



The Influence of Stress Level and Genetics on Hypertension Status Age Range 36-45 Years in Sawit Health Center Boyolali Regency

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Abstract

Based on the observational and preliminary data from the Health Department of Boyolali, it is showed that the most non-communicable disease is hypertension with the total amount is 23.586 cases. The hypertension cases in Sawit Health Center is because of the less healthy lifestyle of the society due to the low attitude and behavior toward the prevention of hypertension. The aim of this study was to analyze the influence of stress level and genetic on hypertension status at Sawit Health Center 2018. The present study used cross sectional study design. The sample of the study was 85 respondents that were taken in Sawit Health Center. Questionnaire was used as the instrument of the study in order to obtain the data of stress level and genetic background of the respondents. The data analysis was done in multiple linear regressions. The results showed that (1) There is the influence of stress on hypertension status with p-value of $0.021 < \alpha (0.05)$. (2) There is the influence of genetic on hypertension status with p-value of $0.000 < \alpha (0.05)$. People are suggested to do healthy life style. the Health Department and Local Government should do some health counseling comprehensively.

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INTRODUCTION

Cardiovascular disease is one of the biggest causes of death in the world. which is around 17 million deaths per year. The prevalence of people suffering from hypertension in the world is around 1.13 billion. Hypertension is responsible for 45% of complications of heart disease (WHO. 2015). The total number of adults with hypertension in 2025 is estimated to increase to 1.56 billion. Increasing driving factors, risk factors, uncontrollable risk factors (mayors) and risk factors that can be controlled (minor). Risk factors that cannot be changed (mayor) such as heredity, gender, race and age. While risk factors that can be controlled (minor) are obesity, lack of exercise, or activity, smoking, drinking coffee, sodium sensitivity, low potassium levels, alcoholism, stress, work, education and eating patterns (Suhadak. 2010).

According to the results of Indonesia's Basic Health Research it is showed that cases of hypertension are one of the public health problems that occur in developed and developing countries (Risikesdas. 2013). The prevalence of hypertension in Indonesia obtained through blood pressure measurements at age ≥ 18 was 9.4%. This indicates that most cases of hypertension in the society have not been diagnosed and affordable for health services. Hypertension is also the 3rd cause of death in Indonesia at all ages with a proportion of deaths 6.8% (Risikesdas. 2013)

The prevalence of hypertension in Indonesia with a greater incidence of cardiovascular disease in women is about 52% compared to men, which is as much as 48%. Generally people with hypertension are people who are over 40 years old, but at this time it does not rule out the possibility of suffering by young people, this is associated with the lifestyle of people who always want an instant life so that it can affect the incidence of hypertension (Yeni. 2010). The increased of blood pressure that lasts for a long time (persistent) can cause damage to the kidneys

(kidney failure), heart (coronary heart disease) and brain (causing stroke) if not detected early and receive adequate treatment (Indonesian Ministry of Health. 2014).

Hypertension is a degenerative disease that appears unconsciously. Factors that cause hypertension can occur due to heredity, age, wrong diet, lack of activity, lifestyle and thoughts or stress (Novian. 2013).

Research in Nepal conducted by Chataut *et al.* (2011) found that hypertension is influenced by gender, age, level of education, physical activity, body mass index (BMI), smoking and alcohol consumption. Smoking can cause hypertension due to chemicals contained in tobacco that can damage the lining of the arterial wall, so that arteries are more prone to plaque buildup (atherosclerosis). This is mainly due to nicotine which can stimulate the sympathetic nerves so that the heart works harder and causes constriction of blood vessels, as well as the role of carbon monoxide which can replace oxygen in the blood and force the heart to meet the body's oxygen needs (WHO. 2013). This fact is in line with the research of Ambarwati *et al* (2014) that someone who is given health education can increase knowledge about problems related to smoking habits and the dangers of smoking.

In addition smoking habit and exercise habits also greatly affect the occurrence of hypertension, where someone who lacks of exercise tends to have a higher heart rate so that the heart muscle will work harder on each contraction (Andria. 2013). Unhealthy lifestyles can cause hypertension, for example; food, physical activity, smoking and stress (Puspitorini. 2009).

Stress is also very closely related to hypertension. Stress is a problem that triggers hypertension where the relationship between stress and hypertension is suspected through the increased of sympathetic nerve activity in the nerves can increase blood pressure intermittently (erratic) Prolonged stress can cause high blood pressure to stay high (Steptoe & Kivimaki. 2013).

Currently the trend of hypertension as much as 90 percent is influenced by genetic factors so that if there are 10 people suffering from hypertension. 9 of them are caused by genetic and environmental factors that increase the risk of hypertension (Ester et al., 2004). Hypertension tends to be inherited from family members. Someone who has a family that has hypertension history the risk of hypertension will increase twice as much as people who have no hypertension history from their family (Soeparman, 2001).

