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Effect Of Progressive Muscle Relaxation Therapy And Slow Deep Breathing On Blood Pressure Of Elderly With Hypertension

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ABSTRACT

Hypertension is one of the degenerative diseases that often appear in the elderly. This starts with a person's inability to control or maintain a stable condition of blood pressure in the body. The frequent visits of the elderly to the elderly Posyandu in Janti village with complaints and blood pressure above normal reflect the lack of efforts of the elderly in controlling or stabilizing blood pressure in the body. The aim of the study was to determine the effect of progressive muscle relaxation therapy and slow deep breathing on hypertension elderly blood pressure.

Research design Like an experiment with a sample of 62 elderly people with hypertension, selected by purposive sampling technique which was then divided into 2 groups, 31 people in the treatment group were given a combination of progressive muscle relaxation and slow deep breathing, and 31 people in the control group were given therapy slow deep breathing. Data analysis used the Paired T-Test and Independent T-Test.

The results of the study in the treatment group before being given the intervention obtained an average of 146.00 mmHg systolic, 91.52 mmHg diastolic (degree 1 hypertension). Independent T-Test analysis found on systolic and diastolic blood pressure, pulse value $\rho = 0.000 < \alpha = 0.05$, meaning that there is a combination effect of progressive muscle relaxation and music therapy on blood pressure and pulse.

Progressive muscle relaxation therapy and slow deep breathing can reduce blood pressure in elderly people with hypertension. It is hoped that this therapy can be used as a non-pharmacological therapy to help lower blood pressure in hypertensive patients in addition to using pharmacological therapy.

Keywords: Elderly, Hypertension, Progressive Muscle Relaxation, Slow Deep Breathing

INTRODUCTION

The aging process that affects physical changes, endurance, to balance control in conditions of physiological and psychic stress in the body can result in the emergence of degenerative diseases. Hypertension is one of the degenerative diseases that often appears in the elderly. This starts from a person's inability to control or treat the condition of blood pressure in a stable body. The frequent visits of the elderly at the janti village elderly posyandu with complaints and blood pressure above normal reflect the lack of efforts of the elderly in controlling or stabilizing blood pressure in the body. The

impact of inability to control blood pressure in hypertension in the elderly can trigger the risk of heart attack, stroke, and kidney failure ((Hesti Despita Siregar et all, 2021).

The prevalence of hypertension is predicted to continue increase significantly in 2025 around 29% of hypertension sufferers, where in Southeast Asia including Indonesia, the cause of death for non-communicable diseases occurs 49.7%, one of which is hypertension. In Indonesia, it is estimated that the number of hypertension cases is 63,309,620 people, while the death rate in Indonesia due to hypertension is 427,218 deaths. Hypertension occurs in the age group of 35-44 years (31.6%), age 45-54 years (45.3%), age 55-64 years (55.2%) age 65-74 (63.2%), age ≥ 75 years (69.5%). Cardiovascular disease conditions occur with age due to decreased elasticity of arterial walls and systemic vascular stiffness due to the aging process. The prevalence of hypertension based on the results of measurements in the population aged ≥18 years in East Java Province was 36.32%, this prevalence increased when compared to 2013 of 26.2% (Riskesdas Jatim, 2018). The prevalence in Sidoarjo regency is 7.52% at the age of ≥ 15 years, namely 562,203 residents, with the proportion of men and women almost balanced, 50%-50%. Based on a preliminary study conducted by the researchers in the work area of the elderly posyandu in Janti Village, Kec.Tulangan, Sidoarjo Regency in August 2022, it was found that the Janti village elderly posyandu consisted of 4 posts from a total of 4 elderly posts that actively participated in the elderly posyandu, namely 171, in the age range of 60-74 years, namely 33 elderly, where 33 elderly people were found to have systolic blood pressure ≥ 120 - ≥ 160 mmHg which indicates the incidence of prehypertensive to hypertension.

