Application Of Slow Deep Breathing On Blood Pressure In Hypertension

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Abstract. Hypertension is a global health problem whose prevalence continues to increase every year. Factors such as age, unhealthy lifestyle, and stress are the main causes of hypertension. One of the effective and easy-to-implement non-pharmacological interventions is Slow Deep Breathing (SDB). SDB can help lower blood pressure by stimulating the parasympathetic nervous system, increasing vasodilation, and reducing peripheral vascular resistance. This study aims to determine the effect of Slow Deep Breathing in lowering blood pressure in people with hypertension. The study design used a pre-experimental one-group pretest-posttest design with 20 respondents selected by purposive sampling. The intervention was carried out for 7 days with a duration of 20 minutes each session. The results of the Wilcoxon test showed a significant decrease in systolic and diastolic blood pressure with a p value = 0.000. Conclusion, Slow Deep Breathing is effective in lowering blood pressure in people with hypertension
Key words: *Slow Deep Breathing,* Blood Pressure, Hypertension

INTRODUCTION

High blood pressure or hypertension is an ongoing health problem. It is a chronic condition with increased blood pressure on the walls of the arteries. This condition makes the heart work harder to distribute blood throughout the body through the blood vessels. (Azizah et al., 2022) Hypertension or high blood pressure is a condition in which the blood flowing through the arteries experiences higher pressure than the normal state of 120/80 mmHg in people. (National Heart Lung and Blood Institute/NHLBI, 2020) Blood pressure is greatly influenced by cardiac output, total peripheral resistance, and arterial stiffness and varies depending on the situation, emotional state, activity and relative health/disease status. In the short term, blood pressure is regulated by baroreceptors (sensors that function to detect blood pressure and volume) which act through the brain to affect the nervous and endocrine systems. Hypertension is one of the main risk factors for cardiovascular disease. Diagnosis of this disease and its treatment depend on accurate blood pressure measurements. (Wahyuni, 2022)

According to the World Health Organization (WHO) in 2021, there are an estimated 1.28 billion cases of hypertension in adults aged 30-79 years worldwide. According to the results of the 2018 Basic Health Research (Riskesdas), the prevalence of hypertension in Indonesia was at 34.1%. However, when compared to the results of the 2023 Indonesian Health Survey (SKI), the prevalence of hypertension in Indonesia has decreased to 30.8%. Hypertension is the disease with the highest prevalence of all non-communicable diseases in Central Java. In 2019, the prevalence of hypertension in Central Java reached 67.46% and continued to increase in the following years. In 2020, hypertension cases reached 72.02%, in 2021 it reached 76.0%, in 2022 it was 76.5% and in 2023 it had reached 70.28% (Central Java Health Office, 2023) According to the Kudus Regency Health Office, hypertension ranks 3rd after arthritis. These results can also be seen from the data on the number of hypertension sufferers in Kudus city, which is 131,423 people with hypertension. Meanwhile, the 3 highest prevalences in Kudus city are in Dawe sub-district with 1.3%, in Kaliwungu with 1.2%, and in Tanjung Rejo with 1.1% (Kudus Health Office 2024) data that the author took from the Dawe Health Center UPTD area, Dawe District, Kudus Regency, the 3 highest are in Cendono village with 17.5%, in Lau with 17%, in Margorejo village with 16.3%.

Hypertension is a chronic condition, which means that if you have suffered from it, you must have regular treatment and if left untreated for a long time, it will cause complications. According to the Ministry of Health (2019), complications that can arise due to hypertension are heart disease, kidney disease, peripheral vascular disease, cerebral (brain) disorders and strokes that lead to death. Efforts to prevent complications can be done by following a healthy diet such as reducing salt and fatty foods, controlling weight, controlling stress levels by quitting smoking and not consuming alcohol, and routinely doing physical activity or exercise (Siwi et al., 2020). Hypertension sufferers often require

regular use of drugs or pharmacological treatment to monitor blood pressure. Pharmacological therapy takes a long time and can cause side effects if used for a long period of time (Purnomo, 2020) Therefore, effective and easy-to-apply non-pharmacological treatments are needed to help lower blood pressure in hypertension sufferers such as massage therapy, meditation, yoga, gymnastics, spiritual emotional freedom technique (SEFT), and deep breathing (Slow Deep Breathing) (Merdekawati et al., 2021) slow deep breathing is one of the non-pharmacological methods that can be used in complementary therapy for patients with high blood pressure.

