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Study of Correlation between Used Cooking Oil and Triglyceride Profile on Hypertension in Coastal Communities in Nambo Village, Kendari

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ABSTRACT

***Background**: According to the World Health Organization (WHO) in 2008, in Southeast Asia, as many as 36% of adults aged 25 years and over had high blood pressure, and 1.5 million deaths occur each year due to complications of high blood pressure. In Indonesia, hypertension is still a big challenge. This is a health problem with a high prevalence of 25.8% according to Riskesdas data in 2013. Hypertension is a chronic increase in blood pressure ≥140/90 mmHg. Non-pharmacological therapy needs to be applied to prevent the occurrence of hypertension, namely by modifying lifestyle to control blood pressure. Used cooking oil contains free fatty acids formed from the process of oxidation and hydrolysis, then these free fatty acids reshape saturated fatty acids and trans fatty acids and free radicals, which can cause various disorders such as endothelial dysfunction, which can lead to hypertension. **Purpose(s):** The purpose of this study was to determine the correlation between the used cooking oil and triglyceride profile with hypertension. **Methods**: The design of this study was observational analytic with cross-sectional research design. The sample of this study amounted to 96 people with purposive sampling technique. The instrument of this study was Questionnaire to determine the used cooking oil and automatic Spectrophotometer (TRX-7010) to measure triglyceride profiles. Data analysis was performed by chi-square test with significance value p < 0,05. **Results**: The results of this study showed that there was a correlation between the used cooking oil and hypertension (p = 0.002) and triglyceride profile with hypertension (p = 0.004). **Conclusions**: Hypertension had a correlation with the used cooking oil and increase in triglycerideprofile.*
***Keywords** : hypertension;, triglyceride profile; used cooking oil*

INTRODUCTION

According to the World Health Organization (WHO) in 2008, in Southeast Asia, as many as 36% of adults aged 25 years and over have high blood pressure, and 1.5 million deaths occur each year due to complications of high blood pressure. Hypertension is still a big challenge in Indonesia. This is a health problem with a fairly high prevalence, which is 25.8% according to the Badan Penelitian dan Pengembangan Kesehatan (2013). Based on data from the National Health Indicator Survey (SIRKESNAS, 2016), the prevalence of people with high blood pressure nationally is 30.9%. The prevalence of high blood pressure in women (32.9%) is higher than that of men (28.7%). The prevalence in urban areas is slightly higher (31.7%) than in rural areas (30.2%). The prevalence increases with increasing age. Although effective drugs are available, the control of hypertension is not yet adequate.

Based on data from Badan Pusat Statistik Kota Kendari (BPS) (2017), high blood pressure/hypertension was ranked 3rd with 18,038 cases in 2016. According to data from the 2017 Nambo Health Center profile,

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there were 126 people suffering from hypertension.

Hypertension is an increase in systolic blood pressure greater than 140 mmHg and/or diastolic greater than 90mmHg in two measurements with an interval of 5 minutes in a calm state (enough rest) (Andrea, 2013). Based on the National High Blood Pressure Education Program (2003) hypertension is blood pressure higher than 140/90 mmHg. Risk factors/triggers for hypertension are divided into those that cannot be controlled and those that can be controlled. Uncontrollable factors such as family history, gender, and age. Controllable factors such as obesity, lack of physical activity, smoking behavior, consumption patterns of foods containing sodium and saturated fat (Kementerian Kesehatan RI, 2014).

The formation of triglycerides in the liver will increase if the daily diet contains excessive carbohydrates. The liver converts carbohydrates into fatty acids, then forms triglycerides. The liver packages triglycerides into Very Low Density Lipoprotein (VLDL) and releases them into the bloodstream. VLDL which is rich in triglycerides is broken down into smaller residual VLDL. Remnant VLDL is further broken down into Intermediate Density Lipoprotein (IDL). IDL through several stages of the process will turn into Low Density Lipoprotein (LDL) which is rich in cholesterol (Arifnaldi, 2014).

Low Density Lipoprotein (LDL) carries cholesterol from the liver to the body cells that need it. If too much is carried, it can build up on the walls of blood vessels. LDL will accumulate on the inside of the arteries that supply organs with oxygen and nutrients. This buildup of LDL can narrow and clog arteries through the formation of atheroma. This process is called atherosclerosis, which can increase the risk of vascular disease including hypertension (Arifnaldi, 2014).