Increased blood pressure in arteries can occur through several ways, namely the heart organ pumps more blood fluid so that it drains more fluid every second, large arterial vessels will lose their flexibility and will become stiff so that the walls of blood vessels cannot expand when the heart pumps blood through the arteries. The blood flowing at each heart rate is forced to go through a narrower wall of vessels than usual and causes a rise in blood pressure. This phenomenon occurs in the elderly, where the walls of the arteries have thickened and stiffened due to arteriosclism (Megawati, 2020). Narrowing of blood vessels due to high blood pressure can lead to reduced blood flow and oxygen to tissues and can result in microinfarction in tissues. Lack of blood pressure control can result in severe complications of hypertension to death due to obstruction and rupture of blood vessels in the brain (Megawati, 2020).

There are complications in vital organs such as the heart, brain or kidney organs. Symptoms caused by hypertension, such as dizziness, headache, and visual impairment often occur during hypertension in old age when blood pressure has reached a certain meaningful number (Masniari Putri, Ludiana, 2022). According to (Hesti Despita Siregar et all, 2021) explained that the increase in non-communicable diseases such as high blood pressure (hypertension) is driven by four main risk factors, namely unhealthy diet, lack of physical activity, tobacco use and harmful alcohol use. Although in this case there are some factors that cannot be controlled such as gender, heredity, and age.

One form of efforts to control the prevention of non-communicable diseases (hypertension) is by using pharmacological and non-pharmacological treatments. Pharmacological therapy is a treatment using drugs that can stabilize and reduce blood pressure. The continued use of pharmacological therapy can also have side effects, this is because the response to a type of drug is different. Some side effects that may arise such as headaches, dizziness, weakness, and nausea (Murhan, Purbianto and Sulastri, 2022). In addition to the side effects of this treatment, it also requires expensive costs, a long time and can increase boredom, resulting in incompliance with therapy (Murhan, Purbianto and Sulastri, 2022). One alternative is to use non-farmakology therapy where this can reduce blood pressure without drug dependence and side effects (Pratiwi, 2020). Non-pharmacological therapy aims to lower blood pressure and control risk factors for complications, where non-pharmacological methods play an important role in the stress management process. Many things that can be done include increasing stress immunity by regulating lifestyle, exercise, not smoking, reducing salt intake, maintaining diet, and relaxation (Pratiwi, 2020). One form of relaxation that can be used in lowering blood pressure is progressive muscle relaxation and slow deep breathing.

In general, progressive muscle relaxation techniques aim to invite individuals to focus their attention and carry out relaxation activities of the muscles and breathing so that they can cause a response to decreased activity of the sympathetic nervous system and increase parasympathetic nerve activity so that vasodilation of the diameter of arterial vessels, decreased contractility of the heart muscle, and decreased cardiac output so that there is a decrease in blood pressure (Setyaningrum, Permana and Yuniarti, 2018). Research conducted previously by (Masniari Putri, Ludiana, 2022) found

that there was an effect of progressive muscle relaxation exercise on decreasing systolic blood pressure in people with primary hypertension, but there was no significant effect on decreasing diastolic blood pressure. The previous research on slow deep breathing relaxation conducted by (Pratiwi, 2020) found that there was an effect on reducing blood pressure in hypertensive patients. Based on the previous research above, researchers are interested in combining progressive muscle relaxation techniques with other techniques, namely slow deep breathing relaxation, which is expected to have a more effective influence on reducing blood pressure among the elderly. This is also continuous with the absence of studies that combine the two therapies.

Based on the phenomenon described in the background accompanied by related data, researchers are interested in researching more about the effect of progressive muscle relaxation with slow deep breathing techniques on the blood pressure of elderly with hypertension.

METHODS

This type of research is Quasy-Experiment or pseudo-experiment. This type of research seeks to analyze the relationship between parental assistance and the level of asancy in young women. In the type of research that emphasizes the time of measurement or observation only once, in the same period (Nursalam, 2013). This study used a pretest-posttest control group design that used a treatment group and a control group, where both groups of subjects were randomly selected. This study aims to determine the effect of the combination of progressive muscle relaxation with slow deep breathing on the blood pressure of the elderly in Janti Village, Tulangan, Surabaya. In this study, the treatment group or experiment will be given a combination intervention of progressive muscle relaxation and slow deep breathing, while in the control group one treatment is given, namely slow deep breathing.

