



The Analysis of Saturated Fat, Sodium, Protein Intake and Body Mass Index on the Occurrence of Hypertension in the Elderly in Semarang Regency

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Abstract

Hypertension is the degenerative disease that if not treated immediately, it causes other diseases such as diabetes mellitus, stroke, and so on indeed death as if it does not take any medical treatments. The prevalence of hypertension on elderly in Central Java in 2018 was 38,4 %. 55-64 years old group was 58,4%, 65-74 years old was 61,6% and >74 years old was 65.6%. The aim of this research is to analyze saturated fat intake, sodium, protein and body mass index related to hypertension on elderly in Semarang Regency. The research used case control design. The sample of the research was 104 respondents obtained by purposive sampling technique. Technique for collecting the data were interview, observation, and questionnaire. Chi square and logistics regression test were used in analyzing the data. The result of the research showed that there were significant influences in the variables of Saturated fat intake ($p=0.019$), sodium ($p=0.006$), protein (0.000), body mass index (0.000) concerning to hypertension on elderly in Semarang Regency. The most influential variable was sodium intake with $p=0.006$; Exp(B) /OR = 0.295. Thus, the increase of information about the importance of hypertension prevention is needed.

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INTRODUCTION

According to WHO (2010) the life expectancy of a person in the world of 66 years, in 2017 has increased to 70 years and in 2018 to 71 years. Globally in 2019 the proportion of the population aged over 60 years is 11.7% of the total world population, it is estimated that the number will continue to increase with increasing life expectancy of a person. Every year the proportion of elderly people in Indonesia will increase (WHO, 2018). From WHO data that around 1.13 billion in the world suffer from hypertension. Hypertension causes 8 million sufferers die each year, and 1.5 million obtained from countries in Southeast Asia. Globally the prevalence of hypertension is 47% (WHO, 2018).

Indonesia is a developing country that is still classified as having a high prevalence of hypertension of 34.1% of the population \geq 18 years. The prevalence of hypertension in the elderly in Indonesia is at the age of 55-64 years at 45.9%, 65-74 years at 63.8% and at \geq 75 years at 63.7% (Risksedas, 2018). The prevalence of hypertension in the elderly in Central Java in 2018 is 38.4%. And for the 55-64 years age group at 58.4%, 65-74 years at 61.6% and umur 75 years at 65.5%. (Risksedas, 2018).

Elderly is a natural and continuous process that undergoes anatomic, physiological and biochemical changes in tissues or organs which ultimately affect the state of the body's functions and abilities as a whole (Fatmah, 2010). Risk factors for hypertension in the elderly include smoking and exposure to cigarette smoke, drinking alcohol, diet / eating patterns, unhealthy lifestyles, obesity, drugs and family history (heredity).

Hypertension cases in Semarang Regency in 2013 to 2016 experienced an increase of 35,023 cases, 40,869 cases, 41,134 cases and 44,173 cases. Compared to other districts in Central Java, Semarang Regency has a relative increase in numbers. The measurement results obtained by many male sufferers, this is caused by smoking,

lack of rest and stress (Semarang District Health Office, 2016).

Semarang Regency is one of the districts that has experienced a fairly high increase in hypertension in the past three years and there has never been a study on hypertension in the area, so it is important to study more deeply about the problem of hypertension. Semarang Regency consists of 13 districts that have 26 puskesmas, based on Semarang district health data in 2017 there were 43,211 cases (11.02%) of hypertension present in 28,025 cases (11.54%) in the women's group and 15,186 in the men's group cases (10.18%). From 26 Public health center in Semarang Regency, there are 3 Public health center with the highest number of hypertension case, including Ungaran Public health center, Sumowono Public health center and Bergas Public health center.

The results of preliminary observations carried out on February 25 - March 8, 2019 in Semarang Regency, by interviewing the head of the non-communicable disease prevention section, said that the case of hypertension in Semarang District, especially in Ungaran, Bergas and Sumowono districts was influenced by the lack of people in paying attention to food intake, age and genetic factors. The results of a preliminary study conducted on 10 elderly people in the districts of Ungaran, Bergas and Sumowono are known to often consume foods such as nuts, salted fish, smoked boiled fish, processed soy products (tempe and tofu), goat meat, quail eggs in addition to food intake hypertension case is influenced by genetic factors. Six respondents who were overweight and 4 respondents who were underweight compared to the BMI standard who had hypertension.

