

Hypertension exercise as an intervention to reduce blood pressure among the elderly in Kalipetir Lor

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Abstract

Hypertension is a significant health issue in the elderly, as it elevates the likelihood of cardiovascular complications. Management efforts are not only limited to pharmacological therapy but also include non-pharmacological interventions such as hypertension exercise. This study aimed to assess how hypertension exercise influences blood pressure reduction in older adults at Padukuhan Kalipetir Lor. A pre-experimental design with a one-group pretest–posttest format was implemented in this study. The sample consisted of 18 respondents selected via total sampling. Blood pressure levels were recorded before and after the intervention and evaluated using the paired t-test. The findings revealed that the mean systolic blood pressure decreased from 157.17 mmHg to 155.28 mmHg; however, the change was not statistically significant ($p = 0.427$). In contrast, the mean diastolic blood pressure significantly decreased from 92.39 mmHg to 89.22 mmHg ($p = 0.010$). The study's outcomes highlight that engaging in hypertension-specific exercise can substantially lower diastolic blood pressure among older adults and can be recommended as a non-pharmacological intervention for hypertension management if performed regularly and continuously.

Keywords: hypertension; hypertension exercise; blood pressure; elderly

1. Introduction

Hypertension, commonly called the silent killer, refers to a sustained increase in blood pressure with systolic levels ≥ 140 mmHg and/or diastolic levels ≥ 90 mmHg. Despite the absence of clear symptoms, it is associated with serious health risks, including cerebrovascular accidents, renal impairment, and coronary heart disease. WHO (2017) estimates that hypertension contributes to 7.5 million deaths annually, equivalent to 12.8% of total deaths worldwide, with a prevalence of 22.1% among adults. The global burden of this condition is anticipated to increase further, potentially affecting over 1.5 billion people by 2025 (Koresponden et al., 2019).

The prevalence of hypertension in Indonesia remains a significant public health concern. Findings from Riskesdas (2018) reported that 34.1% of individuals aged 18 years and older were affected, reflecting a notable increase compared to the 25.8% recorded in 2013. The elderly constitute a high-risk group since physiological changes associated with aging lead to diminished arterial flexibility and increased peripheral vascular resistance (Putu Sumartini et al., 2019). Uncontrolled hypertension can

reduce productivity, increase the burden of health financing, and affect the quality of life of sufferers (Arisandi et al., 2022)

Risk factors for hypertension can be differentiated into internal factors such as age, gender, and genetics, as well as external factors such as covering high-salt consumption, limited physical activity, obesity, smoking practices, intake of alcoholic beverages, and exposure to stress (Putu Sumartini et al., 2019). Other research confirms that lifestyle changes, especially healthy diets and increased physical activity, are one of the important strategies to control hypertension in the community (Efliani et al., 2022)

Hypertension control encompasses medical (pharmacological) and lifestyle-based (non-pharmacological) therapeutic approaches. Nonpharmacological interventions are an effective option because they are safer, cheaper, and easier to run by the community. One form of intervention that has been proven to lower blood pressure is hypertension exercises. This exercise consists of simple movements with light to moderate intensity that are safe for the elderly, able to improve the elasticity of blood vessels, reduce peripheral resistance, and improve blood circulation (Putu Sumartini et al., 2019)

In addition to lowering blood pressure, hypertension exercise also provides psychological benefits in the form of stress reduction and social benefits by increasing community interaction and participation (Putu Sumartini et al., 2019). Research shows that this activity is able to increase motivation, adherence to a healthy lifestyle, and quality of life of people with hypertension. Thus, hypertension exercise can be an effective preventive and promotive strategy in managing hypertension, both at the individual and community levels (Efliani et al., 2022)

2. Literature review

Among older adults, hypertension is recognized as one of the most common chronic illnesses. Clinically, it is identified by a sustained increase in systolic pressure of at least 140 mmHg and/or diastolic pressure of 90 mmHg or higher. This condition is considered the leading contributor to the development of cardiovascular diseases. Frequently labeled as the “silent killer,” hypertension tends to progress without distinct clinical manifestations but can culminate in serious health problems, such as cerebrovascular accidents, kidney dysfunction, and coronary artery disease (Luliana & Sari, n.d.)

Hypertension arises from a combination of factors that can be divided into two groups. The first group consists of irreversible factors, such as age, gender, and hereditary influences. The second group comprises modifiable risk factors, including dietary patterns rich in salt, excess body weight, insufficient physical activity, exposure to stress, tobacco use, and alcohol intake (Saco-Ledo et al., 2022). In the elderly, degenerative processes such as decreased elasticity of blood vessels play a major role in increasing peripheral resistance so that blood pressure tends to increase with age (Luliana & Sari, n.d.)

