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Hypertension-focused exercise on blood pressure management among Indonesian patients

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Abstract
Hypertension remains a serious clinical condition globally that significantly contributing to fatalities worldwide. Intensive and comprehensive care is crucial for preventing its complications. While standard care is always necessary, its effectiveness can be optimized by integrating complementary therapies, such as hypertension management exercise. However, there are limited studies describing the effectiveness of this specific therapy within the Indonesian population. The purpose of this study was to ascertain whether hypertension exercise can lower blood pressure in hypertensive patients at at Turots Al Islamy Hospital, Yogyakarta, Indonesia. The study employed a quasi-experimental design with a one-group pretest-posttest research design. A total of 44 respondents were selected using purposive sampling. For the intervention, researchers utilized videos and leaflets as research instruments. The exercise sessions lasted 15-20 minutes, performed three times a week for two consecutive weeks. Ethical clearance was obtained before the study commenced. Data analysis involved descriptive statistics, normality tests, and the Wilcoxon test. The study found that hypertension exercise was effective in reducing hypertension, with an average reduction of 15.49 mmHg in systolic pressure and 8.19 mmHg in diastolic pressure. The findings of this study can be valuable for healthcare professionals, offering an innovative approach to hypertension management in both hospital and community practice, thereby enhancing chronic illness care.

Keywords: Chronic illness, exercise, healthcare professionals, hypertension, innovation in care

Introduction

World Health Organization (WHO) reported that approximately 1.28 billion adults aged 30-79 worldwide are living with hypertension, with nearly two-thirds residing in low- and middle-income countries (Farhadi et al., 2023). The WHO also highlighted that nearly 80% of adults with hypertension are unaware of their condition, and only 21% of those with hypertension have their blood pressure under control (World Health Organization, 2023). Studies explained that hypertension is the leading cause of young death worldwide (Mills et al., 2020; Meher et al., 2023). Hypertension predominantly affects the elderly due to age-related changes in the body's organs, particularly the loss of blood vessel flexibility, which increases the risk of high blood pressure (Glazier, 2022). The American Diabetes Association (ADA) has established a new guideline defining hypertension as blood pressure exceeding 130/90 mmHg (ElSayed et al., 2023). This means that awareness of hypertension needs to be increased among the public today (Burlacu et al., 2025). When left untreated, hypertension led to many complications such as coronary heart disease, heart failure, stroke, kidney disease, peripheral artery disease, and vision loss (Yu et al., 2023). In Indonesia, hypertension is the third leading cause of death, accounting for 6.8% of all deaths, after stroke (15.4%) and tuberculosis (7.5%) (Casmuti & Fibriana, 2023). Even more specifically, Yogyakarta has a hypertension prevalence of 32.86%, slightly lower than the national average of 34.11%, with Gunung Kidul having the highest rate in the region at 39.25%, followed by Kulon Progo, Sleman, and Bantul (Sasmita & Kristina, 2023). Thus, given the hypertension data, it is imperative that the government and healthcare professionals collaborate to address this problem that leveraging both conventional and complementary therapies. Personalized therapies should be continually developed, particularly in culturally diverse countries such as Indonesia (Turana et al., 2020).

As people age, their organs' functionality declines that making them more susceptible to acute and chronic diseases, including hypertension - a degenerative condition with high morbidity and mortality rates (Guasti et al., 2022). Various factors contribute to hypertension, including genetics, excessive salt consumption, high cholesterol, obesity, stress, smoking, caffeine, and physical inactivity (Princewel et al., 2019). However, hypertension can be managed through

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Figure 1. Blood pressure measurements (Courtesy of www.unsplash.com).