The population in this study was 171 elderly in the work area of the Posyandu Lansia Desa Janti Tulangan Sidoarjo. The sample size in this study was 62 elderly people with hypertension. The sample consists of a section of the affordable population that can be used as a research subject through sample. The method used in sample sorting is non-probability samples, where not all respondents in the population get the opportunity or have the same opportunity to become research samples, with a type of purposive sampling technique, which is a sample sorting technique based on certain opinions or considerations from researchers that are adjusted to the criteria that have been determined by the researcher. This research has been ethically approved by the research ethics committee of the Chakra Brahmanda Lentera Institute with No. 003/011/EC/KEP/LCBL/2023.

After determining the strata randomly or randomly. Furthermore, the identity (name of the elderly) is written on a piece of paper, placed in a box, stirred and taken randomly by 62 respondents after all are collected (Nursalam, 2013). The identity (name of the female student) who has been selected is re-recorded to be used as a sample in the study. After the data is processed, the next step of the data is analyzed, the Data analysis used the Paired T-Test and Independent T-Test.

RESULTS

General research data includes characteristics of respondents based on gender, age, hereditary history of hypertension, smoking habits and consumption of hypertension medication.

a. Characteristics of Respondents Based on Age

Age	Treatment Group		Control Group	
	n	(%)	n	(%)
45-54 Years	11	35.5	6	19.4
55-65 Years	1 9	61.3	21	67.7
66-74 Years	1	3.2	4	12.9
Total	31	100 . 0	31	100 . 0

Table 1 shows that the majority (61.3%) of the respondents in the treatment group were aged 55-65 years and the majority (67.7%) in the control group were aged 55-65 years, where the respondents were elderly.

b. Characteristics of Respondents Based on Gender

Gender	Treatment Group		Control Group	
	n	(%)	n	(%)
Male	12	38.7	12	38.7
Female	1 9	61.3	19	61.3
Total	31	100 . 0	31	100 . 0

Primary Data Sources, 2022

Table 2 shows that the majority (61.3%) of respondents in the treatment group were female and the majority (61.3%) in the control group were female.

c. Characteristics of Respondents Based on Family History of Hypertension

Hereditary History of Hypertension	Treatment Group		Control Group	
	n	(%)	n	(%)
Yes	14	45.2	14	45.2
No	17	54.8	17	54.8
Total	31	100 . 0	31	100 . 0

Table 3 shows that the majority (54.8%) of respondents in the treatment group did not have a hereditary history of hypertension and the majority (54.8%) in the control group did not have a hereditary history of hypertension.

d. Characteristics of Respondents Based on Smoking Habits

Smoking habit	Treatment Group		Control Group	
	n	(%)	n	(%)
Yes	10	32.3	10	32.3
No	21	67.7	21	67.7
Total	31	100 . 0	31	100 . 0

Table 4 shows that the majority (67.7%) of respondents in the treatment group do not have a smoking habit and the majority (67.7%) in the control group do not have a smoking habit.

e. Characteristics of Respondents Based on Hypertension Drug Consumption

Consuming Hypertension Medication	Treatment Group		Control Group	
	n	(%)	n	(%)
Yes	21	67.7	19	61.3
No	10	32.3	12	38.7
Total	31	100 . 0	31	100 . 0

Table 5 shows that the majority (67.7%) of respondents in the treatment group took hypertension medication and the majority (61.3%) in the control group consumed hypertension medication.

f. The blood pressure of hypertensive elderly before progressive muscle relaxation therapy and *slow deep breathing* in the treatment group and control group can be seen in table 6 below:

