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THE EFFECT OF ERGONOMIC EXERCISE ON REDUCING BLOOD PRESSURE IN HYPERTENSIVE ELDERLY AT CIPARAY PANTI SOSIAL TRESNA WERDHA CIPARAY

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A B S T R A C T

Hypertension is a condition when blood pressure is at 140/90 mmHg or more. Every year people with hypertension continue increased, it is estimated that in 2025 as many as 1.5 billion people suffer from hypertension... One way to reduce blood pressure is to do ergonomic exercises. The purpose of this study is to find out ergonomic exercises for decreasing blood pressure on elderly hypertension at Ciparay Elderly Social Rehabilitation Institution. This research used quasi Experiment design by designing a pre and post test group. The population of this study was hypertensive elderly totaling 70 people, The sampling technique uses non probability sampling with the technique purposive sampling, its about 23 respondent. Data collection using questionnaires, observation sheets, and digital sphygmomanometer. The number of respondents was 23 respondents, ergonomic exercises done 3 times repeatedly - according to 3 weeks. Pressure measurement blood is done before gymnastics (pre test) and after 30 minutes after gymnastics (post test). Statistical test results show the average systole pressure before gymnastics is equaldari to160.15 mmHg to and the remaining gymnastics 140.05 mmHg, a decrease of 20.1 mmHg. Diastolic pressure before gymnastics isfrom 96.28 mmHg and as is gymnastics to 86.11 mmHg, a decrease of 10.17 mmHg. Data analysis using Paired Sample T-Test related to ergonomic exercises for impairment blood pressure in hypertensive elderly with systole pressure p value = 0,000 and diastolic pressure p = 0,000.The conclusion Can be accessed the effect of ergonomic exercises on reducing blood pressure in elderly hypertension. The results of ergonomic exercise intervention can be used as a therapy in pressure reduction blood and it is expected that the elderly are routinely approved for ergonomic exercises.

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1. INTRODUCTION

Hypertension is an abnormal increase in blood pressure in the cardiovascular system. (Smeltzer & Bare, 2018). There has been an increase in hypertension sufferers to 6 times in the last 50 years in Indonesia (Indonesian Ministry of Health, 2022). According to the Kementrian Kesehatan RI (2018) based on measurement results in residents aged ≥18 years, 25.8% had hypertension in 2013 and in 2018 it increased by 34.1%. West Java is the province with the highest percentage of hypertension, namely 65.5% (Ministry of Health RI, 2017). In 2016 in West Java, 790,382 people were found with cases of hypertension (2.46% of the population ≥ 18 years), with the number of cases examined as many as 8,029,245 people spread across 26 districts or cities, and only 1 district/city (Kabupaten West Bandung) did not report cases of hypertension (Dinas Kesehatan Provinsi Jawa Barat, 2020).

The prevalence of hypertension increases with age. In the elderly (60 years and over) will experience disturbances due to changes in organs as a result of the aging process, there is a decrease in the elasticity of the arteries resulting in stiffness in the blood vessels which can result in high blood pressure. Reduced flexibility of the arteries and aorta is related to changes in the plasma renin enzyme in the body. As a result, the body experiences fluid retention and cannot remove salt from the body properly. In the elderly, this condition can increase the occurrence of high blood pressure.

WHO (2018) states that the world's elderly population is expected to increase to 2 billion in 2025, from only 900 million people in 2015. The elderly population in Indonesia is predicted to increase higher than the world's elderly population after 2100. The results of population projections 2010-2035, Indonesia will enter a period of aging, where 10% of the population is aged 60 years and over (Kementrian Kesehatan RI, 2020). Interventions for hypertension consist of pharmacology and nonpharmacology. In non-pharmacology that is safe for the elderly is gymnastics. One of the safe exercises is ergonomic exercise with very anatomical, simple, and harmless movements so that it can be done by children and the elderly. It is also an exercise whose basic movements only consist of six movements, which resemble prayer movements (Wratsongko, 2004).

The results of research by Megawati (2017) and Hanik (2018) show that ergonomic exercise can significantly reduce systolic and diastolic blood pressure with a p-value = 0.000. In contrast to Septiningrum (2017) who said that ergonomic exercises did not reduce diastolic pressure with a p-value of 0.320. Based on the results of a preliminary study at the Ciparay Elderly Rehabilitation Social Institution (PSRLU), data obtained that there were 148 elderly people, this social institution is the home that has the largest number of elderly people in District 5 Bandung. Of the 148 elderly, 70 elderly suffer from hypertension, 23 elderly suffer from other diseases, and 55 elderly receive special care. Based on the results of interviews with 10 elderly people who suffer from hypertension, it was found that 5 elderly people did not do gymnastics, 3 of them complained of aches and 2 of them complained of headaches, 5 other elderly people routinely took part in gymnastics complaints but instead focus on lowering the blood puzzle.