Slow Deep Breathing is an activity that regulates breathing slowly and deeply, which is done by individuals consciously. The purpose of slow deep breathing therapy is to create calm that can reduce mental burden and stress so that it can lower blood pressure. (Gholamrezaei et al. (2021) This breathing method requires a breathing frequency of less than or equal to 10 times per minute, with a long exhalation. When relaxation occurs, there is an extension of muscle fibers, a decrease in the sending of nerve impulses to the brain, a decrease in brain activity, and other body functions. The relaxation response is characterized by a decrease in pulse rate, respiratory rate, and blood pressure. (Septiawan et al., 2020). Research supporting the application of slow deep breathing in hypertensive patients was conducted by Angga Arfina, Rizka Febrina, Dendy Kharisna at the Rejosari Pekan Baru Health Center entitled "the effect of slow deep breathing on blood pressure in hypertensive patients in the Rejosari Pekan Baru Health Center work area" which was carried out 6-10 times per minute for 10 minutes 2 times a day in 1 week. A total of 30 respondents The results of the study showed that the average systolic blood pressure before and after decreased from 172.7 ± 22.4 mmHg to 157.0 ± 17.2 mmHg. The average diastolic blood pressure decreased before and after from 98.0 ± 6.4 mmHg to 91.2 ± 6.3 mmHg. The difference in average systolic and diastolic blood pressure before and after the intervention was 15.6 mmHg and 6.8 mmHg. The results of the dependent T test obtained a p value of 0.000, meaning that statistically there was a significant difference in blood pressure before and after the slow deep breathing intervention.

METHODS

The design in this study used a pre-experimental one-group pretest-postest design. The sampling technique used Purposive sampling to take a sample of 20 respondents with inclusion criteria (1) Hypertension patients are willing to be respondents (2) Patients follow the entire intervention until completion (4) Patients with young age (25-24 years), middle age (44-60 years) (WHO) (5) Patients who consume medication at least once a day Exclusion criteria are criteria that are not used as research subjects included in these criteria are (1) Clients refuse to be respondents (2) Clients with severe complications (Heart Disease. Stroke. Kidney Disease.) (3) Patients experience dementia or mental disorders.

This study was conducted in Cendono Village, Dawe District, Kudus Regency. The variables in this study were divided into two variables; namely the independent variable and the dependent variable. The independent variable in this study was the application of Slow Deep Breathing. Slow Deep Breathing was given for 10 days for 10 minutes. The dependent variable in this study was a decrease in blood pressure in patients with hypertension. Blood Pressure measurements were taken before the Slow Deep Breathing procedure was performed (pre-test) and re-measured after 10 days of blood pressure (post-test). The dependent variable of this study is the decrease in blood pressure in hypertension patients. Blood pressure measurements were taken before the Slow Deep Breathing action (pre-test) and re-measured after 10 days of blood pressure (post-test)

RESULTS AND DISCUSSION

A general description of respondents can be seen from the following table:

Table 1. Frequency Distribution of Respondents based on Respondent Age (n=20)

Age	Frekuensi	Presentase (%)
26 – 44 Years	11	55%
45 – 56 Years	9	45%
Total	20	100.0

Based on table 4.1, it can be seen that respondents aged 26-44 years were 11 respondents (55%), while respondents aged 45-56 years were 9 respondents (45%). This finding is in accordance with global trends that show an increase in the prevalence of hypertension in productive ages due to unhealthy lifestyles, stress, and other risk factors (Novari & Nisak S, 2024)

Modern lifestyle changes such as high-salt diets, lack of physical activity, and work stress have caused hypertension to be increasingly found in young to middle-aged age groups. This is important because hypertension that occurs at a younger age has a greater risk of causing long-term cardiovascular complications (Yuniar, 2023).

Table.2
Frequency Distribution of Respondents based on gender (n=20)

Gender	Frekuensi	Presentase (%)
Man	9	45,0
Woman	11	55,0
Total	20	100,0

Based on table 4.2, it can be seen that the majority of respondents are male, namely 9 respondents (45%), while respondents who are female are 11 respondents (55%). This finding shows that hypertension is more often found in women in this study sample. This condition is in line with various studies that show differences in the prevalence of hypertension based on gender, which is influenced by biological, hormonal, and social factors.

According to research (Vriend et al., 2024), although men tend to have higher blood pressure at a young age, women experience a more rapid increase in the prevalence of hypertension after the age of 30, especially post-menopause. This is due to a decrease in estrogen levels which play a role in maintaining blood vessel elasticity and blood pressure regulation. Decreased estrogen increases the risk of hypertension and cardiovascular complications in middle to upper-aged women. According to (Nurhayati, 2023) hypertension in women is influenced by estrogen levels. Because women who have not yet reached menopause are protected by the hormone estrogen which plays a role in increasing High Density Lipoprotein (HDL) levels. The estrogen hormone will decrease when women enter old age (menopause) so that women become more susceptible to hypertension.

