

ARTICLE INFORMATION

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Effect of walking exercise combined with slow deep breathing on blood pressure among hypertensive pregnant women

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Abstract

Background: Hypertension in pregnancy is one of the complications that contributes to the high maternal mortality rate. Non-pharmacological management such as walking exercise and slow deep breathing can be alternative methods to reduce blood pressure. However, research on the combination of these interventions is still limited.

Purpose: To determine the effect of walking exercise combined with slow deep breathing on blood pressure in pregnant women with hypertension.

Method: This study used a quantitative design with a quasi-experimental approach using a one-group pretest-posttest design. The sample was selected using total sampling technique with 30 respondents. The intervention, consisting of walking exercise combined with slow deep breathing, was conducted for 10 minutes, 3 times a week. The instruments used were a respondent characteristic questionnaire and an observation sheet for blood pressure measurements.

Results: After being given walking exercise combined with slow deep breathing, the average systolic blood pressure decreased to 127.00 mmHg and diastolic pressure decreased to 80.63 mmHg. The Effect of Walking Exercise and Slow Deep Breathing on Blood Pressure in Pregnant Women with Hypertension. The results of the Paired t-test showed a p-value of 0.000 ($p < 0.05$).

Conclusion: The results showed that there is a significant effect of Walking exercise combined with slow deep breathing on blood pressure in pregnant women with hypertension.

Keywords: Exercise; Hypertension; Pregnant Women; Slow Deep Breathing; Walking.

INTRODUCTION

Pregnancy is a crucial transitional phase in a woman's life because it can bring about significant physical, psychological, and hormonal changes. These changes lead to physiological adaptations that can increase susceptibility to various health problems, one of which is gestational hypertension (Yulianti & Susanti, 2025). Gestational hypertension is a condition characterized by elevated systolic blood pressure of ≥ 140 mmHg and diastolic blood pressure of ≥ 90 mmHg that occurs after 20 weeks of gestation in a previously normotensive mother. This condition is one of the most common pregnancy complications and contributes to increased maternal and fetal

morbidity and mortality (Farida & Mardianti, 2025).

Gestational hypertension remains a maternal health problem in many countries. The World Health Organization reports that approximately 260,000 maternal deaths occur annually due to complications during pregnancy and childbirth, with gestational hypertension contributing to approximately 14% of all maternal deaths worldwide (World Health Organization, 2023). Globally, the prevalence of hypertension in pregnancy ranges from 10-15% of all pregnancies and is more common in developing countries than in developed countries (Akbar, Irwinda, Dewantiningrum, Bernolian, Sitepu, Chalid,

& Aziz, 2024). This high rate indicates that hypertension in pregnancy remains a major challenge in efforts to improve maternal health.

In Indonesia, hypertension in pregnancy is a leading cause of maternal mortality. Data from the Indonesian Ministry of Health shows that in 2023 there were 4,482 cases of maternal death, with hypertension in pregnancy being the second most common cause of death, with 412 cases after hemorrhage (Ministry of Health of the Republic of Indonesia, 2024). In 2024, the number of maternal deaths decreased to 4,150 cases, but hypertension in pregnancy remained a significant cause of death, with 988 cases (Ministry of Health of the Republic of Indonesia, 2025). This condition shows that hypertension in pregnancy still requires special attention in efforts to achieve the Sustainable Development Goals (SDGs) target, namely reducing the Maternal Mortality Rate to less than 70 per 100,000 live births by 2030.

Banten Province is one of the regions with a relatively high prevalence of hypertension in pregnancy. According to the 2023 Indonesian Health Survey, the prevalence of hypertension in pregnancy in Banten Province reached 4.7%, higher than several other provinces in Indonesia. In 2024, 54 maternal deaths were recorded in Banten Province related to hypertension in pregnancy. In Tangerang City, hypertension cases also remain high, with 206,702 cases in 2025. The Karawaci Baru Community Health Center (Puskesmas) was among the health centers with the highest number of cases of hypertension in pregnancy, with 151 cases in 2025, an increase from 18 cases in 2024. This data demonstrates the need for effective hypertension control efforts in pregnant women in the region (Ministry of Health of the Republic of Indonesia, 2025).

Hypertension in pregnancy can lead to various serious complications for both the mother and the fetus. Maternal complications include preeclampsia, eclampsia, HELLP syndrome, impaired kidney and liver function, the effects of walking exercise and slow deep breathing on blood pressure in pregnant women with hypertension, and even maternal death. Meanwhile, fetal complications can include fetal growth restriction, premature birth, low birth weight, and even perinatal death (Lestari, Hasanah, Ghasyiyah, Diana, Perdana, Widiyasari, & Nugroho, 2025). Various risk factors are known to be associated with hypertension in pregnancy, including

extreme age, hyperplacental obesity, a history of hypertension, diabetes mellitus, anxiety, and lack of physical activity (Yuliana & Dewi, 2022).

