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The Effectiveness of Brisk Walking Exercise on Blood Pressure among Elderly Patients with Hypertension: A One-Group Pretest–Posttest Study

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ABSTRACT Hypertension remains one of the leading causes of cardiovascular morbidity and mortality among older adults worldwide. Despite the widespread use of antihypertensive medication, blood pressure often remains poorly controlled because pharmacological treatment alone is insufficient without complementary lifestyle modifications. Brisk walking exercise has been recommended as a practical non-pharmacological intervention; however, evidence regarding its effectiveness among elderly individuals residing in nursing homes, particularly in Indonesia, remains limited. This study aimed to evaluate the effectiveness of brisk walking exercise in reducing systolic and diastolic blood pressure among older adults with hypertension living in a nursing home. A quasi-experimental study employing a one-group pretest–posttest design was conducted involving 18 older adults with hypertension selected through purposive sampling. Participants performed brisk walking exercise for 20 minutes, six sessions over two weeks, at an intensity adjusted to their physical capacity. Blood pressure was measured before and after the intervention using a calibrated digital sphygmomanometer. Data were analyzed using the Wilcoxon Signed-Rank Test for systolic blood pressure and the paired-sample *t*-test for diastolic blood pressure. The mean systolic blood pressure decreased from **151.00 ± 9.49 mmHg** before the intervention to **125.89 ± 11.68 mmHg** afterward, while the mean diastolic blood pressure decreased from **94.00 ± 7.67 mmHg** to **77.67 ± 5.08 mmHg**. Statistical analysis demonstrated significant reductions in both systolic and diastolic blood pressure (both *p* < 0.001), with large effect sizes, indicating a substantial impact of the intervention. These findings suggest that brisk walking exercise is an effective, safe, and feasible complementary non-pharmacological strategy for improving blood pressure control among elderly individuals with hypertension. Incorporating regular brisk walking into routine nursing care may contribute to better cardiovascular health and reduce the risk of hypertension-related complications in institutionalized older adults.

INDEX TERMS Brisk Walking Exercise, Hypertension, Older Adults, Blood Pressure, Non-Pharmacological Intervention.

I. INTRODUCTION

Hypertension is one of the non-communicable diseases (NCDs) that continues to increase each year. One of the contributing factors to hypertension in Indonesia is the low level of public knowledge regarding how to control and manage hypertension [1] . Elderly individuals often rely solely on medication without balancing it with lifestyle changes, which is frequently ineffective in controlling hypertension. Many elderly patients fail to achieve optimal blood pressure control with medication alone [2]. The number of uncontrolled hypertension cases continues to rise annually [3].

Hypertension remains a major global health problem, with its prevalence having doubled over the past 30 years. The WHO reports that, in 2019, there were 703 million people aged 65 and older, and this number is projected to double to 1.5 billion by 2050 [4]. The Riskesdas report (2019) indicated that the prevalence of hypertension in Indonesia has increased, with an estimated 63,309,620 cases and 427,218 deaths attributed to hypertension [5] The majority of patients with hypertension in Indonesia (78.87%) have uncontrolled hypertension [6], and in other countries, such as Iran, the prevalence of uncontrolled hypertension is 61.7% (95% CI: 60.3–63.2) [3].

Hypertension management can involve two approaches: pharmacological and non-pharmacological. Pharmacological approaches involve the use of prescribed medications, while non-pharmacological approaches include lifestyle modifications such as maintaining a healthy diet, avoiding alcohol and tobacco, managing stress, using herbal remedies, and engaging in regular physical activity [7] [8]. Regular physical activity can help lower blood pressure by improving cardiac strength, enhancing smooth muscle function, and promoting stronger and more regular heartbeats. If left unmanaged, hypertension can lead to organ

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damage and ultimately death, making effective treatment essential [9].

As individuals age, the elasticity of blood vessels decreases, which can lead to increased blood pressure. One non-pharmacological approach that can be implemented is brisk walking exercise. This moderate-intensity physical activity is suitable for elderly individuals with hypertension and can help lower heart rate and blood pressure by releasing beta-blocker-like substances that calm the sympathetic nervous system, improve cardiac function, and enhance blood circulation. It also promotes the release of beta-endorphins, which help reduce stress and improve walking efficiency. This therapy has no significant side effects and is highly effective when performed regularly [10], [11].

