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Effectiveness of Tera Gymnastics and Healthy Heart Gymnastics on Blood Pressure Among Elderly With Hipertension in Sinomwidodo Village, Tambakromo Subdistrict, Pati District

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Abstract

The elderly are at high risk for degenerative diseases. Hypertension occupies the largest proportion of all degenerative diseases reported. Gymnastics Tera and Healthy Gymnastics are one of the nonpharmacology efforts to suppress Hypertension. The purpose of this study was to determine the effectiveness of Gymnastics Tera and Healthy Gymnastics Against Blood Pressure on Hypertensive Elderly. This research uses a quasi experiment method with Nonequivalent control group design. The population in this study is all elderly who suffer from Hypertension in Sinomwidodo Village Tambakromo Subdistrict, Pati Regency which according to criteria amounting to 35 elderly. Sampling with Purposive Sampling technique and sample size is determined by Slovin formula. The sample is 32 respondents with the provision of 11 people tera gymnastics group, 11 people healthy heart gymnastic group and 1o people control group. The results showed that after the intervention there was a significant effect between the group of Gymnastics Tera and Healthy Gymnastics compared with the control group with the measurement of mercury p-value (<0.05). There was no significant difference from the comparison of the post-test value of gymnastic exercise of Tera and Healthy Heart gymnastic to systolic and diatolic blood pressure in elderly hypertension p-value (> 0.05). Conclusion Gymnastics Tera and Healthy Gymnastic Gym are effective in lowering blood pressure in hypertensive elderly. The effectiveness of gymnastics Tera and Healthy Heart gymnastics are the same.

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INTRODUCTION

Indonesian people have experienced increased life expectancy and the number of elderly has been increasing also. Indonesia is predicted to experience an aged population boom in the two decades of the beginning of the 21st century, so it is certainly necessary to be anticipated because it will bring widespread impact in family, community and country life. Elderly need to get better attention in national development (Ministry of Health, 2016). Elderly is a group that has reached the age of 60 years and/or over (Regulation of Government of the Republic of Indonesia, 2004). The results of this study are in line with the study conducted by Pangaribuan & Berawi, (2016) which stated that good gymnastic exercises, healthy heart, yoga, elderly, tera, and aerobics had the same effectiveness to lower blood pressure in the elderly as well as to maintain body fitness. 2004). Individual effects of the aging process may cause various problems. One of the problems associated with elderly people is health problem. As we get older, most health complaints are also growing. Health complaints in the pre-elderly group (45-59 years) were amounted to 35.18 percent. This figure increased to 46.71 percent in the young elderly group (60-69 years), 56.26 percent in the middle aged elderly (70-79 years) and 61.04 percent in the old elderly (80 and above) (Indonesian central Bureau of Statistics, 2014).

Elderly are at high risk for Degenerative diseases, such as Coronary Heart Disease (CHD), Hypertension, Diabetes Militus, Rheumatism and Cancer. In Indonesia there is a change in the pattern of disease from infectious diseases to non-communicable diseases, known as epidemiological transitions. Non Communicable Diseases (NCD) is the leading cause of death in Indonesia. Based on the recapitulation of new case data of NCD in Central Java Province, the number of new cases of PTM reported as a whole by 2015 was 603,840 cases.

Hypertension still occupies the largest proportion of all reported NCD, that was equal to 57,87 percent, while the second order was Diabetes Mellitus of 18,33 percent. The next order was Asthma Bronkiale of 11,50 percent, Heart Disease of 3, 91 percent, Stroke of 2, 87 percent, COP of 2.27 percent, Cancer of 2.22 percent, and Psychosis of 1.01 percent (Central Java Province Health Profile, 2015). One of the districts that experienced increased NCD cases in Central Java Province was Pati Regency.

Data on NCD in 2014 in Pati District showed that there were 34,821 NCD cases and there was an increase compared to the year of 2013 for total 21,904 cases. In 2014 Hypertension was 53.35 percent (18,577 cases), Asthma Bronchiale was 17.43 percent (6,069 cases), Diabetes Mellitus was 19.6 percent (6,823 cases), Traffic Accident was 5.44 percent (1,894 cases), Neoplasms was 0, 62 percent (217 cases) and Psikosis was 2.5 percent (869 cases) (Health Profile of Pati District, 2014).

Control of NCD can be done with appropriate intervention on each target/group of certain population so that the increase of new case of NCD can be suppressed. One effort to suppress NCD and maintain and improve physical fitness for health is physical exercise or acticity. Exercise is very beneficial for human health, among others, to reduce oxydation of fat, blood pressure and increase muscle metabolism (Golbidi et al., 2012). Sports or physical exercise should ideally be designed individually by considering various things such as physical capacity, health status, age and the goals (Ambardini, 2008).

