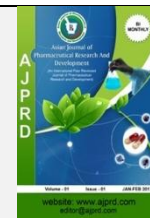


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Research Article

Educational Model: Anti-Stroke Gymnastics on Compliance and Health Status of Patients Hypertension

Santa Manurung

Department of Nursing, Poltekkes Kemenkes Jakarta III, Indonesia

ABSTRACT

Background: The prevalence of hypertension continues to increase, various epidemiological studies show an increase in the incidence and prevalence of hypertension in various parts of the world. According to the American Heart Association (AHA), the American population aged over 20 years suffering from hypertension has reached up to 74.5 million people, but almost 90% of cases have no known cause. Hypertension is a silent killer where the symptoms can vary in each individual and are almost the same as the symptoms of other diseases. In Indonesia, the problem of hypertension is a big challenge, because hypertension is very often found in primary health services with a high prevalence. Hypertension if not handled properly can cause damage to blood vessels throughout the body and the most obvious is the risk of damage to the brain, eyes, heart, and kidney disease. These risks can be avoided and minimized by pharmacological and non-pharmacological management. Anti-stroke exercise is one of the gymnastics that is useful to prevent the risk of stroke in someone who suffers from hypertension. This research is a quasi experiment with pre-post test with control group design. This study aims to determine the effect of anti-stroke gymnastics education on adherence and health status of patients with hypertension. The sampling technique was simple random sampling and the determination of the sample size was using the hypothesis test of the average difference in two independent groups. Data processing and analysis in this study used paired t-test and independent t-test. The results showed that there were significant differences in knowledge, patient compliance, decreased blood pressure and health status of hypertension patients after anti-stroke gymnastics was performed. It is recommended that anti-stroke gymnastics can be used as a non-pharmacological therapy to treat hypertension patients to prevent stroke.

Keywords: Educational, gymnastics, anti-stroke, hypertension patients.

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*Address for Correspondence:

Santa Manurung, Department of Nursing, Poltekkes Kemenkes Jakarta III, Indonesia

INTRODUCTION

The prevalence of hypertension continues to increase, various epidemiological studies show an increase in the incidence and prevalence of hypertension in various parts of the world. Arterial hypertension affects more than 50 million people in the United States, with the highest rates occurring among adults, black, less educated, and low socioeconomic groups. According to the American Heart Association (AHA), the American population aged over 20 years suffering from hypertension has reached up to 74.5

million people, but almost 90% of cases have no known cause. Hypertension is a silent killer where the symptoms can vary in each individual and are almost the same as the symptoms of other diseases.¹⁻⁴

In Indonesia, the problem of hypertension is a big challenge, because hypertension is very often found in primary health services with a high prevalence. Based on the 2013 basic health research, it reached around 25.8%, this shows that

there is an increase in the prevalence of hypertension from 7.6% in 2007 to 9.5% in 2013 and the figure is higher in the elderly.⁵

In addition, hypertension control has not been adequate even though effective drugs are widely available. The elderly population (elderly) is a vulnerable group in society, namely groups who are at risk and are more sensitive to exposure to various risk factors, including economic, social, physical, biological, genetic and lifestyle factors. Factors associated with vulnerability include low socioeconomic status, an unhealthy lifestyle, low self-esteem, helplessness and inability to take care of oneself. Meanwhile, risk factors that predispose to health problems include environmental, nutritional and sociocultural factors.⁶⁻⁸

Hypertension is a disease that mostly affects the elderly, characterized by blood pressure above normal, generally does not cause symptoms, so it is often referred to as the silent killer. It is estimated that there are 76% cases of hypertension in the community that have not been diagnosed.^{9,10}

WHO states that the proportion of a person affected by high blood pressure increases with age, namely 1 in 10 people in their 20-30 years and 5 in 10 people at the age of 50 years. That's why early detection is very important and every adult should know blood pressure and keep it within normal levels.^{11,12}