Brisk walking exercise helps lower blood pressure in various target populations like healthy middle-aged and/or older adults, as well as community-dwelling older adults with hypertension. Only limited data on its efficacy in elderly, nursing home residents is available, especially from Indonesia [10]. Physical activity behavior, dependency and health conditions in older adults living in nursing homes also differ from in community-living older adults. Hence, previous findings may not be applicable to this population. This gap emphasizes the urgency for further investigation of brisk walking exercise as a potential non-pharmaceutical approach to lowering blood pressure in nursing homes.

II. METHOD

The study aimed to determine the effect of brisk walking exercise on blood pressure before and after its implementation among elderly individuals with hypertension living in a nursing home.

A. STUDY DESIGN AND RATIONALE

This study employed a quasi-experimental method using a one-group pretest-posttest design. In this design, there was only one group of participants without a comparison group. Before the intervention was administered, all participants first underwent blood pressure measurement as the pretest. Subsequently, the participants received the intervention in the form of brisk walking exercise, conducted six times over a period of two weeks, with an interval of once every two days. At the end of the study, the participants' blood pressure was measured again as the posttest to determine any changes following the intervention. This design was selected because it is simple, practical to implement, and suitable for evaluating the effect of an intervention within the same group. By comparing blood pressure measurements before and after the brisk walking exercise, the researcher was able to determine the effectiveness of this exercise in reducing blood pressure among older adults with hypertension. Furthermore, this design is appropriate when the number of participants is limited and the use of a control group is not feasible.

B. STUDY SETTING

This study was conducted at Bhakti Luhur Nursing Home, located in Wisma Tropodo Housing Complex, Jl. Kapuas Block FI/No. 22, Tropodo, Waru District, Sidoarjo Regency. The study was carried out in five residential units of the nursing home, namely Kartini Residence, Theresa Residence, Martha Residence, Maria Residence, and Hilde Residence.

C. PARTICIPANTS AND SAMPLING METHOD

The participants in this study were older adults residing at Bhakti Luhur Nursing Home, Sidoarjo. The total population consisted of 60 older adults, of whom 18 had a history of hypertension and were still able to perform daily activities independently without assistance. The study sample was selected from older adults with hypertension who met the study characteristics and were considered representative of the population. The inclusion criteria were: willingness to participate as respondents, age above 60 years, systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg, and the ability to carry out activities independently. The exclusion criteria included older adults with cardiovascular disorders or musculoskeletal disorders that contraindicated brisk walking exercise, as well as those who refused to participate or were uncooperative during the study. The sampling method used was non-probability sampling with a purposive sampling approach, in which participants were selected based on specific considerations relevant to the objectives of the study. Therefore, not all members of the population had an equal chance of being selected as samples. The sample size was determined using the Federer formula, which resulted in a minimum sample size of 16 participants. To anticipate a possible dropout rate of 10%, the sample size was adjusted to 18 participants. Therefore, all 18 older adults with hypertension who met the eligibility criteria at Bhakti Luhur Nursing Home were included as the study sample.

D. DATA COLLECTION INSTRUMENTS AND PROCEDURE

The research instruments used in this study consisted of several tools and supporting documents. The researcher used an informed consent form to obtain participants' consent after providing an explanation regarding the objectives, procedures, and benefits of the brisk walking exercise intervention. In addition, a demographic data form was used to collect the characteristics of older adults with hypertension to support the discussion of the study findings. The main data were collected using an observation sheet, which was used to record the results of the pretest and posttest measurements following the implementation of brisk walking exercise. To ensure that the intervention was carried out consistently, the researcher used a Standard Operating Procedure (SOP) as a guideline for conducting the brisk walking exercise. The brisk walking exercise program was conducted in the morning before 11:00 a.m. WIB, twice a week for two weeks, with each session lasting 20 minutes. During the exercise sessions, time was measured using a stopwatch available on a mobile phone to ensure that the duration of the exercise met the specified requirements. Meanwhile, blood pressure measurements were taken using a OneMed digital sphygmomanometer serial number B2409003020 that had been calibrated by the Agency for the

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Security of Health Equipment and Facilities (BPAFK) and was operated in accordance with the established SOP.

