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CORRELATION STRESS, BODY MASS INDEX AND PHYSICAL ACTIVITIES IN ELDERLY WITH HYPERTENSION

ABSTRACT

The physiological setbacks of the elderly include a decrease in the function of the cardiovascular system, which affects blood pressure in the elderly. One of the cardiovascular problems that often occurs in the elderly is hypertension. Hypertension is often associated with stress due to psychological problems from the elderly. In addition to stress, body mass index is another factor associated with hypertension. Overweight is one of the predisposing factors for the incidence of hypertension. In the elderly who are overweight, if followed by a low level of physical activity, will increase the risk of hypertension. This study aims to determine (1) the correlation between stress levels with hypertension in the elderly, (2) the correlation between BMI with hypertension in the elderly and (3)the correlation between physical activity with hypertension in the elderly. The population in this study was the participants of the Posyandu, an elderly rose in Kayuapak village. The sampling technique uses simple random sampling. Stress level variables are measured using DASS Test, BMI is measured by Digital Body Weight scales, physical activity is measured using a physical activity sheet and blood pressure is measured using a Spigmomanometer. This study uses correlational analysis techniques. The results a relationship between stress levels and blood pressure in the elderly with a significance value of 0.039 <0.05 (p <0.05). There is a relationship between BMI and blood pressure in the elderly with a significance value of 0,000 <0.05 (p <0.05). There is a relationship between the level of physical activity with blood pressure in the elderly with a significance value of 0.011 <0.05 (p <0.05).

Keywords: bmi; hypertension; physical activities; stress

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INTRODUCTION

Elderly is an increase in age marked by a decrease in muscle mass, muscle strength, heart rate (Astriyana and Wahyuni, 2012 It is estimated that in 2017 there were 23.66 million elderly in Indonesia, and in 2020 (27.08 million) and continues to increase to 48.19 million in 2035 (Ministry of Health of the Republic of Indonesia, 2017). According to SUSENAS data, Central Java is in the 2nd position with the largest number of elderly people, amounting to 12.37% of the entire elderly population in Indonesia. The elderly in Indonesia are dominated by the young elderly group (60-69 years old). as much as 63.39% the rest are middle aged (age 70-79 years) by 27.92% and old elderly (age > 80 years) by 8.69 years (Central Bureau of Statistics, 2018).The physiological decline of the elderly includes decreased function from the cardiovascular system, which affects blood pressure in the elderly. One of the cardiovascular problems that often occurs in the elderly is hypertension. Hypertension is a disease that is mostly elderly. he experienced it. Hypertension is a disease that can cause death, because it will result in various complications of disease in the body system. The prevalence of hypertension that occurred on the island of Java in 2004 was 41.9% with the range of each province approximately 36.6%-47.7%. (Depkes RI, 2009)

Hypertension is often associated with stress due to psychological problems of the elderly. Elderly more often experience sleep disturbances, anxiety, feeling lonely, sad and irritable. Weight gain is a risk factor for hypertension. Based on data from the Sukoharjo District Health Office (2018), there were 26,789 cases of hypertension, while obesity cases found in puskesmas in 2018 were 1,700 cases. Body mass index is associated with increased blood pressure/hypertension due to fat accumulation in both arteries and veins (Greyti, 2014).

Besides stress, Body Mass Index (BMI) is another factor related to blood pressure. BMI is a comparison between weight and height to check a person's fitness. Data from Riskesdas in 2018 also showed an increase in obesity in the elderly. In 2013 there were 32.9% of the elderly in Indonesia who were classified as obese, then increased to 54.3% in 2018. Excess body weight is one of the predisposing factors to the incidence of hypertension. This is supported by the results of a study by Nurhasanan and Eti (2017) which states that the factors that influence the incidence of hypertension are age, exercise, sodium and fat consumption. Some people who have a BMI > 25 (overweight) will have difficulty in activities. There is a significant relationship between physical activity and hypertension, where the majority of respondents have a mild level of physical activity because it is related to the function of blood vessels related to the regulation of systolic and diastolic blood pressure (Guslani & Erni, 2016). Lack of physical activity will affect the amount of blood and oxygen is disturbed so that it can affect blood pressure (Hasanudin, et al, 2018). The purpose of this study was to determine: 1) the relationship between stress levels and hypertension in the elderly, (2) the relationship between BMI and hypertension in the elderly and (3) the relationship between physical activity and hypertension in the elderly.