People with high triglyceride levels often have high LDL cholesterol and low HDL cholesterol. Elevated triglyceride levels also make LDL cholesterol toxic to the arterial wall and reduce the beneficial effects of HDL. People who are overweight or obese often also have triglyceride levels that cross normal limits. These conditions will increase the risk of suffering from heart disease or stroke (Arifnaldi, 2014).

Based on secondary data analysis Riskesdas (2007) states that high plasma total cholesterol levels are one of the main risk factors for coronary heart disease. Excessive consumption of fat will cause an increase in blood cholesterol levels. Lipids are also an important issue in influencing the incidence of hypertension.

Based on Arfan's research (2018), it showed that there was a relationship between total cholesterol levels and the incidence of hypertension in the community in Selabangga Village, Moramo Konawe Selatan District with a p-value of 0.001 (p <0.005) and a POR = 2.078 (95% CI = 1.373- 3.145). In Nahoya's research (2018), 54 respondents showed a relationship between triglyceride levels and the incidence of hypertension with a p-value of 0.001 (p <0.005) and a POR value of 2.252 (95% CI = 1.392-3.642).

Increased blood lipid profile levels are closely related to atherosclerosis. If the total cholesterol level in the blood reaches 260 mg/dL, the incidence of atherosclerosis will increase 3-5 times. Based on the Framing Heart Study (FH) and the Multiple Risk Factor Intervention Trial (MRFIT), that impaired lipid metabolism is a central factor in the occurrence of atherosclerosis. Based on its geographical distribution, people living

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in coastal areas will have a higher prevalence than those in areas not surrounded by sea or far from the coast (Feryadi, 2012).

Coconut oil used as cooking oil is a necessity for the Indonesian people in order to fulfill their daily needs. The purpose of the dry extraction process is to extract the oil from the copra by pressing, while the wet method is used to separate the oil from the coconut milk. One of the wet methods is the addition of enzymes which aim to speed up the process of separating oil from other components (Anwar, 2013).

Oil that is repeatedly used can cause a decrease in quality and will even pose a health hazard (Fauziah et al., 2013). According to research conducted by Jonarson (2004), regarding the analysis of the fatty acid levels of cooking oil used by fried snack food vendors in Padang, it was found that there were differences in the amount of saturated and unsaturated fatty acids in cooking oil that had not been used up to 3 times. The more often the cooking oil is used, the higher the saturated fatty acid content, namely unused oil (45.96%), 1 time use (46.09%), 2 times use (46.18%), 3 times use (46.32%).

Based on the initial observations that have been made, coastal communities in the Nambo Village have a habit of consuming fried foods. In addition, it is known that the people of Nambo Village have a body mass index (BMI) that is categorized as overweight to obese. It was recorded that there were 126 people suffering from hypertension in the 2017 Nambo Health Center profile.

Based on this description, it encouraged researchers to conduct research on the relationship between used cooking oil and triglyceride profiles on the incidence of hypertension in coastal communities in Nambo Village.

METHODS

The design of this study was an observational analytic study between one variable and another using a cross-sectional design, namely observing or measuring variables at one particular moment. The research was carried out in November-December 2018. The sampling location for this research was carried out in the Nambo Village and examination of blood samples was carried out at the Maxima Kendari Laboratory. The sampling technique used purposive sampling, which is a non-random sampling technique in which the researcher determined sampling based on inclusion criteria with a total sample of 96 people in this study.

Secondary data collection was carried out by looking at the data of patients suffering from hypertension, taken from Nambo Health Center data, and primary data collection was obtained by direct observation of respondents, namely by distributing questionnaires to respondents about using used cooking oil and taking blood samples from respondents then measuring triglyceride levels , where the measurement of triglyceride levels was carried out at the Maxima Kendari Laboratory. Data analysis was carried out using the chi-square test, with a p value <0.05 with the help of SPSS 16. This research was approved by the Health Research Ethics Commission at the Institute for Research and Community Service, Halu Oleo University.

RESULTS

Based on Table 1, this study shows the results of the study regarding the distribution of the frequency of study components including gender, age, body mass index (BMI), ethnicity, education,

smoking, blood pressure, triglyceride profile, use of used cooking oil, sodium intake, and sodium levels with the number the sample in this study were 96 respondents.