E. DATA ANALYSIS

Univariate analysis in this study was used to describe the characteristics of the respondents and to present blood pressure results before and after the implementation of brisk walking exercise. A normality test was conducted using the Shapiro-Wilk test. The results of the normality test showed that the systolic blood pressure data were not normally distributed ($p < 0.05$). Therefore, the statistical test used for systolic blood pressure was the non-parametric Wilcoxon Signed Rank Test. Meanwhile, the normality test results for diastolic blood pressure showed that all data were normally distributed ($p > 0.05$). Therefore, the statistical test used for diastolic blood pressure was the Paired Sample T-Test.

F. ETHICAL CONSIDERATIONS

This study underwent an ethical feasibility review and received research approval from the Health Research Ethics Committee of the Surabaya Health Polytechnic, Ministry of Health, with approval number EA/3203/KEPK-Poltekkes_Sby/V/2025, dated April 10, 2025. This study complied with ethical standards for conducting research involving vulnerable populations, ensuring confidentiality, voluntary participation, and the right of participants to withdraw at any time without penalty.

III. RESULTS

A study on the effects of brisk walking exercise on blood pressure in elderly individuals with hypertension living in a nursing home was conducted on 18 elderly participants, with the following results:

TABLE 1
Distribution Characteristics of Older Adults with Hypertension

Characteristics of Older Adults with Hypertension		Frequency	Percentage (%)
Age	> 60 years	18	100
	Total	**18**	**100**
Education	Elementary school	8	44,4
	Junior high school	7	38,9
	Senior high school	3	16,7
	Universitiy	0	0
	Total	**18**	**100**
Taking antihypertensive medication	Yes	18	100
	No	0	0
	Total	**18**	**100**
Long-Term Hypertension	1 – 5 years	6	33,3
	6 – 10 years	7	38,9
	> 10 years	5	27,8
	Total	**18**	**100**
Health monitoring	Yes	18	100
	No	0	0
	Total	**18**	**100**
Exercise	Yes	10	55,6
	No	8	44,4
	Total	**18**	**100**
Comorbidities	DM	2	11,1
	Others	1	5,5
	None	15	83,3
	Total	**18**	**100**

Based on TABLE 1, all older adults (100%) were aged >60 years. Nearly half (44.4%) of older adults with hypertension had an elementary school education. All participants (100%) routinely took antihypertensive medication, and nearly half of them (38.9%) had suffered from hypertension for 6–10 years. In addition, all older adults with hypertension (100%) regularly underwent health monitoring, and most of them (83.3%) had no other comorbidities. It was also found that the majority of older adults with hypertension (55.6%) regularly engaged in exercise.

TABLE 2
Distribution of Results of the Wilcoxon Signed Rank Test for Pretest and Posttest Systolic Blood Pressure in Older Adults with Hypertension

Variabel	n	Median (Minimum – Maksimum)	Z score	Nilai *p*
Pre test sistolik	18	148 (141 – 172)	-3.726	< .001*
Post test sistolik	18	125 (105 – 148)		

*Wilcoxon Signed Rank Tes

TABLE 2 presents the results of the Wilcoxon Signed-Rank Test comparing systolic blood pressure before and after the brisk walking exercise intervention. The analysis demonstrated a statistically significant reduction in systolic blood pressure following the intervention ($Z = -3.726$, $p < 0.001$), with a large effect size ($r = 0.88$), indicating a substantial effect of brisk walking exercise on systolic blood pressure among older adults with hypertension.

TABLE 3
Distribution of Results of the Paired Sample T-Test for Pretest and Posttest Diastolic Blood Pressure in Older Adults with Hypertension.

Variable	n	Mean (sd)	Mean difference (sd)	95% CI	*p score*
Pre test diastolik	18	94.00 (7.67)	16.33 (5.88)	13.40 – 19.25	<0,00 1*
Post test diastolik	18	77. 67(5.07)			

sd : standard deviation
95% CI : 95% confidence interval
* Paired t-test

As presented in TABLE 3, diastolic blood pressure significantly decreased following the brisk walking exercise intervention. The Paired Sample t-Test revealed a statistically significant difference between pretest and posttest measurements (mean difference = 16.33 mmHg; 95% CI: 13.40–19.25; $p < 0.001$). Furthermore, the very large effect size (Cohen's $d = 2.78$) indicates that brisk walking exercise had a substantial effect on reducing diastolic blood pressure among older adults with hypertension.

IV. DISCUSSION

The study results showed that all older adults with hypertension were aged over 60 years. This finding is consistent with the study by Okati-Aliabad, H., et.all (2022) [12], which stated that age is one of the factors contributing to the development of hypertension. As individuals age, physiological systems involved in blood circulation, particularly the blood vessels, undergo structural and

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functional changes that contribute to an increased risk of hypertension [13] [14]. In this study, all hypertensive older adults were women. Women over the age of 60 have a higher risk of hypertension due to a decline in estrogen levels [15], [16].