METHOD

The research method is an important factor that will determine the results of the study. A researcher must first really understand the research procedure to be carried out, so that his research will run smoothly. In accordance with this, in carrying out research, certain methods are needed. The use of methods in a research must be appropriate and lead to. The research method uses a correlational approach. Correlational research is a study that aims to determine the relationship between two or more variables and detect the extent to which the variables in one factor are related to variations in one or more other factors based on the correlation coefficient. The population used in this study were all elderly in the village of Kayuapak, Polokarto, Sukoharjo. This study uses a sampling technique with simple random sampling, namely a simple random sampling technique without regard to the strata contained in the population that will be used as many as 37 respondents The variables in this study consisted of independent variables and dependent variables with details, namely: independent variables (independent): Stress Level, Body Mass Index (BMI) and Physical Activity and the dependent variable (dependent): Blood pressur

Body Mass Index (BMI) is a standard comparison of body weight with height which is used as an indicator of nutritional status and general health. BMI measurement instrument using Digital Weight Scal. Physical activity is movement that is produced by muscle contraction along with the systems in the body. The instrument for measuring physical activity uses a physical activity sheet.

Stress is a common adaptation pattern and reaction pattern to stressors originating from individuals and the environment as measured using the DASS which is a set of scales used to measure negative emotional status from depression, anxiety, and stress consisting of 42 assessment items. The measurement instrument used the Indonesian version of the

Despression Anxiety Stress Scale (DASS) questionnaire. Blood pressure is the force produced by the blood against each unit area of the blood vessel wall. The instrument for measuring blood pressure uses a sphygmomanometer. The data analysis technique in this study uses correlational analysis techniques to obtain an overview of the relationship between the dependent and independent variables. The steps of data analysis carried out in this study are Prerequisite Analysis Test which includes data normality test using Shaphiro Wilk and hypothesis testing using Spearman correlation test.

RESULTS

Based on the research data, the results of stress levels, body mass index, physical activity levels and blood pressure in elderly men and women after exercise in the treatment group were calculated the average value obtained, then analyzed statistically. The data are described as follows:

Table 1.
Description of Data by Age

No	Age Group	f	%
1.	45-59	11	29,7
2.	60-74	25	67,6
3.	75-90	1	2,7

Based on the table above, it is known that from the total sample of 37 respondents, it can be described as follows; as many as 67.6% of the elderly aged 60-74 years, 29.7% of the elderly aged 45-59 years, and 2.7% aged between 75-90 years.

Table 2.
Description of Data Distribution Based on Body Mass Index Classification

No	Klasifikasi IMT	Frekuensi	%
1	*Underweight*	0	0
2	*Severe thinness*	0	0
3	*Moderate thinness*	0	0
4	*Mild thinness*	1	2,7
5	*Normal*	21	56,7
6	*Pre obese*	10	27
7	*Obese*	5	13,5
8	*Obese class i*	0	0
9	*Obese class ii*	0	0
10	*Obese class iii*	0	0
	Total	37	100

Table 2 shows that most respondents have normal nutritional status with a frequency of 21 respondents (56.7%), followed by pre-obesity status as many as 10 respondents (27%), obesity as many as 5 respondents (13.5%), and weight and less 1 respondents (2.7%).

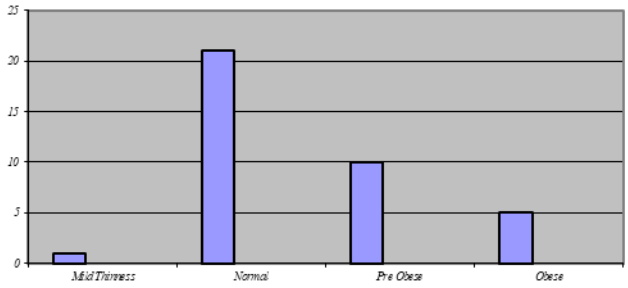

Figure 1. Histogram of Data by Age according to WHO

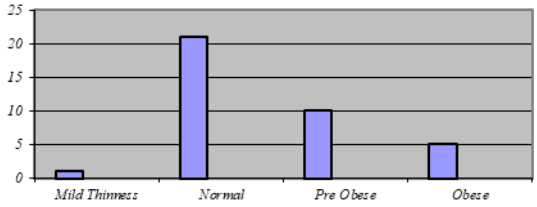

Figure 2. Histogram of Data Distribution Based on Body Mass Index Classification

Figure 2 shows that the normal BMI group has the highest graph, followed by the pre-obese, obese and underweight groups respectively.

