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The Effect of Brisk Walking Exercise on Blood Pressure in Hypertensive Patients in Karanganyar Village, Sambungmacan District

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ABSTRACT

Introduction : *Hypertension is a chronic condition characterized by elevated blood pressure, specifically systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg. The condition is often referred to as the "Silent Killer" because it typically does not present with obvious symptoms, leading many individuals to remain unaware that they have hypertension. If left untreated, hypertension increases the risk of heart disease, stroke, and other cardiovascular conditions. One non-pharmacological approach to hypertension is Brisk Walking Exercise.*
Objectives : *To determine the effect of Brisk Walking Exercise on blood pressure in hypertensive patients in Karanganyar Village, Sambungmacan Subdistrict.*
Methods: : *This study used a Pre-Experimental design with a one-group pre-test post-test approach. The sample consisted of 40 respondents from a population of 450 individuals, selected using purposive sampling. The measurement tool used was a digital sphygmomanometer, and data analysis was performed using the Wilcoxon Signed Ranks-Test.*
Results: *The majority of respondents were aged 60-74 years (67.5%), the majority were female (87.5%), and the majority were farmers (57.5%). Blood pressure after the Brisk Walking Exercise intervention showed an average decrease in systole blood pressure of 24.85 mmHg (from 162.50 mmHg to 137.65 mmHg) and a decrease in diastole blood pressure of 5.7 mmHg (from 87.15 mmHg to 81.45 mmHg). There was a significant decrease in blood pressure with a z -7.772 to -7.771, p-value 0.000 (α <0.05).*
Conclusions: *Brisk Walking Exercise performed regulary three times a week for 30 minutes has been proven effective in lowering blood pressure in hypertensive patients.*
Keyword: *hypertension, blood pressure, brisk walking exercise*

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Introduction

Hypertension is a condition in which systolic blood pressure is greater than 140 mmHg and diastolic blood pressure is 90 mmHg. (Kemenkes RI, 2019.).

Hypertension is one of the non-communicable diseases that ranks high as a cause of death worldwide. This condition generally occurs due to a decrease in blood vessel elasticity that accompanies the aging process, which can cause an increase in blood pressure with age. (Nurcahyani et al. 2022.).

Based on Riskesdas data (2023), the prevalence of hypertension in Indonesia reached 34.1%, with the highest rates in Central Kalimantan (40.7%), South Kalimantan (35.8%), and West Java (34.4%), and the lowest rate in Papua (19.9%). The prevalence in Central Java reached 32.9%. (Dinas Kesehatan Provinsi Jawa Tengah, 2021). According to data from the Sragen Regency Central Statistics Agency, 40% of people over the age of 60 have hypertension, with 5,950 cases consisting of 2,821 men and 3,129 women. (Pemkab Sragen, 2022). Karanganyar Village has a population of 1,908 people aged 40-60 years old. (Puskesmas

Sambungmacan 1, 2019). Hypertension is a major risk factor for stroke, diabetes mellitus, and cancer, which can lead to death if not treated properly. (Suarayasa et al., 2023)

Karanganyar Village, Sambungmacan Subdistrict has a large elderly population, and most of them are unaware that non-pharmacological interventions such as Brisk Walking Exercise are effective in lowering blood pressure in hypertensive patients. (Puskesmas Sambungmacan 1, 2024).

Hypertension management can be approached in two ways: pharmacological therapy, which involves administering medication starting at a low dose and gradually increasing it, and non-pharmacological therapy, one example of which is *Brisk Walking Exercise.* This physical activity is recommended for 30 minutes, 3 times a week. (Kemenkes RI, 2020). Physical exercise has been proven by several studies showing that regular physical activity can lower blood pressure in people with hypertension. (Ratna Sari & Palupi, 2024).

American Heart Association (AHA), stating that aerobic activities such as jogging, cycling, and swimming are part of effective non-pharmacological treatment for controlling blood pressure (Gibbs et al, 2021). Brisk walking is associated with increased vitamin D levels, improved blood sugar levels, and decreased systolic and diastolic blood pressure. (Cigarroa et al, 2023).

Based on guidelines from *European Society of Cardiology* (ESC), Hypertensive patients are advised to do moderate-intensity aerobic exercise such as brisk walking, with a minimum target of 3,000 steps per day for 30 minutes, 5-7 times per week. (Balbrinker et al., 2018).

