

Effect of Slow Deep Breathing on Blood Pressure of Elderly Hypertension

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ABSTRACT

Non-pharmacological treatments can include slow, deep breathing therapy this exercise can reduce the heart's workload by increasing oxygen (O₂) supply, resulting in a decrease in heart rate and subsequent reduction in blood pressure. Objective; to analyze the difference in blood pressure before and after administering Slow Deep Breathing therapy to the elderly with hypertension. Methods: The method used was quantitative research with a Quasi-Experimental design. Sampling was conducted using a nonprobability sampling technique. The results of the Shapiro–Wilk normality test showed that the data were normally distributed, so data analysis was continued using a paired t-test. The experimental research sample was drawn using the simple Federer formula for 18 respondents. Results; The results of statistical analysis using a paired t-test on systolic blood pressure before and after the intervention showed that the p-value was 0.000 <0.05, while the diastolic blood pressure before and after also decreased with the same results, with a p-value of 0.000 <0.05. The hypothesis was accepted, so there was a significant difference. Conclusion: There is an effect of administering Slow Deep Breathing therapy on reducing systolic and diastolic blood pressure in elderly hypertensive patients.

Keywords: hypertension; elderly; influence; blood pressure; slow deep breathing

INTRODUCTION

Elderly people are individuals who are 60 years of age or older, which indicates that a person has entered the final stage of the human life cycle. The aging process is a natural stage in human life, which is related to physical health conditions that are susceptible to various diseases due to a decrease in the body's resistance in dealing with external environmental factors (1). Some common non-communicable diseases include hypertension, diabetes mellitus, stroke, arthritis, and gout. One of these diseases, most common in the elderly, is a cardiovascular disorder, namely high blood pressure (2).

Hypertension is a degenerative disease common in the elderly and is non-communicable. This condition can become more serious if accompanied by other diseases or complications, ultimately increasing the risk of illness and death (3). In the elderly, hypertension is generally triggered by the aging process which reduces physiological function, namely a weakening of the heart's ability to pump blood and a reduction in the elasticity of large arteries (4). Stiff arteries can impede the heart's ability to pump blood, causing blood pressure to rise. Several factors contribute to this, including age, gender, family

history, smoking, excess weight, stress levels, physical activity, coffee intake, a high-sodium diet, and alcohol consumption (5).

Complications of hypertension are increasing and can be fatal if not prevented and treated promptly. Middle age (45-54 years) marks the beginning of old age, or pre-elderly, when the body's condition begins to decline, making it highly susceptible to chronic diseases, one of which is hypertension. This is caused by an unhealthy lifestyle during youth which increases the risk of suffering from diseases (6).

In 2020, the number of elderly people in the world reached 1.4 billion people, and is expected to increase to 2.1 billion by 2050. In the Southeast Asia region, the number of elderly people is recorded at 142 million people, and is predicted to increase threefold in the same year (7). In Indonesia, the percentage of the elderly population in 2022 was 11.75%, and there was an increase of 1.27% from the previous year, which was 10.48% (8).

In 2023, the prevalence of elderly people in Central Java was recorded at 13.50% or around 37.54 million people (8). Based on research, the number of elderly people suffering from hypertension in the Sukoharjo District Health Office area reached 87,950 people, with the highest number of cases at the Mojolaban Community Health Center with 14,360 cases. Based on research, the number of elderly people suffering from hypertension in the Sukoharjo District Health Office area reached 87,950 people, with the highest number of cases at the Mojolaban Community Health Center with 14,360 cases (9). The results of interviews and data observations with the Head of the Klaruan Hamlet Posyandu in RW 15, specifically RT 01, 02, and 03, have a total of 62 elderly people. According to the data, 32 of the elderly suffer from hypertension, consisting of 13 men (40.63%) and 19 women (59.38%).

Inadequate treatment of hypertension can lead to complications. In the heart, this condition can lead to heart failure, also known as coronary heart disease. In the brain, it can trigger a stroke. In the kidneys, it can lead to chronic kidney failure, and in the eyes, it can cause vision problems (10). Treatment for hypertension is divided into pharmacological and non-pharmacological therapies. Pharmacological therapy involves administering antihypertensive medications, such as diuretics, adrenergic blockers, or vasodilators (11). Non-pharmacological treatment can be done using the Slow Deep Breathing method (3).

