Conference Paper

Obesity and Other Risk Factors Associated with Hypertension in Puskesmas Toluaan of Southeast Minahasa Regency

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Abstract

Hypertension, one of many non-communicable diseases, is becoming a worldwide health problem due to its high prevalence, one that continues to increase over time. Hypertension ranks as the third highest cause of premature death. The prevalence of hypertension in North Sulawesi placed the province in fifth place in Indonesia based on RISKESDAS (National Basic Research) 2013. There are several risk factors associated with hypertension, one of them being obesity. North Sulawesi ranks first with the highest prevalence of obesity in Indonesia. This research aimed to analyze risk factors associated with hypertension in Puskesmas (Public Health Center) Toluaan of Southeast Minahasa Regency. The type of research conducted was ananalytic survey with case-control design. The study population was patients who seek treatment at the clinic in Puskesmas Toluaan. Total samples were 248 respondents, divided into 2 groups, cases and controls, each with124 respondents that were determined through purposive sampling method. Research used questionnaires and medical records as instruments. Data was processed through chi-square for bivariate analysis and logistic regression for multivariate analysis by using SPSS 22. Results showed that risk factors associated with hypertension in Puskesmas Toluaan were obesity, gender, alcohol consumption, and fat intake, whereas age, family history of hypertension, physical activity, smoking, and sodium intake were not associated with hypertension. Alcohol consumption was the most dominant factor associated with hypertension in Puskesmas Toluaan of Southeast Minahasa Regency,While obesity was shown to have significant association with hypertension.

Keywords: hypertension, obesity, risk factors, north sulawesi

1. INTRODUCTION

Health problems currently have shifted from communicable to non-communicable diseases. The cause may stem from changes in lifestyle, diet, environmental factors, lack of physical activity, and stress factors. Lifestyle inactivity, intake of too many foods

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containing fats and excess sodium, and inadequate fiber intake can alsolead to non-communicable diseases [15].

Because of its high prevalence and its association with cardiovascular disease, stroke, retinopathy, and kidney disease, hypertension is now one of the non-communicable diseases that is considered a major, health problem throughout the world,one thatcontinues to increase with each year. Hypertension is also a leading risk factor contributing to premature death. WHO reported in 2012 at least 839 million cases of hypertensionwere reported, and it is estimated by 2025 it will increase to 1.5 billion, or about 29% of the total world population, with more female patients (30%) than male patients (29%) [16]. National Basic Research's (RISKESDAS) report in 2013 stated that the prevalence of hypertension highest among those over the age of 18; North Sulawesi province ranked fifth with a percentage of 27.1% [2]. The non-modifiable risk factors of hypertension are age, gender, and genetics, whereas modifiable risk factors include obesity, psychosocial stress, smoking, less exercise, excessive alcohol consumption, excessive salt intake, and hyperlipidemia/hypercholesterolemia [4]. Obesity is a risk factor for hypertension that can be modified. A weight loss as small as 5% can lower blood pressure [3].

Hypertension, with 20.202 patients, is second on the list of 10 prominent diseases, based on theIntegrated Disease Surveillance (STP) on Public Health Centers (PHCs) in North Sulawesi province, just behind influenza [2]. Hypertension is also the highest ranked of non-communicable diseases witha high mortality rate in Southeast Minahasa Regency, with PHC Toluaan ranking fifth in Southeast Minahasa Regency. The number of patients from January to July in 2015 reached 130 cases. Obesity, physical activity, dietary habits, alcohol consumption, and smoking are lifestyle changes that can trigger the incremental increases in hypertensive patients from year to year. The aim of this research was to analyze the risk factors associated with hypertension in the General Polyclinic PHC Toluaan of Southeast Minahasa Regency.

2. METHODS

The type ofresearch conducted was an analytic study using case-control design. This research was conducted at the PHC Toluaan of Southeast Minahasa Regency. This research began in December 2015 and lasted until April 2016. The population in this research were all patients in general polyclinic PHC Toluaan of Southeast Minahasa Regency. Hypertensive patients formed the sample population and patients who did not suffer from hypertension formed the control. The sample was drawn from male or

female outpatients at PHC Toluaan of Southeast Minahasa Regency. The sample size for cases and controls in this study was calculated based on the formula of Lemme show, with a minimal sample size set at 124 respondents for the case group and 124 respondents to the control group. The samples were formed following specific inclusion and exclusion criteria. The inclusion criteria for cases included patients in general polyclinic PHC who met the following requirements: diagnosis by a doctor of hypertension, blood pressure $\geq$140 / 90 mmHg, complete medical records, and a completed informed consent form indicating willingness to participate. The inclusion criteria for controls include outpatients at the general polyclinic PHC Toluaan who met the following: no diagnosis of hypertension, complete medical records and a completed informed consent form indicating willingness to participate. The exclusion criteria were the respondents who denied to participation, were unable to respond, or who had any history of psychiatric disorders.

