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Hypertension risk factors in batu ampar public health center West Borneo

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ARTICLE INFO

Article history:

Received 1 Nov, 2022
Revised 16 Nov, 2022
Accepted 3 Des, 2022

Keywords:

Hypertension
Risk Factors
Batu Ampar
West Borneo

ABSTRACT

Many people do not know that they have been diagnosed with hypertension until complications arise. Hypertension is a non-communicable disease caused by many factors. The risk factors that influence the incidence of hypertension are divided into two: modifiable and non-modifiable risk factors. Thus far, there is no data on risk factors for hypertension in the Batu Ampar Public Health Center work area. The objective of research is knowing the risk factors for hypertension in the working area of Batu Ampar Public Health Center. An observational study with a cross sectional design conducted at the Batu Ampar Public Health Center from April to June 2022. The variable data collected were age, gender, education level, occupation, obesity, smoking habits, exercise habits, alcohol consumption, salt consumption and fruit consumption. and vegetables. Of the 150 respondents (75 with hypertension and 75 without hypertension) it was found that age, occupation, alcohol consumption and salt consumption were risk factors. The probability of hypertension having these four risk factors is 97%. Risk factors for hypertension in the working area of Batu Ampar Public Health Center are age, occupation, alcohol consumption and salt consumption.

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INTRODUCTION

Hypertension is a non-communicable disease (PTM) that often causes health problems. People often do not realize that they suffer from hypertension because they often have no symptoms. Generally, they come to health facilities in more serious conditions or have complications such as coronary heart disease, stroke, or kidney failure, etc. (Garg et al., 2020; Pusat Data dan Informasi Kementerian Kesehatan RI, 2018; Singh et al., 2017; Sukmawati, 2018)

Data from the Ministry of Health of the Republic of Indonesia in 2019, states that hypertension is a "*silent killer*". Data from the World Health Organization (WHO) shows that the total number of hypertensive sufferers worldwide reached 22% of the entire population in 2019. WHO data also states that 50% of PTM are hypertensive sufferers, 25% are receiving treatment and only 12, 5% who received treatment were in good condition. (Han & goleman, daniel; boyatzis, Richard; Mckee, 2019; Kemenkes, 2020; Telaumbanua & Rahayu, 2021)

Data from Riskesdas in 2018, there was an increase in the prevalence of hypertension in Indonesia with a population of around 260 million, which was 34.1% compared to Riskesdas in 2013 which was 27.8%. The prevalence of hypertension in West Borneo Province is in the 5th highest position out of 34 provinces in Indonesia, which is 36.99%. (KemenKes, 2019; Perhimpunan Dokter Hipertensi Indonesia, 2021)

There are 2 risk factors for hypertension, namely risk factors that can be controlled (consumption of sodium, potassium, calcium and magnesium, alcohol consumption, smoking, obesity, lack of physical activity, work level, education level) and those that cannot be controlled (age and gender). In this study, the risk factors for hypertension were sought in the working area of the Batu Ampar Public Health Center (Postigo et al., 2021; Song, 2020).

RESEARCH METHOD

This study is an observational study with a cross sectional design conducted at Batu Ampar Public Health Center. Primary data taken through a questionnaire that had been tested for validity and reliability. By calculating the sample size with different proportions, type I error of 5% and type II error of 20%, as well as the difference in the proportion of risk factors that influence the incidence of minimal hypertension which is considered significant based on the literature by 20%, the minimum sample size is 150 (75 hypertension and 75 without hypertension). Bi-variate analysis was performed with Chi Square test followed by multivariate analysis for data with p-value <0.25 with Logistic Regression test using SPSS version 22 for Windows 11. The relationship that was considered significant from the results of multivariate analysis was p<0.05 (Sugiyono, 2017, 2018, 2019).

RESULTS AND DISCUSSIONS

Results

Validity test (Pearson) questionnaire using 15 respondents obtained r table of 0.514 (valid) and reliability test with Cronbach Alpha results of 0.7 (reliable) (Hidayat, 2021; Yusup, 2018). From the bi-variate analysis, it was found that age, gender, education level, occupation, obesity, alcohol consumption and salt consumption had a significant relationship (Table 1).