The aim of the study was to determine the effect of ergonomic exercise on reducing blood pressure in the elderly with hypertension at the Ciparay Elderly Rehabilitation Social Institution.

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2. METHODS

Research Design

This research is a type of quantitative research with a quasi-experimental design. The intervention carried out was ergonomic gymnastics and the variable given the intervention was blood pressure. This study aims to determine the effect of ergonomic exercise on blood pressure in elderly hypertensives.

Population and Sample

The population in this study were all elderly people with hypertension in the Ciparay Elderly Rehabilitation Social Institution area of 70 patients. The sampling technique was purposive sampling with inclusion criteria for hypertensive elderly who were able to do physical activity, while the exclusion had comorbidities such as osteoporosis, physical disabilities, and psychosis. The number of samples in the study, namely as many as 23 elderly people.

Instruments

In this study using a questionnaire consisting of 5 questions in the form of demographic data, namely name, age, gender, family history, and exercise habits. Other instruments include an observation sheet (SOP for ergonomics) and a digital sphygmomanometer to measure blood pressure. The digital sphygmomanometer was chosen to avoid the resulting bias, such as the desirability of the gauge against the desirability of decreasing blood pressure.

Research Procedure

1) Researchers explain the aims and objectives as well as research procedures clearly and completely. 2) If the respondent is willing to be a research participant or a respondent voluntarily, the respondent signs an informed consent form. 3) After the respondent is willing, the researcher conducts the interview stage by filling out the demographic data sheet. 4) Researchers asked for cooperation from Social Institution employees during the research and provided explanations regarding matters related to research. 5) The researcher conducted a blood pressure check (pre-test) at 05.00 WIB. The results of the blood pressure check will be recorded on the blood pressure observation sheet (attachment) 6) The researcher prepares speakers for the implementation of ergonomic exercises, 7) Warms up before doing ergonomic exercises, then performs ergonomic exercises according to the SOP (attachment) 8) After doing ergonomic exercises Respondents were rested for 30 minutes, then blood pressure was measured again after ergonomic exercises (post test). And record these results back on the blood pressure observation sheet. 9) Then the researcher informs the time contract for the next exercise.

Data Analysis

Before being analyzed the researcher did editing, coding, tabulating, data entry, and scoring. Univariate analysis in this study aims to describe the distribution and percentage of variables before being given ergonomic exercises and after being given ergonomic exercises. Each

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variable is analyzed descriptively using a frequency distribution. Then the bivariate analysis in this study aims to analyze the effect of ergonomic exercise on reducing blood pressure in the elderly who have hypertension. Because the data is normally distributed, the data analysis used is parametric with a paired sample t-test with the help of one of the software from the computer, namely SPSS 16.

Ethical Clearance

This study used ergonomic gymnastics interventions that are not harmful to the elderly and based on previous research can reduce pressure. Respect Human Dignity: The elderly are given informed consent regarding ergonomic gymnastics and are given the authority to participate or not in this study. Right to justice: Ergonomic gymnastics are given in accordance with SOPs so that all respondents get equal treatment. Respondent data uses initials and is not disseminated to other parties. The number of ethical clearance is 070.570/Pen/PSRLU/2019.

3. RESULTS

Table 1 Demographic data

Characteristic	**N**	**%**
Age		
Elderly	11	47.8
Old Elderly	11	47.8
Very Old Elderly	1	4.3
Total	**23**	**100**
Gender		
Male	9	39.1
Female	14	60.9
Total	**23**	**100**
Family history of hypertension		
Yes	15	65.2
No	8	34.8
Total	**23**	**100**
Cigarette consumption		
Yes	8	34.8
No	15	65.2
Total	**23**	**100**
Sports habits		
Yes	23	100
No	0	0
Total	**23**	**100**

Based on table 1, the results of the study explain that almost half of the respondents or as many as 11 people (47.8%) are aged 60-74 years and almost half of the respondents or as many as 11 people (47.8%) are aged 75-90 years. the data shows that the majority of respondents or as many as 14 people (60.9%) are female. Based on a family history of hypertension, it was found that most or as many as 15 people (65.2%) had a family history of hypertension. Based on data on smoking habits, it was found that most of the respondents or as many as 15 people (65.2%) did not

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have a smoking habit. Based on exercise habits, it was found that all or 23 people (100%) always do regular exercise.