Hypertension in pregnancy can be managed through pharmacological and non-pharmacological therapies. One recommended non-pharmacological approach is physical activity in the form of walking exercise. Walking exercise is a light aerobic activity that is safe during pregnancy and is beneficial for improving blood circulation, improving cardiovascular function, increasing blood vessel elasticity, and helping lower blood pressure (Ruri & Nurlaela, 2020). In addition to physical activity, the relaxation technique of slow, deep breathing is also known to be effective in helping control blood pressure by increasing parasympathetic nerve activity and decreasing sympathetic nerve activity, resulting in a more relaxed body and lowering blood pressure (Friskia, Sari, & Asih, 2024).

Several previous studies have shown that walking exercise and slow, deep breathing, individually, are effective in lowering blood pressure. Previous researchers found that 10 minutes of walking therapy can lower blood pressure in primigravida mothers (Ruri & Nurlaela, 2020). Other research has also shown that slow, deep breathing techniques significantly reduce blood pressure in pregnant women with hypertension. However, research combining these two interventions is still limited, particularly in pregnant women with hypertension in primary healthcare settings. However, the combination of physical activity and relaxation techniques is thought to provide a more optimal effect because they work through complementary physiological mechanisms (Dinillah, Siregar, Rahman, & Boy, 2025).

RESEARCH METHOD

This study employed a quantitative method with a quasi-experimental design using a one-group pretest-posttest approach. The study was conducted in the Karawaci Baru Community Health Center in Tangerang City in 2026. The population consisted of all 30 pregnant women with hypertension registered within the Karawaci Baru Community Health Center.

The sampling technique used total sampling, ensuring that all pregnant women with hypertension who met the inclusion and exclusion criteria were included in the study. A total sample size of 30 respondents was obtained. Inclusion criteria included

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pregnant women with hypertension as recorded in their MCH handbook or medical record, being in good general condition, capable of performing interventions, having no history of respiratory disorders, and willing to participate by signing an informed consent form.

Data were collected through blood pressure measurements before (pretest) and after (posttest) the intervention using a digital sphygmomanometer, and observation sheets. The intervention consisted of walking exercise combined with slow, deep breathing for 10 minutes, performed three times a week. Walking exercise involves repeated, rhythmic, and continuous steps, combined with slow and deep breathing exercises using a slow and deep breathing pattern, according to standard operating procedures.

Data on respondent characteristics, including age, education, gestational age, and parity, were collected

using a respondent characteristics sheet. Univariate analysis was used to describe the frequency distribution of respondent characteristics and blood pressure values before and after the intervention. Prior to bivariate analysis, the data were tested for normality using the Shapiro-Wilk test. The results of the normality test indicated a normal distribution, so bivariate analysis was performed using a paired t-test to determine the effect of walking exercise combined with slow and deep breathing on blood pressure in pregnant women with hypertension, with a significance level of $\alpha = 0.05$.

This study has received ethical approval from the Health Research Ethics Committee of the Health Polytechnic, Ministry of Health, Banten, under license number DP.03.04/F.XXII.25/00141/2026, issued on March 3, 2026.

RESEARCH RESULTS

Table Characteristics of Respondents (N=30)

Variable	Result
Age (Mean±SD) (Years) (Range)	(28.03±0.89) (20-45)
Not at risk (20-35 years)	22/73.3
At risk (<20 and>35 years)	8/26.7
Education (n/%)	
Elementary School-Junior High School	19/63.3
High School - Bachelor's Degree	11/36.7
Gestational Age (n/%)	
0-12 Weeks	8/26.6
13-27 Weeks	9/30.1
28-40 Weeks	13/43.3
Parity (n/%)	
Primiparous	3/10.0
Multiparous	27/90.0

Table 1. Shows that the average age of respondents and standard deviation is (28.03 ± 0.89) with an age range of (20-45) years. Based on Education Level, the majority of respondents have Elementary School-Junior High School Education Level, namely 19 respondents (63.3%) with the majority being at 28-40 weeks of pregnancy, 13 respondents (43.3%) and the majority being in the multiparous category, 27 respondents (90%).

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Table 2. Distribution of Average Blood Pressure Before and After Intervention

Variable	(Mean±SD)	Min-Max	Median	95% CI	P-value
Systolic Blood Pressure (Pre-test)	(133.87±5.043)	120-138	134.50	131.98-135.75	0.00*
Diastolic Blood Pressure (Pre-test)	(86.37±6.145)	73-101	86.000	84.07-88.66	
Systolic Blood Pressure (Post-test)	(127.00±4.955)	120-138	127.000	125.15-128.85	0.00*
Diastolic Blood Pressure (Post-test)	(80.63±5.353)	70-94	80.000	78.63-82.63	

