THE EFFECT OF WALKING EXERCISE ON REDUCING BLOOD PRESSURE IN INDIVIDUALS WITH HYPERTENSION

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ABSTRACT

Regular 10-minute brisk walking significantly reduces blood pressure in individuals with hypertension. Unmanaged high blood pressure can lead to organ damage and health complications. Worldwide, around 1.13 billion people have hypertension, expected to reach 1.5 billion by 2025, causing an estimated 9.4 million deaths annually. This quasi-experimental study involved 26 participants from UIN KPKM Syarif Hidayatullah Reni Jaya health services coverage area, with 13 in the intervention and control groups each. Blood pressure was measured using a digital sphygmomanometer before and after the intervention, analyzed using t-tests. The intervention group showed significant reductions in systolic (7.3 mmHg) and diastolic (3.77 mmHg) blood pressure, with p-values of 0.0028 and 0.038, respectively. Furthermore, a significant difference was observed between the intervention and control groups, with p-values of 0.0024 and 0.043 for systolic and diastolic blood pressure, respectively. In conclusion, brisk walking for 10 minutes is associated with decreased blood pressure, emphasizing its importance in managing hypertension non-pharmacologically.

Keywords*: blood pressure; hypertension; walking exercise*

INTRODUCTION

This study aims to provide an overview of walking exercise and its impact on hypertension. Hypertension is a condition that often doesn't cause any real symptoms, but if it's not handled properly for a long time, it can cause damage to the function of organs in the body, such as the heart, kidneys, brain, eyes, and other organs.

Data from the World Health Organization (WHO) in 2019 shows that around 1.13 billion people worldwide suffer from hypertension, meaning that 1 out of 3 people worldwide are diagnosed with hypertension. The number of people with hypertension continues to increase every year. WHO estimates that by 2025 there will be 1.5 billion people suffering from hypertension, and an estimated 9.4 million people will die yearly from hypertension and its complications.

Blood pressure is regulated by two factors, namely blood flow and peripheral vascular resistance. Blood flow is determined by cardiac output (strength, speed, rhythm of heartbeat, blood volume). Resistance to mainstream flow is affected by the diameter of the vessel and, to a lesser extent, by the viscosity of the blood. Increased peripheral resistance due to narrowed arterioles is the most common characteristic of hypertension. Two mechanisms can control the narrowing of peripheral arterioles, each with several components, namely sympathetic nervous system activity (autonomic regulation) and activation of the renin-angiotensin system. Norepinephrine is released in the sympathetic nervous system in response to psychogenic stress or baroreceptor activity. The narrowing of the blood vessels increases peripheral resistance. At the same time, epinephrine is secreted by the adrenal medulla, resulting in an increase in the force of cardiac contraction, an increase in cardiac output, and vasoconstriction.

With prolonged hypertension, the elastic tissue in the arterioles is replaced by fibrous collagenous tissue. The thickened arteriolar walls become less flexible, becoming even greater resistance to blood flow. This process leads to decreased tissue perfusion, especially in the target organs of high blood pressure, namely the heart, kidneys, and brain.

Within the renin–angiotensin system, vasoconstriction causes decreased blood flow to the kidneys. Whenever blood flow to the kidney is reduced, renin is secreted, and angiotensin is formed, causing vasoconstriction in the renal system and an increase in total peripheral blood flow. Angiotensin also stimulates aldosterone secretion, which increases sodium and water retention by the renal tubules, causing an increase in intravascular volume. All of these factors can increase blood pressure (Goodman and Kenda 2015).

According to Nuraini (2015), complications that occur in hypertension, from moderate to severe, include stroke is a form of damage to the target organ in the brain caused by hypertension. Atherosclerosis, found in several brain arteries, makes the arteries weaker so that it is possible to increase the formation of aneurysms. Encephalopathy may also occur, especially in malignant hypertension or hypertension with rapid onset. The high pressure on the disorder causes an increase in capillary pressure, thus pushing fluid into the interstitial space throughout the central nervous system. These things can cause the surrounding neurons to collapse, and coma and even death occur.

Hypertension can cause heart failure, a condition in which the heart can no longer pump the blood the body needs due to damage to the heart muscle or the heart's electrical system. Increased blood pressure in the blood vessels causes the heart to work harder to pump blood. If blood pressure is left uncontrolled, it can cause heart attacks, heart enlargement, and heart failure.

