



THE EFFECT OF A QIGONG-BASED MHEALTH INTERVENTION ON FATIGUE LEVELS AMONG PATIENTS UNDERGOING HEMODIALYSIS

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ABSTRACT

Chronic kidney disease (CKD) is a progressive chronic condition that requires long-term hemodialysis and is frequently associated with fatigue, which can negatively affect patients' physical functioning and quality of life. Qigong exercise delivered through smartphone-based instructional videos may provide an accessible intervention to help reduce fatigue among patients undergoing hemodialysis. This study aimed to determine the effect of a Qigong-based mHealth intervention on fatigue among patients with CKD undergoing hemodialysis. A quantitative pre-experimental study was conducted using a one-group pretest-posttest design. The study involved 30 patients undergoing routine hemodialysis at Bhayangkara Setukpa Lemdiklat Polri Hospital, Sukabumi City, who were selected using purposive sampling. Fatigue was measured using a modified Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-F) questionnaire consisting of 25 items, which had been tested for validity and reliability. Participants received Qigong exercise through smartphone-based instructional videos three times per week. Data were analyzed using a paired-samples t-test. The results showed that fatigue scores decreased from 55.67 before the intervention to 44.63 after the intervention, with a statistically significant difference ($p < 0.001$). It was concluded that mHealth based Qigong exercise significantly reduced fatigue among patients with CKD undergoing hemodialysis.

Keywords: chronic kidney disease; fatigue; hemodialysis; mHealth; qigong exercises

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INTRODUCTION

Chronic kidney disease (CKD) is a major and expanding public health challenge. An estimated 674 million people worldwide live with CKD, and kidney failure requires dialysis or kidney transplantation to sustain life (Kovesdy, 2022). Hemodialysis remains the most widely available form of kidney replacement therapy in many settings, but its life-sustaining benefit is accompanied by a demanding treatment schedule, dietary and fluid restrictions, polypharmacy, and persistent symptom burden (Rantepadang & Tombokan, 2024; Safi et al., 2024). Current international guidance consequently emphasizes person-centered care, physical activity compatible with individual tolerance, and management of complications that affect daily functioning (Sarker et al., 2022). In Indonesia, kidney disease has also been identified as a national priority because long-term dialysis creates substantial clinical, social, and financial pressure for patients, families, and the health system (Sinaga et al., 2024).

Among the symptoms experienced by patients receiving maintenance hemodialysis, fatigue is one of the most prevalent, disabling, and clinically under-addressed. Fatigue in CKD is a multidimensional and subjective experience characterized by persistent tiredness, weakness, exhaustion, or lack of energy that is disproportionate to exertion and interferes with physical and psychosocial functioning (Gregg et al., 2021). A systematic review and meta-analysis estimated that

post-dialysis fatigue affects 61.0% of hemodialysis patients, although prevalence varies across populations and measurement methods (Dou et al., 2023). High-fatigue symptom profiles have also been associated with poorer physical functioning, greater perceived kidney-disease burden, and lower health-related quality of life over time (He et al., 2024). These consequences are particularly important because fatigue may restrict employment, social participation, treatment engagement, and the ability to perform self-care between dialysis sessions.

Exercise is one of the most promising non-pharmacological approaches (Yulianti et al., 2024). However, implementation of conventional exercise programs is frequently constrained by low exercise tolerance, fear of adverse events, limited staffing and space in dialysis units, transportation difficulties, and poor continuity of supervision outside the clinic. An intervention that is brief, low impact, adaptable to sitting or standing, and easy to repeat may be more acceptable for patients with variable functional capacity.

