration of intradialytic exercise. In addition, there was a change in intradialytic blood pressure before and after the intervention with an average blood pressure before the intervention of 179.6/88 mmHg and decreasing after the intervention to 148/86.6 mmHg, with an average decrease in systolic blood pressure of 31.6 mmHg and diastolic of 1.4 mmHg. Intradialytic exercise administered to 5 patients undergoing hemodialysis has been shown to reduce fatigue and hemodialytic blood pressure.

Keywords: chronic kidney disease; fatigue; hemodialysis; intradialytic exercise; intradialytic hypertension

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INTRODUCTION

Chronic Kidney Disease (CKD) is a condition characterized by abnormalities in kidney structure or function that persist for ≥3 months and impact health. CKD is characterized by a decreased glomerular filtration rate (eGFR <60 ml/min/1.73 m^2) or kidney damage such as albuminuria. This disease is progressive and requires long-term evaluation and management to prevent complications and further decline in kidney function (Levin et al., 2024).

The prevalence of Chronic Kidney Disease (CKD) worldwide continues to increase and has become a significant global health problem (Mark et al., 2025). The prevalence of CKD stage 5, or end-stage kidney disease (ESKD), is relatively low compared to other stages, accounting for less than 1% of all CKD cases or approximately 0.1–0.2% in the general population. Nevertheless, this stage carries the highest burden of morbidity and mortality because patients require renal replacement therapy such as hemodialysis or kidney transplantation (Yosef & Ali, 2025). This high prevalence

also reflects the increasing risk factors, such as diabetes and hypertension, that contribute to the incidence of CKD globally (WHO, 2025).

The prevalence of chronic kidney disease (CKD) in Indonesia is showing an increasing trend. It is projected to become a serious health problem, with an overall prevalence reaching 14.8% in at-risk groups such as those with hypertension and diabetes (Hustrini et al., 2025). According to the Indonesian Health Survey, the prevalence of chronic kidney disease (CKD) in the population aged 15 years and older in Indonesia was recorded at 0.18%. Although this percentage appears small, other data from the 2023 Indonesian Health Survey (SKI) indicate an absolute estimate of 638,178 people with chronic kidney disease in Indonesia (SKI, 2023). The prevalence of CKD among individuals aged 15 years and older in Central Java alone was 0.19%, or 88,180 people (SKI, 2023). Hemodialysis is a renal replacement therapy used in kidney failure to remove metabolic waste and excess fluid from the blood and maintain the body's electrolyte and acid-base balance (Guimaraes et al., 2024). Long-term hemodialysis procedures often cause complications, such as fatigue, that impact the patient's quality of life (Sulistiyawati et al., 2025). In addition to fatigue, hemodynamic disorders such as intradialytic hypertension are also common problems during the hemodialysis process. Intradialytic hypertension is associated with an increased risk of cardiovascular complications and mortality in CKD patients (Verrelli et al., 2024).

Fatigue is one of the most common complaints experienced by chronic kidney disease patients undergoing hemodialysis. Patients undergoing hemodialysis often experience fatigue due to anemia, uremic toxins, and hemodynamic changes during dialysis (Nabila et al., 2025). Recent research indicates a high prevalence of fatigue in hemodialysis patients. A 2023 cross-sectional study reported that approximately 51.6% of hemodialysis patients experienced fatigue (Burdelis & Cruz, 2023).

Intradialytic hypertension is also a common complication in chronic kidney disease patients undergoing hemodialysis. Hemodialysis patients can experience intradialytic hypertension due to fluid overload, sodium imbalance, and increased vascular resistance, leading to elevated blood pressure during or after hemodialysis (Dewi et al., 2022). The global prevalence of intradialytic hypertension is reported to be approximately 26.6%. In addition, the incidence of intradialytic hypertension was approximately 19.9% of all hemodialysis sessions, indicating that this condition not only occurs frequently in certain individuals but also recurs with every dialysis procedure (Adejumo et al., 2024).

A non-pharmacological intervention increasingly being developed to address fatigue and intradialytic hypertension is intradialytic exercise, a physical activity performed during hemodialysis, including ankle pumps, ankle rotations, knee flexion-extension, leg abduction-adduction, straight-leg raises, and wrist and elbow exercises—evidence-Based Practice Wahida et al. (2023). Intradialytic exercise is effective in reducing fatigue, improving physical function, and improving cardiovascular parameters, including blood pressure, in hemodialysis patients.