Hypertension is still the main cause of death and morbidity for people in Boyolali Regency with the number of morbidity 23.586 cases of hypertension in 2016 in the city of Boyolali. (Dinkes Boyolali, 2016)

Based on a preliminary study conducted on October 29, 2017 at Boyolali Regency by Departement of Health and Sawit Health Center working area that hypertension is still one of the highest non-communicable diseases which is a main health problem in Boyolali Regency. where hypertension is still being the main cause of death and morbidity in the community and can reduce labor productivity with the number of morbidity 23.586 cases of hypertension in 2016 (Dinkes Boyolali, 2016). This happened because the community's unhealthy lifestyle to prevent hypertension is still low. The aim of the researchers to conduct this study was to determine the influence of stress level and genetic on the hypertension status of the 35-46 year age group in the Sawit Health Center at Boyolali Regency.

METHOD

This research is a quantitative research. The research design used was analytical correlation with cross sectional design. The population in this study was all communities registered in Sawit Health Center working area as many as 549 people. The sampling technique used was purposive sampling. The researcher uses both of criteria. The inclusion criteria in this study are community in Sawit Health Center working area in the age group of 35-46

years. respondents who do regular checkup in the last 6 months. and respondents who don't suffer from chronic disease. While the exclusion criteria are persons who were not willing to be the respondents of this study and those who suffer from mental health. The number of samples in this study was 85 respondents with the age group of 35-46 years. The independent variables of the study were stress level and genetic background. while the dependent variable was hypertension status in the age group of 35-46 years. This study used multiple linear regressions analysis techniques.

RESULT AND DISCUSSION

Descriptive Analysis

Table 1. Distribution of Frequency of respondents' Characteristic at Sawit Health Center

Characteristic	Category	Amo unt	Percent age
Age	<40 year	45	53
	>40 year	40	47
Occupation	Private Employe e	58	68.2
	Farmer	6	7.1
	Civil	4	4.7
	Servant	7	20.0
	Entrepren eur		
Hypertension Status	Moderate	59	69.4
	Serious	26	30.6
	Not	47	55.3
Genetic Background	Existed	38	44.7
	Existed		
Stress level	Minor	18	21.2
	Serious	67	78.8
Smoking habit	Minor	37	43.5
	Serious	48	56.5
Exercise Activity	Poor	17	20.0
	Good	68	80.5
Total		85	100

According to table. the characteristics of respondents in Sawit Health Center working area in Boyolali Regency based on age. most of the respondents aged <40 years were 45 respondents (53%). while the age of > 40 years was 40 respondents (47%). Based on the occupation. it can be seen that the respondents with jobs as private employees as many as 58 respondents (68.2%). as Farmers as many as 6 respondents (68.2%). civil servants as much (4.7%) and entrepreneurs as many as 17 respondents (20%). While based on hypertension status. it can be seen that respondents with serious hypertension status were 26 respondents (30.6%). while the moderate hypertension status was 59 respondents (69.4%).

Based on the table. it is also known that respondents in Sawit Health Center working area in Boyolali Regency based on genetic background of hypertension from 85 respondents. it can be seen that there were 47 respondents (55.3%) with no genetic background of hypertension. while the rests. 38 respondents (44.7%) had genetic background of hypertension.

By using the table. it is known that respondents in Sawit Health Center working area in Boyolali Regency based on stress level. from 85 respondents. the most of respondents had serious stress level amounted 67 respondents (78.8%) while. 18 respondents (21.2%) has minor stress level.

Other information available based on the table is that most of the respondents had serious category of smoking habit with the amount of 48 respondents (56.5%). while the rests had minor category of smoking habit with the amount of 37 respondents (43.5%).

By using the table the researcher found out that from 85 respondents it is known that 17 respondents (20%) had poor category of exercise activities. while 67 respondents (80%) had good category of exercise activities.

Table 2. The influence of stress level on hypertension status in Sawit Health Center

Stress level	Hypertension status				Total		P Value	Risk	CI 95%
	Moderate		Serious		F	%			
	f	%	f	%					
Minor	17	20	1	1.2	18	21	0.021	1.507	1.214-1.870
Serious	48	56.5	26	30.6	74	82			

Based on the results of multiple linear regressions. it is showed that stress level proved to influence hypertension status with Chi-Square test obtained p value of 0.021 ($p < 0.05$). from the analysis obtained the value of PR (Prevalent Ratio) 1.507 and the CI (Confident Interval) range value at a 95% trust level of 1.214-1.870 (not exceeding 1) which means that respondents with serious stress level were have risk to hypertension 1.5 times higher than Minor stress level. The results of this study were inversely proportional to the results of Jadhav et al. (2004). which stated that coping mechanisms do not have a significant relationship with the incidence of hypertension. it means that what coping mechanisms possessed by a person will not affect the incidence of hypertension. Someone who has a good coping mechanism does not necessarily have blood pressure within the normal range and does not experience hypertension. as well as the lack of a coping mechanism does not necessarily have a blood pressure coefficient that is not normal and influence to hypertension.