Qigong offers these characteristics by integrating slow coordinated movements, controlled breathing, postural awareness, and focused attention (J. Zhou et al., 2024). Baduanjin, a commonly studied form of Qigong, is generally described as a moderate-intensity, accessible exercise that can be adapted for people with chronic conditions (Mcgee, 2025). Interest in its application to hemodialysis is increasing, but the evidence remains limited; a recent randomized-trial protocol specifically highlighted the need to establish its effects on physiological function, exercise capacity, nutritional status, dialysis-related outcomes, and quality of life in this population (X.-H. Zhou et al., 2025). Qigong may be particularly relevant to fatigue because its movement component can counter deconditioning, while breathing and attentional components may promote relaxation and perceived control. Nevertheless, its effectiveness depends on patients receiving clear instruction, performing movements safely, and maintaining practice beyond supervised encounters.

Mobile health (mHealth) can extend exercise support beyond face-to-face teaching through instructional videos, reminders, symptom and activity monitoring, self-management education, and communication with health professionals. Evidence from 17 randomized trials involving 1,728 hemodialysis patients suggests that eHealth interventions can improve quality of life and treatment adherence and reduce anxiety and depression (X.-H. Zhou et al., 2025). Recent evidence synthesis further indicates that internet-based remote exercise can support assessment, prescription, monitoring, and behavioral reinforcement for maintenance hemodialysis patients, while emphasizing the need for more standardized and higher-quality studies (Mcgee, 2025).

Despite these developments, digital interventions and Qigong have generally been evaluated as separate approaches, and fatigue-specific evidence for mHealth-delivered Qigong among maintenance hemodialysis patients remains scarce. Integrating the two approaches may address an important implementation gap: Qigong provides a low-impact mind-body exercise, whereas mHealth provides consistent guidance, prompts, and opportunities for self-monitoring. This combination may be especially useful in resource-constrained settings, where scalable nurse-led strategies are needed to support symptom management without increasing the frequency of hospital visits. Accordingly, this study aimed to evaluate the effect of a Qigong-based mHealth intervention on fatigue among patients with CKD undergoing hemodialysis at Bhayangkara Setukpa Lemdiklat Polri Hospital, Sukabumi, Indonesia. It was hypothesized that fatigue levels would decrease after the intervention. The study is expected to provide preliminary evidence for a practical, patient-centered, and sustainable non-pharmacological strategy within hemodialysis nursing care.

METHOD

This study employed a pre-experimental design using a one-group pretest-posttest design without a control group. The population consisted of all patients with chronic kidney disease undergoing hemodialysis at Bhayangkara Setukpa Lemdiklat Polri Hospital, Sukabumi City, with a sample of 30 participants selected using purposive sampling. The inclusion criteria were patients who had undergone routine hemodialysis for at least three months at Bhayangkara Setukpa Lemdiklat Polri Hospital, were aged ≥ 18 years, experienced fatigue based on the established research instrument, and owned or were able to use a smartphone to access the mHealth intervention. The exclusion criteria were patients with musculoskeletal disorders or physical limitations that could interfere with the performance of Qigong movements and those who were participating in other intervention programs specifically aimed at reducing fatigue.

Fatigue was measured using a modified Functional Assessment of Chronic Illness Therapy Fatigue (FACIT-F) Version 4 instrument. The instrument was adapted into Indonesian and modified according to the characteristics of patients with chronic kidney disease undergoing hemodialysis. The modifications included translation, wording adjustments, and selection of relevant items, resulting in 25 items covering physical, social/family, emotional, functional well-being, and additional concerns related to fatigue. Each item was assessed using a 5-point Likert scale, ranging from 0 (not at all) to 4 (very much), based on the participants' condition during the previous seven days. The validity test showed that all items had an r-count value >0.300 , while the reliability test showed a Cronbach's alpha value >0.7 , indicating that all items were valid and reliable. The intervention consisted of Qigong exercise delivered through a mobile health (mHealth) platform. Participants accessed Qigong exercise materials through their smartphones and performed the exercises three times per week. Fatigue was measured before the intervention (pretest) and after completion of the intervention (posttest). Data were collected directly from the respondents using questionnaires. Data were analyzed using a paired-samples t-test. The research ethics letter was issued by the Sukabumi College of Health Sciences Ethics Committee with the number: 003352/KEP STIKES SUKABUMI/2026

RESULT

Table 1.

