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Effect of Elderly Exercise on Blood Pressure of Hypertensive Elderly

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ABSTRAC T

Blood pressure can increase when one is aged 45 – 55 years old. The artery walls become thick due to the collagen accumulation in the muscle layers. As a result, the blood vessels will gradually narrow and become rigid. Elderly exercise is a mild exercise. It is easy to do without burdensome, which is dedicated to the elderly. The objective of this research is to analyze the effect of the elderly exercise on the blood pressure of the hypertensive elderly at Kalikejambon Village, Tembelang District, Jombang Regency.

This research used the quasi experimental method with the pre-post test design. The population of this study were elderly people with hypertension in Kalikejambon Village, Tembelang District Jombang Regency. The sample in this study amounted to 32 respondents who were divided into treatment groups and control groups. The data of research were analyzed by using the t-test.

There was an effect of the elderly exercise on the systolic blood pressure and dyastolic blood pressure of the hypertensive patients as indicated by the p-value = 0.000.

The health workers are required to conduct socialization and training of he elderly exercise need to socialize and train the performance skill of exercise elderly. So, they can manage the elderly whom have hypertension by using non-pharmacological management to control blood pressure on hypertensive patients.

I. INTRODUCTION

Hypertension or high blood pressure is a systolic pressure of more than 140 mmHg and a diastolic blood pressure of more than 90 mmHg. Hypertension is a multifactorial disease that arises due to the interaction of various factors. Increasing age will cause some physiological changes, in the elderly there is an increase in peripheral resistance and sympathetic activity. Blood pressure will increase after the age of 45-55 years, arterial walls will experience thickening by the buildup of collagen substances in the muscle layer, so that blood vessels will gradually narrow to become stiff [1].

The elderly are part of family members and community members whose numbers are increasing in line with the increase in life expectancy. The number of elderly people increased throughout Indonesia to 15.1 million people in 2000 or 7.2% of the entire population with a life expectancy of 64.05 years. In 2006 life expectancy increased to 66.2 years and the number of elderly people to 19 million people, and it is estimated that in 2020 it will be 29 million people or 11.4%. This shows that the number of elderly people consistently increases from time to time [2].

According to the East Java Provincial Health Office, the prevalence of essential hypertension cases in East Java Province in 2011 was 1.96%, a decrease compared to 2010 which was 2.00%. Most people with hypertension are in rural areas compared to urban areas with a prevalence of 31% vs. 23.7%. This may be due to a lack of awareness, public knowledge to maintain health and unhealthy lifestyle behaviors. High blood pressure is considered to increase the risk factors for Coronary Heart Disease (CHD) because high blood pressure will damage the walls of the arteries and accelerate the process of thickening (atherosclerosis) and narrow the arteries.

Recent studies have shown that the combination of non-drug therapy (non-pharmacotherapy) with drugs (pharmacotherapy) not only lowers blood pressure, but also reduces the risk of stroke and ischemic heart disease. Therapy with drugs can be done by giving antihypertensive drugs, while for therapy without drugs it can be done by exercising regularly.

Gymnastics for the elderly is a light exercise that is easy to do, not burdensome, which is applied to the elderly. Gymnastics activities for the elderly help the body to stay fit and fresh because it trains bones to stay strong, encourages the heart to work optimally and helps eliminate excessive free radicals in the body [3]. Research [4] on the effect of elderly exercise on the blood pressure of the elderly with hypertension in the elderly exercise group in Banjarkaja Sesetan, South Denpasar, only used one sample group, blood pressure measurements were only carried out at the first meeting as a pretest and the sixth meeting as a post test, so it is necessary to examine the effectiveness of elderly exercise on blood pressure in the elderly with hypertension.

Preliminary studies that have been carried out obtained data on the high incidence of hypertension in Kalikejambon Village, the working area of the Tembelang Health Center in 2020, there were 118 elderly people with hypertension. The Tembelang Health Center oversees several elderly Posyandu, which in the implementation of their activities have not realized elderly gymnastics. Therefore, from the phenomenon above, researchers are interested in examining the effect of elderly exercise on blood pressure in elderly hypertension in Kalikejambon Village, Tembelang District, Jombang Regency. This research will be conducted by assessing blood pressure before and after elderly exercise in a period of two months once a week.