Slow Deep Breathing is a relaxation technique that involves inhaling for 3 seconds and exhaling for 3 seconds. This therapy is performed six times per minute for 15 minutes, totaling 90 deep breaths, twice daily (morning and evening) for three consecutive days (12). Slow Deep Breathing relaxation is offered as an effort to prevent increased blood pressure in people with hypertension. The advantages of this therapy include being able to be done independently at home, being easy to practice, not requiring a long time, and being able to reduce the impact of existing pharmacological therapies (13).

METHODS

The research conducted was quantitative research, a Quasy Experiment type of research, namely the researcher provided treatment with Slow Deep Breathing breathing therapy carried out three times a week. The study used a One Group Pre-Test Post-Test design, where the respondent group received an intervention in the form of Slow Deep Breathing relaxation therapy. According to patient examination data from the Mojolaban Community Health Center from October to December 2024, the number of elderly patients with hypertension in Palur Village was 77. The selected sample met the inclusion criteria. The sampling process in this study was conducted using a nonprobability sampling technique. The research sampling

was a simple experiment using 18 respondents. The sample size was determined using Federer's formula (14), yaitu $(t-1) (n-1) \geq 15$.

The sample was elderly with age categories, early elderly (aged 46-55 years), late elderly (aged 56-65 years) and elderly (over 65 years) (15). The sample meets the following inclusion and exclusion criteria: a. Inclusion criteria: 1) Elderly aged ≥ 46 years, 2) Elderly with hypertension, 3) Respondents who are cooperative in following all activity instructions. 4) Respondents are residents of Klaruan hamlet RT 01, 02 and 03, RW15, 5) Respondents do not routinely consume antihypertensive medication. While the exclusion criteria: 1) Respondents with hypertension accompanied by physical disorders or physical weaknesses such as fractures and deformities, 2) Respondents with chronic diseases such as heart disease or stroke.

The research instruments and materials needed for Slow Deep Breathing therapy are: a) Sphygmomanometer, b) Stethoscope, c) Observation sheet, d) Writing tools (16). The research stages can be seen in Figure 1.

Pretest Treatment Posttes

Experimental Group:



Figure 1. Research Stages Flow

Information:

X : Experimental Group

1 :Blood pressure measurement before Slow Deep Breathing therapy

2 :Blood pressure measurement after Slow Deep Breathing is given

In each Slow Deep Breathing therapy session, participants inhaled deeply for 3 seconds and exhaled deeply for 3 seconds. The therapy was performed six times per minute for 15 minutes, totaling 90 deep breaths, twice daily (morning and evening) for three consecutive days. Then, observations were made on blood pressure before therapy (pretest), then changes in blood pressure that occurred after treatment (posttest) were observed. The research instrument used was the Slow Deep Breathing Standard Operating Procedure (SOP) as a guide for implementing Slow Deep Breathing therapy. The digital sphygmomanometer is a modern and accurate sphygmomanometer that immediately displays numerical results.

RESULTS

This study used a nonprobability sampling technique. The research design was a simple experiment involving 18 respondents. This number is in accordance with the general rule that simple experimental research typically involves 10 to 20 respondents (17). Respondent characteristic data is grouped according to gender, age, educational level history, and employment history which can be seen in tables 1.

Table 1. Frequency Distribution of Respondents Based on Gender, Age, and Education Level

Characteristics	According to Description	Frequency	Percentage (%)
Gender	Male	7	39%
	Women	11	61%
Age	Early elderly (45-55 years old)	2	11%
	Late Elderly Age (56-65 years)	4	22%
	Age of seniors (> 65 years)	12	67%
Education Level	No School	6	33,5%
	People's Schools	1	5,5%
	Elementary School	9	50%
	Junior High School	1	5,5%
	High School/Vocational School	1	5,5%

(Recapitulation data, 2025)

Respondent characteristics according to gender, the results obtained were as many as 7 or (39%) respondents were male, and as many as 11 (61%) respondents were female. According to age group, the results obtained were early elderly (45-55 years) as many as 2 (11%) respondents, late elderly (56-65 years) as many as 4 (22%) respondents, and elderly (>65 years) as many as 12 (67%) respondents. According to education level, the results obtained were as many as 6 (33.5%) respondents who did not attend school, as many as 1 (5.5%) respondents attended elementary school, as many as 9 (50%) respondents attended elementary school, as many as 1 (5.5%) respondents attended junior high school, and as many as 1 (5.5%) respondents attended high school/vocational school.