Group	Mean	elementary school	S.E	95%CI	n	*P Value*
Systolic Treatment	146.00 _	11.21	1 . 12	49.97-58.99	31	0.0731
Systolic Control	146.97	10.83	1 . 94	51.44 – 60.10	31	
Diastolic Treatment	91.52	5.64	5.64	49.93-59.02	31	0.0817
Diastolic Control	91.19	5.30	0.95	51.40 – 60.14	31	

Based on table 6 above , the mean value for the systolic treatment group is 146.00 and diastolic with a standard deviation for the systolic treatment group of 11.21 and 91.52 for diastolic, while the control group mean for systolic is 146.97 and diastolic 91.19 with a standard deviation for systolic 10.83 and diastolic 5.30. The results of data analysis show p = 0 . 001 which means that there is a difference between the mean systolic and diastolic blood pressure in the treatment and control groups before progressive muscle relaxation therapy and *slow deep breathing.*

g. The blood pressure of hypertensive elderly after progressive muscle relaxation therapy and *slow deep breathing* in the treatment group and control group can be seen in table 7 below:

Group	Mean	elementary school	S.E	95%CI	n	*P Value*
Systolic Treatment	126.52	9.60	1 . 72	41.54 – 49.94	31	0.0001
Systolic Control	145 .87	10.83	1 . 94	51.22 – 59.41	31	
Diastolic Treatment	80.77	6.67	1.19	41.53 – 49.95	31	0.0001
Diastolic Control	89.45	5.30	0.96	51.19 – 59.45	31	

Source: Primary Data, 2022

Based on table 7 above , the treatment group mean systolic value is 126.52 and diastolic 80.77 with a standard deviation for the systolic treatment group of 9.60 and diastolic 6.67 , while the control group mean systolic 145.87 and diastolic 89.45 with a standard deviation for systolic 1.94 and diastolic 0.96. The results of data analysis show p = 0 . 001 which means that there is a difference between the mean systolic and diastolic blood pressure in the treatment and control groups after progressive muscle relaxation therapy and *slow deep breathing.*

h. The effect of Progressive Muscle Relaxation Therapy and *slow deep breathing* on the blood pressure of elderly people with hypertension in the treatment group and control group can be seen in table 8 below:

Variable	Group	Mean	elementary school	S.E	95%CI	t	*pValue*
Systolic Blood Pressure	**Ex. Treatment**						
	Pre Test	146.00	11,219	2,015	(16,903)-	15,415	0,000
	Post Test	124.52	9,602	1,725	(22,065)		
	Ex. Control						
	Pre Test	146.97	10.83	1,946	(-0.017) –	2,011	0.053
	Post Test	145.87	10.33	1,856	(2.211)		
Diastolic Blood Pressure	**Ex. Treatment**						
	Pre Test	91.52	5,644	1,014	(8,891) –	11,852	0,000
	Post Test	80.77	6,672	1,198	(12,593)		
	Ex. Control						
	Pre Test	91.19	5,300	0.952	(0.251–	2,385	0.024
	Post Test	89.45	5,309	0.963	(3.233)		

Based on table 8 above , the mean value for the treatment group is 146.00 and the mean after therapy is 124.52. For the control group the mean was obtained based on before therapy 146.97 and after therapy 145.87. The results of data analysis for the treatment group showed a p value = 0.000 which means that there is a difference in the average (mean) between before and after progressive muscle relaxation therapy and *slow deep breathing*, while the control group shows a value of $p = 0.053$ and $p = 0.024$, which means that there is no difference in the average (mean) before and after .

DISCUSSION

Based on table 6, it shows that blood pressure before giving a combination of progressive muscle relaxation and slow deep breathing in the treatment group averaged systolic blood pressure obtained 146.00 mmHg which means hypertension degree 1, the average diastolic blood pressure is 91.52 mmHg which means hypertension degree 1. In the control group, an average of 146.97 mmHg of systolic blood was obtained which was categorized in degree 1 hypertension, the average diastolic blood pressure was obtained 91.19 which can be categorized in degree 1 hypertension.