From this number of samples, the sample was female, namely 66 people (68.8%), while 30 people (31.2%) were male. Thus it is known that the majority of the research sample is female. The age distribution of respondents showed that the largest sample in this study was 36-45 years old, namely 35 people (36.5%), while the lowest was 18-25 years old, 7 people (7.3%). In measuring the respondent's BMI, 7 people were underweight (6.7%), normal were 40 people (38.1%), overweight were 28 people (26.7%), obesity 1 were 25 people (23.8%) and obesity 2 as many as 5 people (4.8%) . The ethnic distribution of the respondents with the highest ethnicity was the Bugis ethnicity with 39 people (40.6%), and the least ethnic group was the Ambonese with 2 people (2.1%). The distribution of the education level of the respondents showed that with an elementary school education level of 32 people (33.3%), SMP as many as 11 people (11.5%), SMA as many as 42 people (43.8%), D3 as many as 3 people (3.1 %), and S1 as many as 8 people (8.3%).

As can be seen in Table 1, it can be seen that there were 13 respondents who smoked (13.5%), and those who did not smoke were 83 people (86.5%). As can be seen in Table 1, it can also be seen that there were 19 (19.8%) respondents who were menopausal, and 77 (80.2%) who were not menopausal. The distribution of respondents suffering from degree I hypertension was 79 people (82.3%) and hypertension degree II was 17 people (17.7%). The distribution of respondents with normal triglyceride profiles was 53 people (55.2%), and abnormal triglyceride profiles were 43 people (44.8%). The distribution of respondents using used cooking oil was 52 people (54.2%) and not using cooking oil was 44 people (45.8%). The distribution of respondents with normal sodium levels was 84 people (87.5%), and sodium levels were not normal as many as 12 people (12.5%). The distribution of respondents with low sodium intake was 35 people (36.5) and those with high sodium intake were 61 people (63.5).

Based on Table 2, shows the relationship between the use of used cooking oil and the incidence of hypertension. There were 37 people who used used cooking oil and suffered from degree I hypertension and 15 people with grade II hypertension. Samples that did not use used cooking oil and suffered from grade I hypertension were 42 people and hypertension degree II were 2 people, and in Table 2 the value of $p = 0.002$ ($p < 0.05$) was obtained, so there was a relationship between the use of used cooking oil and hypertension in coastal communities. in Nambo Village. Table 2 also shows that there is a relationship between triglyceride profile and the incidence of hypertension, with a value of $p = 0.004$ ($p < 0.05$). Samples that had abnormal triglyceride profiles and suffered from grade I hypertension were 30 people and 13 people with grade II hypertension. There were 49 people with normal triglyceride profiles and suffering from grade I hypertension and 4 people with grade II hypertension.

Multivariate analysis is used to find out the most related factors or variables to find out whether there are other variables that influence the relationship. Multivariate analysis in this study consisted of BMI (body mass index), smoking, menopause, triglyceride profile, use of used cooking oil, sodium intake, and plasma sodium levels.

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Multivariate analysis consists of two stages, namely bivariate selection and multivariate modeling.

Bivariate selection was a potential independent variable (candidate variable) that will be included in the multivariate analysis, namely p<0.25. Independent variables included as candidate variables were plasma sodium levels (p = 0.000), sodium intake (p = 0.000), triglyceride profile (p = 0.003), and use of used cooking oil (p = 0.001). After selecting the candidates, multivariate modeling was carried out using multiple logistic regression with the backward method. It can be seen in Table 1, the triglyceride profile variable has an OR closest to 1 or exceeds 1 so that the triglyceride profile variable is no longer listed in step 2. It can be seen in step 2 that the variables that have the most influence on hypertension in the order of the strength of the relationship from the largest to the smallest are the use of used cooking oil (OR = 5.833), sodium intake (OR = 0.000), and plasma sodium levels (OR = 0.000).

DISCUSSION

The results of this study showed that out of 96 respondents, 79 people (82.3%) were classified as grade I hypertension, and 17 people (17.7%) were classified as grade II hypertension, with male gender suffering from grade I hypertension as many as 22 people and hypertension degree II as many as 8 people. There were 57 women suffering from grade I hypertension and 9 people with grade II hypertension.

Based on the observational analysis of triglyceride profiles with hypertension, p = 0.004 and use of used cooking oil with hypertension, p = 0.002. Thus it can be concluded that there is a relationship between triglyceride profile and hypertension in coastal communities in the Nambo Village, and there is a relationship between the use of used cooking oil and hypertension in the coastal communities in Nambo Village.