II. METHOD

The design used in this study was "Quasi experimental pre-post test" involving the control group and the intervention group. The research was conducted to determine changes in blood pressure before and after being given elderly exercise. Assessment or observation in research using this design will be carried out twice, namely before and after the experiment (pre and post test). The difference between pre and post test is considered the effect of treatment [5].

III. RESULTS AND DISCUSSION

The study was conducted on 32 respondents who were divided into 16 respondents who did not do elderly exercise and 16 respondents who did elderly exercise. Data collection was carried out for 8 weeks. Data collection was carried out 30 minutes before the elderly exercise was carried out and 30 minutes after the elderly exercise was carried out every time the elderly exercise was carried out. The purpose of data collection in this study was to determine whether there was a change in blood pressure before and after elderly exercise in the intervention group compared to the control group at the same time.

1. Results

Table 1. Description of the distribution of the average value of systolic blood pressure in the elderly with hypertension before and after the elderly exercise in the control group.

Systolic Blood Pressure	Mean	Median	SD	Min-maks	P value
Before Exercise	172	172,5	9,9	155-190	0,041
After Exercise	169	170	10,7	150-190	

Based on table 1, it is known that the average value of systolic blood pressure in the control group before exercise was 172 mmHg, with the lowest systolic blood pressure being 155 mmHg and the highest systolic blood pressure being 190 mmHg. The average value of systolic blood pressure in the control group after exercise was 169 mmHg, while the lowest systolic blood pressure was 150 mmHg and the highest systolic blood pressure was 190 mmHg.

Table 2: Description of the distribution of the average value of diastolic blood pressure in the elderly with hypertension before and after the elderly exercise in the control group.

Diastolic Blood Pressure	Mean	Median	SD	Min-maks	P value
Before Exercise	89,38	90	7.7	80-100	0,006
After Exercise	84,38	80	10,7	70-100	

Based on table 2, it is known that the average value of diastolic blood pressure in the control group before exercise was 89.38 mmHg, the lowest diastolic blood pressure was 80 mmHg and the highest diastolic blood pressure was 100 mmHg. The average value of diastolic blood pressure in the control group after exercise was 84.38 mmHg, the lowest diastolic blood pressure was 70 mmHg and the highest diastolic blood pressure was 100 mmHg.

Table 3: The description of the average value of systolic blood pressure in the elderly with hypertension before and after the elderly exercise in the intervention group.

Systolic Blood Pressure	Mean	Median	SD	Min-maks	P value
Before Exercise	182,50	182,5	12,7	160-200	0,000
After Exercise	130	130	7,6	120-145	

Based on table 3, it is known that the average value of systolic blood pressure in the intervention group before exercise was 182.50 mmHg, the lowest systolic blood pressure was 160 mmHg and the highest systolic blood pressure was 200 mmHg. The average value of systolic blood pressure in the intervention group after exercise was 130 mmHg, the lowest systolic blood pressure was 120 mmHg and the highest systolic blood pressure was 145 mmHg.

Table 4: The description of the average value of diastolic blood pressure in the elderly with hypertension before and after the elderly exercise in the intervention group.

Diastolic Blood Pressure	Mean	Median	SD	Min-maks	P value
Before Exercise	97	100	6,8	80-110	0,000
After Exercise	72,81	70	6,0	65-90	

Based on table 4, it is known that the average value of diastolic blood pressure in the intervention group before exercise was 97 mmHg, the lowest diastolic blood pressure was 80 mmHg and the highest systolic blood pressure was 110 mmHg. The average value of diastolic blood pressure in the intervention group after exercise was 72.81 mmHg, with the lowest diastolic blood pressure being 65 mmHg and the highest diastolic blood pressure being 90 mmHg.

Table 5: Analysis of the effect of elderly exercise on systolic blood pressure in elderly hypertension in Kalikejambon Village, Tembelang District, Jombang Regency.