Tabel 2. Frequency of Blood Pressure Data of Pre-Intervention Respondents

Pre-intervention blood pressure	N	Min	Max	Mean
Sistole	18	134	185	154,33
Diastole	18	76	107	88,50

(Recapitulation data, 2025)

Based on the frequency of blood pressure data for hypertensive elderly people pre-intervention in the normality test with N = 18 respondents, it can be seen in Table 2. The average blood pressure data for hypertensive elderly people pre-intervention I Slow Deep Breathing was 154.33/88.50 mmHg.

Meanwhile, based on the frequency of blood pressure data for post-intervention respondents in the normality test with N = 18 respondents, it can be seen in Table 3. The average blood pressure data for hypertensive elderly people post-intervention III Slow Deep Breathing was 136.67/79 mmHg.

Tabel 3. Frequency of Blood Pressure Data of Post-Intervention Respondents

Post-intervention blood pressure	N	Min	Max	Mean
Sistole	18	117	165	136,67
Diastole	18	66	94	79,00

(Recapitulation data, 2025)

During the intervention, some respondents' blood pressure decreased, increased, or remained the same. Based on pre- and post-intervention 1, there were 4 respondents whose blood pressure increased and 14 respondents whose blood pressure decreased. In intervention 2, there were 2 respondents whose blood pressure increased and 16 respondents whose blood pressure decreased. In intervention 3, there were 3 respondents whose blood pressure increased and 15 respondents whose blood pressure decreased. The normality test used Sapirowilk because the number of respondents was less than 50 and the data was normally distributed, so the technical data analysis used the paired t-test.

Tabel 4. Results of Bivariate Analysis of Pre and Post Intervention Blood Pressure of Slow Deep Breathing Therapy

Blood pressure	Min (mmhg)	Max (mmhg)	Value <i>p</i>
Pretest Systolik	134	185	0,00
Pretest Diastolik	76	107	0,00
Posttest Systolik	117	165	0,00
Posttest Diastolik	66	94	0,00

(Recapitulation data, 2025)

The results of the paired sample t-test for systolic blood pressure before and after intervention obtained a significance value or p-value of $0.000 < 0.05$, while for diastolic blood pressure before and after intervention were also the same, with a significance value or p-value of $0.000 < 0.05$. The hypothesis is accepted, there is a significant difference, meaning there is an effect of the therapy. The difference in blood pressure can be seen in the graph of the decrease in hypertension classification before and after intervention as seen in Figure 2 below.

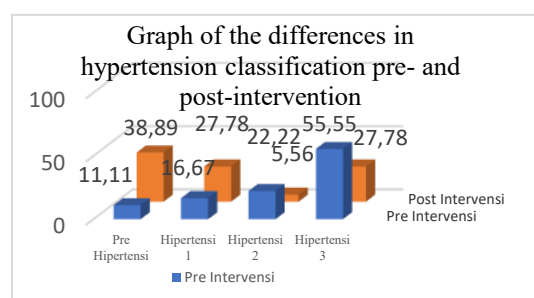


Figure 2. Graph of the Decrease in Hypertension Classification Pre and Post Intervention

DISCUSSION

Hypertension is a form of cerebrovascular system disorder, in the form of obstruction of the cerebrovascular blood vessels, resulting in a decrease or obstruction of the supply of oxygen and nutrients to brain tissue (18). The use of antihypertensive drugs has many side effects that can be detrimental to the body, one of which is increased urine excretion by

thiazide diuretics causing hypokalemia, hyponatremia, and hypomagnesemia (19). Pharmacological treatment with the antihypertensive drug Amlodiphine, despite its high effectiveness and efficiency, should only be used once daily. Hypertensive patients who have been taking antihypertensive drugs for at least one year may experience side effects that manifest as oral complaints, such as mouth ulcers, bleeding gums, swollen gums, and dry mouth (20). Another alternative treatment is carried out non-pharmacologically, namely with Slow Deep Breathing.

