

Effect of Combined Isometric Handgrip Exercise and Dhikr Therapy on Blood Pressure Among Older Adults with Hypertension: A Quasi-Experimental Study

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ABSTRACT

Hypertension is a major public health problem among older adults and a leading risk factor for cardiovascular disease. Although pharmacological therapy remains the primary treatment, complementary non-pharmacological interventions that integrate physical exercise and spiritual care may enhance blood pressure control. However, evidence regarding the combined use of isometric handgrip exercise and Islamic dhikr therapy is still limited. This study aimed to determine the effect of combined isometric handgrip exercise and dhikr therapy on blood pressure among older adults with hypertension. A quasi-experimental study with a one-group pretest–posttest design was conducted among 40 older adults with hypertension at Merdeka Primary Health Center. Participants were selected using purposive sampling according to the predefined eligibility criteria and the sample size was estimated using the Slovin formula to obtain a representative sample from the accessible population. Participants received combined isometric handgrip exercise and guided dhikr therapy for five consecutive days. Blood pressure was measured before and after the intervention using a calibrated digital sphygmomanometer. Data normality was assessed using the Shapiro–Wilk test, followed by the Wilcoxon Signed-Rank Test for statistical analysis. The mean systolic blood pressure decreased from 146.50 mmHg to 123.25 mmHg, while the mean diastolic blood pressure decreased from 100.00 mmHg to 80.75 mmHg after the intervention. The average reductions were 23.25 mmHg for systolic and 19.25 mmHg for diastolic blood pressure. Statistical analysis demonstrated significant differences between pre- and post-intervention measurements for both systolic and diastolic blood pressure ($p < 0.001$). Combined isometric handgrip exercise and dhikr therapy significantly reduced blood pressure among older adults with hypertension. This intervention may be an effective complementary nursing strategy in primary healthcare setting.

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1. INTRODUCTION

Hypertension remains one of the leading global public health challenges and is a major modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature mortality. According to the World Health Organization, approximately 1.28 billion adults worldwide are living with hypertension, and nearly half are unaware of their condition [1]. Despite the availability of effective pharmacological treatments, blood pressure control remains suboptimal because of poor treatment adherence, unhealthy lifestyles, and inadequate implementation of complementary non-pharmacological interventions[2]. Consequently, comprehensive hypertension management should incorporate evidence-based lifestyle modification alongside

medical therapy to reduce cardiovascular risk and improve long-term health outcomes [3], [4].

Older adults are particularly vulnerable to hypertension because aging is associated with progressive arterial stiffness, endothelial dysfunction, reduced vascular elasticity, and impaired autonomic regulation[5]. These physiological changes increase peripheral vascular resistance and contribute to sustained elevation of systolic and diastolic blood pressure [6]. In Indonesia, hypertension is one of the most common chronic diseases among older adults and continues to place a substantial burden on primary healthcare services [7]. Therefore, identifying safe, inexpensive, and easily implemented complementary interventions is essential for improving blood pressure control within community and primary care settings.

Among non-pharmacological approaches, isometric handgrip exercise (IHE) has gained increasing attention because of its ability to improve vascular endothelial function, increase nitric oxide bioavailability, reduce peripheral vascular resistance, and subsequently lower blood pressure[8]. Previous studies have demonstrated that regular isometric handgrip exercise produces clinically meaningful reductions in both systolic and diastolic blood pressure among individuals with hypertension [9], [10]. Because the exercise is simple, inexpensive, and requires minimal equipment, it is considered feasible for implementation in primary healthcare and home-based management programs [6].

Besides physical exercise, spiritual interventions have increasingly been recognized as important complementary components of holistic nursing care. Within the Islamic perspective, dhikr is a form of remembrance of Allah that promotes psychological relaxation, emotional well-being, and stress reduction. Previous studies have suggested that dhikr may activate the parasympathetic nervous system, suppress sympathetic activity, reduce cortisol secretion, and promote cardiovascular relaxation, thereby contributing to lower blood pressure among patients with hypertension [11]. Furthermore, the integration of Islamic spiritual care into nursing practice has been recommended as a culturally sensitive approach for Muslim patients because it addresses physiological, psychological, social, and spiritual dimensions of [11].