In this study, the increase in blood pressure in people with hypertension was due to several factors including age, gender, hereditary history, and cigarette consumption habits (Mayasari et al. , 2019). According to researchers, the factor that influences the increase in blood pressure at the Janti Village Elderly Posyandu is a bad habit, this is evidenced by the fact that there are still many people with hypertension who practice smoking. In addition, a person's hereditary (genetic) medical history can influence the occurrence of hypertension.

A total of 62 respondents were 38 female respondents. Women tend to be at risk of hypertension when compared to the male sex because in middle and older age the incidence of women experiencing hypertension will increase, because after women experience menopause (which occurs at the age of ± 50 years) the function of sex hormones in women begins to decline, namely the hormone esterogen (Fadlilah, Hamdani Rahil and Lanni, 2020). According to researchers, the number of women who experience hypertension is closely related to the incidence of pre-menopause where esterogen hormone levels begin to decrease so that risk factors for hypertension in women are higher.

Of the 62 respondents, 19 respondents suffering from hypertension were aged 55-65 years. In adults, the physiological effects of age can affect the cardiovascular system, namely changes in age, the change in a person's age will affect changes in the heart, namely an increase in contraction and relaxation time of the heart muscle, an increase in the strength of the heart muscle, this can cause blood pressure and pulse pressure in the addition of age increases (Hall, 2020) . According to researchers, the increase in age causes the elasticity of peripheral arteries to increase so that the arteries thicken, the narrowing of blood vessels becomes stiff, so that as they get older, the risk of hypertension occurs.

Showing blood pressure after a combination of progressive muscle relaxation and slow deep breathing in the treatment group obtained an average systolic blood pressure of 126.52 mmHg which is meaningful or included in the prehypertensive category, the average diastolic blood pressure is 80.77 which is included in the prehypertensive category. In the control group after the intervention, the average systolic blood pressure was obtained 145.87 which was included in the category of hypertension of degree 1, the average diastolic blood pressure of 90.55 was included in the category of hypertension of degree 1.

This is supported by the theory put forward (Murhan, Al, Purbianto, 2020) explaining that progressive muscle exercise can produce a response that can reduce stress, thus when doing progressive muscle relaxation by relaxing, calm and full concentration for 30 minutes, there will be a decrease in the secretion of CRH (Cotricotopin releasing hormone) and ACTH (Adrenocorcotropic Hormone) hormones in the hypothalamus decrease in both hormones will decrease sympathetic nerve activity So that the production of adrenaline and non-adrenaline will be reduced, dilation of blood vessels, reduced resistance in blood vessels and decreased pumping of the heart.

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Slow deep breathing will increase cardiopulmonary stretching due to the body's response to deep breathing. Wherein, the stimulus of carotid sinus stretching and aortic diarchus is received and passed on to the vagus nerve to the medulla oblongata (cardiovascular center). Furthermore, baroreceptor reflexes will be stimulated and there is an increase in reflexes until impulses are sent to the heart and stimulate parasympathetic activity and inhibit sympastic nerve activity. During the course of the therapy method, this fills the chest and abdominal cavities completely resulting in intrathoracic pressure in the lungs. Thus causing an increase in oxygen levels in body tissues, and the mechanism of action plays a role in lowering blood pressure (Suranata et al. , 2019) .

Based on the results of the study of systole blood pressure in the treatment group before and after the initial intervention, an average of 146.00 mmHg, which was included in the category of grade 1 hypertension, decreased on average to 124.52 mmHg which was included in the category of prehypertensive hypertension. In the control group before and after the initial systole blood pressure intervention, an average of 146.97 mmHg was obtained which was included in the category of 1st degree hypertension and experienced an average decrease of 145.87 mmHg which was included in the category of degree 1 hypertension.

The diastole blood pressure value of the treatment group before and after the intervention was obtained an average of 91.52 mmHg which was included in the category of firstdegree hypertension, decreased on average to 80.77 mmHg which was included in the prehypertensive category. In the control group before and after the initial intervention, an average of 91.19 mmHg which was included in the category of degree 1 hypertension, decreased on average to 89.45 which was included in the prehypertensive category.

