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THE EFFECT OF PHYSICAL ACTIVITY ON BLOOD PRESSURE IN HYPERTENSIVE PATIENTS: A LITERATURE REVIEW

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ABSTRACT
Hypertension has experienced a significant increase in prevalence each year due to unhealthy lifestyles, especially physical inactivity. Good physical activity affects blood pressure in people with hypertension. This study aims to collect and analyze articles discussing the effect of physical activity on blood pressure in people with hypertension. The design used was a literature review. In this study, the author used the Scopus, PubMed, and Science Direct databases to search for articles. The criteria for articles used were those published between 2020 and 2025. The keywords used were physical activity, blood pressure, and hypertension. Based on the eight articles collected, the results showed that physical activity significantly reduced blood pressure in people with hypertension. Overall, the article also shows that physical activity has a positive effect on systolic and diastolic blood pressure. The most significant reduction in blood pressure occurs with moderate to high intensity exercise performed regularly for 6-12 weeks.

Keywords: blood pressure; hypertension; physical activity

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INTRODUCTION

Hypertension is one of the most common health problems in society and is a major risk factor for cardiovascular disease, stroke, and chronic kidney failure. Prolonged high blood pressure can cause damage to vital organs such as the heart, brain, and kidneys. According to a report by the World Health Organization (WHO, 2023), the global prevalence of hypertension reaches more than 1.2 billion people, and about two-thirds of them come from low-and middle-income countries. In Indonesia, data from the 2018 National Health Survey shows a prevalence of hypertension of 34.1%, with an increasing trend along with age and changes in people's lifestyles.

One of the causes of the increase in hypertension cases is the lack of physical activity due to modern lifestyles that tend to be passive. When a person rarely moves, blood flow becomes less smooth and blood vessels lose their elasticity. This condition can cause pressure on the blood vessel walls to increase, as well as trigger disturbances in the function of the blood vessels and the nervous system that regulates blood pressure (Türko & Harbalıo, 2020). Physical activity is an important component of lifestyle changes that play a role in both the prevention and management of hypertension. A number of studies have shown that physical activity can lower systolic and diastolic blood pressure in individuals with hypertension (Laksmita, 2020). Hypertension that is not properly managed can cause various serious complications in the organs. Long-term high blood pressure can cause damage to blood vessel walls and accelerate the process of atherosclerosis, thereby increasing the risk of coronary heart disease, stroke, and chronic kidney failure (Zou et al., 2025).

Physical activity plays an important role in maintaining heart health and controlling blood pressure. When a person exercises regularly, the heart becomes stronger and able to pump blood more

efficiently. In addition, physical activity also helps improve blood flow and makes blood vessels more elastic, thereby lowering blood pressure (Saco-ledo et al., 2020). Regular physical activity also helps the body regulate blood sugar levels, lower bad cholesterol (LDL) levels, and reduce stress hormones such as adrenaline and cortisol, which can increase blood pressure. In other words, physical activity not only promotes physical health but also helps maintain the balance of the system that regulates blood pressure (Correia et al., 2023).

In this case, good self-management in daily life can help maintain stable blood pressure and prevent complications. Efforts that can be made include lifestyle changes by increasing physical activity, limiting salt intake, and complying with antihypertensive medication use, which can help lower blood pressure and the risk of complications (Ambarwati & Rosyid, 2024). Physical activity is closely related to blood pressure control, both in healthy individuals and those with hypertension. Regular physical activity has been shown to help lower blood pressure by improving heart function, increasing blood vessel elasticity, and reducing peripheral resistance (Pristianto et al., 2025). When the body moves, blood flow increases, making blood vessel walls more flexible and able to adjust to changes in pressure. This reduces the workload on the heart and helps maintain stable blood pressure (Monfared et al., 2024). The purpose of this literature review is to collect and analyze articles discussing the effect of physical activity on blood pressure in hypertensive patients. The topics analyzed include the effect of physical activity on blood pressure in hypertensive patients and the level of physical activity in influencing blood pressure in hypertensive patients.