One of physical exercises usually done and recommended for elderly is gymnastics. Gymnastics is a safe sport and has many physiological benefits for the elderly (Johnston et al., 2008). Some of the exercises that can be done by the elderly are tera gymnastics, yoga gymnastics, healthy heart gymnastics, kegel gymnastics and ergonomic gymnastics (Maryam et al., 2008). One of the developing exercises in the community is tera gymnastics. Tera gymnastics is a breathing exercise originating from China combined with martial arts, tailored to the conditions in Indonesia and has been recognized by the government of Indonesia as an activity that supports government programs since 1987. The movement in this exercise is dynamic, not too fast, produces sweat, and does not cause tiredness but can cause freshness. Tera gymnastics is perfect for the elderly because it reduces the risk of injury and one of the benefits is to lower blood pressure.

In addition to Tera gymnastics, other developing exercise in the community is healthy heart gymnastics which can also lower the blood pressure. Healthy heart gymnastics is an exercise that has the purpose to nourish the heart. This exercise is an aerobic exercise plus sports that can provide flexibility, strength and muscle enhancement in easy, cheap, festive, mass and benefits and safe manners (Widianti & Proverawati, 2010).

This study aims to determine the effectiveness of Tera Gymnastics and Healthy Heart Gymnastics on Blood Pressure among Elderly with hypertension in Sinomwidodo Village, Tambakromo Subdistrict, Pati District.

METHODS

The method used here was quasy experiment with Nonequivalent control group design. The population in this study was all elderly who suffered from Hypertension in Sinomwidodo Village Tambakromo Subdistrict Pati District which according to the inclusion criteria amounted to 35 elderly. Sampling was performed by Purposive Sampling technique and sample size was determined by Slovin formula. The samples were 32 respondents with 11 people in the Tera gymnastics group, 11 people in the Healthy Heart gymnastic group and 10 people in the control group. The study instruments used were stationery, sphygmomanometer (mercury), stethoscope, observation and inspection sheet, and informed consent sheet.

The study was conducted in August - September 2017. Data collection was obtained based on measurement result with mercury sphygmomanometer. *Data analysis was performed by using Wilcoxon test statistic test and Mann Whitney test using SPSS 16.*

RESULTS AND DISCUSSION

This study aims to determine the effectiveness of Tera Gymnastics and Healthy Heart Gymnastics on Blood Pressure among Elderly with hypertension in Sinomwidodo Village, Tambakromo Subdistrict, Pati District. The results will be described as follows:

1. Data Hypothesis Test on Tera Gymnastics, Healthy Heart Gymnastics and Control Groups with the Measurement Using Mercury sphygmomanometer

Table 1. Comparative Analisis between Pre-test and Post-test Data in Three Groups

Group		Meean ± Std Dev	Sig
Tera Gymn	Pre Sistolic	145.00 ± 4.47	0.006**
	Post Sistolic	135.00 ± 8.06	
	Pre Diastolic	91.82 ± 2.52	0.004**
	Post Diastolic	84.55 ± 3.50	
Healthy Heart Gymn	Pre Sistolic	144.55 ± 5.68	0.006**
	Post Sistolic	135.45 ± 7.56	
	Pre Diastolic	91.36 ± 2.33	0.004**
	Post Diastolic	84.55 ± 3.50	
Control	Pre Sistolic	145.50 ± 4.97	0.672*
	Post Sistolic	146.50 ± 8.18	
	Pre Diastolic	91.50 ± 2.41	0.480*
	Post Diastolic	90.50 ± 3.68	

Note: * different not significant
** different significant

The values of respondent's blood pressure in table 1. were obtained using mercury sphygmomanometer. The result of comparation test between pre-test and post-test in tera gymnastics and healthy heart gymnastics groups obtained significance value <0.05, which meant that there was a significant difference of blood pressure between before and after tera gymnastics and healthy heart gymnastics. This proved the hypothesis that tera gymnastics and healthy heart gymnastics were effective in lowering blood pressure in elderly with hypertension. As for the control group obtained significance value of > 0.05 which proved that there was no significant change in blood pressure in the control group.

The results of blood pressure measurement by using mercury sphygmomanometer showed that there was a significant difference in the mean of blood pressure between before and after being given gymnastics in the intervention group i.e Tera gymnastics group and Healthy Heart gymnastics compared to the control group. There was a difference in systolic and diastolic blood pressure levels in the intervention group after being given Tera gymnastics which obtained by the measurement using mercury sphygmomanometer. The result of measurement using mercury sphygmomanometer was proved by comparative value between before and after Tera gymnastics in the systolic blood pressure with the significance value $\rho = 0.006 < 0,05$ and comparative value between before and after Tera gymnastics in the diastolic blood pressure with the significance value $\rho = 0.004 < 0.05$.