Variables used in this research include an independent variable (obesity), a dependent variable (hypertension), and confounding variables (age, gender, family history, sodium intake, fat intake, alcohol consumption, smoking, and physical activity). Data sources in this research were primary data obtained through interviews on the subject of research by using questionnaires, with additional secondary data obtained from the medical records of PHC Toluaan. Instruments used in this research were questionnaires that were modified by researchers in accordance with the aim of research, medical records, stationery, Riester brand tension meter, Littman brand stethoscope, Camry brand weight scales (capacity of 120 kg and accuracy level of 0,1 kg), and microtoise for measuring height (accuracy level of 0.1 cm).

3. RESULTS

The results obtained through research were then analyzed by univariate analysis, bivariate analysis, and multivariate analysis. Bivariate analysis using chi-square test was used to test the hypothesis of the association between risk factors and hypertension. Multivariate analysis using logistic regression was used to control confounding factors and determine the most dominant factor associated with hypertension disease. The distribution of respondents by variable and bivariate analysis results can be seen in Table 1.

Results of the analysis of the association between obesity and hypertension is indicated by the p value = 0.000; thus, the probability (significance) was smaller than 0.05.

H_1 was accepted, indicating there was an association between obesity and hypertension. OR calculation results of 3.48 means that people who are obese had 3 times the risk of suffering from hypertension than those who are not obese. Results of the analysis of the association between age and hypertension is indicated by the p value = 0.381; thus, the probability (significance) was greater than 0.05. H_1 was rejected, indicating there was no association between age and hypertension. Results of the analysis of association between gender and hypertension is indicated by the p value = 0.000; thus, the probability (significance) was smaller than 0.05. This showed that H_1 was accepted, indicating there was association between gender and hypertension. OR calculation results of 3.68 means that males had 3 times the risk of suffering from hypertension than females. Results of analysis of the association between family history and hypertension is indicated by the p value = 0.310; thus, the probability (significance) was greater than 0.05. H_1 was rejected, indicating there was no association between family history and hypertension.

Results of the analysis of the association between physical activity and hypertension is indicated by the p value = 0.241; thus, the probability (significance) was greater than 0.05. H_1 was rejected, indicating there was no association between physical activity and hypertension. Results of the analysis of the association between alcohol consumption and hypertension is indicated by the p value = 0.000; thus, the probability (significance) was smaller than 0.05. H_1 was accepted, indicating there was association between alcohol consumption and hypertension. OR calculation results of 5.53 means that people who consumed alcohol had 5 times the risk to suffer from hypertension than those who did not consume alcohol. Results of the analysis of the association between smoking and hypertension is indicated by the p value = 0.368; thus, probability (significance) was greater than 0.05. H_1 was rejected, indicating there was no association between smoking and hypertension. Results of the analysis of the association between sodium intake and hypertension is indicated by the p value = 0523; thus, probability (significance) was greater than 0.05. H_1 was rejected, indicating there was no association between sodium intake and hypertension. Results of the analysis of the association between fat intake and hypertension is indicated by the p value = 0.000; thus, the probability (significance) was smaller than 0.05. H_1 was accepted, indicating there was association between fat intake and hypertension. OR calculation results of 3.74 means that people who consumed fat had 3 times the risk to suffer from hypertension than those who did not consume fat.

The logistic regression final model for multivariate analysis can be seen in Table 2.

TABLE 1: Distribution of Respondents based on Variables and *Chi-Square* Results.

Variable	Case		Control		OR	95% CI	p value
	n	%	n	%			
Obesity							
Yes	74	29.8	37	14.9	3.480	2.056-5.889	0.000*
No	50	20.2	87	35.1			
Age							
≥45 years	89	35.9	96	38.7	0.742	0.418-1.317	0.381
<45 years	35	14.1	28	11.3			
Gender							
Male	67	27.0	30	12.1	3.683	2.142-6.332	0.000*
Female	57	23.0	94	37.9			
Family History							
Yes	57	23.0	66	26.6	0.748	0.454-1.232	0.310
No	67	27.0	58	23.4			
Physical Activity							
Not Good	43	17.3	53	21.4	0.711	0.426-1.188	0.241
Good	81	32.7	71	28.6			
Alcohol Consumption							
Yes	88	35.5	38	15.3	5.532	3.210-9.533	0.000*
No	36	14.5	86	34.7			
Smoking							
Yes	48	19.4	56	22.6	0.767	0.463-1.272	0.368
No	76	30.6	68	27.4			
Sodium intake							
Not Good	71	28.6	65	26.2	1.219	0.737-2.006	0.523
Good	53	21.4	59	23.8			
Fat intake							
Over	88	35.5	49	19.8	3.741	2.204-6.351	0.000*
Enough	36	14.5	75	30.2			

TABLE 2: Logistic Regression Final Model.