The impact of hypertension on the elderly is very large on the quality of life. Persistent hypertension that is not adequately managed may give rise to life-threatening complications, including coronary heart disorders, myocardial failure, cerebrovascular stroke, and progressive renal impairment (Sari et al., 2023). According to WHO data, hypertension contributes to more than 13% of global deaths so its treatment is a public health priority (Palmeira et al., 2021)

One of the recommended non-pharmacological interventions in the control of hypertension is physical exercise or hypertension exercises. Hypertension exercises are a series of simple, rhythmic, and systematic movements aimed at lowering blood pressure naturally and safely for the elderly. This exercise includes moderate-intensity physical activity, with the aim of improving cardiovascular fitness while helping to maintain the elasticity of blood vessels (Luliana & Sari, n.d.).

Extensive research highlights the beneficial role of physical exercise in blood pressure reduction. Empirical findings indicate that aerobic training can lower systolic blood pressure by approximately 7–10 mmHg and diastolic by 5–7 mmHg in patients with essential hypertension. Moreover, additional evidence suggests that consistent exercise over an 8–12 week period may decrease 24-hour ambulatory blood pressure by 9–11 mmHg in individuals diagnosed with resistant hypertension (Wen & Wang, 2017).

Beyond aerobic activity, alternative exercise modalities such as isometric handgrip training (IHT) have also demonstrated efficacy in reducing blood pressure. Evidence from a study revealed that a 12-week IHT program significantly decreased systolic blood pressure among hypertensive patients in primary care, although no substantial effects were observed on diastolic or ambulatory blood pressure [8]. Supporting evidence from Indonesia further confirms these benefits, where Sari et al. (2023) found that Maumere exercise—a rhythmic, culturally rooted activity—led to a reduction of 43.5% in systolic and 48.7% in diastolic blood pressure following a four-week intervention. The mechanisms underlying these benefits include decreased sympathetic nerve activity, increased parasympathetic activity, release of endorphins, and vascular vasodilation (Palmeira et al., 2021).

The latest literature review also confirms that hypertension exercise has a positive impact on the elderly, especially when done regularly for 15–30 minutes implemented three times weekly. In addition to lowering blood pressure, hypertension exercise also improves physical fitness, prevents joint stiffness, and provides psychological benefits in the form of reducing stress and improving quality of life (Luliana & Sari, n.d.). Thus, based on scientific evidence from various international and local studies, hypertension exercise can be recommended as an effective, inexpensive, and safe non-pharmacological to facilitate blood pressure control among the elderly population.

3. Method

This research employed a quantitative approach with a pre-experimental design, specifically utilizing a one-group pretest–posttest method. The study population consisted of 18 elderly participants residing in RT 35, Padukuhan Kalipetir Lor, Margosari, Pengasih, Kulon Progo. The sampling technique in this study uses total sampling, i.e. all members of the population who meet the inclusion criteria are used as respondents. The population in this study is all women members of RT social gatherings who attend social gathering activities. The intervention was carried out in one group whose blood pressure was measured 15 minutes before the hypertension exercise intervention, then blood measurements were taken 5 minutes after the hypertension exercise intervention. Pre- and post-intervention blood pressure values were recorded using a digital sphygmomanometer. Data analysis was performed with a paired t-test to identify mean differences, with statistical significance determined at $p < 0.05$.

4. Results and Discussion

4.1. Research Results

4.1.1. Univariate analysis

Table 1. Systolic blood pressure before and after hypertension exercise in the elderly

Variabel	Mean (mmHg)	Median (mmHg)	Mode (mmHg)	SD	Min (mmHg)	Max (mmHg)
Before Hypertension Exercise	157,17	152,50	76	32,596	113	234
After Hypertension Exercise	155,28	152	124	33,230	114	237

Findings from the univariate analysis indicated that respondents' average systolic blood pressure before the implementation of elderly exercise reached 157.17 mmHg with a standard deviation of 32.59, a median of 152.50 mmHg, and a minimum-maximum value between 113–234 mmHg. After the elderly were performed, the mean systolic blood pressure of the participants was reduced to 155.28 mmHg with a standard deviation of 33.23, a median of 152.00 mmHg, and a minimum-maximum value between 114–237 mmHg. The data also showed a variation in distribution with multiple mode values, where the smallest values that appeared repeatedly were 113 mmHg in the pre-test and 124 mmHg in the post-test.