METHOD

This study used a literature review method on eight articles published from 2020 to 2025. Literature review is a research method that reviews the results of primary research to produce more comprehensive and balanced facts (Ebidor & Ikhide, 2024). The data search was conducted using search engines such as Scopus, Biomedic Database (PubMed), and Science Direct with the selected keywords: (“physical activity” OR exercise) AND (hypertension OR “high blood pressure”) AND (effect OR impact OR influence). The literature review was conducted by screening selected articles using the PICOS standard. The aim was to determine whether the articles were suitable as a basis for research. There are five important points in the PICOS standard, including: P (Population): the entire group of subjects who will participate in the research; I (Intervention): treatment given to patients to provide an effect from the treatment in accordance with the treatment actions in the article: C (Comparison): a comparison that affects the intervention group in the article: O (Outcome): achievements or results in studies related to the treatment given to research subjects; S (Study Design): the research model used for review.

Inclusion criteria include relevance to the keywords, patients with hypertension, and the form of intervention provided in the form of physical activity, whether physical activity at work, recreation, aerobic physical exercise, isometric handgrip training, or a combination of aerobic and resistance training. Articles published between 2020 and 2025, articles available in full text, and articles with experimental research types were also included. After collecting journals using journal databases such as Scopus, Pubmed, and Science Direct using the keywords “Physical Activity” AND “Hypertension,” a total of 155 journals were found that matched the keywords. Not all of these reviews were relevant to the research theme, and there were still a number of duplicate articles. The researchers then downloaded the 155 journals and proceeded with the journal selection process. Eight duplicate journals were found and excluded, leaving 147 journals to be selected.

The remaining journals from the duplication selection process numbered 147, which were then selected according to the predetermined research titles based on the researcher's desired criteria. The article selection process, based on the title, abstract, and keywords, resulted in 75 journals being excluded because they did not match the research theme. Journals were excluded because they did not match the research theme. A total of 72 journals were included and proceeded to the full-text

selection process because there was still a possibility that some journals did not meet the researcher's desired criteria.

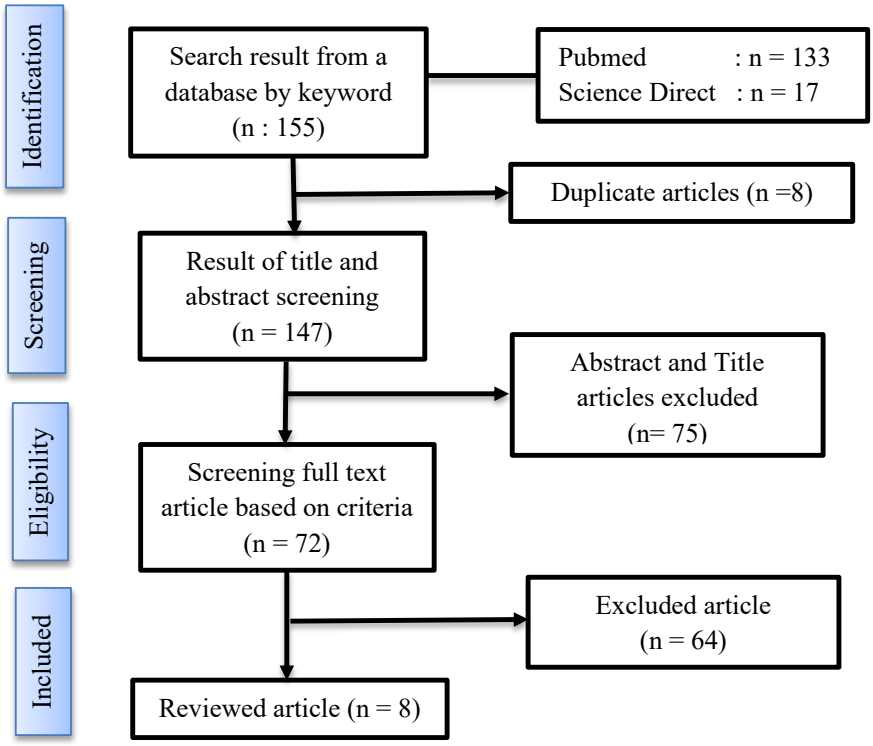

Figure 1. Article Search Flow

RESULT

The types of interventions provided to lower blood pressure in patients with hypertension in these eight articles varied. The types of physical activity provided included physical activity at work, recreation, aerobic exercise, isometric handgrip training, cycle ergometer training, and a combination of aerobic and resistance training.