Average blood pressure after gymnastics	Median	SD	Min-maks	P value
Control group systolic blood pressure	170	10.7	150-190	0,000
Intervention group systolic blood pressure	130	7.6	120-145	

Based on table 5, it is known that the mean systolic blood pressure in the control group after exercise was 170 mmHg, the lowest systolic blood pressure was 150 mmHg and the highest systolic blood pressure was 190 mmHg. And the mean systolic blood pressure in the intervention group after exercise was 130 mmHg, with the lowest systolic blood pressure being 120 mmHg and the highest systolic blood pressure being 145 mmHg. The results of statistical tests using the independent t test obtained a p value of 0.000, meaning that there was an effect of elderly exercise

on systolic blood pressure in hypertensive elderly in Kalikejambon village, Tembelang district, Jombang regency.

Table 6: Analysis of the effect of elderly exercise on diastolic blood pressure in elderly hypertension in Kalikejambon Village, Tembelang District, Jombang Regency.

Average blood pressure after gymnastics	Median	SD	Min-maks	P value
Control group diastolic blood pressure	80	7,2	70-100	0,000
Intervention group diastolic blood pressure	70	6,0	65-90	

Based on table 6, it is known that the mean diastolic blood pressure in the control group after exercise was 80 mmHg, with the lowest diastolic blood pressure being 70 mmHg and the highest diastolic blood pressure being 100 mmHg. And the median value of diastolic blood pressure in the intervention group after exercise was 70 mmHg, with the lowest diastolic blood pressure being 65 mmHg and the highest diastolic blood pressure being 90 mmHg. The results of statistical tests using the independent t test obtained a p value of 0.000, meaning that there was an effect of elderly exercise on diastolic blood pressure in the elderly with hypertension in Kalikejambon Village, Tembelang District, Jombang Regency.

2. Discussion

a. The description of the average value of blood pressure in the elderly with hypertension before and after the elderly exercise in the control group.

The elderly can be affected by hypertension due to decreased organ function in the cardiovascular system, thickened and stiff heart valves, and decreased elasticity of the aorta and other large arteries [6]. In addition, there is an increase in peripheral vascular resistance when the left ventricle pumps, so that systolic pressure and afterload increase [7].

One of the factors that can lead to increased blood pressure in the elderly is the lack of physical activity such as exercising regularly [8]. Lack of physical activity, such as gymnastics, can also cause hypertension due to a decrease in cardiac output (heart output) so that pumping to the heart is reduced. Lack of physical activity exercise can cause stiffness of blood vessels, so that blood flow is blocked and can cause hypertension [9].

Physical exercise is all efforts carried out to improve physical fitness and physical condition of the elderly. Physical fitness is a physical aspect of overall fitness. The purpose of physical exercise is to increase strength, cardiorespiratory endurance, speed, skill, and flexibility. Physical fitness in the elderly is health-related fitness, namely heart-lung and blood circulation fitness as well as muscle strength and joint flexibility [10].

b. The description of the average value of blood pressure in the elderly with hypertension before and after the elderly exercise in the intervention group.

Judging from the blood pressure in the intervention group showed a decrease in the average systolic and diastolic blood pressure. The occurrence of a decrease in systolic and diastolic blood pressure in the elderly with hypertension in the intervention group, is due to elderly exercise resulting in a decrease in cardiac output and a decrease in total peripheral resistance, resulting in a decrease in blood pressure [11]. According to research [7] regular exercise can absorb or eliminate cholesterol deposits in the arteries. The sport in question is an exercise to move all the joints and muscles of the body such as walking, swimming, riding a bicycle. It is not recommended to do stressful sports such as boxing, wrestling or weightlifting, because strenuous exercise can actually cause hypertension.

c. Analysis of the influence of elderly exercise on blood pressure in elderly hypertension in Kalikejambon Village, Tembelang District, Jombang Regency

Based on the results of the study, it was known that the mean systolic blood pressure in the control group after exercise was 170 mmHg, the lowest blood pressure was 150 mmHg and the highest blood pressure was 190 mmHg. The mean blood pressure in the intervention group after exercise was 130 mmHg, the lowest blood pressure was 120 mmHg and the highest blood pressure was 145 mmHg. The results of statistical tests using the independent t test obtained a p-value of 0.000, meaning that there was an effect of elderly exercise on blood pressure in the elderly with hypertension in Kalikejambon Village, the working area of the Tembelang Health Center, Jombang.