Table 3.
Description of Data Distribution Based on Classification of Physical Activity Levels

No	BMI Classification	Frekuensi	%
1	Heavy	0	0
2	Currently	10	27
3	Light	27	73

Table 3 can show that most respondents have light activity levels with a frequency of 27 (73%), followed by moderate activity as many as 10 respondents (27%), and no respondent has a high activity level.

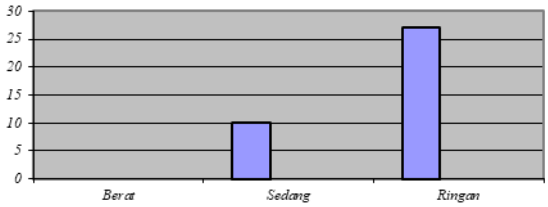

Figure 3 Histogram of Data Distribution Based on Activity Level Classification

Figure 3 activity level histogram can be seen that the activity level group is light and followed by moderate activity group, and no respondent has a heavy activity level.

Table 4.
Description of Data Distribution Based on Blood Pressure Classification (Systolic)

No.	BMI Classification	Frekuensi	%
1	Normal	0	0
2	Pre hypertension	12	32,4
3	Hypertension 1	12	32,4
4	Hypertension II	13	35,2

Table 4 shows that the majority of respondents have hypertension level II with a frequency of 13 respondents (35.2%), followed by hypertension I as many as 12 respondents (32.4%), and pre-hypertension as many as 12 respondents (32.4%).

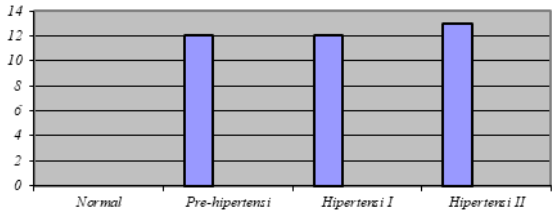

Figure 4. Histogram of Data Distribution Based on Blood Pressure Classification (Systole)

Table 5.
Data Description of Stress Level, Body Mass Index, Physical Activity Level and Blood Pressure

No.	Stress level	IMT	Physical Activity Level	Blood Pressure (Systolic)
1.	14	17	26	114
2.	14	18	26	125
3.	14	19	30	130
4.	15	19	30	131
5.	16	20	30	133
6.	16	20	30	135
7.	16	21	30	136
8.	18	21	33	141
9.	19	21	34	143
10.	19	22	35	148
11.	19	22	35	148
12.	19	22	36	149
13.	20	23	36	149
14.	21	23	36	149
15.	22	23	36	156
16.	22	23	37	157
17.	23	23	37	157
18.	23	23	38	157
19.	24	24	38	159
20.	24	24	38	159
21.	24	25	38	160
22.	24	25	38	161
23.	24	25	39	162
24.	24	26	39	163

No.	Stress level	IMT	Physical Activity Level	Blood Pressure (Systolic)
25.	24	26	39	164
26.	25	26	40	169
27.	26	27	40	171
28.	26	27	40	173
29.	26	29	42	182
30.	27	29	42	183
31.	27	30	44	197
32.	28	30	44	200
33.	28	30	44	201
34.	29	30	45	214
35.	30	31	46	222
36.	32	31	46	226
37.	32	32	48	226

Based on table 5, it is known that 37 respondents had very severe stress levels with an average DASS test score of 52, normal nutritional status with an average BMI of 24, moderate activity level of 1.54, and had blood pressure with hypertension level of 1 with The mean systolic pressure was 157 mmHg.