lifestyle modifications such as a balanced diet, smoking cessation, stress management, regular blood pressure monitoring **(Figure 1)**, and exercise (Silva et al., 2022). Engaging in exercises like brisk walking, swimming, or cycling can improve cardiovascular health and reduce blood pressure (Rego et al., 2019). Additionally, exercise can help reduce stress and anxiety which are common contributors to high blood pressure (Tavoian & Craighead, 2023). Specifically, regular physical activity, including hypertensive exercises can help control hypertension. This exercise is a valuable non-pharmacological therapy for hypertension (Alpsoy, 2020). For hypertensive patients, recommended physical activities should be done gradually and without overexertion. Specifically, exercises that are tailored to individual capabilities, such as gentle aerobic activities, can help manage hypertension effectively. Hypertension exercise is a physical activity for hypertensive and elderly patients that designed to aid in weight reduction and stress management. Typically lasting 15-30 minutes, this exercise should be performed regularly at least twice a week. The primary goal of hypertension exercise is to enhance blood flow and oxygen supply to active muscles and the heart that helping to lower blood pressure (Sumartini et al., 2019).

Several previous studies have reported the effect of hypertension exercise on blood pressure (Anwari et al., 2018; Sumartini et al., 2019; Basuki & Barnawi, 2021; Indrayani et al., 2022) and exercise among elderly (Safarina et al., 2022). However, unlike previous studies which were primarily conducted in health centers, *Posbindu* (Integrated Health center), or nursing homes, this recent research was distinct in its setting, as it was carried out in a Type C hospital in the Yogyakarta region. Moreover, this therapy has not been widely implemented in Yogyakarta hospitals as a complementary therapy for standard hypertension treatment. This exercise therapy shows great promise due to its lack of side effects and proven effectiveness, as demonstrated in several previous studies. Our preliminary study documented that At Turots Al Islamy Hospital Yogyakarta, reported 80 patients with hypertension in November 2024. Among them, 7 patients aged 50-70 years regularly controlled their condition and adhered to their medication regimen. One patient had hypertension complicated by kidney failure that requiring dialysis twice a week. Some patients opted for non-pharmacological approaches, such as consuming celery leaf decoction, although they were unsure about the proper dosage. Notably, when interviewed, patients admitted to never having done hypertension exercises. They also reported experiencing dizziness and weakness which they attributed to stress and irregular sleep patterns. Therefore, for these reasons, hypertension exercises were carried out to help reduce blood pressure in hypertensive patients at that hospital. The findings of this study can improve the standard care of hypertension in both hospital and community health settings.

Method

The study used a quasi-experimental with one-group pretest-posttest design. Choosing this design driven by several practical and ethical considerations inherent to clinical research. The design allows to measure participants' blood pressure before and after intervention that enabling to observe changes attributable to the exercise. While it lacks a control group – which would make it a true experiment – a quasi-experimental design is often chosen when it's impractical or unethical to withhold an intervention (like exercise, which is generally beneficial) from a group of patients (Capili & Anastasi, 2024). It offers a more realistic setting for studying interventions in real-world clinical environments like a hospital (Knapp, 2016). In such settings, random assignment to a control group might be difficult to implement due to logistical constraints or patient preferences (Handley et al., 2018). Essentially, this design provides a pragmatic way to assess the effectiveness of an intervention by comparing a patient's own baseline condition to their condition after treatment. The population of the study is all the patients with hypertension in At Turots Al Islamy Hospital Yogyakarta. Data collection process was completed in 24 – 26 February 2024. This study's inclusion criteria included hypertensive patients with blood pressure above 140/90 mmHg, aged 40-70 years, who had never engaged in hypertensive exercises. Additionally, participants had to be free from upper and lower extremity weaknesses (e.g., inability to walk or stroke) and

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vision problems (e.g., cataracts or blindness). The exclusion criteria comprised patients who were unwilling to participate, experienced headaches, or had a history of stroke, heart disease (including Acute Myocardial Infarction), or kidney failure. A total of 44 participants were selected for the study using a convenience and purposive sampling method. The research instruments included leaflets outlining 17 Hypertension Exercise movements **(Figure 2)**, video guiding the exercise implementation, calibrated sphygmomanometers (document for calibration is available), and observation sheets The observation form records systolic and diastolic blood pressure readings taken before (pretest) and after (posttest) the intervention.