From the results of the study it can be seen that as many as 4 respondents had normal triglyceride profiles but suffered from grade II hypertension, the following 4 respondents did not use used cooking oil but had high plasma sodium levels or had high sodium intake. The increase in plasma sodium causes an increase in extracellular fluid volume (ECF). Other factors that can cause hypertension such as age, education, employment, obesity, smoking, exercise/physical activity, alcohol consumption, sodium intake, and potassium intake (Anggara et al., 2013) so that respondents with normal triglyceride profiles can also suffering from hypertension.

The results of this study found that 44 respondents did not use used cooking oil but had hypertension, this could be due to other influencing factors.

It can be seen in Table 2 as many as 2 respondents did not use used cooking oil but suffered from degree II hypertension, these respondents had a body mass index (BMI) classified as obese 1 and an abnormal triglyceride profile, this made the respondent suffer from degree II hypertension.

A total of 42 respondents did not use used cooking oil but suffered from grade I hypertension, 21 of these respondents had high sodium intake, and the other 21 respondents had abnormal triglyceride profiles, and had a body mass index (BMI) classified as overweight and obese 1.

According to Blair in Loh et al. (2013) factors that can cause hypertension such as age, gender, genetics, ethnicity, smoking, physical activity, obesity, and a diet high in saturated fat so that respondents who do not use used cooking oil can also

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suffer from hypertension.

This research was in line with the research conducted by Nahoya (2018) that there were 11 (20.37%) respondents with normal triglyceride profiles suffering from hypertension, while 23 (42.60%) respondents with abnormal triglyceride profiles suffered from hypertension (p value = 0.001).

The same research was conducted by Feryadi et al. (2012) reported that the proportion of respondents who had abnormal triglyceride levels had more hypertension than normotension. The results of the chi-square statistical test obtained a value of p = 0.04. This research is also in line with research conducted by Agustina et al. (2015) Based on the results of the Chi-Square statistical test, it showed that there was a relationship between the use of used cooking oil and the incidence of hypertension with a value of p = 0.009 (p <0.05). It can be seen in the analysis of all independent variables, that the variables that most influence on hypertension in the order of the strength of the relationship from the largest to the smallest are the use of used cooking oil (OR = 5.833), sodium intake (OR = 0.000), and plasma sodium levels (OR = 0.000). It can be concluded that the use of used cooking oil has the highest role in the incidence of hypertension in coastal communities in Nambo Village.

CONCLUSIONS

Based on the results of data analysis and discussion of the research variables, it can be concluded that there is a relationship between triglyceride profiles and the incidence of hypertension in coastal communities in Nambo Village (p-value = 0.004), and there is a relationship between use of used cooking oil and the incidence of hypertension in coastal communities in Nambo Village (p-value = 0.002).

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Table 1. Characteristics of Respondents

Characteristics of Respondents		Number of Respondents (N) = 96	%
Sex	Male	30	31,2
	Female	66	68,8
Age (years)	18-25	7	7,3
	26-35	16	16,7
	36-45	35	36,5
	46-55	23	24
	56-60	15	15,6
IMT (	*Underweight*	7	6,7
	Normal	40	38,1
	Overweight	28	26,7
	Obesity 1	25	23,8
	Obesity 2	5	4,8
Tribe	Tolaki	37	38,5
	Bugis	39	40,6
	Makassar	4	4,2
	Muna	7	7,3
	Ambon	2	2,1
	Buton	7	7,3
Education	SD	32	33,3
	SMP	11	11,5
	SMA	42	43,8
	D3	3	3,1
	S1	8	8,3
Smoking	Positive (+)	13	13,5
	Negative (-)	83	86,5
Menopause	Positive (+)	19	19,8
	Negative (-)	77	80,2
Hypertension (JNC VII)	Hypertension Std. I	79	82,3
	Hypertension Std. II	17	17,7
Natrium Level	Normal	84	87,5
	Abnormal	12	12,5
Natrium Intake	Low	35	36,5
	High	61	63,5
Trygliceride level	Normal	53	55,2
	Abnormal	43	44,8
Used Cooking Oil	Positive (+)	52	54,2
	Negative (-)	44	45,8

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Table 2. Relationship Between Used Cooking Oil and

		Hypertension (N = 96)		
		Hypertension Grade 1	Hypertension Grade II	
Used Cooiking Oil	Positive (+)	37	15	*p = 0,002
	Negative (-)	42	2	
Trygliceride level	Normal	49	4	*p= 0,004
	Abnormal	30	13	

Note :*Chi-square test, significant if $p < 0,005$