Five out of ten patients undergoing hemodialysis at Indriati Solo Baru Hospital reported experiencing fatigue. Observations also indicated that patients experienced dialytic hypertension during the dialysis process. Meanwhile, intradialytic exercise, a non-pharmacological intervention for patients with stage 5 CKD undergoing hemodialysis, has not been implemented optimally in the hemodialysis ward at Indriati Solo Baru Hospital. Therefore, this evidence-based practice aims to implement intradialytic exercise to reduce fatigue and help stabilize blood pressure during hemodialysis.

METHOD

This study used an evidence-based practice approach to address fatigue and help stabilize blood pressure during hemodialysis through intradialytic exercise. The exercise procedures were based on the intervention model of Wahida et al. (2023), which has been shown to reduce fatigue and maintain stable blood pressure in hemodialysis patients when performed routinely for 2 weeks.

The participants were selected using a purposive sampling technique. Five hemodialysis patients who met the predetermined inclusion criteria were recruited to receive the intradialytic exercise intervention, namely undergoing routine hemodialysis at least twice a week, experiencing signs of fatigue such as feeling tired, easily tired during light activities, feeling weak, and decreased activity tolerance during or after hemodialysis, patients who have the potential for increased blood pressure during the hemodialysis procedure, aged 20–60 years, do not have severe respiratory disorders or mental disorders, do not use femoral hemodialysis access, can actively follow instructions during exercise.

Before the exercise, the nurse checked the patient's blood pressure, assessed fatigue using a pretest questionnaire and a posttest at the end of the intervention, and then provided brief education on the purpose of intradialytic exercise. The intervention, in the form of intradialytic exercise, was performed for 15–20 minutes during the first 2 hours after hemodialysis began. The intervention was given after hemodialysis had been started routinely for two weeks. The patient was then positioned in a seated or semi-Fowler's position in a relaxed state. The series of exercises began with ankle movements in the form of dorsiflexion and plantarflexion, 10–20 times. Next, the patient was asked to lift the foot slightly off the bed and rotate the ankle clockwise ±20 times, then counterclockwise ±20 times. The exercise continued by straightening the leg on the bed, then slowly bending the knee and straightening it again 10–15 times. After that, with the leg straight, the patient moved the leg away from the body (abduction) and returned to its original position 10–15 times. The next movement is the straight leg raise, which involves lifting the straight leg 20–30 cm off the bed, holding it for 5 seconds, then slowly lowering it, repeating 10 times. The exercise concludes with wrist and elbow exercises for the hand without the fistula, including 20 wrist flexion-extension movements and 20 elbow flexion-extension movements.

During the intervention, nurses monitored patients' comfort and responses to ensure that each exercise technique was performed correctly and did not cause discomfort. Blood pressure reduction was evaluated using a hospital-owned digital tensiometer calibrated on February 24, 2026, and fatigue was evaluated using the Indonesian version of the Multidimensional Fatigue Inventory (MFI) instrument, which consists of 20 questions using a Likert scale with 5 answer choices: very appropriate, appropriate, slightly appropriate, inappropriate, and very inappropriate. The total score was obtained by summing the item scores to determine the patient's fatigue level: higher scores indicate greater fatigue, and lower scores indicate lower fatigue. Assessments were conducted both before and after the intervention period. The Indonesian version of the MFI instrument has passed validity and reliability tests, with a Cronbach's alpha of 0.92 (Romadlon et al., 2022).

RESULT

Diagram 1 shows the distribution of respondent characteristics by gender. All respondents in this case study were female, representing 5 patients (100%). These results indicate that respondent characteristics by gender are homogeneous, as all participants were female.

Diagram 1. Distribution of Respondent Characteristics by Gender

Diagram 2 shows the distribution of respondent characteristics by age. The majority of respondents were in the 46–60 age group (3 patients) (60%), while the 26–35 and 36–45 age groups each had one patient (20%). There were no respondents in the 17–25 age group.