The danger of hypertension if not treated immediately can cause other diseases such as diabetes mellitus, stroke and so on can even cause death

METHOD

This research was conducted using a case control design. The population taken is the elderly who live in Semarang Regency who follow the elderly program. The sample in this study consisted of a case group of 52 respondents and a control group of 52 respondents. The sampling technique used is purposive sampling.

The independent variables in this study were the intake of saturated fat, sodium, protein and Body Mass Index. The dependent variable in this study is the case of hypertension in the elderly. Data collection techniques are interviews, observations and questionnaires. In this study univariate, bivariate analysis using the Chi Square test and multivariate using the Logistic regression test to see the effect on the dependent and independent variables.

RESULTS AND DISCUSSION

Table 1. Univariate Analysis

Variable	Case		Control	
	Frequency	Percentage	Frequency	Percentage
Saturated Fat Intake				
High	33	31.7	21	20.2
Low	19	18.3	31	29.8
Sodium Intake				
High	44	42.3	17	16.3
Low	8	7.7	35	33.7
Protein Intake				
High	34	31.7	20	19.2
Low	18	17.3	32	30.8
Body Mass Index				
Thin	40	38.5	19	31.7
Obesity	12	11.5	33	18.3
Total	52	100.0	52	100.0

Based on table 1 it can be seen that in Semarang Regency most respondents consuming high saturated fat intake compared to those consuming low saturated fat are more likely to experience hypertension. Most respondents who consume high sodium intake compared to those who consume low sodium are more likely to experience hypertension.

Most respondents who consume high protein intake compared to those who consume low protein are more likely to experience hypertension.

Most of the elderly who have more weight than those who have more or less weight tend to experience hypertension.

Table 2. Bivariate Analysis

Variable	P-value
Saturated Fat Intake	0.019
Sodium Intake	0.006
Protein Intake	0.000
Body Mass Index	0,000

Based on table 2 it is known that the saturated fat intake factor has a p-value of $0.019 < 0.05$. It was concluded that H_0 was rejected or could be interpreted that there was an influence between saturated fat intake and the case of hypertension in Semarang Regency. In accordance with the study of Swanida, et al (2012) elderly who often consume foods containing saturated fats have a risk of 3.333 times greater hypertension compared to elderly who rarely consume foods containing saturated fats (Swanida, et al, 2012). Foods that contain lots of fat cause narrowing of blood vessels, blood flow slows so that it forces the heart to work even harder to pump blood throughout the body thereby increasing peripheral resistance of blood vessels so that blood pressure increases (N. Leg, Nonce et al, 2015).

The higher the intake of fat consumed, the higher the risk of hypertension in menopause (Yulistina et al, 2017). The elderly often consume foods that are partly high in saturated fat such as tilapia fish, tilapia, chicken, beef, meatballs, etc. Consuming an average of once a week, in connection with

consuming these foods which causes the elderly may be exposed to foods containing saturated fatty acids.

In line with the research cited from Lean (2013) where the intake of saturated fats contained in foods of animal origin include: milk, chicken, beef, mutton, pork, duck meat, corned beef, organ meats, fish, eggs, margarine etc. Groups of meat that contain lots of fat are, pork, beef and chicken. Meat that contains saturated fatty acids can cause hypertension (Rokot, Risha, et al, 2019).

In addition, many elderly people like to eat junk food because junk food is considered to be more practical, tasty and does not take long time so it can be served anytime and anywhere. Junk food contains large amounts of sodium which can increase the volume of blood in the body so the heart must pump blood more strongly which causes higher blood pressure (hypertension) (Sumarni et al, 2015).

The importance of the role of saturated fat in the body, which can be used as a protective agent and a builder in the body. However, in consuming saturated fat must be in accordance with the limit, saturated fat consumption is recommended as much as 20% (73 mg) per day for the elderly (Priyoto, 2015). Because too much is also not good, will result in a person prone to developing hypertension, which if not treated immediately will cause other diseases and can even cause death.