Two types of stress level done by an individual in facing a problem or stress are stress level strategies that focus on problems and stress level strategies that focus on emotions. A problem-focused stress level strategy is a

person's process to be able to focus on a specific problem or situation that has occurred. while trying to find ways to change it or avoid it later. (Rustiana & Widya. 2012).

Jordan (2016). states that the mechanism of the body's response to stress begins with the presence of stimuli originating from outside and from within the individual's own body which will be passed on to the limbic system as a central regulator of adaptation. The lymphatic system includes the thalamus. hypothalamus. amygdala. hippocampus and septum. The hypothalamus has a very strong effect on almost the entire visceral system of our body because almost all parts of the brain have a relationship with it. Because of this relationship. the hypothalamus can respond to psychological and emotional stimuli. The role of the hypothalamus to stress includes four specific functions. Reinforced by Owolabi (2012). he stated that someone with high stress levels is at high risk of developing hypertension. Stress levels at work tend to cause severe hypertension. Sources of stress in work include workloads. inadequate work facilities. unclear roles in work. unclear responsibilities. problems in relationships with others. work demands. and family demands (Korneliani & Dida. 2012)

The sympathetic nervous system responds to nerve impulses from the hypothalamus by activating various organs and the smooth muscles under its control. for example. can increase the speed of the heart rate and dilate the pupil. The sympathetic nervous system also signals the adrenal medulla to release epinephrine and norepinephrine into the bloodstream. Adrenaline. thyroxine. and cortisol as the main hormones of stress will increase in number and significantly influence the homeostasis system. Adrenaline which works synergistically with the sympathetic nervous system affects the increase in heart rate. and blood pressure. Activation of the sympathetic system will cause vasoconstriction so that the blood is pumped more in a moment. where the stroke volume increases. Increased

stroke volume will cause blood pressure to increase.

Table 3. The Influence of Genetic on hypertension status in Sawit Health Center

Ge neti c	Status Hipertensi		Total		P Va lue	R R	CI 95 %	Mi n- Ma x
	Mode rate	Serio us	f	%				
Not Exi sted	4 6 1	5 4. 1	1 2 3	1. 7 5.	4 5. 3	0.0 86 1	2. 4.4 55	1.8 37- 4.4 55
Exi sted	1 3 3	1 5. 4	2 5 4	2 9. 4	3 8 7	4 4. 7		

Based on the results of multiple linear regression. it showed that stress level proved to affect hypertension status with Chi-Square test obtained the value of $p = 0.000$ ($p < 0.05$) from the analysis obtained the value of PR (Prevalent Ratio) 2.861 and the CI (Confident Interval) range value at a 95% confidence level of 1.837-4.455 (not exceeding 1) which means that respondents who have a genetic history are more at risk 2 times compared to mild stress level with hypertension. The results of this study are consistent with the results of previous studies by Biino et al (2013) which stated that there was a relationship between a positive history of hypertension and an increased incidence of hypertension. The same thing was also expressed by Ranasinghe et al.. (2015) the highest prevalence of hypertension. namely those who have a genetic history of hypertension from the family According to Kher (2012) states that genes that play a role in sodium homeostasis in the kidney are WNK-1 (lysine-deficient protein kinase 1 gene). SNNN1B (amilorid-sensitive sodium channel). SCNN1G (beta and gamma subunit genes that encode 2 sodium channel ENaC subunit). These genes affect the $Na^+ - K^+$ pump in the renal tubules thereby increasing

retention of sodium and water in the kidneys. With increased sodium reabsorption in the kidneys, the volume of plasma and extracellular fluid increases. That way, extracellular volume increases and causes increased venous return to the heart. An increase in cardiac output and subsequent increase in arterial pressure.

The genes that are thought to influence metabolism of steroid hormones are CYP11B2 (aldosterone synthase gene) and NR3C2 (mineralocorticoid receptor gene). These genes increase aldosterone production so that it will increase sodium retention in the kidneys. An increase in cardiac output and subsequent arterial pressure increase (Natekar et al., 2014).