Table 1.
Article Search Results

No.	Author (year)	Title	Type of Physical Activity	Research Design	Result
1.	(Herrod et al., 2021)	Time-efficient physical activity interventions to reduce blood pressure in older adults: a randomised controlled trial	Physical activity with a cycle ergometer (high-intensity interval training), isometric handgrip training (IHG)	Randomized Controlled Trial	After 6 weeks, the results showed a significant decrease in SBP in the HIIT and IHG groups of approximately 9 mmHg and no significant change in DBP in all groups.
2.	(Caetano et al., 2025)	Post-isometric exercise hypotension occurs irrespective of muscle mass in adults with hypertension : A randomized clinical trial	Physical activity Isometric handgrip exercises for the Small Muscle Mass (SMM) group and isometric knee extension exercises for the Large Muscle Mass (LMM) group	Randomized Controlled Trial	There was a decrease in blood pressure over 24 hours of approximately 4.1 mmHg (p=0.044) in SBP in the exercise group with small muscle mass (SMM) and approximately 5.6 mmHg (p=0.040) in the group with large muscle mass (LMM).
3.	(Cohen et al., 2023)	Reductions in systolic blood pressure achieved by hypertensives with three isometric training sessions per week are	Physical activities such as isometric exercises like isometric handgrips and wall squats	Randomized Controlled Trial	There was a significant decrease in systolic blood pressure (SBP) and diastolic blood pressure (DBP). At the end of phase 1, the decrease in SBP and DBP was 6.4 mmHg (p <

No.	Author (year)	Title	Type of Physical Activity	Research Design	Result
		maintained with a single session per week			0.001) and 4.6 mmHg ($p < 0.001$), respectively. After phase 2, the decrease remained significant, with $p < 0.001$ for SBP and $p = 0.01$ for DBP.
4.	(Rodrigues et al., 2025)	Evaluation of vascular responses to intensity interval physical exercise in subjects with elevated blood pressure : a randomised, cross-- over clinical trial	High-intensity interval cycle ergometer exercise (HIIPE); cycle ergometer without high intensity (MICPE)	Randomized Controlled Trial	There was a decrease in aortic systolic blood pressure (SBP) after HIIPE compared to baseline and 24-hour MICPE (113±19; 118±10 and 117±10 mmHg; p=0.013)
5.	(Lambert et al., 2023)	Associations of physical activity levels, and attitudes towards physical activity with blood pressure among adults with high blood pressure in Bangladesh	Physical activity at work, commuting to and from places, recreational activities, sitting time.	Cluster randomized controlled trial	The higher the physical activity, the lower the blood pressure, with a p-value of 0.001 (SBP) and $p = 0.03$ (DBP); respondents with high activity levels had an SBP of 146.9 mmHg and a DBP of 89.1 mmHg, which was lower than those with moderate or low activity levels.
6.	(Palmeira et al., 2021)	Effects of isometric handgrip training on blood pressure among hypertensive patients seen within public primary healthcare : a randomized controlled trial	Isometric Handgrip Training (IHT) physical activity	Randomized Controlled Trial	Isometric Handgrip Training (IHT) significantly reduced systolic blood pressure in hypertensive patients by approximately 8 mmHg with a p value < 0.05. Meanwhile, no significant effect of IHT on diastolic blood pressure was found with $p > 0.05$.
7.	(Neto et al., 2024)	What is the role of leisure-time physical activity in the association between neighborhood environmental characteristics and hypertension in older adults ? The EpiFloripa Aging Cohort study	Physical activity combining aerobic and resistance exercises in a home-based exercise program	Randomized Controlled Trial	After 12 weeks, the results showed a decrease in systolic blood pressure (SBP) of 9.5 mmHg ($p < 0.05$) and a decrease in DBP of 5.4 mmHg ($p < 0.05$).
8.	(Nemoto et al., 2021)	Effects of Isometric Handgrip Training on Home Blood Pressure Measurements in Hypertensive Patients : A Randomized Crossover Study	Isometric Handgrip Training (IHT) physical activity	Randomized crossover trial	There was a significant decrease in systolic blood pressure (SBP) and diastolic blood pressure (DBP) with values of $p<0.05$ and $p<0.01$. There was a significant decrease in systolic blood pressure (SBP) and diastolic blood pressure (DBP) with values of $p<0.05$ and $p<0.01$.