In accordance with a quote from Villarreal (2008) in the research of Putri & Kamsiah (2015) saturated fat is indeed very much needed as a protective substance and a builder in the body, but if consumed in excess can lead to hypertension. The journey of saturated fat can cause hypertension begins when a lot of cholesterol contained in LDL will accumulate in the walls of blood vessels and form plaque, plaque will mix with protein and covered by muscle cells and calcium that develops into atherosclerosis, coronary arteries that suffer from atherosclerosis do not elastic and narrowed so that blood pressure rises which causes hypertension.

The intake factor of Sodium has a p-value of $0.006 < 0.05$. It was concluded that H_0 was rejected or could be interpreted that there was an influence between sodium intake and hypertension in Semarang Regency. This is because Sodium plays an important role in the body which functions to maintain extracellular fluid balance. But it is not good if excessive consumption is not according to existing rules, salt consumption should not exceed 6 grams or 1 teaspoon per day for the elderly (Nugroho, 2018).

Most come from side dishes, for example, salted fish, anchovies, eggs, and unconsciously the use of flavoring ingredients and table salt that is not controlled. In cooking for 3 times a day the use of salt is at least 1 teaspoon, equivalent to 2000 mg per day. For patients with hypertension this must be highly considered especially since there is still the use of MSG or flavoring which has a very large sodium content (Yulistina et al., 2017).

In line with Nugroho's research (2018) where the use of iodized salt can prevent disorders caused by iodine deficiency (IDD). However, excessive use of salt is also not recommended because salt contains sodium which can increase blood pressure. (Nugroho, 2018). The decision of the WHO Expert Committee on Prevention of Cardiovascular Disease is recommended to consume around 6 grams of salt or 2400 mg of sodium per day. Excessive consumption of sodium can reduce the diameter of the arteries, making the heart have to pump harder to push blood volume through narrower spaces, causing blood pressure to rise (Emiria & Mulyati, 2012).

In this study, the elderly often consume food from excessive sodium sources which are mixed in foods such as salt as a spice, Monosodium Glutamate (MSG), salted fish, instant noodles and tend to consume salted fish, respondents are happy to consume salted fish because the price is cheap and easy obtained in the market. The use of salt in the elderly is recommended not to exceed 6 grams or one full teaspoon per day (Priyoto, 2015). Generally the elderly have been given

counseling related to the need to limit the use of salt, but some elderly people prefer typical salty foods. Sodium intake can affect hypertension (Fitri et al., 2018). According to sensory consuming salty foods and foods containing sodium glutamate (vetsin, soy sauce and sauce) can cause hypertension (Mahmudah et al., 2016).

The protein intake factor has a p-value of $0,000 < 0.05$. It was concluded that H_0 was rejected or could be interpreted that there was an effect between protein intake and hypertension in Semarang Regency.

This is because protein has a very important role in the body that functions as helping to expedite the process of absorption and digestion in the body. However, if excessive consumption of protein intake can burden the kidney. Protein needs in the elderly per day is 15-20% of energy needs (Fatmah, 2010).

Protein intake can affect blood pressure in two ways. First, the intake of protein derived from food is related to the synthesis of ion channels in cells which indirectly affects the pathway that regulates blood pressure regulation. Secondly, protein supplementation can increase the concentration of tyrosine and tryptophan amino acids in the brain or blood vessel walls that trigger a vasodilation response. Besides the amino acid arginine which is a nitric oxide substrate plays an important role in vasodilation. From the discussion above, it can be seen the role of protein in controlling both systolic and diastolic blood pressure. With good protein intake according to the recommendation that is equal to 50 grams / day for adult women and 60 grams / day for adult men both from vegetable, animal and cereal sources can help in lowering blood pressure. In this study there was no relationship between protein intake with systolic and diastolic blood pressure because most of the subjects have less food intake, and because it is not separated between animal protein intake and protein protein (Menad & Chandra, 2017).

Most of the elderly often consume tofu tempeh, where the food is consumed daily as a

source of protein. Besides tofu, tempeh elderly often consume shrimp and chicken eggs. Generally the elderly consume food according to the food prepared by their children. In line with Bertalina & Muliani's research (2016) that the intake of foods that contain high protein can cause hypertension, food sources that contain high protein fried tempeh, fried tofu, eggs, fatty chicken, milk, salted fish and egg yolks.