DKI Jakarta Province has a tendency to increase non-communicable diseases, especially hypertension. The same thing was also found in Banten Province, where there was an increase in the prevalence of hypertension based on blood pressure measurements from 8.0% to 8.6%. In addition, when viewed from the ratio of Public health center to population, Banten Province has the lowest ratio, which is 0.59 per 30,000 population. This describes the actual condition of the community's accessibility to basic health services. Likewise, data obtained from the Cipayang Sub-district Health Center, East Jakarta, showed that in 2016 hypertension patients who came for treatment with new visits were 96 people, and old visits were 533 people, so the total visits were 629 people. Whereas in 2017 this condition experienced a sharp increase, where new visits of hypertension patients were 119 people, while the old visits were 1636 people, so the total visits of hypertension patients who came for treatment were 1755 people. This condition is certainly very concerning and requires special handling from health workers to be able to carry out prevention and treatment programs for patients. Hypertension disease that does not get good treatment will cause complications, such as stroke, coronary heart disease, diabetes, kidney failure, and blindness. Stroke (51%) is the highest cause of death, while target organ damage due to complications of hypertension will depend on the magnitude of the increase in blood pressure and the duration of undiagnosed and untreated blood pressure conditions.

Research related to anti-stroke exercise has been carried out by many researchers, but the combination of education and anti-stroke gymnastics which is the development of non-pharmacological therapy has never been done. Therefore, the authors are interested in conducting research by developing an anti-stroke education and exercise model as a non-pharmacological therapy for patients with hypertension, so as to improve the health status of the sufferers through stability or lowering of blood pressure to near normal.

METHODS AND MATERIALS

This study uses a quasi-experimental design, pre-post test with control group design. In this design, before being given treatment, both groups were given an initial test or pre-test to measure the initial conditions (O_1), then the experimental group was given educational treatment in the form of health counseling followed by gymnastic exercises using media in the form of anti-stroke exercise videos (x) and in the group Controls were not treated (0), but only leaflets containing hypertension and anti-stroke exercise were given. After completion of treatment, both groups will be given a test again as a post-test (O_2).

This research was conducted in DKI Jakarta and Banten Province. The study population was all hypertensive patients who went to the Cipinang Muara Health Center and the North Cipinang Besar Health Center, East Jakarta and the Banten Health Center. The sampling strategy used simple random sampling. The sample size used the hypothesis test of the mean difference in two independent groups.¹³ The sample consisted of 60 for the intervention group and 60 for the control group. For sampling, simple random sampling technique was used from an affordable population. Inclusion criteria set in this study were patients suffering from hypertension and taking medication regularly, age 40-59 years, no history of heart disease, not currently participating in gymnastics/other exercises, at least graduated from elementary school and willing to be research subjects. While the exclusion criteria set were hypertension patients with complications, and patients who withdrew became respondents.

Data collection tools for patient characteristics (age, gender, education and length of illness with hypertension) used a questionnaire and to measure patient compliance and health status used questionnaires, observation sheets and interviews. Meanwhile, to measure blood pressure using an aneroid type sphygmomanometer and an acoustic stethoscope.

This analysis was conducted to see compliance and health status of hypertension patients before and after the intervention and to see differences in adherence and health status of hypertension patients in the intervention group and control group using Paired t-test and Independent t-test statistical tests.

RESULTS

Table 1: Characteristics of respondents based on the patient's age and duration of illness Hypertension

Variable	Groups	N	Mean	Median	SD	Min-Max
Age	Intervention	60	57.5	57	8.98	47 - 73
	Control	60	56.1	56.5	7.38	38 – 78
Duration of illness	Intervention	60	8.70	5	8.78	1 - 37
	Control	60	5.06	4	5.57	1 - 35

Table 1 shows that the mean age of respondents in the intervention group was 57.5 years, the youngest age was 47 years and the oldest was 73 years. Meanwhile, in the control group, the mean age of patients with hypertension was 56.1 years with the youngest being 38 years and the oldest being 78 years. The mean duration of

hypertension in the intervention group respondents was 8.7 years with a minimum length of illness of 1 year and a maximum of 37 years and in the control group the average length of illness of hypertension in respondents was 5.06 years with a minimum length of illness of 1 year and a maximum of 35 years.

Table 2 Characteristics of respondents based on gender and education

Variable	Intervention		Control		Total	
	N	%	N	%	N	%
Gender						
Man	10	16.7	19	31.7	29	24.17
Women	50	83.3	41	68.3	91	73.83
Education						
Elementary school	29	48.3	17	28.3	46	38.33
Junior high school	12	20	13	38.3	25	20.83
Senior high school	17	28.3	9	31.7	26	21.67
College	2	3.3	1	1.7	3	2.7

Table 2 shows that for gender in both groups, the majority of hypertension sufferers are women. The educational background of the majority of respondents is Elementary School for the intervention group, while the control group is the majority of respondents with Junior High School education.

