RISK FACTOR ANALYSIS OF HYPERTENSION DISEASE IN THE ELDERLY AT GIRIREJO STASI IN SAMARINDA

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ABSTRACT

The aims of the study were to determine: (1) the relationship between family history and the incidence of hypertension (2) the relationship between physical activity and the incidence of hypertension; (3) the relationship between cholesterol and the incidence of hypertension, and (4) the relationship between body mass index and the incidence of hypertension in the elderly.
The research was conducted from March – May 2022 at Girirejo Stasi, Samarinda City. The research design used was analytic survey research or analytical observational (non-experimental) with a cross-sectional approach.
The population of this study were all elderly people living in the city of Samarinda. A total sample of 30 elderly people was selected based on inclusion and exclusion criteria.
Data was collected using a questionnaire, filling out each question item directly to the respondent, consisting of: age, gender and type of work, activity level, cholesterol level, blood pressure, body mass index, family history of hypertension.
The results showed that: (1) There was a relationship between a family history of disease and the incidence of hypertension; (2) There is a relationship between physical activity and the incidence of hypertension in the elderly; (3) there is no relationship between body mass index and the incidence of hypertension, and (4) there is a relationship between cholesterol levels and the incidence of hypertension.

KEYWORDS: *Risk Factors, Hypertension, Elderly*

INTRODUCTION

The occurrence of epidemiological, demographic, and technological transitions in Indonesia has resulted in changes in disease patterns from infectious diseases to non-communicable diseases. The occurrence of this epidemiological transition is due to changes in socioeconomic, environmental and population structure changes that result in people adopting unhealthy lifestyles, such as lack of physical activity, smoking habits, fatty and calorie foods and drinking alcohol habits, which are suspected to be risk factors for non-communicable diseases. (Rahajeng and Sulistyowati, 2011). One of the degenerative diseases associated with these risk factors is hypertension (Sarwanto, 2009).
The community consists of children, adolescents, adults and the elderly with their respective health problems. As the life expectancy of Indonesian people increases to 72 years, the total population of Indonesia in 2018 is 265 million, consisting of 133.17 million men and 131.88 million women (Bappenas 2013, uploaded 18 May 2018) with the number of elderly as many as 23.66 million people (9.3%), data from the National Commission for the Elderly (2011) In Indonesia there was a significant increase in the number of elderly people, recorded 14.4 million (7.18%) elderly in 2000 and is estimated to be 28.8 million (11.34%) in 2020. According to the international population demographic data released by the Bureau of the Census USA, it is reported that in 1990-2025 Indonesia will experience an increase in the number of elderly people by 414% with their own problems and are service users. most health. The results of the Indonesian Ministry of Health's household health survey in 2002 showed that the problems experienced by the elderly were: hypertension as much as 42.9%, joint disease as much as 39.6%, anemia as much as 46.3%, heart and blood vessel disease as much as 10.7%, limited body function as much as 88.9%, limited participation as much as 43.4%.

Hypertension is still a major problem in the health sector, not only in Indonesia but also throughout the world (Rohman et al., 2011). Hypertension is also called the silent killer, because it is a deadly disease, often without any symptoms first, even if symptoms such as headaches appear, it is often considered a normal disorder, so that victims are too late to realize that the disease is coming (Sustrani 2006). Hypertension is also a risk factor for cerebrovascular disorders where hypertension can lead to rupture of cerebral blood vessels, besides that hypertension not only causes stroke, but also threatens the heart by causing coronary heart disease. In addition, hypertension also threatens the retina of the eye and kidneys (Gunawan 2001).

Hypertension in the elderly is mostly isolated systolic hypertension (HST), increasing systolic blood pressure causes an increase in the possibility of stroke and myocardial infarction even though the diastolic pressure is within normal limits. Hypertension is still a major factor for the incidence of stroke and coronary heart disease where its role is greater compared to younger people.
Conditions related to the elderly, in the elderly, arteriosclerosis occurs from the arteries to become stiff so that the arteries and aorta lose their adaptability, the walls are no longer elastic so that the blood flow out of the heart becomes not smooth.