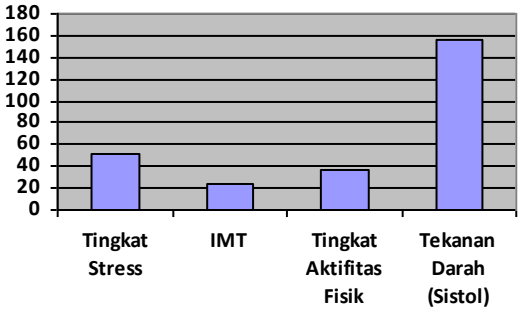

Figure 5. Histogram Average Value of Stress Level Data, Body Mass Index, Physical Activity Level and Blood Pressure

Table 6.
Hypothesis Testing Results of Stress Levels and Blood Pressure

Correlations			
		Blood Pressure	Stress
Blood Pressure	Pearson Correlation	1	,341*
	Sig. (2-tailed)		,039
	N	37	37
Stress	Pearson Correlation	,341*	1
	Sig. (2-tailed)	,039	
	N	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7.
Testing Results of Body Mass Index (BMI) and Blood Pressure

Correlations

		Blood Pressure	IMT
Blood Pressure	Pearson Correlation	1	,721**
	Sig. (2-tailed)		,000
	N	37	37
IMT	Pearson Correlation	,721**	1
	Sig. (2-tailed)	,000	
	N	37	37

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8.
Physical Activity Test Results and Blood Pressure

Correlations

		Blood Pressure	Physical Activity
Blood Pressure	Pearson Correlation	1	-,411*
	Sig. (2-tailed)		,011
	N	37	37
Physical Activity	Pearson Correlation	-,411*	1
	Sig. (2-tailed)	,011	
	N	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

The discussion of the results of this study provides further interpretation of the results of the data analysis that have been presented. Based on hypothesis testing has resulted in the following analysis:

The Relationship Between Stress Levels And Blood Pressure

Based on the distribution of data in table 4.6, there is a relationship between stress levels and the incidence of hypertension as evidenced by the p value of 0.039 <0.05. In line with the research conducted by Rustono and Hengki(2018) on 81 respondents, it is known that stress is related to the incidence of hypertension. The body's reaction to stressors, dangers, challenges begins with initial reactions in the hypothalamus that initiate chain reactions through nerve fibers and biochemical reactions, which then go through the sympathetic autonomic nervous system which causes various changes throughout the body. Activation of the sympathetic nervous system will trigger increased organ activity, smooth muscle contraction and increased heart rate, as well as the release of epinephrine and norepinephrine into the bloodstream and adrenal medulla (Shewood, 2010). Stimulation of sympathetic nerve activity will increase peripheral blood

vessel retention and cardiac output so that it will have an impact on increasing blood pressure (Nasution, 2011).

Stress can affect blood pressure in the elderly along with stressors that occur in the elderly depending on the life background of each elderly which then has an impact on sleep disorders and is followed by an increase in elderly blood pressure (Alva et al, 2016). A study conducted by Supriati (2017) said that stress can trigger disorders in the physical condition of the elderly where a significant value was obtained between stress and the incidence of hypertension in the elderly (r = 0.723) which showed a strong relationship and a positive direction. So the higher the stress level, the higher the risk of hypertension. But in another study said that stress is one of the factors that can cause hypertension, but not the only factor that causes hypertension. Emotional stress can cause constriction of blood vessels which can increase arterial pressure so that the heart rate also increases which causes an increase in blood pressure (Lidia et al, 2018).

The Relationship Between Body Mass Index (BMI) And Blood Pressure

There is a relationship between Body Mass Index (BMI) and Blood Pressure, which is known through the significance value in table 4.7, which is 0.000 < 0.05. Factors that affect a person's nutritional level include age, nutrition, and lifestyle. Lifestyle is widely associated with the occurrence of blood pressure. An increase in body weight will be followed by an increase in the need for blood and oxygen in the body's tissues. This increase will result in an increase in arterial pressure which then triggers an increase in arterial blood pressure.

BMI has a moderate correlation strength in a positive direction on the incidence of hypertension, so someone who has a large BMI will have a greater risk of hypertension. This condition will also increase a person's risk of experiencing coronary heart disorders 3-4 times greater than normal people (Supriati, 2017). Factors that cause an increase in blood pressure are from food and body weight. People with obesity have the potential to develop hypertension due to the accumulation of fat crust/rust in the blood vessels which causes an increase in blood pressure (Greyti et al, 2014).

Obesity is associated with fat deposits in the body which can increase peripheral pressure. Moreover, fat in the blood is associated with the occurrence of atherosclerosis which can narrow the diameter of blood vessels. The narrower the blood vessels, the heart will work harder in pumping blood coupled with increased blood viscosity so that the risk of increasing blood pressure will be higher. A study proves that a person's weight loss can cause a decrease in blood pressure (Gunawan, 2001). The elderly have the potential to become obese because of their decreased metabolic ability which is not balanced with physical activity. Based on the results of weight and blood pressure measurements in the elderly, a relationship was found between the two with a weak relationship strength (Ulumuddin and Yogi. 2018).