Brisk walking is an inexpensive activity that can be done by older adults in the community. An 8-week home-based brisk walking program did not show an increase in blood pressure or saliva biomarkers, but was able to maintain parameters. Brisk walking accompanied by music has been proven to be more effective in reducing fat mass, increasing fat-free mass, and improving heart rate recovery. Thus, brisk walking with music has the potential to prevent cardiovascular disorders in the elderly, although further research with longer durations and larger samples is still needed. (Jinakote et al., 2024)

Research conducted by Nurbaiti Siti (2020) stated that administering Brisk Walking Exercise intervention for 2 weeks, 20 minutes per session, to 2 elderly hypertensive respondents showed positive results. According to research Nur Aziz Muslim (2023), which found a decrease in blood pressure in 65 elderly respondents after a 3-week Brisk Walking Exercise intervention, each session lasting 30 minutes, 3 times per week. Research conducted by Anggraini Dian (2022) The results of the *Brisk Walking Exercise* intervention, which was conducted four times a week for 30 minutes to 15 respondents over three weeks, showed that there was an effect on lowering blood pressure in elderly people with hypertension.

Research conducted by Harun et al., (2022) with the title "The Effect of 12 Weeks of Brisk Walking Exercise on Blood Pressure and VO2max in Overweight and Obese Female Students in Indonesia" found that the BW-60 and BW-40 groups effectively increased VO2max, but there were no significant changes in blood pressure. However, further research is needed to optimize the exercise dose for health benefits, with longer and more intense intervention durations, as well as various types of exercise.

Brisk Walking Exercise has been proven effective in lowering both systolic and diastolic blood pressure in individuals with hypertension and in the general population. Research by (Malem, 2024) through meta-analysis concluded that it can lower systolic blood pressure by -0.13. These results support the findings by The Cochrane Collaboration (2023) which shows that regular walking can lower systolic blood pressure by -4.11 mmHg and diastolic blood pressure by -1.79 mmHg. Meanwhile, research He et al., (2021) in China showed that there is a dose-response relationship between the number of daily walking steps and a decrease in systolic blood pressure, where an increase in the number of steps can lower systolic blood pressure by up to 6.22 mmHg. These findings confirm that brisk walking can be an effective, inexpensive, and easy-to-implement non-pharmacological intervention in the control of high blood pressure.

Based on this background, this study aims to determine the effect of brisk walking exercise on blood pressure in elderly people with hypertension in Karanganyar Village, Sambungmacan District.

Methods

This study used a pre-experimental design with a one-group pre-test-post-test approach. The design of this study aimed to determine the effect of brisk walking exercise on elderly patients with hypertension.

This research has passed the ethical approval from the Research Ethics Committee of RSUD Dr. Moewardi Surakarta and is declared to comply with the principles of research ethics according to applicable standars (number : 686/III/HREC/2025).

Systematically, the research design is described in the following table :

Table 1 Research Design

Pre-Test	Intervensi	*Post-Test*
O1	X	O2

Description :

O1 : *Pre-test* (before *Brisk Walking Exercise*)

X : Treatment in the *Brisk Walking Exercise* intervention group

O2 : *Post-test* (after dilakukan *Brisk Walking Exercise*)

Researchers determine the size of the population and characteristics to be studied and draw conclusions. (Nur Hikmatul Auliya et al., 2020.)

The results of the data collected using the Slovin formula were obtained from 40 respondents out of a total population of 450 hypertensive patients.

The sampling technique used the Non-Probability Sampling method with a Purposive Sampling approach to determine the sample to be used in the study. (Nur Hikmatul Auliya et al. 2020.)

With the following inclusion criteria: patients aged 60-74 years old, patients willing to be respondents and willing to sign informed consent when collecting data in the study.

Data collection was conducted in two stages, namely pre-test and post-test, using a *digital sphygmomanometer* and observation sheets to measure patients' blood pressure before and after the *Brisk Walking Exercise* intervention. (Nur Hikmatul Auliya et al., 2020.)

The intervention consisted of brisk walking exercise conducted nine times for 30 minutes over three weeks. Researchers recorded patients' blood pressure before and after *Brisk Walking Exercise* using a *digital sphygmomanometer* and observation sheets during treatment.

3.1 Sample Characteristics

This research was conducted during May 2025 with a sample size of 40 respondents.

Data analysis is a technique that discusses the process of collecting data and information that has been obtained.

Data analysis techniques used to describe the distribution of Brisk Walking Exercise data before and after the intervention, such as mean, median, and standard deviation values.

For inferential analysis, the data was first tested for normal distribution using the Shapiro Wilk-Test. If the data did not show a normal distribution, the Wilcoxon Signed Ranks-Test was used as the appropriate statistical analysis method. The analysis was performed at a significance level of 0.05 using SPSS version26.