WHO Director for the Elderly, John Beard stated that living a healthy lifestyle can reduce the risk of getting all types of non-communicable diseases, he said that being physically active, eating a healthy diet, avoiding alcohol and cigarette consumption can improve healthy life in the elderly. WHO urges the whole world to always promote a healthy lifestyle throughout life and provide basic health services to detect chronic diseases at an early stage so that they can be treated, in addition to promoting a healthy lifestyle, blood pressure checks and counseling about hypertension and its dangers on a regular basis, especially in elderly with a history of hypertension.

Ninety percent of the elderly have low levels of physical fitness, especially in the cardiorespiratory component and muscle strength. Activities that can be done by the elderly in order to maintain their cardiovascular function and create a sense of freshness by exercising properly and correctly on a regular basis.
The findings on community service activities for the elderly at the Giri Rejo stasi in 2021, it was found that 30 elderly people had systolic blood pressure of more than 140 mmHg and diastolic of 80 mmHg. Therefore, it is necessary to conduct research to determine the factors that influence the incidence of hypertension in the elderly group at the Giri Rejo Station, Samarinda.

The aims of the study were to determine (1) the relationship between family history and the incidence of hypertension (2) the relationship between physical activity and the incidence of hypertension (3) the relationship between cholesterol and hypertension.

RESEARCH METHODS

A. Time and Location

The research was conducted from March – May 2022 at Girirejo Stasi, Samarinda City.

B. Research Design

The research design used was analytic survey research or analytical observational (non-experimental) with a cross-sectional approach. The cross sectional survey research design is a research design by measuring and observing at the same time (once).

C. Population and Sample

The population of this study were all elderly living in Samarinda City. The population was selected based on inclusion and exclusion criteria. Inclusion criteria were: > 45 years old, able to read and write, willing to be a respondent, and have a systolic blood pressure > 120 mmHg; and the exclusion criteria were the elderly who were not present at the time of the study and the elderly who were sick.

The sampling technique used is total sampling (Hidayat in Susilo, Aima and Suprapti, 2014). The number of samples is all the population, namely 30 elderly people.

D. Data Collection and Analysis

Data collection is done by using a questionnaire, filling out each question item is done directly to the respondent. The data collected are presented in Table 1.

Table 1. Variables in Research

Variable	Definition	Measuring Instruments and Measurement Results	Analysis Plan	Scale
Hypertension	Blood pressure measured based on the doctor's diagnosis, namely systolic blood pressure> 140 mmHg and diastolic blood pressure> 90 mmHg	Measuring blood pressure using a digital sphygmomanometer The measurement results are hypertension and not hypertension	1 = Pra Hipertensi 120-139/80-89 mmHg 2 = Hypertension level I 140-159 /90 -99 mmHg 3 = Hypertension level II ≥160 / ≥100 mmHg	Nominal
Physical Activity	Respondent's habits do physical activity like work and exercise physical fitness inside home or in the air open like a road, a road relaxing, brisk walking, running, gymnastics, minimal cycling carried out for 30 minutes 3-5 times a week	Questionnaire The measurement result is active respondent and not active	0. High if score >2.00 1. Mild if score <1.99	Nominal
Age	Respondent's age is calculated by year of birth until it's done Interview	Questionnaire The measurement result is age category of respondents	1. 45-54 years 2. 55 -65 years 3. 66-74 years 4. 75-90 years 5 >90 years	Ordinal
Family History	History of hypertension from immediate family (father, mother) and family not direct (grandfather and grandmother)	Questionnaire The measurement result is respondents have history of hypertension or no	0. There isn't any descendants hypertension 1 There are descendants hypertension	Nominal
Hyperlipidemia	Fat levels in a person's blood obtained based on blood tests	Measuring blood fat levels The measurement result is normal Hyperlipidemia	< 200 normal > 200 increase	Nominal
Body mass index	An indicator of a person's body fat relative level used to determine weight	1. Height Measuring instrument:	17.0-18.4 = Thin 18.5-25.0 = Normal	Ordinal

	status	Scales 2. Weight Measuring instrument: Meter	25.1-27.0 = Fat >27.0 = Obesity (Depkes 2015)	