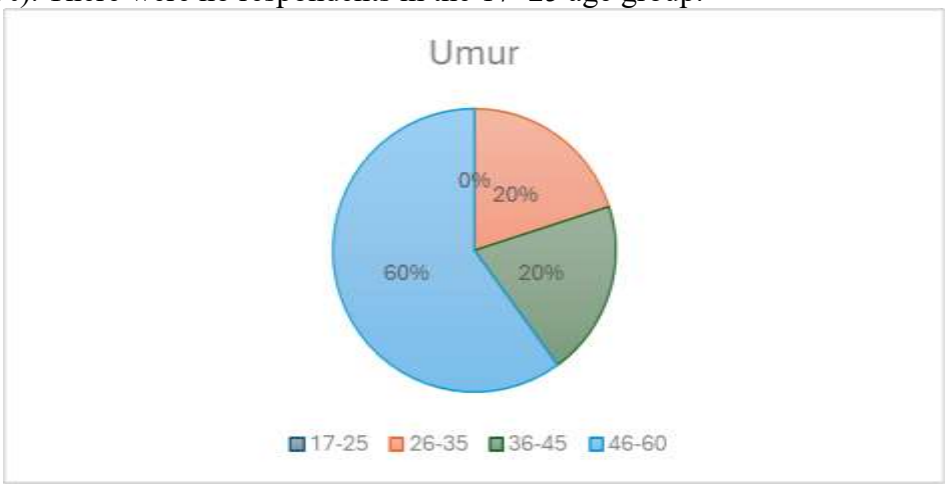

Diagram 2. Distribution of Respondent Characteristics by Age

Diagram 3 shows the distribution of hemodialysis duration, indicating that most patients had undergone hemodialysis for a considerable period. The longest duration of hemodialysis was found in Mrs. A, at 39 months, while the lowest duration was found in Mrs. S, at 9 months.

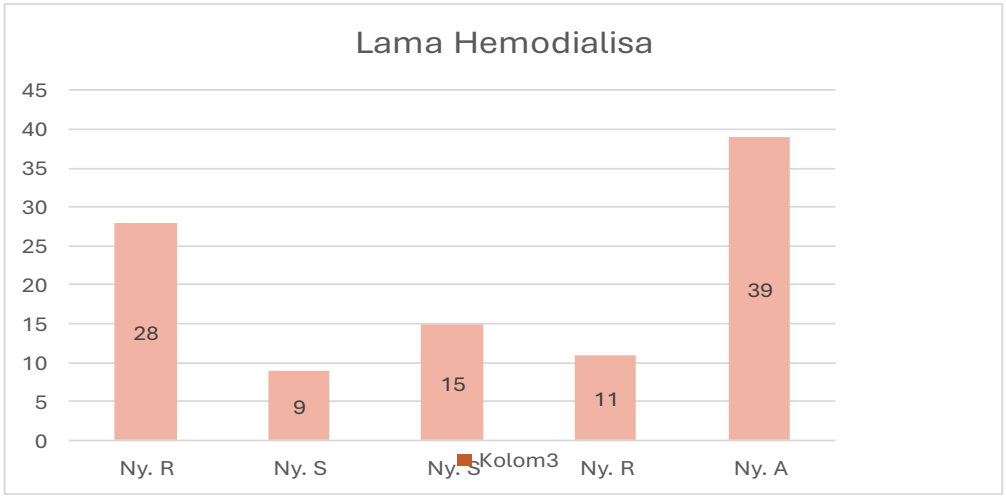

Diagram 3. Distribution of Hemodialysis Duration

Diagram 4 shows the distribution of respondents with comorbidities. All respondents had comorbidities, with 5 patients (100%). Comorbidities found in the respondents included hypertension and diabetes mellitus.