The data collection process was structured to confirm consistency and reliability regarding the intervention and subsequent data capture. Participants engaged in the hypertension-focused exercise for a duration of 15 to 20 minutes per session reflecting a timeframe deemed sufficient for physiological impact **(Figure 3)**. These sessions were conducted with a frequency of three times per week that spaced out within a two-week intervention period. This regimen allowed for a consistent exposure to the exercise protocol while keeping the study duration concise. The entire data collection effort was a collaborative endeavor, primarily carried out by the researcher themselves alongside research assistants. The research assistant underwent rigorous training prior to the commencement of the study. This comprehensive training encompassed the precise execution of the exercise protocol and the standardized methods for recording all data points. This preparatory step was vital to minimize inter-observer variability and improve validity and reliability of the data. For the statistical analysis, descriptive statistics were first employed to characterize the study sample. Following this, the Shapiro-Wilk test was utilized to assess the normality of the data distribution, a crucial step in determining the appropriate subsequent inferential tests. Given the nature of the data, the Wilcoxon test was then applied for hypothesis testing. All statistical computations were performed using SPSS software, with the significance level consistently set at 0.05. Ethical clearance was obtained from Universitas 'Aisyiyah Yogyakarta, Indonesia with number 3444/KEP-UNISA/II/2024 to guarantee the study runs without any ethical problems. All the informed consent was provided before study begin.

Figure 3. Data collection process during study in the hospital (Documented by authors).

Results

The table shows that the majority of respondents were female, accounting for 38 respondents (86.4%), and most patients fell within the 51-60 years age range (47.7%) **(Table 1)**. The patients' average blood pressure before the hypertension exercises was 155.66 mmHg (systolic) and 97.28 mmHg (diastolic). After the exercises, their blood pressure decreased to an average of 140.17 mmHg (systolic) and 89.09 mmHg (diastolic) **(Table 2)**. The Shapiro-Wilk normality test generated *p*-values of 0.19 for both pretest and posttest data. Since these values are lower than 0.05, it can be concluded that the research data follows an abnormal distribution. This finding necessitates the use of non-parametric statistical methods for subsequent analyses. Consequently, analytical approach of the Wilcoxon signed-rank test was more appropriate to ensure the validity and reliability of the inferences drawn **(Table 3)**. Adhering to this methodological imperative is paramount for accurate interpretation of the study's findings and avoiding Type I or Type II errors. Therefore, all subsequent statistical procedures will be carefully selected to align with the non-normal nature of the data.

Discussion

The study highlighted that most of the participants who experienced hypertension was female with menopause. A study supported that menopausal process causes women to experience high blood pressure (Lima et al., 2012). The hormone estrogen helps increase High-Density Lipoprotein (HDL) offers protective benefits to premenopausal women (Ryczkowska et al., 2022). Conversely, high levels of Low-Density Lipoprotein (LDL) cholesterol and low levels of HDL cholesterol contribute to atherosclerosis and increased blood pressure (Borén et al., 2020). Healthcare professionals are encouraged to provide comprehensive care that addresses conditions. For example, monitoring blood pressure regularly, assessing cardiovascular risk factors, and developing innovation treatment plans that consider the patient's need. They can also

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educate patients on lifestyle modifications, such as diet, exercise, and stress reduction, and provide guidance on hormone replacement therapy (HRT) or other treatment options (Ahmadi et al., 2019). Support from family members, such as husbands or children, is also important in helping patients adhere to their treatment plans (Geleta et al., 2025). The study also noted that the majority of respondents are between 51 and 60 years old which age is the factor lead hypertension (Oliveros et al., 2020). As people age, their blood vessels naturally lose elasticity, leading to increased blood pressure and potential instability (Buford, 2016). Healthcare policies should prioritize the elderly with hypertension to prevent further complications and morbidities. Developing innovative approaches like telehealth is a promising strategy for reaching patients in remote locations.

Table 1. Participants' characteristics.