To measure the level of physical activity of an elderly person for 24 hours, it is expressed in Physical Activity Level or PAL which is obtained from the amount of energy released (kcal) per kilogram of body weight for 24 hours (WHO/FAO 2003). The PAL value is calculated using the formula:

$$\mathbf{PAL} = \frac{\underline{(\,PAR\,)\ X\ (\,Wi\,)}}{24\ hours}$$

Remarks:

PAL = Physical Activity Level
PAR = Physical Activity Ratio (of each physical activity performed for each type of activity per hour)
W = Time allocation for each activity
The category of physical activity level based on HAL is:
1. Light (sedentary lifestyle) 1.40 kkal/jam – 1.69 kkal/ hour
2. Medium (active or moderately active lifestyle) 1,70 kkal/hour – 1,99 kkal/ hour
3. High (vigorous or vigorously active lifestyle) 2,00 kkal/ hour – 2,40 kkal/ hour

After all data is collected completely, then the data is processed and then analyzed, and interpreted.

RESULTS AND DISCUSSION

A. Characteristics of Respondents

The characteristics of the respondents including age, gender and type of work are presented in Table 2.

Tabel 2. Characteristics of Respondents

No	Characteristics of the Elderly	n	(%)
1.	Age		
	45 – 59 Years	8	27
	60 – 65 Years	17	57
	66 – 74 Years	2	6
	75 – 90 Years	3	10
2.	Gender		
	Female	21	70
	Male	9	30
3	Type of work		
	Housewife	12	40
	Pension	7	23
	ASN	1	3
	Farmer/Labourer	5	17
	Private	5	17

Table 2 above shows that the respondents are aged 45-59 years (27%), 60-65 years (57%), 66-74 years (6%) and 75-90 years (10%). Based on gender, there were 21 women (70%) and 9 men (30%). Most of the respondents work as housewives as many as 12 people (40%).

B. Measurement and Analysis

1. Elderly Activity Levels, Cholesterol Levels, Body Mass Index, Family History Suffering from Hypertension and Blood Pressure

The condition of the respondents doing physical activity, cholesterol levels, body mass index, family history of suffering from hypertension and blood pressure conditions are presented in Table 3

Tabel 3. Results of Research on Physical Activity, Cholesterol Levels, Body Mass Index, Family History Suffering from Hypertension and Respondent's Blood Pressure Status

No	**Elderly Physical Activity Level**	n	(%)
1	Light Activity	17	57
2	Strenuous Activity	13	43
No	**Cholesterol Level**	n	(%)
1	Normal Cholesterol	13	43
2	Hiperkolesterolemia	17	57
No	**Body mass index**	n	(%)
1	Normal	20	67
2	Obesity	10	33
No	**Family History of Suffering from Hypertension**	n	(%)
1	There is	16	53
2	There is not	14	47
No	**Blood pressure**	n	(%)
1	Pre Hypertension	11	37
2	Hypertension Level I	8	26
3	Hypertension Level II	11	37

Source: Processed Data (Year 2022)

Based on the data in Table 3 shows that of the 30 respondents: (1) who had light activities were 17 people (57%), and strenuous activities were 13 (43%); (2) who have normal cholesterol are 13 people (43%), while respondents who have hypercholesterolemia are 17 people (57%); (3) those who have a normal Body Mass Index are 20 people (67%), while there are 10 people who have an obese Body Mass Index (33%); (4) who have a family history of hypertension as many as 16 people (53%), and respondents who do not have a family history of suffering from hypertension as many as 14 people (47%); and (5) there are 11 people (37%) who have blood pressure in the category of pre-hypertension blood pressure as much as 37%, category I Hypertension (26%), and who have blood pressure in the category of hypertension level II (37%).

2. Bivariate Analysis of Factors Associated with Hypertension

The results of the bivariate analysis of the factors associated with hypertension in the Girirejo Samarinda Station are presented in Table 4.