After analysis of the paired T – Test test showed a difference in the average blood pressure (pre-post) of progressive muscle relaxation therapy and slow deep breathing in the treatment and control groups, obtained in the systolic and diastolic blood pressure treatment group with $p = 0.000$ values. In the systolic blood pressure control group, a value of $p = 0.053$ and diastolic blood pressure with a value of $p = 0.024$ were obtained . With an indigo of $\alpha < 0.05$ which means $p < \alpha$, Ho was rejected, meaning that there was a significant difference in blood pressure values before and after progressive muscle relaxation therapy and slow deep breathing in the treatment and control groups.

In the control group there was a decrease before the administration of therapy and after the administration of therapy (Slow Deep Breathing). The average decrease occurs in systolic and diastolic blood pressure. The decrease occurred but did not occur significantly as evidenced by the results of the T-Paired test exceeding the value of $P > \alpha$, $P > 0.05$.

After the Independet T-Test analysis showed a comparison of systolic and diastolic blood pressure values in the treatment group and control group after the administration of progressive muscle

relaxation therapy and slow deep breathing obtained a p value = 0.001 besides that the α < value of 0.05 which means p < α, then Ho was rejected, meaning that there is an influence of progressive muscle relaxation therapy and slow deep breathing against blood pressure and pulse in the treatment and control groups.

The results of the study above are supported by research conducted by (Waryantini and , Reza Amelia, 2021) with the title the effect of Progressive Muscle Relaxation on Blood Pressure in the Elderly with Hypertension, with the results of the study there is an influence of progressive muscle relaxation on blood pressure in the elderly with hypertension (p value = 0.0001) in the treatment group, while in the control group there is no influence. Likewise with the research conducted by (Izzati, Kurniawati and Dewi, 2021) entitled The Effect of Slow Deep Breathing on Blood Pressure in Hypertension Sufferers, with the results of the study there was an influence of slow deep breathing on the blood pressure of elderly people with hypertension obtained a p-value of 0.000 (p < 0.05).

Non-pharmacological therapies recommended in lowering blood pressure include progressive muscle relaxation and slow deep breathing (Hasina, S. N., & Khafid, M., 2020). These two therapies will be better when done simultaneously because they provide a more optimal effect in lowering blood pressure (Hesti Despita Siregar et all et al. , 2022). When a person performs progressive muscle relaxation by relaxing, calm and full of concentration for 30 minutes, there will be a decrease in hormones in the hypothalamus, where the hormones will decrease sympathetic nerve activity so that the production of adrenaline and nonadrenaline will be reduced. Such a condition will help lower blood pressure. The provision of slow deep breathing therapy is effective in stabilizing or controlling blood pressure when done for 10-15 minutes with every minute 5 cycles (Antari et al. , 2016).

Researchers argue that one of the non-pharmacological therapies that can be done to control hypertension is with a combination of progressive muscle relaxation and slow deep breathing. Where progressive muscle relaxation aims to lower muscle tension so that the muscles become more relaxed and concentrate muscle contractions on certain muscles carried out by the muscles of the hands, arms, shoulders, face, neck, back, abdomen to legs, so that a person will get a feeling of relaxation. This relaxation is combined with slow deep breathing, which affects the work of the sympathetic nerves, and the supply of oxygen to the brain so that it affects the mind to be calmer, more relaxed (Hasina, S. N., Sukartini, T., & Setiyowati, E. (2019).

This feeling of relaxation that will cause the blood pressure of people with hypertension will decrease. For the degree of influence to highlight the results in the treatment group when compared to the control group this can be related to the time of administration or the distance (session) between the group and the control group. The more routine the time of therapy, the more it will affect blood pressure.

CONCLUSION

There is an influence of progressive muscle relaxation therapy and slow deep breathing on blood pressure in elderly people with hypertension.

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