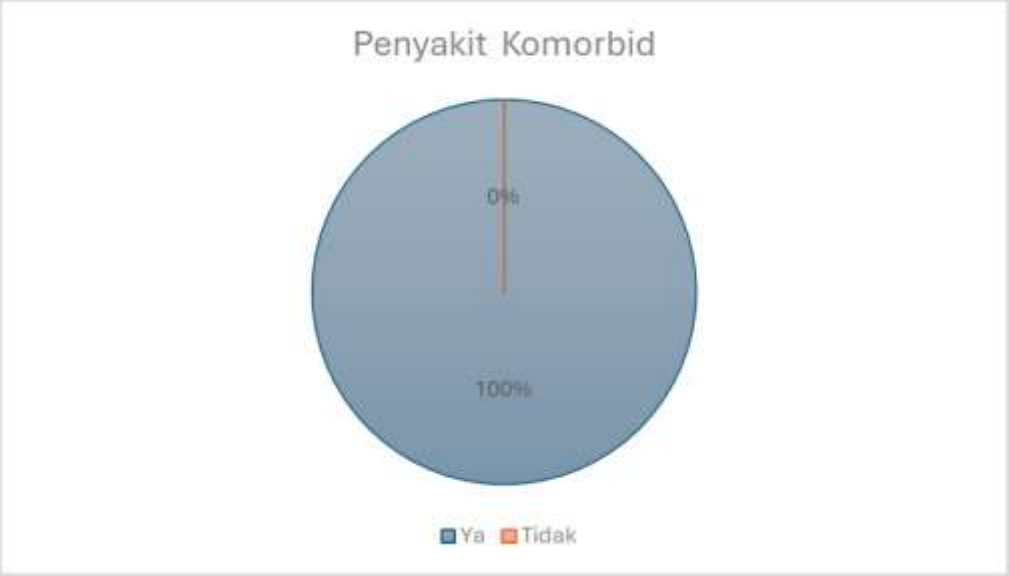

Diagram 4. Distribution of Respondents with Comorbidities

Diagram 4 shows the distribution of fatigue levels, indicating that all respondents experienced a decrease in fatigue scores after the intradialytic exercise intervention. Fatigue scores before the intervention (pretest) ranged from 58 to 82, while after the intervention (posttest), they decreased to 38 to 52. Fatigue scores decreased in all patients, indicating an improvement after the intervention.

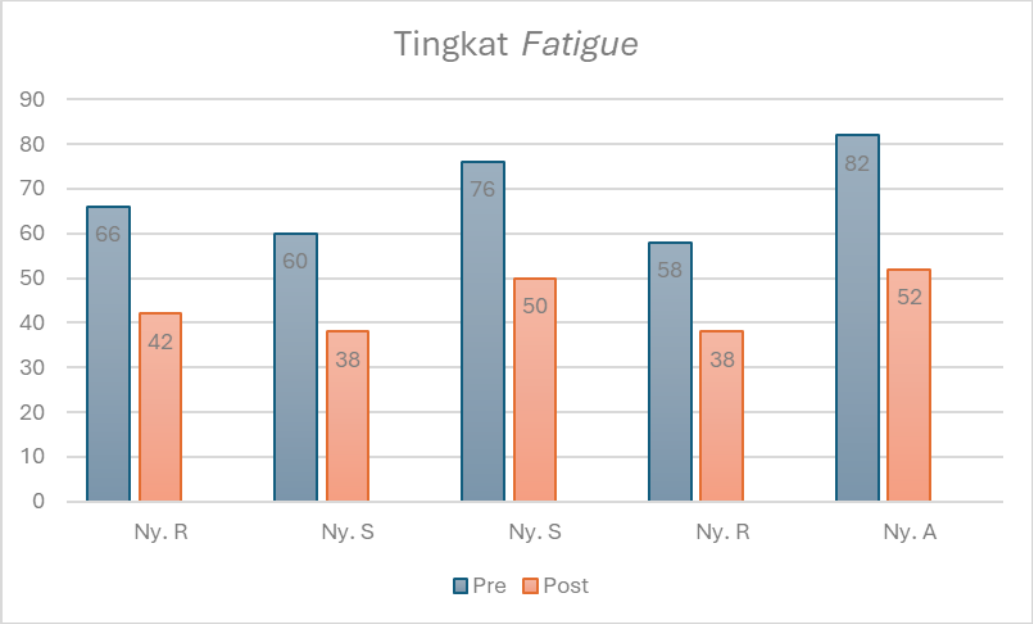

Diagram 5. Distribution of Fatigue Levels

Table 1 presents the distribution of fatigue levels in hemodialysis patients before (pretest) and after (posttest) the intradialytic exercise intervention. Data are presented as frequencies (n) and percentages (%) to illustrate changes in patient fatigue levels, allowing for identification of any decrease or improvement in condition following the intervention.

Table 1.
Distribution of Fatigue Level Categories

Tingkat *Fatigue*	*Pretest*		*Posttest*	
	Frekuensi (n)	Presentase (%)	Frekuensi (n)	Presentase (%)
Rendah	0	0	6	100
Sedang	3	60	0	0
Tinggi	2	40	0	0

Table 2 illustrates changes in intradialytic blood pressure in patients before and after intradialytic exercise. Data are presented for each patient to compare blood pressure values as an indicator of response to the intervention.

Table 2.
Intradialytic blood pressure

Pasien	Tekanan Darah Intradialitik	
	Sebelum	Sesudah
Ny. A	180/98 mmHg	150/89 mmHg
Ny. R	185/85 mmHg	148/85 mmHg
Ny. R	170/80 mmHg	143/88 mmHg
Ny. S	188/86 mmHg	150/86 mmHg
Ny. S	175/91 mmHg	149/85 mmHg

Table 2 shows that the average intradialytic blood pressure before intradialytic exercise intervention in 5 hemodialysis patients was 179.6/88 mmHg, while the average blood pressure after the intervention decreased to 148/86.6 mmHg. These results indicate a decrease in average systolic blood pressure of 31.6 mmHg and diastolic blood pressure of 1.4 mmHg after intradialytic exercise.