Respondent Characteristics of Patients with Chronic Kidney Disease (n=30)

Respondent Characteristics		f	%
Age (Year)	18 – 40	2	6.7
	40 – 60	18	60.0
	>60	10	33.3
Gender	Male	18	60.0
	Female	12	40.0
Education	Elementary School	7	23.3
	Junior High School	2	6.7
	Senior High School	18	60.0
	Collage	3	10.0
Marital Status	Married	26	86.7
	Unmarried	3	10.0
	Widowed	1	3.3
Employment Status	Employed	5	16.7
	Unemployed	25	83.3
Duration of CKD	<1 Year	5	16.7
	1 – 5 Years	15	50.0
	>5 Years	10	33.3
Hemodialysis Frequency	Once a week	2	6.7
	Twice a week	24	80.0
	Three times a week	4	13.3
Duration of Hemodialysis	<12 months	13	43.3
	≥ 12 months	17	56.7

Table 1 shows that the majority of respondents were aged 40–60 years, totaling 18 people (60.0%); male, totaling 18 people (60.0%); had a high school education, totaling 18 people (60.0%); and were married, totaling 26 people (86.7%). Most respondents were unemployed, totaling 25 people (83.3%); had been living with chronic kidney disease (CKD) for 1–5 years, totaling 15 people (50.0%); underwent hemodialysis twice a week, totaling 24 people (80.0%); and had been undergoing hemodialysis for ≥ 12 months, totaling 17 people (56.7%).

Table 2.

Univariate Analysis of Fatigue Levels (n=30)

Fatigue Levels	Min	Max	Mean	SD
Before	30	80	55.67	11.642
After	18	66	44.63	11.787

Table 2 shows that the average fatigue test results before and after the measurement decreased from 55.67 (11.642) to 44.64 (11.787).

Table 3

Hypothesis Testing on the Effect of Qigong-Based mHealth on Fatigue Levels in Hemodialysis Patients

Variable	Before Mean (SD)	After Mean (SD)	p-value	t	Cohen's d
Fatigue Levels	55.67	44.63	<0.001	15.640	2.85 (very large)

The results of the hypothesis test in Table 3 show that after the Qigong-Based mHealth intervention, the average fatigue level decreased from 55.67 to 44.63. The results of the paired-sample t-test indicate a statistically significant difference between the pre- and post-intervention measures, $t = 15.640$, $p < 0.001$, with Cohen's $d = 2.85$, indicating a very large effect.

DISCUSSION

The research findings indicate that an mHealth intervention based on qigong exercises is effective in reducing fatigue levels in patients with chronic kidney disease undergoing hemodialysis. This was demonstrated by a decrease in the average fatigue score from 55.67 before the intervention to 44.63 after the intervention. The results of the paired-sample t-test showed a statistically significant difference between fatigue levels before and after the intervention ($p < 0.001$), with a Cohen's d value of 2.85, indicating a very large effect. These findings are consistent with the study by Wu et al. (2014), which demonstrated that qigong exercises can reduce fatigue in patients undergoing hemodialysis. These results were confirmed by Wang et al. (2021), who demonstrated that qigong exercises provide benefits in alleviating fatigue across various health conditions. Lu et al. (2024) demonstrated the benefits of various forms of exercise on fatigue in patients undergoing hemodialysis. These findings reinforce the results of this study, indicating that qigong exercises have the potential as a nonpharmacological intervention to help reduce fatigue in hemodialysis patients.