Insertion / deletion polymorphism of the ACE gene (angiotensin - converting enzyme) is characterized by the presence or loss of the 28 bp repeat sequence at 16 introns and is a gene that is also thought to play a strong role in the mechanism of hypertension. The gene polymorphism produces 3 genotypes: Homozygous II, heterozygous ID, and homozygous DD. Studies suggest homozygous individuals with D alleles have higher ACE concentrations compared to heterozygous ID or homozygous II individuals. With increasing levels of ACE in the blood and tissues, the levels of Ang II (angiotensin II) also increase. Two main effects of Angiotensin II in increasing arterial pressure are vasoconstriction in various regions of the body and a decrease in salt and kidney excretion by water. With vasoconstriction in various places, there is an increase in total peripheral resistance which further increases arterial pressure. Ang II also plays a role in sodium and water reabsorption from urine. The mechanism of hypertension is the same as the mechanism of hypertension by genes that play a role in sodium homeostasis in the kidneys. In addition, according to Amalia's (2013) research, hypertensive patients who conduct examinations in health services can add information through hypertension posters to increase knowledge and attitudes about the risk of hypertension.

Table 4. The Influence of Exercise Activity on on hypertension status in Sawit Health Center

Exercise Activity	Hypertension status		Total		P Value		
	Moderat	Serious	F	%			
Poor	1	14.	5	5.9	1	20.	1.00
	2	1			7	0	0
Good	4	55.	2	24.	6	80.	
	7	3	1	7	8	0	

Based on the results of multiple linear regression showed that sports activities proved to have no effect on hypertension status with Chi-Square test obtained value values obtained $p = 1.000$ ($p > 0.05$) H_0 : accepted which means that there was no influence of sports activities on hypertension status in community in Sawit District, Boyolali Regency.

For patients with hypertension, sports activities can help lower blood pressure and help drug performance more effective for patients with hypertension (Sheps, 2005). However, exercise cannot be done on someone who has systolic blood pressure of more than 170 mmHg and or diastolic more than 110 mmHg. In the elderly starting at 45 years of age, regular exercise has been shown to improve cardiovascular function which slows down the decline in body function (Afriwardi, 2009). Consistent with the results of research by Fitri et al (2016) which states that aerobic physical activity is one of the sports activities which can affect blood pressure. Based on the results of the statistical analysis test, it was found that $p = 0.250$ H_0 was accepted, meaning that there was no relationship between exercise with blood pressure in patients with hypertension. There is no relationship between the frequency of exercise with blood pressure in hypertensive patients.

The frequency of good exercise is that if someone does exercise within a week of 3-5 times and is carried out regularly with moderate intensity can reduce blood pressure (Divine, 2016)

Table 5. The Influence of Smoking Habit on on hypertension status in Sawit Health Center

Smoking Habit	Hypertension status		Total		P Value		
	Moderate	Serious	F	%			
	F	%	F	%			
Minor	2	31.	1	11.	3	43.	0.698
	7	8	0	8	7	5	
Serious	3	37.	1	18.	4	56.	
	2	6	6	8	8	5	

Based on the results of multiple linear regression showed that smoking habits proved to have no effect on hypertension status with Chi-Square test obtained p value = 0.698 ($p > 0.05$) H_0 : acceptable which means that there was no influence of smoking habits on hypertension status in the community in the District Palm Oil Boyolali Regency. Smoking problems begin to be considered well in the world because smoking is a habit that is detrimental to health as the main cause that undermines human health and causes premature death. Five hundred million people today live on earth will die from smoking habits (Lone. 2015). Nicotine is a substance or ingredient in pyridine compounds found in *Nicotiana Tabacum* which is addictive which can lead to dependence. This nicotine can increase blood pressure, constrict peripheral vessels and cause addiction and dependence on the wearer (Leone. 2015). So the use of filters in cigarettes is very influential because it can reduce the amount of nicotine that enters the smoker's body. Because the more amount of nicotine that enters the body, it will increase the incidence of hypertension. These results are inversely proportional to the results of the research by Venkataraman et al. (2013) which states that there is a significant relationship between the intensity of smoking and the incidence of hypertension. Cigarettes cause a direct increase in blood pressure (both systolic and diastolic) and a heartbeat that lasts for more than 15 minutes after being compared to non-smokers. Although smoking is known to

increase the risk of developing hypertension, there is currently no evidence that smoking directly reduces blood pressure in people with hypertension.

Another study conducted by Madhuri et al. (2012) in India shows that tobacco consumption increases blood pressure and heart rate which is similar to smoking tobacco. this is caused by nicotine exposure contained in tobacco. Evidence shows that chewing tobacco causes blood nicotine levels to be the same as that seen in smoking. from the research obtained a ratio of 2.3 (95% IK: 1.3-4.3)

CONCLUSION

Based on the result and discussion of the study that conducted at Sawit Health Center Boyolali Regency. it can be concluded (1) there is no influence of exercise activity on hypertension status $p=1.000$ ($p > 0.05$). (2) There is no influence of smoking habit on hypertension status $p=0.698$ ($p > 0.05$). (3) There is the influence of stress level on hypertension status $p=0.021$ ($p < 0.05$). (4) There is the influence of Genetic on hypertension status $p=0.000$ ($p < 0.05$).

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