Table.3
Frequency Distribution of Respondents based on systolic blood pressure (n=20)

	Mean	Median	Minimum	Maximum
Pre Sistole	152.40	153,0	142	169
Post Sistole	125.60	124,0	111	153

Based on table 3 above, it is known that the average pre-systolic value is 152.40 mmHg with the lowest systolic blood pressure being 142 mmHg and the highest systolic blood pressure being 169 mmHg. The average post systole value is 125.60 mmHg with the lowest post systole blood pressure being 153 mmHg, and the highest systole being 111 mmHg.

Table 4
Frequency Distribution of Respondents based on diastolic blood pressure (n=20)

	Mean	Median	Minimum	Maximum
Pre Diastole	92,10	81,85	85	73
Post Diastole	92,00	81,00	98	93

The average pre-diastole value was 92.10 mmHg with the lowest diastolic blood pressure being 85 mmHg and the highest diastolic blood pressure being 73 mmHg. The average post diastole value is 92.00 mmHg with the lowest post diastole blood pressure being 98 mmHg, and the highest diastole being 93 mmHg

Table 5
Wilcoxon Signed Ranks Test blood pressure (n=20)

	Mean	Z	*p value*
Pre-Post Sistolic	10.50	-3.923	0.000
Pre-Post Diastolic	10.00	-3.830	0.000

Based on table 5 of the Wilcoxon sign ranks test results, it is known that Slow Deep Breathing has a significant effect on reducing hypertension with a p value of 0.000 in systolic and a p value of 0.000 in diastolic. . These results indicate that there is a statistically significant difference between pre- and post-intervention systolic blood pressure, with a tendency for blood pressure to decrease after the intervention. Previous studies also support these findings. For example, a study by (Izzati et al., 2021) showed that slow deep breathing significantly reduced systolic and diastolic blood pressure in elderly hypertensive patients with a p value <0.05. Slow deep breathing in hypertension affects the nervous system that controls blood pressure. Slow deep breathing also affects the modulation of the cardiovascular system which will increase fluctuations in the respiratory frequency interval and have an impact on increasing the effectiveness of the baroreflex (a mechanism that regulates blood pressure) and can contribute to lowering blood pressure. Baroreflex will activate the activity of the parasympathetic nervous system which results in vasodilation of blood vessels, decreased cardiac output and results in decreased blood pressure. The advantages of this relaxation therapy are that it can be done independently at home, is relatively easy to do, does not take long to carry out therapy, and can reduce the impact of pharmacological therapy for hypertension sufferers (Ii, et.al 2021).

Slow deep breathing exercises can reduce the production of lactic acid in muscles by increasing oxygen supply, and reduce the oxygen demand in the brain, leading to oxygen balance in the brain. Deep and slow breathing can also stimulate the autonomic nerves which affect the decrease in sympathetic nerves and increase in parasympathetic nerves so that it can cause a decrease in blood pressure. Breathing techniques include breathing exercises and exercises designed to reduce the work of breathing, thereby achieving more controlled and effective ventilation. (Utami Muchtar et al., 2022) Physiologically, the effect of lowering blood pressure through slow deep breathing therapy is explained through several mechanisms. First, slow deep breathing can reduce the activity of the sympathetic nervous system which plays a major role in increasing blood pressure through the process of vasoconstriction and increasing heart rate. With a decrease in sympathetic nerve activity, there is relaxation of the smooth muscles of peripheral blood vessels, causing vasodilation and lowering blood pressure. Second, slow deep breathing increases the activity of the parasympathetic nervous system which plays a role in reducing heart rate (bradycardia) and improving blood pressure regulation through the body's homeostasis mechanism. In addition, slow deep breathing also increases the sensitivity of baroreceptors which function as the main sensors in regulating blood pressure. By increasing the sensitivity of baroreceptors, the body becomes more responsive in lowering blood pressure (Aditya & Syazili Mustofa, 2023)

CONCLUSION

The results of the 10-day study showed a decrease in the average systolic and diastolic blood pressure in respondents. The results showed a p-value = 0.000 in systolic and p-value = 0.000 in diastolic. These results indicate that slow deep breathing therapy can lower blood pressure in hypertensive patients. This technique works by increasing relaxation, reducing the activity of the sympathetic nervous system, and increasing the activity of the parasympathetic system, so that blood pressure decreases naturally

RECOMMENDATIONS
1. For Health workers

The Author Hopes That Health Workers Will Use Slow Deep Breathing As One Of The Interventions In Nursing Care To Lower Blood Pressure

2. For patients or respondents

Researchers hope that patients with hypertension will use Slow Deep Breathing as a therapy for hypertension because Slow Deep Breathing therapy can be done independently and safely .

3. For institutions or further research

For further researchers, it is recommended to conduct further research on the application of Slow Deep Breathing with the development of other methods so that they can observe the impact on reducing hypertension.

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