DISCUSSION

After searching for articles published between January 1, 2020 and October 15, 2025, a total of eight articles were found. The review results showed that physical activity has a significant effect on reducing systolic blood pressure (SBP) and diastolic blood pressure (DBP) in hypertensive patients. Overall, all of the studies analyzed showed that various forms of physical exercise, including aerobic, isometric, and a combination of both, can improve blood pressure regulation. This reduction in blood pressure occurs through a number of physiological mechanisms, such as increased blood vessel elasticity, decreased peripheral resistance, increased heart capacity, and regulation of the autonomic nervous system. Isometric handgrip and moderate-to-high intensity aerobic exercises are the most frequently studied forms of activity and show significant results. For example, studies by Herrod et al. (2021) and Palmeira et al. (2021) show a decrease in systolic blood pressure of 8–9 mmHg after 6–12 weeks of exercise. This reduction is clinically

significant as it has the potential to reduce the risk of cardiovascular disease by 10–15%. Meanwhile, Cohen et al. (2023) showed that the effect of blood pressure reduction can persist even if the frequency of exercise is reduced after the initial intervention period, indicating that the body's adaptive effects to physical activity are quite long-lasting.

Additionally, research by Rodrigues et al. (2025) found that high-intensity interval exercise (HIIE) resulted in a greater reduction in aortic systolic blood pressure and improved vascular function compared to moderate-intensity exercise (MICPE). These findings reinforce the evidence that varying exercise intensity has different effects on cardiovascular system adaptation. However, some studies, such as Herrod et al. (2021) and Lambert et al. (2023), noted that the reduction in diastolic blood pressure (DBP) was not always significant, which may be due to variations in exercise duration, intensity, and individual characteristics such as age and initial fitness level.

These results also support the recommendation from the World Health Organization (2023), which recommends at least 150 minutes of physical activity per week, five days or more, to maintain heart health and prevent hypertension. Such activities do not have to be strenuous physical activities but can include light to moderate activities such as brisk walking, cycling, traveling/recreation, or physical activities at work, which have also been proven to provide benefits in lowering blood pressure (Lambert et al., 2023). Increasing self-awareness among people with hypertension is very influential in enabling them to take good care of themselves, including engaging in physical activity to prevent hypertension and complications in people with hypertension (Cahyanti, 2021).

CONCLUSION

Based on a review of eight research articles published between 2020 and 2025, it can be concluded that physical activity significantly lowers blood pressure in hypertensive patients. Types of exercise that have been proven effective include isometric handgrip exercises, moderate to high-intensity aerobic exercise, and a combination of aerobic and resistance training. The recommended exercise frequency is three to five times per week for a total duration of approximately 150 minutes. The reduction in blood pressure is mainly seen in systolic blood pressure, while the effect on diastolic blood pressure varies between studies. Factors such as age, exercise duration, intensity, and adherence to the exercise program affect the magnitude of the results. Regular physical activity should be part of the main nonpharmacological intervention in the management of hypertension. Health workers, especially nurses, play an important role in providing health education and motivation to hypertensive patients to regularly engage in physical activity according to their abilities and physical condition. Researchers also suggest that other researchers conduct studies using different designs so that research can be sustained and provide clinical evidence.

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