Result

Table 2 Frequency Distribution of Respondents

Variable	Frequency	Presentase (%)
Age		
45-59 year	9	22,5
60-74 year	27	67,5
75-90 year	4	10,0
Total	40	100,0
Gender		
Male	5	12,5
Female	35	87,5
Total	40	100,0
Occupation		
Housewife	16	40,0
Farmers	23	57,5
Private Sector	1	2,5
Total	40	100,0

Table 3 Blood Pressure Measurements Before and After Intervention

		Pre-Test			Post-Test		
		N	Mean	SD	N	Mean	SD
Day 1	Sistolik	40	162,50	15,189	40	146,63	13,976
	Diastolik	40	87,15	10,986	40	82,03	8,649
Day 2	Sistolik	40	155,23	13,321	40	142,78	9,736
	Diastolik	40	83.90	9,432	40	81,20	7,643
Day 3	Sistolik	40	150,67	12,589	40	140,25	13,188
	Diastolik	40	85,08	10,073	40	80,85	7,947
Day 4	Sistolik	40	150,82	9,956	40	138,95	10,631
	Diastolik	40	81,93	7,392	40	76,52	6,013
Day 5	Sistolik	40	150,28	7,958	40	137,65	8,702
	Diastolik	40	80,00	6,034	40	76,82	4,893
Day 6	Sistolik	40	146,92	7,717	40	135,15	8,381
	Diastolik	40	83,30	5,928	40	78,55	5,616
Day 7	Sistolik	40	152,27	6,805	40	140,05	9,112
	Diastolik	40	81,88	6,386	40	78,38	6,196
Day 8	Sistolik	40	149,52	5,697	40	138,97	6,439
	Diastolik	40	81,83	6,131	40	82,00	4,540
Day 9	Sistolik	40	147,20	5,441	40	137,65	6,989
	Diastolik	40	83,83	6,774	40	81,45	6,756

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Table 4 Wilcoxon Signed Ranks Test Results

Variabel	Z	P value
Before intervention Systolic Diastolic (*Pre-Test)*	-7.772	0.000
After intervention Systolic Diastolic (*Post-test*)	-7.771	0.000

Discussion

Based on Table 2, the characteristics of respondents in Karanganyar Village, Sambungmacan Subdistrict, show that the majority are aged 60-74 years old, totaling 27 (67.5%), female, totaling 35 (87.5%), and the majority work as farmers, totaling 23 (57.5%).

Based on Table 2, the results show that the majority of hypertensive patients were aged 60-74 years (27 or 67.5%), followed by those aged 45-59 years (9 or 22.5%). (Astuti et al, 2020).

The results of this study are supported by the American Heart Association (2020), which states that approximately 70% of people aged 60 years and above worldwide have hypertension. This theory is supported by (Anggraini et al., 2022.) which explains that due to the accumulation of collagen in the muscle layer with age, the walls of the arteries thicken. This can cause the blood vessels to become narrow and stiff, increasing blood pressure. The function of important organs such as the kidneys and liver, which are responsible for regulating blood volume and pressure, can decline due to aging. (Touyz et al., 2015).

One of the most important risk factors for people with hypertension is age. People aged 60 and above are more susceptible to high blood pressure than those under 60. This is due to natural changes in the body that cause the heart to work harder and the heart muscles to contract more strongly, resulting in greater blood flow through the arteries. (Arif Gunawan, 2020)

Based on Table 2, the results show that the majority of hypertensive patients are women (32 or 87.5%) and men (5 or 12.5%). In a study conducted by Novitaningtyas (2014), elderly women (43.7%) were more likely to have hypertension than men (25%). This shows that in postmenopausal women, the risk of hypertension increases sharply, especially in those aged 60 years and above..

This theory is supported by Munarwah (2017) states that before menopause, women tend to have lower blood pressure than men. However, after menopause, women's blood pressure generally increases and can even be higher than before menopause. This increase is related to hormonal changes, particularly a decrease in estrogen levels. Estrogen is known to have a protective effect on the cardiovascular system, including by increasing High Density Lipoprotein (HDL) levels, which helps prevent atherosclerosis. After menopause, the production and function of estrogen gradually decrease, causing this protection to disappear. This process causes older women to have a higher risk of hypertension than men of the same age.

Changes in blood pressure can also be influenced by other mechanisms, such as the long-term vascular effects of hypertension during pregnancy, interactions between the renin-angiotensin-aldosterone system and reproductive hormones, and psychosocial factors related to gender, such as socioeconomic limitations. (Connelly, Currie, & Delles, 2022).