Table 4. Results of Bivariate Analysis on Factors Associated with Hypertension at Girirejo Station, Samarinda

No	Variable	Hypertension Pre-Hypertension n (%)	Hypertension Level I n (%)	Hypertension Level II n (%)	p *value*
1	**Family history of hypertension**				0.042
	a. There is	2 (5.9%)	4 (4.3%)	10 (5.9%)	
	b. There isn't	9 (5.1%)	4 (3.7%)	1 (5.1%)	
2	**Physical Activity**				0.021
	a. Light	4 (6.2%)	3 (4.5%)	10 (6.2%)	
	b. Heavy	7 (4.8%)	5 (3.5%)	1 (4.8%)	
3	**Body mass index**				0.258
	a. Normal	8 (7.3%)	4 (5.3%)	8 (7.3%)	
	b. Obesity	3 (3.7%)	4 (2.7%)	3 (3.7%)	
4	**Cholesterol Level**				0.015
	a. Normal	9 (4.8%)	3 (3.5%)	1 (4.8%)	
	b. Hiperkolesterolemia	2 (6.2%)	5 (4.5%)	10 6.2%)	

Source: Data Processing Results

2.1. The Relationship Between Family History of Hypertension Patients with the Incidence of Hypertension

Based on the results of a bivariate analysis between a family history of hypertension and hypertension (Table 4), it shows that 5.9% of respondents who have a family history of hypertension have pre-hypertensive blood pressure, 4.3% have level I hypertension blood pressure, and 5.9% have hypertension. level II hypertension. Meanwhile, among

respondents who had no family history of hypertension, 5.1% of respondents who had a family history of hypertension had pre-hypertensive blood pressure, 3.7% had level I hypertension blood pressure, and 5.1% had level II hypertension blood pressure (p :0.042, : 0.05). From the results of this analysis, it can be stated that individuals who have a family history of hypertension are more at risk of suffering from hypertension.
Individuals who have a family history of hypertension are almost 1.4 times more likely to cause hypertension than individuals who do not have a family history of hypertension. In various countries have shown a similar increased risk, the results of other studies say that those with a family history of hypertension have 2-4 times more likely to develop hypertension. Johns Hopkins in his study stated that hypertension in mothers and fathers had a strong independent relationship with increased blood pressure levels and the incidence of hypertension in adults (Ranasinghe, Cooray, Jayawardena, & Katulanda, 2015).

Family history and hypertension show a stratified relationship because prevalence increases with increasing number of generations suffering from hypertension. Research has shown that a positive family history of hypertension is associated with an increase in early markers of inflammation and plaque instability in individuals, possibly leading to a predisposition to early atherothrombosis and coronary artery disease. Death from cardiovascular disease is increased in patients with a family history of hypertension. Therefore, family history can be used as a tool to detect not only those at risk of hypertension but also other cardiovascular risk factors.

Family history is a common non-modifiable risk factor because it is a collective reflection of shared genetic, environmental and behavioral susceptibility (Khanna N, Sharma RS, Sidhu RS., 2011). However, although family history alone is a non-modifiable risk factor, it is necessary to identify high-risk populations before a diagnosis of hypertension is made, and to target disease intervention and prevention. (Van Der et al, 2001). Awareness of risk is a factor that drives better and earlier health-related behaviors and lifestyle modifications have been shown to be effective in primary prevention of hypertension. Therefore, overall there is promising potential for the use of family history as a public health tool that aids in the prevention of hypertension (Whelton et al, 2002).

Individuals with a family history of hypertension may benefit from targeted interventions to prevent the development of hypertension through increased physical activity. Therefore, identifying family history would be a practical and useful approach for public health and preventive medicine.

2.2. The Relationship between Physical Activity and Hypertension

Based on the results of the bivariate analysis between physical activity in respondents with hypertension (Table 4), it was found that 6.2% of respondents who had light activities had pre-hypertensive blood pressure, 4.5% had level I hypertension blood pressure, and 6.2% had hypertension blood pressure. level II. Meanwhile, among respondents who have strenuous activity, 4.8% of respondents who suffer from hypertension have pre-hypertensive blood pressure, 3.5% have level I hypertension blood pressure, and 4.8% have level II hypertension blood pressure (p: 0.021, : 0.05) . From the results of this analysis, it can be stated that individuals who do not do physical activity regularly are more likely to be at risk of suffering from hypertension compared to individuals who have sufficient physical activity.
Regular exercise at moderate levels for three days per week 30 minutes/day results in increased longevity, decreased mortality, and decreased progression of cardiovascular disease, heart attack, hypertension, arthritis, osteoporosis, depression and various cancers (R. F. Craven, C. J. Hirnle, & S. Jensen, 2012).