Table 3. Differences in health status scores, knowledge, compliance and blood pressure before and after the anti-stroke gymnastics education model in the intervention and control groups.

Variable	Groups	Mean	SD	95% CI	T	P-value
Health status	Intervention		9.100	-8.517 - -5.249	-5.249	0.000
	Pre-test	43.433				
	Post-test	49.600				
	Difference	-6.166				
	Control		9.324	-4.775 – 0.042	-1.966	0.064
	Pre-test	42.366				
Knowledge	Post-test	44.733				
	Difference	-2.366				
	Intervention		3.233	-3.285 - -1.614	-5.869	0.000
	Pre-test	10.100				
	Post-test	12.550				
	Difference	-2.450				
Compliance	Control		5.217	-2.514 – 0.181	-1.732	0.089
	Pre-test	8.266				
	Post-test	9.433				
	Difference	-1.166				
	Intervention		4.801	-6.457 - -3.976	-8.416	0.000
	Pre-test	4.683				
Systolic	Post-test	9.900				
	Difference	-5.216				
	Control		2.673	-0.623 – 0.757	0.193	0.848
	Pre-test	5.166				
	Post-test	5.100				
	Difference	0.066				
Systolic	Intervention		10.421	1.474 – 6.858	3.697	0.003
	Pre-test	145.92				
	Post-test	141.75				
	Difference	4.166				
	Control		13.869	-1.249 – 5.916	1.303	0.198
	Pre-test	136.07				

	Post-test Difference	133.73 2.333				
Diastolic	Intervention Pre-test Post-test Difference	92.75 89.25 3.50	6.783	1.747 – 5.252	3.997	0.000
	Control Pre-test Post-test Difference	77.183 77.783 -0.600	8.986	-2.921 – 1.721	-0.517	0.607

The results of the analysis in table 6 above show that there are significant differences in health status scores, adherence and diastolic pressure between the intervention group and the control group after the educational intervention about hypertension care and anti-stroke exercise with p value = 0.032; 0.000 and 0.006. However, there was no difference in knowledge scores, systolic pressure between the intervention group and the control group (p value = 0.109 ; 0.352). From the results of the analysis, it can be concluded that there is an effect of educational intervention on hypertension treatment and anti-stroke gymnastics on improving the health status of patients with hypertension, adherence to stroke care and exercise and decreasing diastolic blood pressure.

DISCUSSION

The results showed that the average age of respondents in the intervention and control groups was almost the same, namely: 57.5 years. The lowest age of patients with hypertension in the intervention group was 47 years and the oldest was 73 years. Meanwhile, in the control group, the lowest respondent was 38 years old and the highest was 78 years old. The results of this study are in line with research which explains that the majority of respondents are aged between 60-74 years, both in the control group and in the intervention group. Hypertension is closely related to age, the older a person is, the greater the risk of developing hypertension. Increasing age causes a loss of elasticity of the arteries due to natural changes in the heart, blood vessels and hormones. Large arteries lose their elasticity, so they become stiff and blood with each heartbeat is forced to pass through the narrow blood vessels and eventually causes an increase in blood pressure.¹⁴⁻¹⁶

Increased blood pressure can also be influenced by various risk factors, including: age, gender, family history, obesity, high salt levels, and poor living habits such as smoking and drinking alcohol. For someone who has risk factors, he should be more alert and earlier in taking preventive efforts, for example the simplest efforts are routinely to control blood pressure more than once, exercise and try to avoid other hypertension trigger factors.^{17,18}

The results of the study found that the majority of respondents were women, both in the intervention group and in the control group. The results of this study are supported by research conducted by Surti *et al* which explains that the gender characteristics of most of the respondents are women. Hypertension in young women is relatively low, but that does not mean they are protected forever from hypertension when they get older, namely when they enter the age of 50 they must start to be more alert to the threat of this disease which is often called the silent killer. When women begin to enter

menopause, women begin to lose the hormone estrogen, so that at the age of 45-55 years the prevalence of hypertension in women is higher. Women who have not menopause are protected by the hormone estrogen which plays a role in increasing levels of High Density Lipoprotein (HDL). High HDL levels are protective in preventing the process of atherosclerosis. Women are also more at risk of developing hypertension because physically women have a greater chance of increasing their body mass index. Monthly cycle syndrome (premenstrual syndrome), post-menopause which makes the distribution of body fat easily accumulate due to the hormonal process. The results of basic health research in 2013 show that the prevalence of hypertension in Indonesia tends to be higher for women than men.^{5,19,20}