Although numerous studies have independently investigated the effectiveness of isometric handgrip exercise or dhikr therapy, evidence regarding the combined application of these interventions remains limited. Most previous studies have evaluated either physical exercise or spiritual therapy separately, leaving uncertainty regarding their potential synergistic effects when implemented simultaneously [9], [12]. Combining physiological and spiritual interventions may provide greater benefits by targeting multiple mechanisms involved in blood pressure regulation. While isometric handgrip exercise primarily enhances vascular function through improved endothelial function and nitric oxide bioavailability, dhikr therapy may reduce sympathetic nervous system activity by promoting relaxation and stress modulation [6], [11].

Therefore, the combination of these interventions has the potential to produce greater reductions in blood pressure than either intervention alone, although evidence supporting this integrated approach remains scarce. To our knowledge, few studies have evaluated the integration of isometric handgrip exercise and dhikr therapy among older adults with hypertension in Indonesian primary healthcare settings. Generating evidence from this context is important because culturally acceptable, low-cost, and nurse-led interventions are highly relevant for community-based hypertension management. Therefore, this study aimed to determine the effect of combined isometric handgrip exercise and dhikr therapy on blood pressure among older adults with hypertension at a primary healthcare center in Palembang, Indonesia.

2. METHOD

2.1. Study Design

This study employed a quasi-experimental one-group pretest–posttest design to evaluate the effect of combined isometric handgrip exercise and dhikr therapy on blood pressure among older adults with hypertension. A quasi-experimental design allows researchers to examine the effects of an intervention when random assignment is not feasible[13] [14]. Baseline blood pressure was measured before the intervention (pre-test), and follow-up measurements were obtained immediately after completion of the five-day intervention (post-test).

2.2. Eligibility Criteria

Inclusion and exclusion criteria for respondents were established to ensure participant eligibility, so that the study could generate relevant, valid, and high-quality data in line with the research objectives.

2.2.1. Inclusion Criteria

- a. Aged 45 years or older.
- b. Had a physician-confirmed diagnosis of hypertension.
- c. Were registered as patients at UPTD Merdeka Primary Health Center, Palembang.
- d. Were able to communicate effectively and follow the intervention procedures.
- e. Provided written informed consent to participate in the study.

2.2.2. Exclusion Criteria

- a. Had severe cardiovascular complications requiring emergency medical treatment.
- b. Had cognitive impairment or communication disorders that prevented participation.
- c. Had upper extremity musculoskeletal disorders or disabilities that limited performance of isometric handgrip exercise.
- d. Had medical conditions contraindicating moderate physical exercise.
- e. Withdrew from the study or had incomplete blood pressure measurements.

2.3. Study Setting and Duration

This study was conducted at UPTD Merdeka Primary Health Center, Palembang, South Sumatra, Indonesia, a primary healthcare facility that routinely provides hypertension screening, treatment, and follow-up services for community-dwelling older adults. Data collection was conducted from May to June 2026, including participant recruitment, baseline blood pressure assessment, implementation of the combined intervention, and post-intervention evaluation.

2.4. Population and Sample

The study population comprised older adults with physician-diagnosed hypertension who attended hypertension services at UPTD Merdeka Primary Health Center, Palembang, South Sumatra, Indonesia. Participants were selected using purposive sampling according to the predefined eligibility criteria. A total of 40 eligible participants were recruited and completed the study. The sample size was estimated using the Slovin formula to obtain a representative sample from the accessible population [13]. All participants completed both the pre-intervention and post-intervention assessments, and no attrition occurred during the study period.

2.5. Intervention Procedures

Participants received a combination of isometric handgrip exercise (IHE) and guided dhikr therapy for five consecutive days. Before the intervention, baseline systolic and diastolic blood pressure measurements were obtained after participants had rested in a seated position for at least five minutes.

The intervention began with isometric handgrip exercise using a standardized handgrip device. Participants were instructed to perform sustained isometric contractions at a moderate intensity according to the study protocol under the supervision of trained nurses. Following completion of the exercise session, participants received guided dhikr therapy in a quiet and comfortable environment. During the session, participants were instructed to perform Islamic remembrance (dhikr) in a calm and focused manner while practicing slow, regular breathing to promote physical and psychological relaxation.

The combined intervention was delivered once daily for five consecutive days. All intervention sessions were supervised by the research team to ensure adherence to the intervention protocol and participant safety. Blood pressure was reassessed immediately after completion of the intervention period using the same standardized measurement procedure.