In someone who is obese, it will affect the need for blood in the body so that it will result in an increase in blood flow in the blood vessels. This will trigger the activity of the sympathetic nerves and the Reni Angiotensin Aldosteron System (RAAS) which is triggered by the hormone aldosterone which is associated with water retention and sodium which is known to be related to blood pressure regulation (Selastri et al, 2012).

The Relationship Between Physical Activity And Blood Pressure

There is a relationship between Physical Activity and Blood Pressure. Table 4.3 shows that most respondents have a light activity level with a respondent frequency of 27 (73%), followed by moderate activity as many as 10 respondents (27%), and no respondent has a high moderate

activity level in table 4.8 shows that the significance value is 0.011 < 0 ,05 (p<0.05). Physical activity is very important in maintaining physical fitness. Especially at this time where a person's lifestyle is served with various facilities that provide convenience without having to do physical activity. Several factors that affect a person's physical activity include age, nutritional level, health condition. As a person gets older, eating will affect the level of physical activity carried out. The elderly experience degeneration in the neuromuscular, musculoskeletal, and balance systems, plus the cardiovascular system. Various setbacks of organs and systems in the elderly cause the elderly to feel tired while doing physical activities so that it will result in a decline in activity tolerance.

Cardiovascular function also depends on a person's level of activity. Someone who has a high activity tolerance will experience physiological changes in the body including thickening of the arterial lining and a decreased risk of atherosclerosis so that the diameter of the arteries will be wider which will then facilitate the work of the heart. In addition, someone who has a good level of fitness will affect the activity of the autonomic nerves so that blood pressure will be maintained at normal values. It is different with someone who has a low activity level, it will burden the heart a lot in pumping blood flow back to the heart and because of low physical activity it will reduce the level of blood vessel permeability.

Elderly people who work tend to have low physical activity which can cause hypertension. There is a significant relationship between physical activity and hypertension, where the majority of respondents have a mild level of physical activity because it is related to the function of blood vessels related to the regulation of systolic and diastolic blood pressure (Guslani & Erni, 2016). Lack of physical activity will affect the amount of blood and oxygen is disturbed so that it can affect blood pressure (Hasanudin, et al, 2018). Adult men with light physical activity have a 3 times greater risk of suffering from hypertension because they have a higher pulse rate which forces the heart to contract harder in pumping blood so that peripheral pressure will rise and cause hypertension (Rina et al, 2017). Someone who does exercise regularly (frequency 2-3 times a week with a duration of > 30 minutes will have a low risk of hypertension and can improve their quality of life (Nurhasanah and Eti, 2017). Physical activity will increase the strength of the heart muscle so that the ability of the heart to contract will increase. This is also followed by better blood vessel permeability. Someone who has low physical activity will result in blood flow not being smooth and experiencing blood flow disorders including hypertension (Angaraini et al, 2018).

CONCLUSION

There is a relationship between stress levels and blood pressure in the elderly at Posyandu Mawar, Polokarto, Sukoharjo. There is a relationship between Body Mass Index (BMI) and systolic blood pressure in the elderly at Posyandu Mawar, Polokarto, Sukoharjo. There is a relationship between the level of physical activity with systolic blood pressure in the elderly at Posyandu Mawar, Polokarto, Sukoharjo. The results of research on the relationship between stress levels, BMI, and physical activity on blood pressure, in the elderly, it is known that increasing age will affect a person's health condition, especially those related to blood pressure. The higher the level of stress, the BMI and the lower the activity level of a person, the higher the blood pressure. From the results of this study, it can be used to help the elderly in maintaining healthy cardiovascular function, nutritional status and increasing snakes, in this case is blood pressure by maintaining physical activity levels. Based on the conclusions and implications above, it can be suggested to the elderly and posyandu health cadres in the future to do the following: For the elderly, it can be used as a consideration to maintain health and fitness levels, by maintaining a diet, increasing physical activity so as to prevent various risks of metabolic

disorders and maintaining fitness due to age and degeneration. Health cadres in the future are expected to be used as a consideration to determine the right activities in providing health programs at posyandu for the elderly.

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