Regular aerobic exercise causes a decrease in systolic and diastolic blood pressure by 11 and 8 mmHg, respectively. A regular program of physical activity should be started gradually and maintained for 30-45 minutes most days of the week. This level of activity can control hypertension without pharmacology. The use of physical exercise in the long term serves as a non-pharmacological method for lowering blood pressure at rest or during daily physical activity. Researchers recommend non-pharmacological methods rather than pharmacotherapy. Non-pharmacological methods include lifestyle modification by doing a low sodium diet, low fat diet, increasing potassium and calcium intake, weight loss in obese individuals, daily exercise, and reducing anxiety and fear. In the elderly, exercise may be a more suitable method of controlling blood pressure because it is inexpensive and does not interfere with other treatments. Through exercise and physical activity, the detrimental physiological effects that occur with aging can be reduced and quality of life improved. One session of light or moderate intensity exercise can cause a decrease in blood pressure after exercise in hypertensive individuals, which is called post-exercise hypotension (Kazeminia et al., 2020).

Other studies suggest that increasing physical activity to the recommended level (aerobic activity should be of at least 10 minutes duration) will help eliminate 6% to 10% of non-communicable diseases. The study recommends that older adults increase their vigorous physical activity by up to half an hour a day. This recommendation will be different in cases where the elderly cannot take part in strenuous physical activity. There are various other types of physical activity for them to choose from. Of the 10 participants who participated in moderate activity for more than half an hour and light activity for more than half an hour a day, 36.7% of them showed hypertension was below average. Although this activity may not reflect a particular pattern, it can be a helpful reference for creating new fitness for hypertension prevention. It should be noted that vigorous physical activity will increase the risk of musculoskeletal injury rates. To avoid such risks, it is better to encourage adults aged 45 years and over to start physical activity from moderate to higher levels gradually (You et al, 2018).

2.3. The Relationship between Body Mass Index and Hypertension

Based on the bivariate analysis between the body mass index of respondents with hypertension (Table 4), it shows that 7.3% of respondents who have a body mass index in the normal range have pre-hypertensive blood pressure, 5.3% have grade I hypertension blood pressure, and 7.3% have hypertension. level II hypertension. Meanwhile, among respondents who have an obese body mass index, 3.7% of respondents have pre-hypertensive blood pressure, 2.7% have grade I hypertension blood pressure, and 3.7% have grade II hypertension blood pressure (p: 0.258, : 0.05). From the results of this analysis, it can be stated that individuals who have a body mass index in the normal range have the same risk of suffering from hypertension as individuals who have a body mass index of obesity.

The results of the study describe the relationship between family history and hypertension independent of body weight (Li, Peng, Shao, Fang, & Zhang, 2021). Studies show that body mass index is significantly and independently associated with systolic blood pressure and diastolic blood pressure in elderly Japanese American men. This relationship appeared to level off at the middle and upper levels of the body mass index for systolic blood pressure, except for older ages (older than 70 years). In contrast, previous publications including middle-aged men from this cohort demonstrated a linear relationship between body mass index and systolic blood pressure and diastolic blood pressure, with no protrusion in the upper levels of body mass index. Thus, it appears that the relationship between body mass index and systolic blood pressure changes somewhat with older age in this population.

Population-based studies show that the average body mass index value increases with age to 69 years, after which it declines. Body Mass Index decreases with age from 45 years of age (Masaki et al, 1997). Age is a factor that affects an individual's Body Mass Index. Across the age groups, the highest obesity rate (4.0%) was recorded by the 46-50 year age group. The increase in obesity rates with increasing age could be due to the fact that older people are less physically active but maintain the same energy intake as in previous years. Therefore, the excess energy that is not expended is stored as fat, increasing their chances of becoming obese (Rofles et al., 2014).

Research conducted by Frederick (2017) stated that a negative correlation was obtained between body mass index and systolic blood pressure ($r = -0.21$). This is a weak correlation. According to the results from the literature, this was unexpected. However, it could be because the number of participants who are obese is less than participants with normal BMI. In addition, blood pressure has many confounders that can lead to this unexpected result. Body Mass Index is not the best indicator of body fat. A high body mass index does not necessarily mean there is an increase in body fat. A high Body Mass Index can be caused by an increase in bone or muscle density. Central adiposity provides a better indication of body fat and can be used to demonstrate the relationship between body fat and blood pressure.