Variables	Frequency (n)	Percentage (%)
Sex		
Male	6	13.6
Female	38	18.4
Age		
40-50 years	14	31.8
51-60 years	21	47.7
>61 years	9	20.5

Table 2. Blood pressure analysis.

Variables	Before		After	
Blood pressure	Mean	SD	Mean	SD
Systole	155.66	10.60	140.17	6.04
Diastole	97.28	6.67	89.09	6.85

Table 3. Wilcoxon test.

Variables	Mean	*p*
Pretest	22.99	0.000
Posttest	22.00	0.000

The study began with respondents having a mean systolic blood pressure of 155.66 mmHg and diastolic blood pressure of 97.28 mmHg. After participating in hypertension exercises, their mean blood pressure decreased to 140.17 mmHg (systolic) and 89.09 mmHg (diastolic), representing reductions of 15.49 mmHg and 8.19 mmHg, respectively. Exercise achieves this blood pressure-lowering effect by increasing blood flow and oxygen supply to active muscles, particularly the heart muscle. A typical hypertension exercise program includes warm-up, core, and cool-down activities designed to reduce stress, anxiety, and depression. Regular exercise activates the parasympathetic nervous system, inducing vasodilation and subsequently lowering both systolic and diastolic blood pressure. This mechanism relaxes blood vessels, ultimately contributing to reduced blood pressure (Basuki & Barnawi, 2021; Green & Smith, 2018). A significant drop in blood pressure can be attributed to the respondents' proper and consistent exercise routine, which consisted of 15–20-minute sessions, three times a week. When patients with hypertension perform exercises optimally and in a relaxed manner, they experience maximum benefits, including a notable decrease in blood pressure. Regular hypertension exercises not only help maintain physical fitness but also promote weight management, stress reduction, and improved metabolic activity. Additionally, these exercises stimulate heart activity and strengthen heart muscles, contributing to overall cardiovascular well-being (Hartati et al., 2023). Research has shown that exercising three times a week for 15-60 minutes can help relax blood vessels and lower blood pressure (Sari & Ikbal, 2022). Studies have consistently found that elderly individuals who participate in regular exercise experience a significant decrease in blood pressure (Kazeminia et al., 2020; Hayes et al., 2022; di Cagno et al., 2023). This decrease is likely due to the exercise's ability to enhance the heart's efficiency in meeting the body's energy needs that increasing skeletal and respiratory muscle activity. Furthermore, regular exercise can help remove plaque from blood vessel walls by burning fat which improving blood flow and lowering blood pressure.

Hypertension-focused exercise program is key in blood pressure management among Indonesian patients. The government's role coupled with healthcare policy is foundational in promoting such initiatives. The Indonesian government

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Figure 2. Hypertension exercise guidelines for the elderly provided in Bahasa version (Documented by authors).

in collaboration with Ministry of Health can create and enforce policies that prioritize non-communicable diseases such as hypertension in recognizing exercise as a preventative and management tool. This includes allocating funding for community-based exercise programs, integrating hypertension management guidelines into primary healthcare services, and launching awareness campaigns to educate the public about the benefits of regular physical activity. Effective healthcare policies also emphasize the training of healthcare providers in exercise prescription for patients with hypertension. The government's involvement in such regulatory and funding frameworks ensures accessibility and equity that reaching rural and underserved populations who are often vulnerable to hypertension due to lack of resources (Jindal et al., 2023). On the innovation and comprehensive care front, Indonesia can benefit from developing integrated treatment models combining exercise with digital health technologies to monitor patient progress and adherence. Innovations like mobile health (mHealth) applications can provide personalized exercise regimens, reminders, and real-time blood pressure tracking, empowering patients to take charge of their health (Liquori et al., 2024). Comprehensive care models would also incorporate multidisciplinary teams including physicians, physiotherapists, nutritionists, and community health workers to address lifestyle, medication adherence, and psychosocial factors contributing to hypertension. Furthermore, programs that consider Indonesian social and environmental factors would improve engagement (Woodham et al., 2020).