Studies show that the renin-angiotensin-aldosterone system (RAAS) regulates sodium balance, extracellular fluid volume, renal vascular resistance, and systemic vascular resistance. (Burrello et al., 2022).

Based on Table 2, the majority of respondents with hypertension worked as farmers, numbering 23 (57.5%). Housewives ranked second, numbering 16 (40.0%). Meanwhile, only 1 person (2.5%) worked in the private sector. Occupation is one of the factors that can affect a person's blood pressure because it is related to stress levels, physical activity patterns, and lifestyle. Occupations that are physically demanding or too passive, such as sitting for long periods of time, can increase the risk of hypertension. In addition, stress due to work pressure and lack of rest also contributes to increased sympathetic nervous system activity, which leads to an increase in blood pressure. (Gina Octavianie, 2022).

The results of research conducted by Rakhmi Aisyah El Mawaddah (2022) It can be shown that farming work can affect blood pressure because strenuous and continuous physical activity under extreme weather conditions has the potential to cause chronic fatigue and physiological stress. Farmers who work more than eight hours per day have a greater risk of high blood pressure compared to farmers who work less than six hours per day. This is due to heavy physical workloads, non-ergonomic body positions when hoeing, and insufficient rest time

The results of this study are in line with research conducted by Nur Aziz Muslim (2023) states that physical activity is physical movement performed by skeletal muscles that requires energy to occur. Such activity can increase heart rate and blood pressure, so it is recommended that individuals take a 5–10 minute break after exercising. The results of this study are in line with research conducted by Miyashita (2008) Comparing the cumulative effects of 10 sessions of brisk walking exercise for 3 minutes with 1 session of brisk walking exercise for 30 minutes on postprandial plasma triacylglycerol concentration and resting blood pressure. On day 2, the area under the plasma triacylglycerol concentration-time curve was 16% lower in the group with brisk walking intervention, both accumulated and continuous, compared to the control group ($\bar{x}$ ± SEM: 9.98 ± 0.67; 9.99 ± 0.76; and 11.90 ± 1.02 mmol·7h/L; P = 0.005, one-way ANOVA). In addition, resting systolic blood pressure also showed a decrease of approximately 6–7% throughout the second day in the accumulated and sustained brisk walking groups compared to the control group (109 ± 1; 110 ± 1; and 117 ± 2 mmHg; P < 0.0005).

The results of this study are supported by Tully (2005) Assessing the impact of brisk walking exercise for 30 minutes at one's own pace and without supervision, 5 days per week, on the health and fitness of people aged 50-65 years. A randomized control trial with an intervention group (21) was asked to perform brisk walking for 30 minutes, 5 times a week for 12 weeks. Participants were allowed to complete the 30-minute duration in one full session or divide it into several short sessions with a minimum duration of 10 minutes. They were also asked to record the duration of walking and the number of steps taken in each session using a pedometer. Meanwhile, the control group (10) continued their daily habits without making any changes to their activity or diet patterns.

The results of this study are in line with Anggraeni (2025) The study used a quasi-experimental pre-test post-test control group design involving 28 respondents divided into intervention and control groups, each consisting of 14 people. The results showed a decrease in the average systolic and diastolic blood pressure in the group that received the intervention accompanied by antihypertensive drugs compared to the control group that only took medication. Statistical tests produced a p-value of 0.000 (α<0.05), which means that brisk walking has a significant effect on lowering the blood pressure of hypertensive patients at the Gemaharjo Health Center.

Brisk Walking Exercise is a type of moderate to high intensity aerobic exercise with short duration and low intensity. Several studies have proven that it can lower blood pressure in hypertensive patients and can be used as a non-pharmacological therapy. This exercise is a

substitute for pharmacological therapy, relatively inexpensive, safe, and does not require any equipment. It can be done independently or in groups in the morning.

Univariate Analysis

Using univariate analysis, the variables of pre-test and post-test measurement results were identified through the *Brisk Walking Exercise* intervention.

Based on Table 3, on the first day, the average systolic blood pressure decreased from 16.50 mmHg to 146.63 mmHg, and the average diastolic blood pressure decreased from 87.15 mmHg to 82.03 mmHg. On the ninth day, the average systolic blood pressure decreased from 147.20 mmHg to 137.65 mmHg, and the average diastolic blood pressure decreased from 87.15 mmHg to 82.03 mmHg.