People have become less physically active these days due to urbanization. Today, most people prefer to take a car rather than walk. In addition, respondents do not do regular exercise. The study found that only 37 (18.5%) of the participants did exercise. Therefore, it is not surprising that there are high rates of overweight and obesity because reduced physical activity (sedentary lifestyle) is associated with overweight and obesity (Winnick & Porretta, 2016)

From the results obtained in this study, it is very clear that overweight and obesity occur as a result of lack of physical activity. All obese participants did not do any form of exercise. Furthermore, there are 4 (2.7%) respondents who have a body mass index in the obesity category have level I hypertension, and 3 (3.7%) respondents who have a body mass index in the obesity category suffer from level II hypertension. Exercise is a very important factor to consider in reducing the incidence of overweight and obesity in the population. This is because exercise helps the body burn fat and utilize excess calories.

2.4. The Relationship between Cholesterol Levels and Hypertension

Based on bivariate analysis between cholesterol levels in respondents with hypertension (Table 4) shows that there are 4.8% of respondents who have cholesterol levels in the normal range have pre-hypertensive blood pressure, 3.5% have hypertension blood pressure level I, and 4.8% have high blood pressure. level II hypertension. Meanwhile, among respondents who had hypercholesterolemia, 6.2% of respondents had pre-hypertensive blood pressure, 4.5% had grade I hypertension, and 6.2% had grade II hypertension (p: 0.015, : 0.05). From the results of this analysis, it can be stated that individuals who have hypercholesterolemia are more at risk of suffering from hypertension.

Many factors affect the increase in cholesterol levels, namely; obesity, fatty foods, consumption habits, high cholesterol, smoking habits, lack of activity, stress levels, and genetics (Mahampang et al., 2015). The relationship between cholesterol levels and hypertension is that the arteries become hard, stiff, because cholesterol, plaque and calcium cause narrowing of the arteries or called atherosclerosis, so the heart has to work hard to pump blood through these rigid blood vessels. This condition causes an increase in blood pressure (hypertension). When the body experiences hypertension and hypercholesterolemia simultaneously, they can interact with each other, causing damage to blood vessels and the heart to occur more quickly (Sopiah et al, 2021).

Total cholesterol is known to be harmful to endothelial function, and elevated serum levels of total cholesterol cause arterial stiffness by increasing vascularity. Smooth muscle cell response to angiotensin II and reduced nitric oxide bioavailability. This pathophysiological pathway is consistent with the findings of our current study, that TC levels are associated with increased systolic blood pressure. Oxidized lipids accumulate along with the inflammatory reaction and migrate to the tunica intima, causing degradation of collagen, elastic fibers and proliferation of smooth muscle cells, thereby leading to the development of arterial stiffness. Blood lipids can cause accumulation of plaque, which narrows the arteries, exacerbates arteriosclerosis and ultimately causes an increase in systolic blood pressure (Chen et al, 2021). Total cholesterol, arterial stiffness, and hypertension are closely related to cardiovascular disease. The incidence of hyperlipidemia continues to increase, and the burden of cardiovascular disease associated with dyslipidemia will also continue to increase. Research conducted by Tanaka et al (2000) stated that arterial stiffness can be improved by lifestyle changes such as aerobic exercise and weight loss. Total cholesterol and arterial stiffness are risk factors for increased blood pressure.

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

Based on the results of research and discussion, it can be concluded as follows:

1. There is a relationship between family history of disease and the incidence of hypertension
2. There is a relationship between physical activity and the incidence of hypertension in the elderly.
3. There is no relationship between Body Mass Index and the incidence of hypertension
4. There is a relationship between cholesterol levels with the incidence of hypertension

B. Suggestion

Based on the results of the study, several suggestions can be put forward, namely as follows:

1. The public is expected to avoid the risk factors of hypertension and to exercise regularly as a preventive effort from hypertension
2. Health workers are expected to be active in conducting regular education in the community about hypertension, the factors that cause hypertension and preventive efforts that the community can take to prevent the increase in the incidence of hypertension in the community.

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