The relevance of this Slow Deep Breathing research is in accordance with research conducted by (12), Slow Deep Breathing therapy is very effective in lowering blood pressure in elderly people with hypertension, the only difference is that the sample used by Adinda is only 2 respondents. In Slow Deep Breathing therapy carried out on Mrs. S, it can reduce blood pressure from 155 / 90 mmhg to 130/80 mmhg, and for Mr. H from blood pressure of 150 / 90 mmhg to 140 / 90 mmhg, Mrs. S and Mr. H's blood pressure decreased. Although there are slight differences in the form of Slow Deep Breathing therapy intervention, namely when inhaling deeply through the nose for 3 seconds until the chest is lifted maximally, keeping the mouth closed during inspiration, and holding the breath for 3 seconds and exhaling slowly through the mouth for 6 seconds. Relaxation therapy is applied 6 times, within 15 minutes, a total of 90 deep breaths, done twice a day (morning and evening) for 3 days.

According to (21), Slow Deep Breathing Relaxation is a breathing relaxation that is done calmly and consciously, the goal is to regulate breathing slowly, with a relaxed upright position that results in a relaxing effect. Slow Deep Breathing is very suitable to do, because it is easy to imitate and can be done anytime for 16-19 minutes, and by anyone. According to (22), the breathing technique known as short-term breathing relaxation (Slow Deep Breathing) uses a supportive mood and a breathing frequency that is the same or less than 7 minutes. During relaxation, muscle fibers stretch, nerve impulses sent to the brain decrease, brain activity decreases, and body activities such as heart rate, number of breaths, and blood pressure decrease.

The reason for administering Slow Deep Breathing relaxation to the elderly in this study was because elderly people with high blood pressure rarely comply with treatment, the medication tastes bitter, they have difficulty swallowing medication, are concerned about cost, feel better, and are unaware of the risks that will arise, which can result in uncontrolled blood pressure. If used long-term, it can cause complications such as cardiovascular disease, atherosclerosis, heart failure, stroke, and kidney failure. People with high blood pressure who stop taking their medication are five times more likely to have a stroke. Deep breathing, a type of relaxation therapy, will reduce sympathetic nerve activity by increasing central rhythm inhibition (12).

Hypertension is a major contributing factor to death from stroke. Its presence often goes unnoticed, leaving some people feeling healthy enough to carry out their normal activities (23). If not treated with appropriate medication, this condition can exacerbate the risk of myocardial infarction. Furthermore, hypertension can potentially lead to disability and emotional disturbances. Non-pharmacological therapy, a combination of Spiritual Emotional Freedom Techniques and Slow Deep Breathing, has been shown to lower blood pressure, thereby helping prevent complications of hypertension (24).

Non-modifiable (uncontrollable) risk factors for hypertension, including age, gender, race, family history, and genetics, are beyond an individual's control and are difficult, if not impossible, to prevent. Meanwhile, modifiable (controllable) risk factors include obesity, excessive salt consumption, lack of physical activity, a high-fat diet, smoking, alcohol consumption, and others (25). Several other factors that can cause high blood pressure include lifestyle, stress, genetics, excessive salt intake, diabetes, obesity, and others. High blood pressure can be a serious threat if not properly managed. Hypertension can be managed through pharmacological and non-pharmacological therapies, but medical treatment alone is considered ineffective because it often triggers relapses and has the potential for dangerous long-term side effects.

CONCLUSION

Based on the results of statistical analysis using paired t-test on systolic blood pressure before and after intervention, the p-value was $0.000 < 0.05$, while for diastolic blood pressure before and after also decreased with the same results, with a p-value of $0.000 < 0.05$. The hypothesis is accepted, so there is a significant difference. The provision of Slow Deep Breathing therapy has an effect on reducing systolic and diastolic blood pressure in elderly with hypertension in RW 15 Dusun Klaruan, Mojolaban Community Health Center Working Area.

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