Those results are in accordance with the study conducted by Eriyanti (2016) that there was a difference in the effect of tera gymnastics on blood pressure decrease in elderly with hypertension in Elderly Posyandu Pabelan Village Kartasura: treatment I obtained p-value in systolic blood pressure of 0.000 (significant) and diastolic blood pressure of 0.034 (significant). The treatment II obtained the probability value (p-value) in systolic blood

pressure of 0.005 (significant) and diastolic blood pressure of 0.004 (significant). The treatment III obtained the probability value (p-value) in systolic blood pressure of 0.000 (significant). The treatment IV, obtained the probability value (p-value) in systolic blood pressure of 0.014 (significant) and diastolic blood pressure of 0.017 (significant). In general, the purpose of tera gymnastics is to improve the various components contained in the heart and lungs so that the heart and lung conditions may work properly and and the body becomes fit.

The study results are also in line with the study conducted by Fatarona (2011) that there was a significant difference between blood pressure before and after tera gymnastics intervention in elderly patients with hypertension with p-value of 0.001 (<0.05). The decrease in blood pressure occurrs because at the time of doing gymnastics there 9s breathing exercise. Slow breathing allows the body to relax and dilate capillaries, thereby improving blood circulation. This happens because taking a deep breath and exhaling completely will improve the circulation of O2 and CO2. Besides, inhalation and exhalation regularly can also improve the efficiency of the heart working. Performing tera movements correctly will make the body to feel relax and the peak of body relaxation can be achieved, so as to reduce physical and mental tension (Maryam et al., 2008).

Tera gymnastics can stimulate decreased sympathetic nervous activity and increased parasympathetic nerves that affect the decrease of adrenaline, norepinephrine and catecholamine, and vasodilation or dilation of blood vessels resulting in total oxygen transport in the body, especially to the brain becomes smooth, which can lower blood pressure and pulse will be normal. Regular exercise activity to burn glucose through muscle activity will produce ATP so that endorphins will appear and bring comfortness, happyness and pleasure. Exercise will also stimulate the mechanism of HPA (Hypothalamus Pituitari Adrenal) axis to stimulate the pineal gland to secrete serotonin and melatonin. The stimulus from the hypothalamus will be transferred to the pituitary to form the beta endorphin and enkephalin which will create relaxation and pleasure (Triyanto, 2014).

There was also a significant difference in systolic and diastolic blood pressure levels after being given intervention in the Healthy Gymnastics group with the measurement using mercury sphygmomanometer. Meanwhile, for Healthy Heart gymnastic group based on measurement result using mercury sphygmomanometer, the result of comparative value between before and after Healthy Heart gymnastic also showed difference in systolic and diastolic blood pressure levels. The systolic blood pressure showed significance value $\rho = 0.006 < 0.05$ and comparative value between before and after Healthy Heart gymnastics in the diastolic blood pressure showed significance value $\rho = 0.004 < 0.05$. The results are in accordance with the study conducted by Merianti & Wijaya (2015) that there was an influence of healthy heart gymnastics to decrease blood pressure in patients with hypertension ($p \leq 0.05$). The univariate analysis showed that before healthy heart gymnastic intervention, the mean of systolic blood pressure was 145.33 mmHg and the mean of diastolic blood pressure was 88.00 mmHg. Meanwhile, after healthy heart gymnastic, the mean of systolic blood pressure was 137,33 mmHg and the mean of diastolic blood pressure was 82.00 mmHg. The results of this study are also in line with the study of Pangaribuan & Berawi (2016), that the activities of heart exercises performed on the respondents aged 45-60 years performed for 4 weeks showed a decrease in sistole blood pressure of $p = 0.042$ and diastole blood pressure of $p = 0.027$.

Based on the results of the study, there was significant difference in the measurement results of systolic and diastolic blood pressures using mercury sphygmomanometer between before and after the intervention of gymnastics. Elderly with Hypertension Grade I who were given intervention of Tera gymnastics and Healthy Heart gymnastics experienced a decrease in blood pressure due to exercise can smooth blood circulation and increase the amount of blood volume. So doing gymnastics on a regular basis can minimize the occurrence of cardiovascular disease, especially hypertension. Doing physical activity or exercise can be used for the prevention and management of high blood pressure or hypertension (Kokkinos et al., 2009). This is in accordance with the study conducted by Alsairafi et al., (2010) in Kuwait which mentioned that physical activity was effective and could control blood pressure in people with hypertension.