The Body Mass Index factor has a p-value of 0,000 < 0.05. It was concluded that Ho was rejected or it could be interpreted that there was an influence between Body Mass Index and the case of hypertension in Semarang Regency. This was because being overweight would interfere with blood circulation travel activities so that the heart had to pump blood more strongly thus increasing blood pressure. Obesity is at risk of getting hypertension 4.20 times greater than people who are not obese (Korneliani & Meida, 2012).

In line with research (Setya & Saptono, 2018) that body mass index has a risk of 4,450 times greater occurrence of hypertension in the elderly. Being overweight can cause cardiac output and circulation of blood volume to be high, peripheral retention is reduced while semantic activity can increase accompanied by low plasma renin activity resulting in hypertension (Emiria & Mulyati, 2012). Obesity means an imbalance between calorie consumption and energy requirements, causing an increase in active fat tissue and this will increase the burden or work of the heart. (Aryantiningsih & Silaen, 2016). Not in line with the study of Ramli & Najihah (2018) which says there is no relationship between body mass index and blood pressure.

Obesity will increase the risk of hypertension because the greater the body mass, the more blood is needed to supply oxygen and food to body tissues. This means that the volume of blood circulating through blood vessels increases so that it puts greater pressure on the walls of the arteries (Aryantiningsih & Silaen, 2016). The risk of hypertension will increase in overweight or

obese individuals, if the body weight increases above normal body weight the risk of hypertension will also increase. The greater the body mass, the more blood is needed to supply oxygen and food to the body's tissues. This means that the volume of blood circulating through blood vessels increases so that it puts more pressure on the artery walls. Being overweight also increases heart rate frequency and insulin levels in the blood. Increased insulin causes the body to retain sodium and water which ultimately increases blood pressure (Rahmawati, Esti, 2016). Arum Research (2019) says that being overweight is a risk factor for hypertension, where the greater the body mass, the more blood is needed to supply oxygen and food to body tissues. This means that the volume of blood circulating through the blood vessels increases so that it puts more pressure on the artery walls. In line with research Chacon et al (2008) and Yang et al, (2017) say that being overweight can cause blood pressure to increase

Table 3. Multivariate Logistic Regression Results of The Most Influential Factors on The Case of Hypertension in Semarang Regency

No	Variab le	B	p-Val ue	Exp (B)	95.0% C.I. for EXP (B)	
					Low er	Upp er
1	Sodiu m Intake	- 1.222	0.027	.295	.100	.872
2	Protei n Intake	- 2.638	0.000	.071	.024	.217
3	BMI	- 1.458	0.006	.233	.082	.658
	Const ant	2.276	0.000	9.735		

Based on Table 3. Results from the Logistic Regression analysis that all variables have a significant influence on the case of hypertension. This is because all variables have

a p value <0.05. From these results, the value of p value for both variables is equal to 0,000 but seen from the OR value, the largest Exp (B) / OR value is obtained from the sodium intake variable which is 0.295, CI 95% = 0.100 - 0.872.

Someone who consumes salt > 7 grams per day tends to have a risk of developing hypertension and has a risk of 5.675 times greater than those who consume garam 3 grams of salt per day (Agustina & Raharjo, 2015). Salt causes a buildup of fluids in the body because it draws fluid outside the cell so that it is not released, so that it will increase the volume and blood pressure (Agustina & Raharjo, 2015). High salt consumption has a risk of 4,173 times experiencing uncontrolled hypertension compared to salt consumption in normal amounts (Artyaningrum & Azam, 2016).

In line with Yang's research, Li, Xu et al (2014) in Southern China, elderly people who consume excessive salt are associated with hypertension. Apidechkul's research, Tawatchai (2018) in the mountains of Northern Thailand suggests that the high consumption of salt results in increased blood pressure.

CONCLUSION

The factors that influence the case of hypertension are the intake of saturated fat, sodium, protein and Body Mass Index on the case of hypertension in Semarang Regency. The most influential factor on the case of hypertension in Semarang Regency is sodium intake.

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