In this study, the average systolic blood pressure of pregnant women with hypertension before the intervention was 133.87 mmHg with a standard deviation of 5.043 mmHg, while the average diastolic blood pressure was 86.37 mmHg with a standard deviation of 6.145 mmHg. Systolic blood pressure values ranged from 127–144 mmHg, while diastolic blood pressure ranged from 73–101 mmHg and the average systolic blood pressure of pregnant women with hypertension after the intervention was 127.00 mmHg with a standard deviation of 4.955 mmHg, while the average diastolic blood pressure was 80.63 mmHg with a standard deviation of 5.353 mmHg. Systolic blood pressure values were in the range of 120–138 mmHg and diastolic blood pressure in the range of 70–94 mmHg. These results indicate a decrease in average blood pressure. Table 3 shows that the average systolic blood pressure of pregnant women with hypertension after the intervention was 127.00 mmHg with a standard deviation of 4.955 mmHg, while the average diastolic blood pressure was 80.63 mmHg with a standard deviation of 5.353 mmHg. Systolic blood pressure values ranged from 120–138 mmHg and diastolic blood pressure values ranged from 70–94 mmHg. These results indicate a decrease in average blood pressure.

The paired t-test showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of walking exercise combined with other risk factors such as a history of hypertension, obesity, stress, and lack of physical activity. According to the cardiovascular adaptation theory in pregnancy, an increase in plasma volume of 40–50% and increased cardiac output causes the circulatory system to work harder, potentially affecting blood pressure, especially in women with

predisposing factors for hypertension.

DISCUSSION

Most respondents were in their third trimester of pregnancy. During this period, the fetus's oxygen and nutrient needs increase, resulting in increased blood volume, heart rate, and the workload on the mother's cardiovascular system. This condition can increase the risk of hypertension if the body's adaptive mechanisms are not functioning optimally. Furthermore, the majority of respondents were multigravida. Repeated pregnancies can cause vascular and metabolic changes that affect blood pressure regulation during pregnancy.

Before the intervention, the respondents' average systolic blood pressure was 133.87 mmHg and their average diastolic blood pressure was 86.37 mmHg. These results indicate that the respondents were in a blood pressure condition that required management to prevent pregnancy complications. Hypertension in pregnancy occurs due to increased peripheral vascular resistance, which forces the heart to work harder to pump blood throughout the body. If uncontrolled, this condition can increase the risk of preeclampsia, eclampsia, fetal growth retardation, and even maternal and perinatal death.

The results showed that after the intervention of walking exercise combined with slow, deep breathing, the average systolic blood pressure decreased from 133.87 mmHg to 127.00 mmHg, while the average diastolic blood pressure decreased from 86.37 mmHg to 80.63 mmHg. The paired t-test showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of walking exercise combined with slow, deep breathing on the blood pressure of pregnant women with hypertension.

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The decrease in blood pressure after walking exercise can be explained by aerobic exercise theory. Walking exercise is a light-to-moderate intensity aerobic activity that involves optimal oxygen use to generate energy. This activity can increase cardiac efficiency, improve blood circulation, increase blood vessel elasticity, and decrease peripheral resistance. When blood vessel resistance decreases, the heart does not need to pump blood at such high pressure, thus maintaining better blood pressure control. Furthermore, regular physical activity can increase the release of nitric oxide in the blood vessel endothelium, which plays a role in vasodilation, resulting in smoother blood flow. This finding is in line with other studies which state that walking therapy is effective in reducing blood pressure in pregnant women (Ruri & Nurlaela, 2020).

In addition to physical activity, slow, deep breathing also contributes to lowering blood pressure. Physiologically, slow, deep breathing techniques stimulate chemoreceptors and baroreceptors, which play a role in blood pressure regulation. Activation of these receptors increases parasympathetic nervous system activity and decreases sympathetic nervous system activity. This condition causes a decrease in heart rate, vasodilation of blood vessels, and a decrease in the secretion of stress hormones such as catecholamines, resulting in lower blood pressure. According to Benson's relaxation theory, a state of relaxation achieved through breath regulation can reduce the body's oxygen consumption, decrease muscle tension, and create a more stable physiological state. The results of this study support previous research showing that slow, deep breathing is effective in lowering blood pressure in pregnant women with hypertension (Reza et al., 2024).

The combination of walking exercise and slow, deep breathing is thought to provide a more optimal effect than either exercise alone. Walking exercise works by improving cardiovascular function and blood circulation, while slow, deep breathing works through relaxation mechanisms and regulation of the autonomic nervous system. The synergy of these two mechanisms results in a significant reduction in systolic and diastolic blood pressure. Thus, the combination of these two interventions can be an effective non-pharmacological approach to help control blood pressure in pregnant women with hypertension.

The findings of this study imply that walking

exercise combined with slow, deep breathing can be recommended as a safe, easy-to-perform, and economical non-pharmacological intervention that can be implemented in antenatal care to help control blood pressure and reduce the risk of hypertensive complications during pregnancy.

CONCLUSION

The paired t-test results showed a p-value of 0.000 ($p < 0.05$), thus it can be concluded that walking exercise combined with slow deep breathing has a significant effect on reducing blood pressure in pregnant women with hypertension. This intervention can be a safe, easy-to-do, and effective non-pharmacological therapy alternative in helping control blood pressure during pregnancy.

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