In the kidney, it can lead to kidney failure caused by long-standing complications of hypertension and acute processes such as malignant hypertension. Chronic kidney disease can occur due to progressive damage due to high pressure in the capillaries of the kidneys and glomeruli. Damage to the glomerulus will cause blood to flow to the kidney's functional units, disrupting the nephrons and leading to hypoxia and kidney death. Damage to the glomerular membrane will also cause the protein to come out through the urine, so edema is often found due to reduced plasma colloid osmotic pressure.

Walking exercise is a form of aerobic exercise that utilizes energy in the muscles by using an exercise program. The exercise depends on motion with sufficient frequency, intensity, and time to obtain benefits in aerobic exercise. An important component in prescribing aerobic exercise is continuous and includes FITT (Frequency, Intensity, Type, and Time). Regular aerobic exercise makes blood flow smooth and speeds up the removal of metabolic waste substances so that recovery occurs quickly. (Carolyn & Colby, 2018)

In this context, brisk walking exercises can be used in physiotherapy. Brisk walking is a form of aerobic exercise. Regular 10-minute brisk walking can reduce blood pressure by decreasing vascular resistance through vasodilation and increasing the diameter in the lumen by lowering the production of endothelial-1, a vasoconstrictor, and by increasing the production of nitric oxide, a vasodilator.

METHOD

This study used a pre-post quasi-experimental design with a control group. Samples were taken using the purposive sampling method, with a total sample of 26 people in the KPKM UIN Syarif Hidayatullah Reni Jaya health service coverage area, which was divided into 13 people in the intervention group who were given the 10-minute walk intervention and 13 people in the control group given education. Blood pressure check data was taken before and after the intervention using a digital sphygmomanometer. Data analysis was performed using dependent and independent t-tests.

RESULTS AND DISCUSSION

The results of the analysis showed that there were significant differences in blood pressure before and after giving brisk walking training in the intervention group, with an average decrease in systolic blood pressure of 7.3 mmHg and an average reduction in diastolic blood pressure of 3.77

mmHg, with a value p for systolic blood pressure = 0.0028 and diastolic blood pressure = 0.038. There were significant differences in blood pressure before and after between the intervention and control groups, with p-values for systolic blood pressure = 0.0024 and diastolic blood pressure = 0.043. It can be concluded that there is a significant relationship between brisk walking for 10 minutes regularly and a decrease in blood pressure in individuals with hypertension.

The results and discussion section is a unit containing an explanation of the results of the analysis related to the objectives. Each research result is directly discussed. The discussion contains the meaning of research results which include facts, theories and opinions. Tables, pictures or illustrations are written according to the serial number of appearance in the text and given a short title (title of the table or picture is 12 pt), while the contents of the table are 11 pt; long exposure to results and discussion of 50-60% of articles.

Table 1. Description of Subjects at the KPKM UIN Syarif Hidayatullah South Tangerang in 2022

Characteristics		Intervention Group	Control Group
Gender			
-	Male	2 (15,4%)	2 (15,4%)
-	Female	11 (84,6%)	11 (84,6%)
Age			
-	Mean	51,77	52,18
-	Median	52	54
-	Standar deviasi	5,833	6,162
-	Minimum	41	43
-	Maximum	59	60

Based on Table 1 above, it can be seen that most of the respondents in the intervention group were female, namely 11 people (84.6%), while in the control group, most of the respondents were also female, as many as 11 people (84.6%). And by age in the intervention group, the youngest was 41 years, and the oldest was 59, with an average age of 51.77. Whereas in the control group, the youngest was 43 years, the oldest was 60, with an average age of 52.18.

Table 2. Distribution of Systolic and Diastolic Blood Pressure Before and After Walking Exercise Intervention Group

Blood pressure intervention group	Before	After
Sistolic		
Mean ± SD	153,38 ± 23,107	146,08 ± 19,577
Median	148,000	144,00
Minimum	111	110

Maximum	194	189
Diastolic		
Mean ± SD	90,23 ± 14,805	86,46 ± 11,865
Median	88,000	85,00
Minimum	68	65
Maximum	115	104

Based on Table 2 above, it can be seen that of the 13 respondents who were given the walking exercise intervention, the average systolic blood pressure before the walking exercise intervention was 153.38 mmHg with a standard deviation of 23.107, while the median was 148.00 mmHg. The minimum and maximum values before the intervention were 111 – 194 mmHg. The results of measuring the average diastolic blood pressure before the Walking Exercise intervention was 90.23 mmHg with a standard deviation of 14.805, while the median was 88.00 mmHg. The minimum and maximum values before the intervention were 68 – 115 mmHg.

