The Effect of Elderly Exercise on Blood Pressure in Hypertension

Sakinah Yusro Pohan(✉), Nanda Masraini Daulay, Febrina Angraini Simamora, Khoirunnisah Hasibuan, Rini Amalia Batubara, and Fitri Rahma Handayani

Universitas Aufa Royhan, Padangsidimpuan, Indonesia
sakinahyusropohan@gmail.com

Abstract. Elderly gymnastics is a form of physical exercise that gives a good influence on the level of human physical ability, if implemented properly and correctly. This study aims to determine the effect of elderly gymnastics on blood pressure in elderly hypertension. This research design uses Quantitative Quasy Experiment with pretest and posttest design. This research was conducted at Puskesmas Pangirkiran. The number of respondents of this study as many as 40 people with the sampling technique in total sampling. The result of pretests of moderate TD gymnastics research was 18 people (45,0%). And moderate gymnastics posttets are as many as 20 people (50.0). The result of test of wilcoxon in get result $p = 0.000$ or $p < 0,05$. The results of this study indicate the influence of elderly gymnastics on blood pressure in hypertensive elderly at Pangirkiran Health Center, Halongonan Sub-district, Padang Lawas Utara Regency. It is expected that health workers always carry out routine gymnastics and conduct counseling related to hypertension problem and expected to elderly in order to increase their knowledge and often health control to health officer.

1 Introduction

Hypertension or high blood pressure is a systolic blood pressure when it is higher than 140 mmHg and a higher than 90 mmHg of diastolic blood pressure. Hypertension is a multifactorial disease which arises due to the interaction of various factors. Increasing age will cause several physiological changes. In old age, there is an increase in peripheral resistance and sympathetic activity. Blood pressure will increase after the age of 45–55 years. The arterial walls will be thickened by the accumulation of collagen substances in the muscle layer, so that the blood vessels will gradually narrow and become stiff (Setiawan, 2014).

The elderly are part of the family and community whose numbers are increasing in line with the increase in life expectancy. The estimated global prevalence of hypertension was 1.28 million whose aged 30–79 years of the total world population in developing and middle-income countries in 2021 by 23% (World Hearth Organization, 2021). According to (Kemenkes RI, 2018) prevalence of hypertension was 34.11%. This proportion is higher than the world average of 22%. The age of 55–64 years (55.2%), age 65–74 years (63.2%), age over 75 years (69.5%). North Sumatra Province is one of the provinces in Indonesia with a higher proportion of hypertension than the world average, which

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is 29.19%. Based on the cause of death of inpatients at the Regency/City Hospital of North Sumatra Province, hypertension was in the first rank with a mortality proportion of 27.02% (1,162 people), elderly category >60 years it is 20.23% (1,349 people) (Idrus, 2015). Data obtained from Padang Lawas Utara Health Office, the number of patients with hypertension was 3051 people (Dinas Kesehatan Padang Lawas Utara, 2020).

High blood pressure or hypertension has killed 9.4 million people worldwide every year. World Health Organization (WHO) estimates that the number of people with hypertension will continue to increase along with the growing population. By 2025, it is projected to be around 29% of the world's population will suffer from hypertension (WHO, 2013).

In 2019, it was discovered that the trends in the causes of death were hypertension, smoking, and dietary risk. It indicates that hypertension is a major case that should be alert for resulting in death and disability (Kemenkes RI, 2019). Most people on high blood pressure or hypertension have no signs or symptoms, even after taking blood pressure measurement, their blood pressure has reached dangerous levels. However, some people who suffer from hypertension will sometimes complain of a headache that feels dull, bleeding through the nose that is increasingly frequent or dizzy (Mujahidullah, 2012).

If it is left unchecked, hypertension can develop into chronic heart failure, stroke, and a reduction in brain volume, so that the cognitive and intellectual function of a person with hypertension will be reduced. The impact of hypertension in the long term can also cause sudden death (Tilong, 2014).