Hypertension is influenced by age, sex, education, medication adherence, duration of illness, health monitoring, and comorbidities. Older age leads to lifestyle changes and vascular degeneration, increasing the risk of hypertension [17], [18]. Postmenopausal women are more vulnerable to hypertension due to decreased estrogen levels. Lower educational attainment is associated with limited knowledge regarding healthy lifestyles, thereby increasing the risk of hypertension. Adherence to antihypertensive medication is essential to control blood pressure and prevent complications. Lack of physical activity also worsens hypertension in older adults. Therefore, older adults are encouraged to exercise regularly, such as through brisk walking exercise, to help reduce blood pressure, maintain physical fitness, and improve vascular function [19], [20].

According to the blood pressure measurements based on the American Heart Association classification, the average blood pressure before brisk walking exercise was categorized as Stage 1 hypertension [21]. After brisk walking exercise, the average blood pressure was classified as prehypertension to normal. The results of this study are consistent with previous research [22], [23].

The results of the study show that brisk walking exercise significantly lowers systolic blood pressure in older adults with hypertension. These results demonstrate the effectiveness of this intervention in improving systolic blood pressure in older adults with hypertension [10], [24]. The effect size was large (r = .88), indicating that the brisk walking exercise intervention had a large effect on reducing systolic blood pressure in older adults with hypertension [25].

Systolic blood pressure represents the maximum pressure inside the arteries when the heart contracts to pump blood throughout the body. When the heart's ventricular muscles contract (systole), blood is forcefully pushed out into the aorta and arteries [26]. This force is known as systolic pressure. Normally, systolic pressure ranges from 90 to 129 mmHg [21].

The effects of systolic hypertension include an increased risk of stroke, heart failure, chronic kidney disease, and even dementia due to impaired blood flow to the brain. High systolic blood pressure forces the heart to work harder. This leads to ventricular hypertrophy and an increased risk of heart attack and congestive heart failure [27], [28]. Brisk walking exercise interventions have been shown to lower systolic blood pressure and can therefore be recommended as a complementary nursing intervention for elderly patients with hypertension, provided there are no contraindications.

Brisk walking has also been shown to be effective in lowering diastolic blood pressure in older adults with hypertension. This was demonstrated by a very large effect size (Cohen's d = 2.78). Diastolic blood pressure is the pressure inside the arteries when the heart is at rest or relaxing between two heartbeats. During this phase, the heart muscle relaxes, and the arteries deliver oxygen throughout the body while refilling the heart chambers with blood [29]. Normal diastolic blood pressure is <80–89 mmHg [21].

Diastolic blood pressure reflects arterial pressure during cardiac relaxation and is closely associated with peripheral vascular resistance. Persistent elevation of diastolic blood pressure may increase cardiac workload, promote left ventricular hypertrophy, impair organ perfusion, and accelerate vascular damage. The reduction observed in this study may be attributed to improved endothelial function, enhanced nitric oxide production, decreased sympathetic nervous system activity, and reduced peripheral vascular resistance resulting from regular aerobic exercise. Therefore, brisk walking exercise may serve as an effective non-pharmacological intervention for controlling diastolic blood pressure and reducing the risk of cardiovascular complications among older adults with hypertension [30], [31].

Brisk walking exercise can increase the release of beta-endorphins, which help reduce stress levels in hypertensive patients. During brisk walking exercise, the body releases beta-endorphins, causing individuals to feel happier and more relaxed when exercising regularly, since stress is one of the factors that can trigger elevated blood pressure [10], [32]. The results of this study have shown that brisk walking improves blood pressure in older adults with hypertension while they continue to take antihypertensive medication; therefore, brisk walking can be used as a complementary treatment intervention.