Table 2. Diastolic blood pressure before and after hypertension exercise in the elderly

Variabel	Mean (mmHg)	Median (mmHg)	Mode (mmHg)	SD	Min (mmHg)	Max (mmHg)
Before Hypertension Exercise	92,39	93,50	82	10,135	76	109
After Hypertension Exercise	89,22	87,50	76	11,685	71	110

Descriptive analysis results indicated that, among the 18 participants, the average diastolic blood pressure before the implementation of elderly exercise was 92.39 mmHg with a median of 93.50 mmHg and a mode of 82 mmHg. After exercise, the average value decreased to 89.22 mmHg with a median of 87.50 mmHg and a mode of 76 mmHg. The distribution of data (standard deviation) before exercise was 10,135 and after exercise was 11,685. Before exercise, the diastolic blood pressure values varied between 76 mmHg and 109 mmHg, while after the exercise they ranged from 71 mmHg to 110 mmHg. This suggests that elderly exercise contributed to a decrease in the average diastolic blood pressure.

4.1.2. Bivariate analysis

Table 3. Bivariate analysis of systolic and diastolic blood pressure before and after hypertension exercises for the elderly

Variabel	Mean Difference	SD	t	df	p-value
Sistolic (Pre-Post)	1,889	9,851	0,813	17	0,427
Diastolic (Pre-Post)	3,167	4,668	2,878	17	0,010

The paired t-test analysis revealed a p-value of 0.427 for systolic blood pressure ($p > 0.05$), indicating no statistically significant difference between pre- and post-exercise measurements. In contrast, diastolic blood pressure showed a p-value of 0.010 ($p < 0.05$), signifying a significant reduction, with an average decrease of 3.17 mmHg following elderly exercise.

5. Discussion

The findings demonstrated a statistically significant difference in the diastolic blood pressure of the respondents after the hypertensive exercise intervention was carried out at one meeting, while systolic blood pressure did not show a significant difference. Systolic decline usually requires regular and continuous physical exercise to produce significant changes to blood vessel elasticity and peripheral resistance (Koresponden et al., 2019).

On the other hand, diastolic blood pressure in this study decreased significantly, from 92.39 mmHg to 89.22 mmHg ($p = 0.010$). This is in line with the theory that aerobic exercise is able to increase peripheral vasodilation, which directly decreases vascular resistance and contributes to the reduction of diastolic blood pressure. Other studies also support these findings, where structured hypertensive exercise programs have been evidenced to substantially lower blood pressure in populations with hypertension (Dwisetyo et al., 2023). Hypertension exercises have been shown to reduce blood pressure among the elderly, so that it can be used as a non-pharmacological intervention in controlling hypertension (Faizah & Supratman, 2023). The effectiveness of hypertension exercises in decreasing blood pressure is attributed to their ability to boost heart performance and dilate blood vessels (Arisandi et al., 2022).

Other research suggests that hypertension exercises can stimulate increased activity of the parasympathetic nervous system as well as decrease sympathetic activity, so that blood vessels are more relaxed and blood pressure decreases, especially in diastolics who are more sensitive to changes in peripheral resistance (Noor Wijayanti & Khadijah, n.d.). In addition, the effectiveness of hypertension exercise will be more optimal if it is done regularly 2-3 times per week because repeated exercise can improve vascular function and provide a more stable blood pressure reduction (Dwisetyo et al., 2023).

The study results reveal that a single exercise session produces a significant reduction in diastolic blood pressure, but does not significantly affect systolic blood pressure. This emphasizes the importance of regularity in performing hypertension exercises to obtain maximum benefits for blood pressure control.

6. Conclusion

The study findings indicated that implementing hypertension exercise among the elderly in Padukuhan Kalipetir Lor positively influenced blood pressure reduction, especially diastolic blood pressure. A statistically significant difference was identified between diastolic values before and after exercise ($p = 0.010$) with an average decrease of 3.17 mmHg. Meanwhile, systolic blood pressure showed no statistically significant change ($p = 0.427$), although there was a mean decrease after exercise. These findings indicate that hypertension exercises can be one of the useful nonpharmacological interventions in helping to control hypertension in the elderly, especially when done regularly and continuously. Therefore, the hypertension exercise program needs to be encouraged as part of promotive and preventive efforts to enhance the well-being and life quality of older adults.

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