Efforts that can be made by hypertension patients to lower blood pressure can be done in two types, namely pharmacological and non-pharmacological. One kind of non-pharmacological therapy is by doing exercise. Type of physical exercise that can be done is elderly gymnastics. Elderly gymnastics is a series of regular and targeted and planned tone movements that are followed by elderly people in the form of physical exercises that affect their physical abilities. The gymnastics with a frequency of three times a week has been proven to flex the blood vessels (Maryam, 2010). The purpose of elderly gymnastics is to increase endurance, strength, body coordination and maintain health. In addition, elderly gymnastics can also delay physiological changes that usually occur in the musculoskeletal aging process, decrease strength and flexibility, increase susceptibility to injury, decrease joint structure flexibility, and protect the elderly from falls (Tilong, 2014).

The research (Pratiwi and Hatmanti, 2013) showed that elderly gymnastics had an effect on reducing blood pressure on the elderly with hypertension. Research by (Sukartini, 2010) on the benefits of elderly gymnastics also shows that it could affect not only pulse stability, but also the stability of systolic and diastolic blood pressure, respiration and immunoglobulin levels. The duration of the exercise or gymnastics lasts 15–60 min with a frequency of exercise 2–5 times a week to get maximum results as evidenced by the flexibility of blood vessels (Rismayanthi, 2011).

Based on the preliminary survey conducted by researchers at the Pangirkiran Health Center, Halongonan District, North Padang Lawas Regency, the number of elderly who seek treatment at the Community Health Center was 269 people. The researchers conducted interviews with seven elderly people who came to the Health Center. There were five out of seven elderly people did not want to take elderly gymnastics because they

did not have time and they knew only a little bit about the benefits of elderly gymnastics for muscle movement without other benefits, so that they ignored it. The purpose of the study was to determine the effect of elderly gymnastics on blood pressure in the elderly with hypertension.

2 Method

This research used Quantitative Quasi- Experiment with pretest and posttest design. It was conducted at Pangirkiran Health Center. The population in this study was all elderly people who visited the Public Health Center with hypertension at the Pangirkiran Health Center, Halongonan District, North Padang Lawas Regency. The respondents of this study were 40 people with total sampling technique. The method of data collection was by using observation sheets and blood pressure measurements. Then, bivariate analysis used Paired T-Test.

3 Result

Based on Table 1, it could be seen that of the 40 respondents, the majority was high school students with 22 people (55.0%), the majority was farmer as many as 23 people

Table 1. Frequency Distribution of Respondents Based on Characteristics of the Elderly

Characteristics of Respondents	Frequency	Percentage (%)
Education		
Elementary School	3	7,5
Junior High School	8	20,0
Senior High School	22	55,0
College	7	17,5
Total	**40**	**100**
Occupation		
Farmer	23	57,5
Entrepreneur	9	22,5
Civil Servants	8	20,0
Total	**40**	**100**
Resources		
Printed Press	7	17,5
Media Electronics	24	60,0
Health Workers	9	22,2
Total	**40**	**100**

Table 2. Results of Univariate Analysis

Blood Pressure Before Pre Post Gymnastics	Pre		Post	
	F	%	f	%
Low	7	17,5	3	7,5
Medium	18	45,0	25	50,0
High	11	27,5	8	32,5
Very High	4	10,0	4	10,0
Total	**40**	100	**40**	**100**

Table 3. Results of Bivariate Analysis

		N	Mean Rank	Sum of Ranks	Result of Wilcoxon test
Post Test – Pre Test	Negative Ranks	0[a]	00	00	0.000
	Positive Ranks	36[b]	11.50	251.00	
	Ties	4[c]			
	Total	40			

a. Post test < Pretest
b. Post test > Pretest
c. Posttest = Pretest

(57.5%). Meanwhile, the majority received resources through electronic media was as many as 24 people (60.0%).

Based on Table 2, it showed that of the 40 respondents regarding the measurement of blood pressure after elderly gymnastics (posttest) where most of the largest decrease in blood pressure occurred. It was in the moderate blood pressure category from (pre) 45% to (post) 50%.