The risk of hypertension was 8.34 times among patients who exercised less than 3 days per week. The American College of Sports Medicine (ACSM) recommends regular and sufficient aerobic exercise to prevent hypertension. Performing the right movements for 30-40 minutes or four times per week can lower blood pressure 10 mmHg in systolic and diastolic blood pressures (Doewes, 2004). According to the study conducted by Collier et al. (2008) doing aerobic exercise for 4 weeks

could decrease blood flow and blood pressure in patients with early hypertension. Aerobic exercise decreased arterial stiffness in individuals with hypertension thus lowering blood pressure. Exercise is an intervention that can reduce risk factors for cardiovascular disease without negative side effects.

Exercise in addition to prevent stress can also lose weight and burn body fat and strengthen the heart muscle (Suryati, 2005). The results of this study are also in line with Liu et al. (2012) who stated that physical exercise or exercise could lower blood pressure in pre-hypertensive individuals and individuals who already suffer from hypertension. The test result of systolic and diastolic blood pressure changes after exercise obtained p-value < 0.01.

Meanwhile, the results of blood pressure measurement using mercury sphygmomanometer in the control group that was not given gymnastic intervention showed that the blood pressure experienced by elderly people with Hypertension Grade I was not much different or can be said constant. It was also proved by comparative value in systolic blood pressure measurement results using mercury sphygmomanometer between before and after intervention with significance value ρ = 0,672> 0,05 and comparative value in diastolic blood pressure between before and after with significance value ρ = 0,480> 0.05. Based on the analysis of the author, the respondents in this control group might be less able to control other factors that could trigger blood pressure levels either systolic blood pressure or diastolic blood pressure, among other regular physical activities such as gymnastics performed by the intervention group.

Post-Test Data Hypothesis Test on Tera Gymnastics and Healthy Heart Gymnastics Groups with the Measurement Using Mercury sphygmomanometer

Table 2. Comparative Analysis of Post-Test Value on Tera Gymnastics and Healthy Heart Gymnastics Groups
Note: * different not significant
** different significant

Group		Meean ± Std Dev	Sig
Sistolic	Tera Gymn	135.00 ± 8.06	0.861*
	Healthy Heart Gymn	135.45 ± 7.56	
Diastolic	Tera Gymn	84.55 ± 3.50	1.000*
	Healthy Heart Gymn	84.55 ± 3.50	

The values of blood pressure of respondents in table 2. were obtained using mercury sphygmomanometer. The result of comparative test between post test value in systole blood pressure in Tera gymnastics group and healthy heart gymnastics group showed a significance value of 0.861 (p > 0.05) and post-test diastole value of 1,000 (p > 0.05) which meant that there was no significant difference in blood pressure between Tera gymnastics group compared to healthy heart gymnastics. This proved that the effectiveness of both exercises in lowering blood pressure was equal.

The result of blood pressure measurement using mercury sphygmomanometer showed that there was no significant difference in blood pressure after being given intervention between the intervention groups namely Tera gymnastics group and healthy heart gymnastics group. This was proved with the comparative test result between post-test of Tera gymnastics group compared to Healthy Heart gymnastics which obtained the significance value of 0.861 (p > 0.05) and post-test diastole value of 1,000 (p > 0.05) which meant that there was no significant difference in blood pressure between Tera gymnastics group compared to healthy heart gymnastics. This proved that the effectiveness of both exercises in lowering blood pressure was equal.

The results of this study are in line with the study conducted by Pangaribuan & Berawi, (2016) which stated that all exercises including healthy heart, yoga, elderly, tera, and aerobics had the same effectiveness to lower blood pressure in the elderly as well as to maintain body fitness.

CONCLUSION

Based on the study results and discussion above, it can be concluded that there was a significant influence of Tera gymnastics and Healthy Heart gymnastics on blood pressure among elderly with hypertension in Sinomwidodo village Tambakromo Subdistrict Pati District. P value of <0.05 meant that Tera gymnastics and Healthy Heart gymnastics were effective to lower blood pressure in elderly with hypertension. There was no significant influence showed in the blood pressure measurement in the control group in Sinomwidodo Village, Tambakromo Sub-district, Pati District. There was no significant difference in post-test value of Tera gymnastic and Healthy Heart gymnastic on systolic and diatolic blood pressure in elderly with hypertension performed by measurement using mercury sphygmomanometer in Sinomwidodo

village, Tambakromo subdistrict, Pati District. The p value of > 0.05 meant that the effectiveness of Tera gymnastics was equivalent with Healthy Heart Gymnastic. Recommendation is to conduct a study on other factors that have not been studied in this study related to the effectiveness of Tera Gymnastic Gymnastics and Healthy Heart Gymnastics on Blood Pressure among Elderly with hypertension in Sinomwidodo Village Tambakromo Subdistrict Pati District.

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