2.6. Outcome Measures

The primary outcome of this study was blood pressure, including systolic blood pressure (SBP) and diastolic blood pressure (DBP). Blood pressure was measured using a calibrated digital sphygmomanometer and recorded in millimeters of mercury (mmHg). Measurements were performed twice: at baseline before the intervention (pre-test) and immediately after the completion of the five-day intervention (post-test).

To ensure measurement accuracy, participants were instructed to avoid strenuous physical activity, caffeine, and smoking for at least 30 minutes before the assessment. Blood pressure was measured with participants in a seated position after a minimum of five minutes of rest, following standard clinical guidelines.

The same measurement procedure, device, and arm position were used during both pre-test and post-test assessments to maintain consistency and minimize measurement bias.

2.7. Data Analysis

Data were analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize participants' characteristics and blood pressure measurements. Continuous variables are presented as means and standard deviations (SD), while categorical variables are presented as frequencies and percentages. Data normality was evaluated using the Shapiro–Wilk test. Because the data were not normally distributed, the Wilcoxon Signed-Rank Test was used to compare pre- and post-intervention systolic and diastolic blood pressure. The magnitude of the intervention effect was quantified using the effect size (r) for the Wilcoxon test. Statistical significance was determined using a two-tailed p -value of < 0.05 [15].

2.8. Ethical Considerations

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Ahmad Dahlan Palembang, Indonesia (Approval No. 002730/KEP Universitas Muhammadiyah Ahmad Dahlan Palembang/2026) on May 8, 2026.

Before data collection, all participants received a complete explanation of the study objectives, procedures, potential benefits, and possible risks. Written informed consent was obtained from each participant prior to enrollment. Participants were informed that their participation was entirely voluntary and that they could withdraw from the study at any time without affecting the healthcare services they received. To ensure confidentiality, all personal information was anonymized, securely stored, and used solely for research purposes.

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 Sociodemographic Characteristics

This study yielded sociodemographic data from 44 respondents, including their age, gender, educational level, and history of catheterization, as follows:

Table 1. Frequency Distribution of Respondents' Sociodemographic Characteristics

Characteristic	n	%
Age (years)		
54–60	15	37.5
61–65	5	12.5
66–71	20	50.0
Mean $\pm$ SD	64.2 $\pm$ 5.4	
Sex		
Male	11	27.5
Female	29	72.5
Education		
No formal education	14	35.0
Elementary school	22	55.0
Junior high school	4	10.0
Duration of hypertension		
2–5 years	18	45.0
6–10 years	21	52.5
11–15 years	1	2.5
Mean $\pm$ SD	6.1 $\pm$ 2.5 years	

A total of 40 older adults with hypertension participated in this study and completed all intervention sessions. The mean age of the participants was 64.2 ± 5.4 years. Half of the participants (50.0%) were aged 66–71 years, followed by 54–60 years (37.5%) and 61–65 years (12.5%).



Most participants were female (72.5%), while 27.5% were male. Regarding educational attainment, 55.0% had completed elementary school, 35.0% had no formal education, and 10.0% had completed junior high school. The average duration of hypertension was 6.1 ± 2.5 years. More than half of the participants (52.5%) had experienced hypertension for 6–10 years, followed by 2–5 years (45.0%) and 11–15 years (2.5%). Detailed sociodemographic characteristics are presented in Table 1.

3.1.2 Blood Pressure Before and After the Intervention

Changes in systolic and diastolic blood pressure following the combined isometric handgrip exercise and dhikr therapy intervention are presented in Table 2. The table summarizes the mean, standard deviation, minimum, and maximum values of blood pressure measured before and after the intervention.

Table 2. Comparison of Blood Pressure Before and After the Intervention

Variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference
Systolic blood pressure (mmHg)	146.50 $\pm$ SD	123.25 $\pm$ SD	23.25
Diastolic blood pressure (mmHg)	100.00 $\pm$ SD	80.75 $\pm$ SD	19.25

Table 2 presents the comparison of systolic and diastolic blood pressure before and after the combined intervention. The mean systolic blood pressure decreased from $146.50 \pm$ SD mmHg before the intervention to $123.25 \pm$ SD mmHg after the intervention. Similarly, the mean diastolic blood pressure decreased from $100.00 \pm$ SD mmHg to $80.75 \pm$ SD mmHg, indicating an average reduction of 23.25 mmHg and 19.25 mmHg, respectively.