DISCUSSION

The results of this case study indicate that before the intervention, the majority of patients undergoing hemodialysis experienced significant levels of fatigue, with the majority being moderate (60%) and the rest at high levels (40%). This finding indicates that fatigue is a common problem among patients with end-stage chronic kidney disease, influenced by factors such as anemia, uremic toxin accumulation, metabolic disorders, and the hemodialysis process itself (Widayati et al., 2025). After the intervention, fatigue levels decreased. This improvement indicates that the intervention positively affected the patient's condition (Wayunah et al., 2023).

Fatigue is one of the most common and debilitating symptoms in hemodialysis patients, with a significant impact on daily activities and quality of life (Debnath et al., 2021). Fatigue in hemodialysis patients is not only physical but also influenced by psychological factors and the duration of therapy, making it a multidimensional problem that impacts the patient's quality of life. Fatigue in patients with chronic kidney disease results from a combination of physiological factors, including anemia, uremic toxin accumulation, and decreased physical activity during hemodialysis (Palar & Lobo, 2022).

The reduction in fatigue can be attributed to increased tissue perfusion, improved oxygen delivery, and greater activity tolerance during hemodialysis (Safruddin et al., 2025). Decreased fatigue is also associated with increased functional capacity and activity tolerance in patients. This is in line with research by Kim et al. (2022), which found that exercise programs during hemodialysis improve physical condition, enhance quality of life, and reduce fatigue in patients with end-stage chronic kidney disease. This also aligns with research by Yuniartika (2022), which found that physical exercise effectively reduces fatigue among hemodialysis patients.

In addition to reducing fatigue, intradialytic exercise also helps maintain patient hemodynamic stability during hemodialysis. Light physical activity can improve vascular function and circulation, thereby reducing intradialytic complications such as intradialytic hypertension. This is in line with research by Maliya (2021), which explains that intradialytic complications in hemodialysis patients

are influenced by factors such as hemodialysis duration, comorbidities, and the patient's hemodynamic status during therapy.

Intradialytic exercise is known to increase blood flow to tissues, open muscle capillaries, and enhance the removal of uremic toxins during dialysis, thereby contributing to reduced fatigue (Lakshmi et al., 2024). Intradialytic exercise has been proven to increase joint flexibility, improve blood flow, and reduce fatigue experienced by patients during dialysis procedures (Rizki Muliani, 2021)

Intradialytic blood pressure measurements showed a trend toward decreased blood pressure after the intervention in some patients. This decrease can be explained by reduced peripheral vascular resistance and increased muscle relaxation due to activity during hemodialysis (Depari et al., 2026). Blood pressure changes during hemodialysis are common, resulting from fluid ultrafiltration and alterations in intravascular volume. A decrease in intradialytic blood pressure can result from reduced plasma volume and an imbalance between the rate of fluid excretion and the body's compensatory vascular capacity (Prasad et al., 2022).

Intradialytic exercise can positively affect physiological parameters, including systolic and diastolic blood pressure (Purba et al., 2024). This is in line with research by Syamsuddin & Tamrin (2025), which shows that interventions such as intradialytic exercise can significantly impact blood pressure, particularly by lowering systolic and diastolic blood pressure. Intradialytic exercise helps stabilize blood pressure through several physiological mechanisms. Physical activity during hemodialysis can increase peripheral vasodilation, thereby reducing vascular resistance and helping lower blood pressure (Sindi et al., 2023).

Non-pharmacological interventions such as intradialytic exercise in hemodialysis patients can help reduce physical and psychological symptoms, such as fatigue, and maintain stable blood pressure during hemodialysis. Non-pharmacological approaches are recommended because they are relatively safe, easy to perform, and can be routinely implemented during the hemodialysis process (Aini & Maliya, 2022).

CONCLUSION

Intradialytic exercise administered to five patients undergoing hemodialysis has been shown to reduce fatigue, as demonstrated by all patients shifting to the low-fatigue category after the intervention. Furthermore, this intervention also contributed to lowering and stabilizing intradialytic blood pressure. Therefore, intradialytic exercise can be recommended as an evidence-based nursing intervention to reduce fatigue and stabilize blood pressure.

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