The level of education is one of the factors that influence a person's perception of being more receptive to new ideas and technologies. The results showed that the majority of respondents in the intervention group had an elementary education background. Meanwhile, in the control group, the majority of respondents are junior high schools. The results of this study are in line with research which describes that the majority of respondents' education is elementary school education. Likewise, the results of research which stated that most of the respondents had junior high school education, both in the intervention group and in the control group. The level of education has an influence on the incidence of hypertension, where people who have a high level of education will usually have a lot of knowledge about health and will have awareness in maintaining their health.^{21,22}

The results of the analysis showed that there was an increase in the knowledge score about hypertension treatment and anti-stroke exercise in the intervention group by 2,450 with a p value of 0.000. It can be concluded that there is a significant effect of educational intervention on hypertension care and anti-stroke exercise through audio-visual media and anti-stroke exercise learning module on increasing knowledge of hypertension patients. The results of this study are in accordance with the results research which states that there is an effect of health education on a low-salt diet on changes in knowledge of hypertension patients, with p value = 0.001. In addition, the results research also explained that there was an effect of health education on increasing respondents' knowledge with a p value of <0.05. Likewise, that there was an effect of health education on hypertension diet on increasing respondents' knowledge with a p value = 0.015 and in the control group there was no significant effect with a p value = 0.089. Suratun, *et al* also explained in their research that there was a significant effect of the continuous nursing service approach intervention through health education about

hypertension diet on increasing the knowledge score of respondents by 4.091 with a p value of 0.000.²³⁻²⁵

Knowledge is the result of a person's sensing of an object through his senses. By itself at the time of sensing to produce knowledge is strongly influenced by the intensity of attention and perception of the object. Most of a person's knowledge is obtained through the senses of hearing and sight. A person's knowledge of objects has different intensities or levels. Knowledge is a very important domain for the formation of one's actions.²¹ The increase in knowledge is influenced by the factor of health workers who have experience in providing good information in explaining simply but easily understood by patients and using adequate media considering that most hypertensive patients are in the elderly. Education about hypertension treatment and anti-stroke exercise in this study was carried out in groups using videos and guide modules accompanied by exercises and discussions/questions and answers.

The results of the analysis of the patient's adherence to anti-stroke exercise showed that there was a significant difference in the intervention group with p value = 0.000, the average difference in increasing foot exercise adherence in the intervention group was 5.216. This shows that there is a significant effect of educational intervention on hypertension care and anti-stroke exercise in hypertensive patients through video media and training modules on the compliance of hypertensive patients to perform anti-stroke exercise and hypertension treatment. The results of this study are in accordance with the results of the study of Suraton, et al. who explained in their research that there was a significant effect of the intervention of a sustainable nursing service approach through health education about hypertension diet on changes in respondents' positive attitudes with a value of p = 0.000.²⁵

Compliance is the degree to which the patient carries out the treatment and behavior recommended by his doctor or by others. Compliance which is also known as adherence is the degree to which the patient follows the clinical advice of the treating doctor. In the medical context, the concept of compliance is a level that shows the patient's behavior in obeying or following procedures or medical expert advice. Compliance is the extent to which the patient's behavior is in accordance with the provisions given by health professionals. Adequate knowledge of patients about gymnastics and foot care allows patients to behave to carry out orders suggested by authorized persons, such as: doctors, nurses and other health workers.²⁶⁻²⁸

The results of the analysis showed that there was a decrease in the systolic blood pressure of the intervention group respondents by 4.17 mmHg and the diastolic blood pressure decreased by 3.50 mmHg with p value = 0.000. Likewise in the control group respondents there was a decrease in systolic of 2.33 mmHg and diastolic of 0.60 mmHg. From these findings, it can be concluded that there is a significant effect of the anti-stroke exercise education intervention on reducing systolic and diastolic blood pressure in the intervention group respondents and the reduction in systolic blood pressure and diastolic blood pressure is greater in the intervention group compared to the control group.