This study has strengths and weaknesses in terms of its design. One significant strength of this design is its practicality and feasibility in real-world clinical settings. It's often more straightforward to implement in hospitals or community health centers where randomizing patients into a separate control group might be challenging, problematic, or simply not preferred by patients. This design also tolerates each participant to serve as their own control that meaning their post-intervention blood pressure is compared to their pre-intervention baseline data. This reduces variability stemming from individual differences that could otherwise confound results in a between-group comparison. Furthermore, it's a cost-effective and time-efficient approach as a novel intervention before committing to more complex and resource-intensive randomized controlled trials. However, this one-group design carries several notable limitations that affect the generalizability and internal validity. The most prominent weakness is the absence of a true control group. Without a comparison group that does not receive the intervention, it's difficult to definitively conclude that any observed changes in blood pressure are solely due to the hypertension-focused exercise. Other factors, known as threats to internal validity, could also explain the changes. For instance, maturation (natural physiological changes over time), history (other events occurring during the study period, like concurrent medication changes or lifestyle shifts unrelated to the exercise), testing

effects (the act of being measured influencing the outcome), or regression to the mean (extreme initial scores naturally moving closer to the average over time) could all contribute to blood pressure reductions. This makes it challenging to establish a clear cause-and-effect relationship. Notwithstanding the above explanation, this study can demonstrate the intervention's impact on that specific group to deal with hypertension.

Conclusion

This investigation illuminates a compelling truth of hypertension-focused exercise emerges as a potent and pragmatic cornerstone in the blood pressure management. Our findings unequivocally affirm its capacity to meaningfully reduce both systolic and diastolic pressures that echoing a melody of restored cardiovascular equilibrium. This efficacy whispers a powerful promise for a population grappling with the pervasive shadow of hypertension. It champions a shift from sole reliance on pharmacotherapy to an integrated model, where patient empowerment through physical activity becomes a vital prescription. The demonstrable impact within the Indonesian context particularly underscores its potential as a scalable and culturally resonant intervention. While the present study casts a significant light, the landscape of understanding remains vast, beckoning further exploration. Future inquiries should aspire to transcend the immediate efficacy observed here that venturing into multi-center trials to decipher the sustained impact and potential dose-response relationships of these exercises. Furthermore, exploring the cost-effectiveness of integrating such exercise programs into primary healthcare systems across Indonesia would provide invaluable data for policy formulation. Finally, the role of digital health platforms presents an exciting frontier for innovation and helps patients to adhere with this exercise.

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AI statements

The author chose not to employ generative text AI tools at any point during the writing of this article.

Author declaration

All authors engaged in the review of the topic, the analysis of the data, and the preparation of the manuscript for publication.

Availability of data and materials

All data are available from the author when requested.

Competing interests

None.

Ethical clearance

This study received ethical approval from Universitas ‘Aisyiyah Yogyakarta, Indonesia as described in the method section.

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Publishers and journal’s note

The study present innovation in hypertension management among adults’ population in Hospital. No adverse effects were observed during the study that suggesting that hypertension exercise holds promise as a complementary therapy for managing hypertension in a broader population. There was no conflict interest declared in this work.

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Authors' perspective

Innovation points

- Hypertension-focused exercise indicated an approach to physical activity for managing high blood pressure among adults with hypertension.
- The primary outcome being investigated is blood pressure management that suggesting the research aims to quantify or describe the effect of the exercise on blood pressure levels.
- The study is specifically conducted among Indonesian patients that highlighting its relevance and applicability within the Indonesian demographic and healthcare context.

Potential areas of interest

- What specific types of exercises are included under hypertension-focused exercise that adapted or designed for Indonesian patients?
- Does the study explore the sustained impact of this exercise intervention on blood pressure management beyond the immediate study period?
- What are the potential challenges or facilitators for implementing hypertension-focused exercise programs on a wider scale across diverse healthcare settings or communities in Indonesia?

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