Table 2. Systolic blood pressure at pretest and posttest

	N	Minimum	Maximum	Mean	Std. Deviation
Prettest Systolic	9 times to 23 respondent	152	166	160.15	4.226
Posttest Sistolic	9 times to 23 respondent	136	145	140.05	2.814

Based on table 2, the results of the study explain that the average systolic blood pressure before doing ergonomic exercises for 9 times following ergonomics is 160.15 mmHg and the average systolic blood pressure after doing ergonomics for 9 times is 140.05 mmHg.

Table 3. Diastolic blood pressure at pretest and posttest

	N	Minimum	Maximum	Mean	Std. Deviation
Prettest Diastolic	9 times to 23 respondent	91	100	96.28	3.357
Posttest Diastolic	9 times to 23 respondent	85	88	86.11	1.021

From table 3, the results of the study explain that the average diastolic blood pressure before doing ergonomic exercises for 9 times following ergonomics is 96.28 mmHg and the average diastolic blood pressure after doing ergonomics for 9 times is 86.11 mmHg.

Table 3. T-test Results On Blood Pressure

	Paired Sample Test			
	Pretest	Posttest	Decrease in Blood Pressure	Sig. (2-tailed)
Sistolic	160.15	140.05	20.1	0.000
Diastolic	96.28	86.11	10.17	0.000

Based on table 3, after processing the data using SPSS 16, from the results of the study it was found that there was an effect between before and after ergonomic exercise based on the Paired Sample T-Test obtained a p value of 0.000 for both systolic and diastolic pressure, meaning that there is an effect of ergonomic exercise on blood pressure reduction in hypertensive elderly. With an average difference in blood pressure values before and after the intervention was 20.1 mmHg for systolic pressure and 10.17 mmHg for diastolic pressure.

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4. DISCUSSION

Ergonomic Influence on Systolic Blood Pressure After the Paired Sample T-test statistical test was carried out, the results showed that the blood pressure of hypertensive elderly who took part in ergonomic exercises for 3 weeks experienced changes, as shown in table 4 where there was an average decrease of 20.1 mmHg in systolic blood pressure with a p value of 0.000 (α<0 .05) which means that there is an effect of ergonomic exercise on reducing blood pressure in elderly hypertensives at the Ciparay Elderly Rehabilitation Social Institution.

The results of this study are in accordance with Megawati's research (2017) that there is an effect of ergonomic exercise on systolic blood pressure, this can be seen from the same criteria of respondents as the researcher, where most of the elderly are female. Hypertension is very closely related to gender, especially in women who have experienced menopause, this is also supported by the opinion of Cortas (2018) who said that premenopausal women are protected by the hormone estrogen which plays a role in increasing levels of High Density Lipoprotein (HDL), high HDL levels. is a protective factor in the process of atherosclerosis. This protective effect of estrogen is considered as a woman's immunity at premenopausal age.

Hanik's research (2018) also says that there is an effect of ergonomic exercise on systolic blood pressure, this can be seen from the same criteria of the respondents as the researcher, where most of the elderly are female, most of the elderly are aged 60-74 years, almost all respondents are not smoking and most of the respondents had a family history of hypertension. According to research by Dedullah et al (2015) the age category over 43 years has a 5 times greater risk of suffering from hypertension than the age category less than 43 years. The results of another study conducted by Aripin et al (2016), where the results of the study concluded that there was no significant relationship between smoking and the incidence of hypertension. In this study, it cannot be concluded that smoking is a risk factor for hypertension, this is due to the unequal number of male and female samples. A study by Siringoringo et al (2013) said that family history has a relationship with the incidence of hypertension. Suiraoka's theory (2012) also says that heredity has a big role in the emergence of hypertension. Hypertension is more common in patients with monozygotic twins (one egg cell) than heterozygous (different egg cells).

Research by Megawati (2017) and Hanik (2018) says that there is an effect of ergonomic exercise on reducing systolic blood pressure, this can be seen from the same frequency of exercise as the researchers, which is 9 times in 3 weeks. Ergonomic gymnastics is able to lower blood pressure after ergonomic gymnastics intervention is carried out in that time span.During exercise, muscle fibers intertwine and increase blood flow in waves. This is the beginning of a chemical process in the blood vessel cells, so that a material is formed, namely Nitric Oxide (NO) and releases Endhotelial Derive Relaxing Factor (EDRF) which relaxes and causes dilation of the blood vessels. NO is a mediator in smooth muscle relaxation in blood vessels (Rai, 2012).

Blood pressure can be stable under normal conditions when NO is released, because it stimulates soluble Guanylate Cyclase (sGC) which causes an increase in the cyclic synthesis of Guanosine Monophosphate (GMP) from Guanosine Triphosphate (GTP). An increase in

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cyclic GMP will cause the vascular smooth muscle to relax. The result of relaxation will cause an increase in the diameter of the blood vessels, so that the resistance of the blood vessels will decrease and be accompanied by a decrease in blood flow which causes a decrease in blood pressure (Ganong, 1995 in Hasanah, 2018).