This theory is also supported by Hapsari (2021) which states that the decrease in blood pressure after *Brisk Walking Exercise* occurs because this activity can improve cardiovascular system function and reduce peripheral blood vessel resistance. During exercise, muscles work more actively and require more oxygen, causing the heart to pump blood faster and blood vessels to undergo vasodilation. This condition can improve blood flow and reduce pressure on the artery walls. In addition, *Brisk Walking Exercise* can stimulate the parasympathetic nerves and suppress the sympathetic nerves, which are responsible for increasing blood pressure during stress or strenuous physical activity. Regular *Brisk Walking Exercise* also helps lower stress hormone levels such as adrenaline and cortisol, both of which have the potential to constrict blood vessels. Blood pressure becomes more stable as the body adapts to this exercise and the heart becomes more efficient.

Bivariate Analysis

This study used the *Wilcoxon Signed Ranks-Test* to analyze the effect of brisk walking exercise because the data was not normally distributed. The purpose of this method was to determine the difference in the scores of the effect of *Brisk Walking Exercise* before and after the intervention.

Based on Table 4 above, using the Wilcoxon Signed Ranks-Test method, the results show that Ho is rejected and Ha is accepted with a p-value of 0.000 or <0.05, indicating that brisk walking exercise has an effect on lowering blood pressure in elderly patients with hypertension.

Brisk Walking Exercise is an aerobic activity in the form of fast walking that stimulates muscle contraction, breaks down glycogen as an energy source, increases heart rate and tissue oxygenation, and reduces plaque formation through increased utilization of fat and glucose. (Rachmatullah, 2022).

Brisk Walking Exercise has been shown to reduce mortality and morbidity in patients with hypertension through calorie burning, weight maintenance, relaxation, and increased beta-endorphin levels to reduce stress. *Brisk Walking Exercise* is also considered safe for patients of all ages with hypertension. (Kowalski, 2015)

Brisk Walking Exercise it has been proven to be effective in significantly lowering systolic and diastolic blood pressure. Some individuals may experience mild side effects such as excessive fatigue, dizziness, or muscle pain if the exercise is performed without warming up. (Malem et al., 2024)

This study is in line with Andrianti (2021) Blood pressure measurements were taken before and after participants underwent the *Brisk Walking Exercise* program. This exercise was carried out by walking briskly for 20–30 minutes at an average speed of 4–6 km/hour. For participants who were unable to achieve this duration, the exercise could be increased gradually. *Brisk Walking* was carried out for a minimum of 15 minutes, as this is the time frame

in which the aerobic heart rate is generally achieved. The exercise was given daily with one day of rest on the 7th day, or at least three times a week for two months. Meanwhile, the control group only received antihypertensive drug therapy and blood pressure checks were carried out simultaneously with the intervention group. Data analysis used a paired t-test with a 95% confidence level ($\alpha < 0.05$), so that if the ρ value was ≤ 0.05, a significant effect was declared.

Although research shows a significant decrease in blood pressure, respondents may still experience other symptoms of hypertension, such as dizziness, palpitations, and sleep disturbances. Therefore, the application of *Brisk Walking Exercise* in hypertensive patients should be combined with other therapies, such as pharmacotherapy, a low-salt and low-cholesterol diet, smoking cessation, and stress management. (Siauta, Embuai, & Tuasikal 2020)

Conclusions and Recommendations

The majority of respondents with hypertension in Karanganyar Village, Sambungmacan Subdistrict, were aged 60-74 years, totaling 27 people (67.5%). Based on gender, the majority were women, totaling 35 people (87.5%). The majority of respondents worked as farmers, totaling 23 people (57.5%).

With a p-value of 0.000 or <0.05, there was a significant effect on blood pressure before and after the *Brisk Walking Exercise.* The average systolic blood pressure before Brisk Walking Exercise was 162.50 mmHg and diastolic 87.15 mmHg, and the average systolic blood pressure after *Brisk Walking Exercise* was 137.65 mmHg and diastolic 81.45 mmHg. In addition, the Wilcoxon Signed Ranks-Test was used to analyze the data.

Brisk Walking Exercise can significantly lower blood pressure in elderly people with hypertension, as demonstrated by the best available evidence. Regular brisk walking exercise can reduce the risk of dependence on antihypertensive drugs. However, brisk walking is recommended as a preventive measure rather than monotherapy for hypertension. The results show that in order to improve physical health, including heart health, community-based physical activity is needed in the future.

The results of this study are expected to serve as a source of information and knowledge regarding the benefits of brisk walking exercise as an alternative method for lowering blood pressure that does not require special equipment and can be done individually or in groups.

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