For the measurement results after the Walking Exercise intervention, the average systolic blood pressure was 146.08 mmHg, with a standard deviation of 19.577 and a median of 144.00 mmHg. The minimum and maximum values after the intervention are 110 – 189 mmHg. The results of measuring the average diastolic blood pressure after the Walking Exercise intervention was 86.46 mmHg with a standard deviation of 11.865, while the median was 85.00 mmHg. The minimum and maximum values before the intervention were 65 – 104 mmHg.

Table 3. Distribution of Systolic and Diastolic Blood Pressure Before and After in the Control Group

Blood Pressure Control Group	**Before**	**After**
Sistolic		
Mean ± SD	146,23 ± 16,953	151,00 ± 18,092
Median	141,000	149,00
Minimum	120	125
Maximum	179	193
Diastolic		
Mean ± SD	88,85 ± 8,071	89,46 ± 8,875
Median	91,000	90,00
Minimum	77	77
Maximum	100	110

Table 3 shows that of the 13 control group respondents who were given education, the average systolic blood pressure was 146.23 mmHg with a standard deviation of 16.953 mmHg, while the median was 141.00 mmHg. The minimum and maximum values before the intervention were

120 – 179 mmHg. The results of measuring the average diastolic blood pressure before physiotherapy education were 88.85 mmHg with a standard deviation of 8.071, while the median was 91.00 mmHg. The minimum and maximum values before the intervention were 77 – 100 mmHg.

For the measurements after education, the average systolic blood pressure was 151.00 mmHg, with a standard deviation of 18.092 and a median of 149.00 mmHg. The minimum and maximum values after the intervention are 125 – 193 mmHg. The results of measuring the average diastolic blood pressure after the provision of physiotherapy education were 89.46 mmHg with a standard deviation of 8.875, while the median was 90.00 mmHg. The minimum and maximum values before the intervention were 77 – 110 mmHg.

Table 4. The difference in the average difference
in mean systolic and diastolic blood pressure between the intervention group and the control group

Group	*Mean*	SD	*SE Mean*	*p value*	n
Sistolic					
Intervention	7,308	10,570	2,932	0,024	13
Control	4,769	14,572	4,042		13
Diastolic					
Intervention	3,769	5,847	1,621	0,043	13
Control	0,615	4,519	1,253		13

Based on the table above, the mean systolic blood pressure difference before and after the intervention in the intervention group was 7.308, with a standard deviation of 10.570. In the control group, it was 4.769, with a standard deviation of 14.572. The statistical test results obtained a value of p = 0.024, meaning p <alpha (0.05), so it can be concluded that there was a significant difference in the average systolic blood pressure between the intervention group and the control group.

The mean difference in diastolic blood pressure before and after the intervention in the intervention group was 3.769, with a standard deviation 5.847. In the control group, it was 0.615, with a standard deviation of 4.519. The statistical test results obtained a value of p = 0.043, meaning p <alpha (0.05), so it can be concluded that there was a significant difference in the average diastolic blood pressure between the intervention group and the control group.

CONCLUSION

There was a significant difference in the mean systolic blood pressure before and after in the intervention group, 7.308, and the control group was 4.769, with a p = 0.024, meaning p <alpha (0.05). There was a significant difference in the mean diastolic blood pressure before and after in the intervention group, 3.769, and the control group was 0.615, with a value of p = 0.043, meaning p <alpha (0.05). Walking exercise has a positive effect on reducing blood pressure in individuals with hypertension. In this study, walking exercise effectively reduced blood pressure in individuals with hypertension. Walking consistently and regularly provides long-term benefits in managing blood pressure in hypertensive individuals. Regular walking exercises help keep your blood pressure within the normal range or significantly lower. Walking exercise is a relatively safe and easily accessible exercise method for individuals with hypertension. This can be an effective and affordable option for managing hypertension without dependence on medication. Although walking exercise is beneficial in lowering blood pressure in hypertensive individuals, it is important to consult a physician or physiotherapist before starting or changing an exercise program. Each individual has different conditions and needs, and proper supervision is necessary to adapt exercise to individual health conditions. These conclusions suggest that walking exercise has the potential to be an effective non-pharmacological intervention in managing blood pressure in hypertensive individuals, with long-term benefits in improving cardiovascular health.

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