In the elderly there is a decrease in no activity, but by doing regular exercise at least 3 times a week can produce NO in the body (Ilkafah, 2014). According to Afriwardi (2009), the recommended frequency of exercise for people with hypertension is 3–5 times a week, so that if people with hypertension do sports with a frequency of <3 times a week, once a month, let alone once a year, it has less effect on reducing blood pressure . The decrease in blood pressure in the elderly who was given an ergonomic exercise intervention was caused by relaxing the blood vessels so that there was no increase in blood pressure to pass through the blood vessels, so that blood pressure would decrease (Febriani, 2016) .

2. Diastolic Blood Pressure

After the Paired Sample T-test statistical test was carried out, the results showed that the blood pressure of hypertensive elderly who participated in ergonomic exercises for 3 weeks experienced changes, as shown in table 4.5 where there was an average decrease of 10 mmHg in diastolic blood pressure with a p value of 0.000 (α<0 .05) which means that there is an effect of ergonomic exercise on reducing blood pressure in elderly hypertensives at the Ciparay Elderly Rehabilitation Social Institution.

The results of this study are in accordance with Hasanah's research (2018) that there is an effect of ergonomic exercise on reducing diastolic pressure in elderly hypertensives. This can be seen from the same respondent criteria as the researcher, where most of the elderly are female, and most of the elderly are aged 60 years. Based on the theory according to Potter & Perry (2010) an increase in blood pressure in the elderly is caused by a decrease in the elasticity of blood vessels. Gender has an effect on this study because of the theory that the presence of the hormones estrogen and progesterone will increase the response to the pressor angiotensin II by involving the RAAS pathway thus increasing blood pressure in the elderly (Pangaribuan, 2015).

This result is inversely proportional to the Septiningrum study (2017) where there was no significant change in diastolic blood pressure in the intervention group with a result of 0.320 (p>0.05). The possible difference can be seen from the time of doing different ergonomic exercises, namely 6 times in 2 weeks in the Septiningrum study, in the research study it was 9 times in 3 weeks.

Prime (2014) explained that systolic pressure increases until the age of 70-80 years, but diastolic blood pressure tends to settle, therefore blood pressure will have an effect when the exercise intensity is more intense and regular. Wratsongko (2004) also said that the benefits of ergonomic exercises for reducing blood pressure can be obtained for at least 3 weeks of doing ergonomic exercises.

Ardiani et al (2018) stated that exercise habits have an influence on hypertension. Lack of exercise will increase the likelihood of obesity, this is what is always associated with hypertension. People who are inactive will tend to have a higher heart rate so that the heart muscle has to work harder with each contraction. The harder and more often the heart muscle

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has to pump, the greater the pressure that is imposed on the arteries (Suparto, 2010).

Exercise can also reduce or prevent obesity and can reduce salt intake in the body because salt in the body will come out with sweat, exercise can also improve circulation blood in the body so that it can lower blood pressure (Suiraoka, 2012). According to Cornelissen & Neil (2013) a decrease in peripheral blood vessels after exercise will cause the diameter of blood vessels to increase, which is caused by a decrease in the influence of the sympathetic nerves or an increase in the effect of local vasodilators such as Nitric Oxide (NO). Ergonomic exercise movements can increase blood flow to the upper body, especially the head, ears, nose and lungs, which can allow toxins to be cleaned by the blood and can control high blood pressure (Sagiran, 2014). According to the theory of Wratsongko (2004) ergonomic exercise can maximize the combustion system, one of which is burning cholesterol, burning will affect LDL levels in the blood and increase HDL which will reduce atherosclerosis which can inhibit blood flow so that blood pressure increases.

Ergonomic exercises carried out by the respondents made the arteries and arterioles around the muscles constrict due to pressure from the muscles, so that blood flow in the blood vessels was restrained. When the muscles are relaxed, a reactive hyperemia mechanism will occur which causes activation of all vasodilator factors in the local blood vessels, and stimulates 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. (Pollock & Wilmore, 2010). In ergonomics, researchers provide direction for each step of ergonomic gymnastics to be in accordance with intervention SOPs so that every movement is the same and able to lower blood pressure.

5. CONCLUSION

There was a decrease in blood pressure in systole (20.1 mmHg) and diastole (10.17 mmHg) respondents after being given ergonomic gymnastics with the results of p value = 0.000 ($\alpha<0.05$).

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7. CONFLICT OF INTEREST

The authors have no conflicts of interest to declare

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