Based on Table 3, the comparison of blood pressure before and after blood pressure after the Wilcox statistical test results obtained a p-value (0.000) ($p < 0.05$), it could be concluded that there was a significant effect on elderly gymnastics on blood pressure in the elderly.

4 Discussion

The finding of the non-parametric Wilcoxon statistic test got p = value equal to the result (0.000), thus a significant value of p-value = (0.000) ($p < 0.05$) then Ha was accepted and Ho could be concluded that there was an effect of elderly gymnastics on blood pressure in the elderly with hypertension at the Pangirkiran Health Center, Halongonan District, North Padang Lawas Regency.

The finding of this study were also in line with research conducted by (Izhar, 2017) with the title the effect of elderly gymnastics on blood pressure in the elderly with hypertension at the Tresna Werdha Budi Luhur Social Institution in Jambi City where the results were $p = 0.0002$ ($p < \alpha$). It showed that there was an effect of elderly

gymnastics on the blood pressure of the elderly with hypertension at the Tresna Werdha Budi Luhur Social Institution in Jambi City.

The results of this study were supported by research conducted by (Aji, 2015) there was a close influence between the treatment of elderly gymnastics and a decrease in blood pressure using the Paired T-test, and a p-value of 0.002 means that H0 was rejected and Ha was accepted.

Then, there will be a decrease in blood pressure in the elderly by doing exercise or gymnastics. This is due to changes in the partner and aortic valves. These valves become thin and loose. If the heart muscle relaxes after the elderly gymnastics is done, the stress will decrease and the heart frequency will quickly return to its basic condition. It will be found that the stroke volume is no longer increasing so that the decrease in cardiac output will result in blood pressure dropping or returning to normal (Udjianti, 2010).

The results of this study were in line with research conducted with (Merianti and Wijaya, 2015) activities carried out for four weeks on 15 elderly people with mild to moderate hypertension, from 15 respondents carrying out elderly hypertension exercise for once a week with a duration of ±30 min. Before doing hypertensive exercise, the average systolic blood pressure and hypertension was 145.33 mmHg, the average diastolic blood pressure was 88.00 mmHg. After doing hypertensive exercise in the elderly, most of the respondents had pre-hypertension blood pressure where the average systolic blood pressure was 137.33 mmHg, the average diastolic blood pressure was 82.00 mmHg.

Hypertension is mostly experienced by the elderly caused by age, having a history of hypertension, heredity, gender and cultural factors. This is because the older a person is the metabolic regulation of his/her lime (calcium) substance is disturbed. In addition, along with the aging process in the elderly, there is a physiological setback in the elderly which causes the large arteries to lose flexibility and become stiff, unable to expand when the heart pumps blood through the arteries. Then, the blood in each heartbeat is forced through the vessels that are narrower than usual, causing an increase in blood pressure. This was what happens in old age, the walls of the arteries have thickened and stiffened due to arteriosclerosis (Izhar, 2017).

According to (Tulak and Umar, 2017) hypertension in the elderly occurred as a result of the aging process in the elderly, namely a physiological decline caused the strength of the heart's pumping machine to decrease and large arteries lose their flexibility. Then, it would become stiff and could not expand when the heart pumped blood through the arteries caused an increase in blood pressure.

Decreased blood pressure in people who were ready to suffer from hypertension caused by exercise in the form of elderly gymnastics performed by the elderly, then, it stimulated an increase in the strength of the heart pump and stimulates vasodilation of blood vessels so that blood flow was smooth and there was a decrease in blood pressure.

Gymnastics has been proven to be able to increase the levels of endorphins four to five times in the blood. So, the more you do gymnastics, the higher the levels of benzorphins you have. When a person does the gymnastics, the bendorphine will come out and be captured by receptors in the hypothalamus and limbic system functioning to regulate emotions. Increased endorphins had been shown to be closely related to reducing pain, improving memory, improving appetite, sexual ability, blood pressure

and breathing. Gymnastics could also reduce blood pressure through weight loss so that the heart would work lighter and the decrease blood pressure (Yanti and Saputri, 2021).

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