Variable	β	S.E.	p value	OR	95% CI	
					Lower	Upper
Obesity	0.14	0.42	0.001	3.872	1.382	11.989
Alcohol Consumption	0.74	0.31	0.000	5.709	3.141	10.378
Gender*Obesity	0.77	0.19	0.000	2.159	1.482	3.135

Variables associated with hypertension in the PHC Toluaan of Southeast Minahasa Regency were obesity and alcohol consumption. The most dominant variable associated with hypertension is indicated by the highest OR value. Table 2 shows that the

most dominant variable associated with hypertension is alcohol consumption, with an OR value of 5.709. This means that people who consume alcohol have 5 times the risk to suffer from hypertension than those who do not consume alcohol.

4. DISCUSSION

The results showed that primary variables associated with hypertension in the PHC Toluaan of Southeast Minahasa Regency were obesity, gender, alcohol consumption, and fat intake. This indicates that an imbalance is present where the number of calories consumed through food and drink is greater than the number of calories expended through growth and development, metabolism, or activity. Results of the analysis of the association between obesity and hypertension showed the p value less than 0.05, which means there was an association between obesity and hypertension. The results of this research aligns with research conducted by Sulastri, et al. (2012) at Minangkabau ethnic communities in the city of Padang, which stated that there was an association between obesity and hypertension (p = 0.049; OR = 1.82). Similar results were also obtained by Puspita, et al. (2014) in patients seeking treatment at the clinic of the Regional Hospital in Baji Labuang Makassar which found the same association between obesity and hypertension (p = 0.039; OR = 8.4). Research conducted by Handayani and Sartika (2013) also found similar results indicating an association between obesity and hypertension in workers at the Oil and Gas Company X in East Kalimantan (p = 0.024; OR = 2.27). The presence of obesity may increase the risk of suffering from hypertension. A larger body mass means that the volume of blood needed to supply oxygen and nourishment to the body tissues will be increased. This causes the heart to work harder, applying greater pressure on the artery walls, resulting in an increase of blood pressure [14].

The results of this research indicated that there was association between gender and hypertension (p = 0.000; OR = 3.68). Gender has an influence on the incidence of hypertension; at a ratio of 2:2.29 for increment in systolic blood pressure, there were more males that had hypertension than females [5]. The results of this research were comparable with research conducted by Tjekyan (2014) in the city of Palembang, where there was also association between gender and hypertension (p = 0.018; OR = 1.39). The results of this research indicated that there was association between fat intake and hypertension (p = 0.000; OR = 3.74). This was found to be a result of the eating habits of people in Southeast Minahasa Regency, especially the people in the District Toluaan. They frequently ate fatty foods, such as pork, dog meat, rat meat,

and fried foods 3-4 times per month and fried foods 2 times per day. Excessive fat intake can pose the risk of hypertension, because it will increase cholesterol levels in the blood. Cholesterol damages the artery wall by harming the lining and forcing white blood cells to counterattack, the combination of which forms plaque in the blood, leading to atherosclerosis. This research was in line with research conducted by Manawan, et al. (2016) in the village of Tandengan District Eris of Minahasa regency, which also found that there was association between fat intake and hypertension (p = 0.000). Research conducted by Mardani, et al. (2011) also found association between fat intake and hypertension in PHC Telogosari Kulon Semarang (p = 0.034; OR = 4.9). Alcohol consumption was the most dominant variable associated with hypertension in the PHC Toluaan of Southeast Minahasa Regency. Most respondents (35.5%) in this research had a habit of alcohol consumption. The type of alcohol most often taken by the respondents was *cap tikus*. *Cap tikus* is an alcohol drink with an average of 30-40% alcohol percentage; it is produced through distillation of *saguer*, which is a white liquid obtained from the palm tree trunk. Respondents in this research largely reported alcohol consumption for more than 30 years, or since a young age. The duration of alcohol consumption also increased the risk for hypertension. The usage of alcohol for a long time (chronic) increased blood pressure and had a greater effect on systolic pressure [12]. The results are similar with research conducted by Malonda, et al. (2013) of the elderly in Tomohon city, where there was association between alcohol consumption and hypertension (p = 0.006; OR = 2,792). Research conducted by Anggara and Prayitno (2013) also found that alcohol consumption was associated with hypertension (p = 0.043).

5. CONCLUSIONS

The risk factors associated with hypertension in the PHC Toluaan of Southeast Minahasa Regency were obesity, gender, alcohol consumption, and fat intake, while the risk factors that were not associated with hypertension were age, family history, physical activity, smoking, and sodium intake. The most dominant risk factor associated with hypertension in PHC Toluaan of Southeast Minahasa Regency was alcohol consumption. Recommendations that can be given by researchers included improving health promotion in public health centers to spread knowledge about hypertension among people in the District Toluaan and enabling the activities of Integrated Patronage Post "(Posbindu)" that encourage community participation in early detection, monitoring, and follow-up of hypertension. The community should also be encouraged to perform

blood pressure checks, take medications regularly, and adopt healthy lifestyles by controlling weight, eating low-fat diets, regularly exercising, reducing alcohol consumption, and avoiding other risk factors to prevent further complications.

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