Based on the results of the study, it was known that the mean diastolic blood pressure in the control group after exercise was 80 mmHg, the lowest diastolic blood pressure was 70 mmHg and the highest diastolic blood pressure was 100 mmHg. The mean diastolic blood pressure in the intervention group after exercise was 70 mmHg, the lowest diastolic blood pressure was 65 mmHg and the highest diastolic blood pressure was 90 mmHg. The results of statistical tests using the independent t test obtained a p value of 0.000, meaning that there was an effect of elderly exercise on diastolic blood pressure in the elderly with hypertension in Kalikejambon Village, the working area of the Tembelang Health Center, Jombang.

[12] Concluded that exercise can be applied as hypertension management not only for prevention but also for maintaining the health of the elderly. This study is in line with research conducted by [4] which concluded that there was a significant effect between elderly exercise and a decrease in systolic and diastolic blood pressure in elderly hypertension. Elderly exercise is done repeatedly (high frequency), then over time the decrease in blood pressure will last a long time. That is why regular physical activity exercises can lower blood pressure. The type of exercise that is effective in lowering blood pressure is elderly exercise with moderate intensity. The frequency of exercise is 3-5 times a week with a duration of 20-60 minutes of exercise every time [13].

Exercise affects the cardiovascular system (circulatory blood) to improve its ability. More blood vessels (small blood vessels) are formed in active tissues to improve the supply of food and oxygen, and exercise burns excess fat in the system and blocks the fat content in the vessels, thereby reducing the risk of thrombosis [14]. Exercise has also been known to increase High Density Lipoprotein (HDL), which in turn helps metabolic processes and lowers Low Density Lipoprotein (LDL) levels [15]. Elderly gymnastics which consist of warm-up exercises, core exercises, and cooling exercises in which the movements in it also aim to reduce anxiety, stress, and reduce levels of depression. This decrease will stimulate the work of the peripheral nervous system (autonomous nervous system), especially the parasympathetic which causes vasodilation of the cross-section of blood vessels which will result in a decrease in blood pressure both systolic and diastolic [14].

This study is also in line with research conducted by [16] which states that there is an effect of yoga practice on decreasing systolic and diastolic blood pressure in the elderly. Research conducted by [17] on the benefits of tera gymnastics on elderly fitness showed that exercise could affect not only pulse stability, but also blood pressure stability, respiration and immunoglobulin levels, with the results of statistical analysis tests for the p-systolic blood pressure category. value 0.02 means a < p = 0.05) meaning that there is a difference in blood pressure between the elderly in the treatment and control groups.

The results of this study are in line with research by [1] which found that the frequency of elderly exercise on pulse showed a moderate relationship (r = -0.394) and a negative pattern, which means the higher the frequency of elderly exercise, the lower the pulse rate. The results of statistical tests found that there was a significant relationship between the frequency of elderly exercise on the pulse (p value = 0.026). The results showed that there was a relationship between the frequency of elderly exercise and the pulse in the elderly. Gymnastics for the elderly is a light exercise that is easy to do, not burdensome, which is applied to the elderly. Elderly gymnastics activities help the body to stay fit and fresh because it trains bones to stay strong, encourages the

heart to work optimally and helps eliminate excessive free radicals in the body [3]. The results of this study are in line with research conducted by [18] which states that there is an effect of tera gymnastics on increasing fitness as indicated by a decrease in resting pulse.

IV. CONCLUSION

The average value of systolic blood pressure in the control group before exercise was 172 mmHg and after exercise 169 mmHg. The average value of diastolic blood pressure in the control group before exercise was 89.38 mmHg, and after exercise 84.38 mmHg. The average value of systolic blood pressure in the intervention group before exercise was 182.50 mmHg and after exercise 130 mmHg. The average value of diastolic blood pressure in the intervention group before exercise was 97 mmHg and after exercise 72.81 mmHg. There is an effect of elderly exercise on systolic and diastolic blood pressure in the elderly with hypertension in Kalikejambon Village, Tembelang District, Jombang Regency.

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