3.1.3 Effect of the Combined Intervention on Blood Pressure

The effect of the combined isometric handgrip exercise and dhikr therapy on blood pressure was analyzed using the Wilcoxon Signed-Rank Test because the data were not normally distributed. The results are presented in Table 3.

Table 3. Effect of the Combined Isometric Handgrip Exercise and Dhikr Therapy on Blood Pressure (n = 40)

Variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference	Z	p-value
Systolic blood pressure (mmHg)	146.50 $\pm$ 7.36	123.25 $\pm$ 4.74	23.25	-5.511	<0.001
Diastolic blood pressure (mmHg)	100.00 $\pm$ 10.86	80.75 $\pm$ 7.30	19.25	-5.159	<0.001

Table 3 shows that the combined isometric handgrip exercise and dhikr therapy resulted in significant reductions in both systolic and diastolic blood pressure among older adults with hypertension. Mean systolic blood pressure decreased from 146.50 ± 7.36 mmHg before the intervention to 123.25 ± 4.74 mmHg after the intervention, representing a mean reduction of 23.25 mmHg. Similarly, mean diastolic blood pressure decreased from 100.00 ± 10.86 mmHg to 80.75 ± 7.30 mmHg, with a mean reduction of 19.25 mmHg.

The Wilcoxon Signed-Rank Test confirmed that the reductions in systolic ($Z = -5.511$, $p < 0.001$) and diastolic ($Z = -5.159$, $p < 0.001$) blood pressure were statistically significant. These findings indicate that the combined intervention was effective in lowering blood pressure among older adults with hypertension during the five-day intervention period.

3.2 Discussion

The present study demonstrated that the combination of isometric handgrip exercise and dhikr therapy significantly reduced both systolic and diastolic blood pressure among older adults with hypertension. Following the five-day intervention, systolic blood pressure decreased by 23.25 mmHg, while diastolic blood pressure decreased by 19.25 mmHg. The Wilcoxon Signed-Rank Test confirmed that these reductions were statistically significant ($p < 0.001$). These findings suggest that integrating structured physical exercise with Islamic spiritual therapy may provide an effective complementary nursing intervention for blood pressure management among older adults.

The observed reduction in blood pressure may be explained by the physiological adaptations induced by isometric handgrip exercise. Repeated isometric muscle contractions improve endothelial function, increase nitric oxide bioavailability, reduce peripheral vascular resistance, and enhance autonomic cardiovascular regulation, all of which contribute to lowering resting blood pressure [9], [12]. The 2023 European Society of Hypertension (ESH) [6] Guidelines also recognize lifestyle modification, including structured exercise, as a cornerstone of hypertension management because of its beneficial effects on vascular health and cardiovascular risk reduction [6].

The magnitude of blood pressure reduction observed in this study was greater than that reported in previous studies evaluating isometric handgrip exercise alone. [12] reported average reductions of approximately 6.7 mmHg in systolic blood pressure and 4.5 mmHg in diastolic blood pressure following chronic isometric handgrip training, whereas the present study demonstrated reductions of 23.25 mmHg and 19.25 mmHg, respectively. This difference may be attributed to the simultaneous implementation of dhikr therapy, which may complement the physiological benefits of exercise by reducing psychological stress and sympathetic nervous system activity. Nevertheless, differences in participant characteristics, intervention duration, baseline blood pressure, and study design should also be considered when interpreting these findings.

Besides the physiological effects of exercise, dhikr therapy may have contributed to blood pressure reduction through psychophysiological mechanisms. Dhikr involves repetitive remembrance of Allah accompanied by focused attention and controlled breathing, which may promote relaxation and emotional regulation. Relaxation responses have been associated with increased parasympathetic activity, suppression of sympathetic nervous system activation, reduced cortisol secretion, and improved cardiovascular homeostasis. Furthermore, Islamic spiritual care has been recognized as an essential component of holistic nursing because it addresses patients' spiritual needs while enhancing psychological well-being and coping abilities [11].