The researcher assumes that there are other factors influencing blood pressure among older adults with hypertension that were not examined in this study, such as poor adherence to a low-salt diet and unstable emotions, both of which may contribute to increased blood pressure. These factors should be considered in future studies to obtain more comprehensive results. During the study, the participants' adherence to proper brisk walking exercise techniques improved gradually. Monitoring and correction of exercise techniques were continuously carried out to ensure effectiveness and prevent injury. Brisk walking exercise had a significant effect in lowering blood pressure among older adults with hypertension because it improves circulation and vascular elasticity. The more regularly and appropriately it is performed, the greater the potential reduction in blood pressure. However, its effectiveness should be supported by a healthy lifestyle, such as regular use of antihypertensive medication, a low-salt diet, and stress management. Without these supports, the benefits of brisk walking may not be optimal. Brisk walking exercise is a non-pharmacological management strategy that is easy to perform without special equipment, safe for older adults when adjusted to physical condition, and effective in lowering blood pressure when done regularly.

Based on the results and discussion above, it can be concluded that the blood pressure of older adults before performing brisk walking exercise was in the Stage 1 hypertension category, whereas after performing brisk walking exercise, it decreased to the prehypertension normal category. Therefore, brisk walking exercise had a significant effect on blood pressure among older adults with hypertension. From this conclusion, nurses have a preventive

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role in reducing the risk of complications in patients with hypertension and may utilize brisk walking exercise as one of the non-pharmacological interventions to help control blood pressure. For future researchers, it is recommended to further develop this study by considering other factors that may influence hypertension. Future studies may also use a pretest-posttest control group design so that internal and external factors affecting hypertension can be better controlled. In addition, combining brisk walking exercise with other forms of exercise may produce more optimal results and provide sustainable benefits.

V. CONCLUSION

This study aimed to evaluate the effectiveness of brisk walking exercise as a non-pharmacological intervention for reducing systolic and diastolic blood pressure among older adults with hypertension residing in a nursing home. The findings demonstrated that a structured brisk walking exercise program performed for 20 minutes per session, six sessions over two weeks, produced significant improvements in blood pressure control. Before the intervention, the participants had a mean systolic blood pressure of 151.00 ± 9.49 mmHg, which decreased to 125.89 ± 11.68 mmHg after the intervention. Similarly, the mean diastolic blood pressure declined from 94.00 ± 7.67 mmHg to 77.67 ± 5.08 mmHg. Statistical analysis confirmed that these reductions were highly significant, with the Wilcoxon Signed-Rank Test indicating a significant decrease in systolic blood pressure ($Z = -3.726$, $p < 0.001$) and the paired-sample t-test demonstrating a significant reduction in diastolic blood pressure (mean difference = 16.33 mmHg; 95% CI: 13.40–19.25; $p < 0.001$). Moreover, the intervention produced a large effect size for systolic blood pressure ($r = 0.88$) and a very large effect size for diastolic blood pressure (Cohen's $d = 2.78$), indicating that brisk walking exercise exerted a substantial clinical effect on blood pressure reduction in this population. These findings support the incorporation of brisk walking exercise as a practical, safe, low-cost, and feasible complementary strategy alongside pharmacological therapy to improve hypertension management and reduce the risk of cardiovascular complications among institutionalized older adults. Nevertheless, the findings should be interpreted in light of several methodological limitations, including the relatively small sample size, the absence of a control group, and the short intervention period, which may limit the generalizability of the results. Future studies are therefore recommended to employ randomized controlled trial designs with larger and more diverse populations, longer follow-up periods, and comprehensive assessments of additional factors influencing blood pressure, such as dietary sodium intake, medication adherence, psychological stress, body mass index, and physical fitness. Furthermore, future research should investigate the long-term sustainability of brisk walking exercise and compare its effectiveness with other aerobic or combined exercise interventions to establish evidence-based recommendations for hypertension management among older adults.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Sherly Aldeiyana Hasan designed and developed the study, conducted data collection, and participated in data analysis and interpretation. Supriyanto contributed to the development of educational materials, supervised the implementation of the intervention, and participated in the writing and revision of the manuscript. Hepta Nur Anugrahini assisted in data analysis and interpretation and provided critical feedback on the manuscript. Endang Soelistyowati participated in the literature review, data collection, and manuscript editing. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work to ensure its integrity and accuracy.

DECLARATIONS

ETHICAL APPROVAL

This study was conducted in accordance with ethical standards and received approval from the Surabaya Health Polytechnic, Ministry of Health, with ethical clearance number EA/3203/KEPK-Poltekkes_Sby/V/2025. Informed consent was obtained from all participating older adults, and the confidentiality as well as anonymity of the participants were maintained throughout the research process. All procedures complied with ethical guidelines for research involving human subjects.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants.

COMPETING INTERESTS

The authors declare no competing interests.

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