The results of this study are in accordance with research which states that there is a significant effect of systolic blood pressure between the experimental group and the control group with $p < 0.005$. Meanwhile, for diastolic blood pressure, p value = 0.025. Likewise, the results of the study by Suraton et al which explained that there was a significant effect of the intervention of a continuous nursing service approach through health education about hypertension diet on reducing systolic and diastolic blood pressure with a p-value of 0.000.^{29,30}

Likewise, the results of research there was a significant difference in both systolic and diastolic blood pressure of hypertension patients in the intervention group before and after being given anti-stroke exercise with a $p < 0.005$. There was a decrease in systolic blood pressure in the intervention group by 8.62 mmHg and diastolic blood pressure by 4.00 mmHg. Before being given anti-stroke exercise, the median systolic blood pressure of the respondents was 160.00 mmHg with the lowest value being 140 mmHg and the highest 160 mmHg and the median diastolic blood pressure being 100.00 mmHg with the lowest value being 90 mmHg and the highest being 100 mmHg. After the intervention, it decreased to a median systolic blood pressure of 140 mmHg with the lowest value being 130 mmHg and the highest being 150 mmHg.^{31,32} The decrease in blood pressure after exercise (anti-stroke exercise) can be explained by two mechanisms, namely changes in sympathetic nervous system activity and vascular responses after exercise. Neurohumorally, decreased activity of the sympathetic nervous system in peripheral blood vessels is an indication of a decrease in blood pressure. In addition, the vascular response has an important role in reducing blood pressure after exercise. Exercise is thought to change the response of a strong vasoconstrictor (constriction of blood vessels) to a vasodilator (reducing vasoconstriction or dilation of blood vessels) and increasing the production of nitrogen oxides. Increased respiratory activity will increase venous return, causing an increase in stroke volume which will directly increase cardiac output. This causes arterial blood pressure to increase and a resting phase will occur. This resting phase is able to reduce skeletal muscle respiratory activity and cause sympathetic nerve activity to increase and after that heart rate decreases, stroke volume decreases and arteriolar venous vasodilation occurs. This decrease results in a decrease in cardiac output and total peripheral resistance, resulting in a decrease in blood pressure.

The results showed that there was a significant difference in the health status of respondents in the intervention group before and after the intervention of hypertension care education and anti-stroke exercise of 6,166 points. While in the control group there was no significant difference in the health status of the respondents before and after the intervention of hypertension care education and anti-stroke exercise, the average difference in score was 2,366 with p value = 0.064. From these findings, it can be concluded that education about hypertension treatment and anti-stroke exercise have a significant effect on the health status of hypertensive patients ($p = 0.000$). Based on the results of interviews with respondents, information was obtained that respondents had been able to rest for 6 hours of sleep per day,

decreased blood pressure and reduced dizziness or headaches after participating in educational programs in the form of anti-stroke exercise and hypertension treatment.

The findings of this study are supported by the results of research which states that tai-chi exercise can significantly improve sleep quality in healthy adults and patients with health problems of chronic disease, improve health including physical appearance, decrease pain and psychological well-being. In addition, the results of this study are also in line with the results of research who explained that there was a significant effect of the tai-chi exercise program on the health status of the elderly.^{33,34}

In the control group, the results showed that there was no significant difference in the health status of the respondents, although the test results showed that there was a difference in health status before and after of 2,366 points, but there was no significant effect of education in the form of anti-stroke exercise and hypertension treatment on the health status of the respondents with p value = 0.064. Even though the respondents took part in sports carried out by the Public Health Center, they had not been able to improve the health status of the respondents. This shows that anti-stroke exercise and hypertension treatment have a major role in improving the health status of hypertensive patients. Therefore, it is expected that nurses at the Public health center can continue anti-stroke gymnastics and hypertension treatments on a regular basis and monitor the patient's health status.

CONCLUSIONS

Based on the research results, it can be concluded that educational model of anti-stroke gymnastics can improve knowledge, patient compliance, decreased blood pressure and health status of hypertension patients.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

ETHICAL CLEARANCE

This research has received ethical approval from the Research Ethics Committee, Health Polytechnic of Jakarta III No.KEPK-PKKJ3/187/IV/2018

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