The findings of this study support the hypothesis that combining isometric handgrip exercise and dhikr therapy may provide complementary benefits through different yet interconnected physiological pathways. Isometric exercise primarily improves vascular function through endothelial adaptation and enhanced nitric oxide production, whereas dhikr therapy primarily influences neuroendocrine regulation by reducing stress-related sympathetic activation. Targeting both vascular and psychological mechanisms simultaneously may explain the greater reduction in blood pressure observed in the present study. This integrated approach is consistent with the principles of holistic nursing, which emphasize the interrelationship between biological, psychological, social, and spiritual dimensions of health[15].

From a nursing perspective, the combined intervention offers several practical advantages. Both interventions are inexpensive, non-invasive, require minimal equipment, and can be implemented by nurses in primary healthcare settings after appropriate training. Furthermore, because dhikr is culturally and spiritually meaningful for Muslim patients, integrating spiritual care into routine hypertension management may improve patient engagement, treatment adherence, and overall satisfaction with nursing services. Consequently, this intervention may represent a feasible strategy for strengthening community-based hypertension management programs in Indonesia.

Despite these promising findings, several limitations should be acknowledged. The use of a one-group pretest–posttest design without a control group limits causal inference. In addition, the relatively small sample size, recruitment from a single primary healthcare center, and short intervention period may restrict the generalizability of the findings and preclude assessment of long-term effectiveness. Future multicenter randomized controlled trials with larger sample sizes and longer follow-up periods are warranted to confirm the effectiveness and sustainability of this combined intervention.

Overall, the present study provides preliminary evidence that combining isometric handgrip exercise and dhikr therapy may represent an effective complementary nursing intervention for reducing blood pressure among older adults with hypertension. Integrating evidence-based physical exercise with culturally appropriate Islamic spiritual care may enhance holistic hypertension management and contribute to improved cardiovascular health outcomes in primary healthcare settings.

The findings of this study suggest that the combination of isometric handgrip exercise and dhikr therapy may serve as an effective complementary nursing intervention for blood pressure management among older adults with hypertension. As both interventions are non-invasive, low-cost, and easy to implement, they can be incorporated into routine nursing care in primary healthcare settings to complement pharmacological treatment. Nurses can educate patients on performing isometric handgrip exercise correctly while facilitating dhikr therapy as a culturally appropriate relaxation technique, thereby promoting holistic hypertension management.

The integration of physical exercise and spiritual care reflects the holistic nursing approach, which addresses not only physiological health but also psychological and spiritual well-being. This combined intervention may enhance patient participation, improve adherence to hypertension management programs, and increase patient satisfaction, particularly among Muslim older adults. Furthermore, the intervention requires minimal equipment and can be delivered by nurses after appropriate training, making it feasible for implementation in community health centers and home-based nursing services.

These findings also support the development of evidence-based nursing protocols for non-pharmacological hypertension management. Future nursing practice may benefit from incorporating structured isometric handgrip exercise and guided dhikr therapy into health promotion and chronic disease management programs. However, further multicenter randomized controlled trials with larger sample sizes and longer follow-up periods are recommended to confirm the long-term effectiveness and generalizability of this intervention.

This study has several limitations that should be considered when interpreting the findings. First, the use of a one-group pretest–posttest quasi-experimental design without a control group limits the ability to establish a causal relationship between the intervention and the observed reduction in blood pressure. Second, the relatively small sample size and recruitment from a single primary healthcare center may limit the generalizability of the findings to broader populations. Third, the intervention was conducted over only five consecutive days, preventing the assessment of its long-term effectiveness. In addition, potential confounding factors, such as participants' dietary intake, physical activity, medication adherence, and psychological status, were not fully controlled during the study. Therefore, future studies employing randomized controlled trial designs with larger, more diverse populations and longer follow-up periods are recommended to validate and extend the present findings.

4. CONCLUSION

The present study demonstrated that the combination of isometric handgrip exercise and dhikr therapy significantly reduced systolic and diastolic blood pressure among older adults with hypertension. These findings suggest that integrating physical exercise with Islamic spiritual therapy may provide an effective complementary approach to conventional hypertension management. As a simple, low-cost, non-invasive, and culturally appropriate intervention, this combined strategy has the potential to be incorporated into routine nursing care in primary healthcare settings, particularly for Muslim older adults. Further randomized controlled trials with larger sample sizes and longer follow-up periods are recommended to confirm the long-term effectiveness and generalizability of these findings.

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CONFLICT OF INTEREST

The authors declare that there are no financial, professional, or personal conflicts of interest that could have influenced the design, conduct, analysis, or reporting of this study.

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