Fatigue, from the perspective of traditional Chinese medicine, is not merely viewed as physical muscle exhaustion, but as a clinical manifestation of a deficiency in the body's vital energy reserves specifically, the weakening of the Qi and Yang essences within a person's body. In this context, Qi and Yang function to optimize metabolism, supply energy for daily activities, and stimulate vitality. When the flow of Qi or Yang decreases due to chronic illness or medical procedures, the body loses its optimal capacity to generate energy. This leads to a systemic feeling of weakness and lethargy (Yang et al., 2025). One non-pharmacological therapy that addresses this issue of fatigue is qigong practice. Qigong is a cultural component of traditional Chinese medicine that integrates gentle body movements, breath control, and mental concentration. This practice focuses on stabilizing the flow of vital energy within the body to restore both physical and psychological balance. Qigong is believed to be able to stimulate an individual's internal Qi energy, a concept that aligns with the meaning of its name. Qigong also has the potential to reduce fatigue by supporting the balance of Qi and Yang energy, allowing individuals to feel more energetic and perform daily activities more effectively (Han et al., 2025). Several studies indicate that Qigong practice as a whole can increase

energy and vitality in the elderly and in people with chronic diseases (Liu et al., 2024; Low et al., 2024; Zimmerman et al., 2023).

Qigong practice is a key component that has the potential to influence fatigue levels because qigong is a mind-body practice that combines physical movement, breath control, and concentration. Thongthawee et al. (2025) describe qigong as a practice involving slow, controlled movements accompanied by breath control. The effectiveness of qigong in this study can be understood from the characteristics of the practice, which integrates physical movements, breathing control, and mental concentration. This approach allows activities to be performed in a controlled manner while providing a relaxation component, making it relevant for hemodialysis patients who face physical limitations and the burden of long-term therapy. Wang et al. (2021) revealed that qigong exercises have benefits for fatigue, suggesting that an approach combining physical activity with mind-body components holds potential for managing this symptom. Findings by Wu et al. (2014) in hemodialysis patients also showed that qigong exercises can reduce fatigue as long as the exercises are performed regularly. Breathing-based approaches have also been shown to be beneficial in supporting the condition of hemodialysis patients, particularly when exercises are performed at low intensity and accompanied by breathing regulation.

The use of mHealth in this study made an important contribution to supporting the implementation of qigong exercises, as digital technology allows intervention guidelines to be delivered in a structured, easily accessible, and flexible manner for patients. This convenience is particularly relevant in managing fatigue among hemodialysis patients, as interventions can be delivered through platforms that enable patients to follow the guidelines more consistently. Alishahi et al. (2024) demonstrated that the use of smartphone-based applications can help reduce fatigue in hemodialysis patients, indicating that digital technology has the potential to support the delivery of nonpharmacological interventions in this population. This potential is also evident in the implementation of technology-assisted collaborative care, which utilizes technology to support the management of symptom burden in hemodialysis patients. The use of smartphone apps allows interventions to be delivered through various forms of content such as exercise guides, videos, music, and educational materials ensuring that patients receive information and instructions in a more targeted manner. This support can make it easier for patients to follow the steps of qigong exercises while maintaining consistency in their practice.

This study has several limitations that should be considered when interpreting the results. The use of a one-group pretest-posttest design without a control group limits the study's ability to confirm that the reduction in fatigue was entirely due to the qigong-based mHealth intervention. The relatively small sample size 30 patients and the fact that the study was conducted at a single healthcare facility also limit the generalizability of the results to the broader population of hemodialysis patients. The intervention, which was administered over four weeks without long-term follow-up, did not allow for an assessment of the sustainability of the effects after the study period ended. Furthermore, the use of fatigue measurements based on patients' subjective reports, as well as the simultaneous administration of mHealth and qigong exercises, did not allow for the identification of the respective contributions of each component to the reduction in fatigue. Future studies are recommended to use a controlled design with a larger and more diverse sample size, a longer follow-up period, and a comparison group that allows for a more specific evaluation of the contributions of mHealth and qigong exercises.

CONCLUSION

mHealth-based Qigong exercise significantly reduced fatigue among patients with chronic kidney disease undergoing hemodialysis. mHealth-based Qigong exercise may be considered as a supportive nursing intervention for fatigue management among patients undergoing hemodialysis.

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