Table 1. Bivariate analysis with chi square test

No.	Variable	Blood Pressure		p-value
		Hypertension	Normal	
		n (%)	n (%)	
1.	Age			0,000
	≥50 years old	59 (39,3)	27 (18)	
	<50 years old	16 (10,6)	48 (32)	
2.	Gender			0,005
	Female	53 (35,3)	36 (24)	
	Male	22 (14,6)	39 (26)	
3.	Educational Background			0,012
	≤Junior High School	67 (44,6)	55 (36,6)	
	≥Senior High School	8 (5,3)	20 (13,3)	
4.	Job			0,000
	Unemployed	56 (37,3)	30 (20)	
	Employed	19 (12,6)	45 (30)	
5.	Obesity			0,003
	Yes	48 (32)	30 (20)	
	No	27 (18)	45 (30)	

No.	Variable	Blood Pressure		p-value
		Hypertension	Normal	
		n (%)	n (%)	
6.	Smoking Habits			0,072
	Yes	46 (30,6)	35 (23,3)	
	No	29 (19,3)	40 (26,6)	
7.	Physical Exercise Habits			0,513
	Yes	41 (27,3)	37 (24,6)	
	No	34 (22,6)	38 (25,3)	
8.	Alcohol Consumption			0,009
	Yes	11 (7,3)	2 (1,3)	
	No	64 (42,6)	73 (48,6)	
9.	Salt Consumption			0,001
	Much	54 (36)	34 (22,6)	
	Less	21 (14)	41 (27,3)	
10.	Fruits and Vegetables Consumption			
	Rarely			0,180
	Often	33 (22)	25 (16,6)	
		42 (28)	50 (33,3)	

The results of the multivariate analysis test showed that age, occupation, alcohol consumption and salt consumption had a significant relationship (Table 2).

Table 2. Multivariate analysis with logistic regression test

No.	Variable	B	Sig. / p-value	Exp (B)	95% CI for EXP (B)	
					Lower	Upper
1.	Age	2,517	0,000	12,396	4,672	32,889
2.	Job	1,447	0,003	4,249	1,661	10,871
3.	Alcohol Consumption	2,170	0,036	8,758	1,154	66,483
	Salt Consumption					
4.	Constant	1,094	0,012	2,986	1,273	7,005
		-3,627	0,000	0,027		

From the logistic regression equation obtained, it is continued with the calculation of the probability of the occurrence of hypertension in the working area of the Batu Ampar Public Health Center as listed in Table 3 (Dahlan, M. S., 2014; 2019b).

Table 3. Probability of Individuals Suffering from Hypertension Based on Risk Factors

No.	Risk Factors	Logistics Regression Equation $y = a + \beta_1X_1 + \ldots. + \beta_iX_i$	Probability $p = 1 / 1+\exp[-(y)]$ (%)
1.	Age ≥50 years old	2,517 x (1)	97%
	Unemployed	1,447 x (1)	
	Consume alcohol	2,170 x (1)	
	Consume a lot of salt	1,094 x (1)	
2.	Age <50 years old	2,517 x (0)	74,7%
	Unemployed	1,447 x (1)	
	Consume alcohol	2,170 x (1)	
	Consume a lot of salt	1,094 x (1)	
3.	Age ≥50 years old	2,517 x (1)	89,6%

No.	Risk Factors	Logistics Regression Equation $y = a + \beta_1X_1 + \ldots. + \beta_iX_i$	Probability $p = 1 / 1+\exp[-(y)]$ (%)
	Employed	1,447 x (0)	
	Consume alcohol	2,170 x (1)	
	Consume a lot of salt	1,094 x (1)	
4.	Age ≥50 years old	2,517 x (1)	80,7%
	Unemployed	1,447 x (1)	
	Do not consume alcohol	2,170 x (0)	
	Consume a lot of salt	1,094 x (1)	
5.	Age ≥50 years old	2,517 x (1)	92,46%
	Unemployed	1,447 x (1)	
	Consume alcohol	2,170 x (1)	
	Consume little bit of salt	1,094 x (0)	
6.	Age <50 years old	2,517 x (0)	41,02%
	Employed	1,447 x (0)	
	Consume alcohol	2,170 x (1)	
	Consume a lot of salt	1,094 x (1)	
7.	Age <50 years old	2,517 x (0)	25,23%
	Unemployed	1,447 x (1)	
	Do not consume alcohol	2,170 x (0)	
	Consume a lot of salt	1,094 x (1)	
8.	Age <50 years old	2,517 x (0)	49,75%
	Unemployed	1,447 x (1)	
	Consume alcohol	2,170 x (1)	
	Consume little bit of salt	1,094 x (0)	
9.	Age <50 years old	2,517 x (0)	7,3%
	Employed	1,447 x (0)	
	Do not consume alcohol	2,170 x (0)	
	Consume a lot of salt	1,094 x (1)	
10.	Age <50 years old	2,517 x (0)	18,9%
	Employed	1,447 x (0)	
	Consume alcohol	2,170 x (1)	
	Consume little bit of salt	1,094 x (0)	
11.	Age <50 years old	2,517 x (0)	2,6%
	Employed	1,447 x (0)	
	Do not consume alcohol	2,170 x (0)	
	Consume little bit of salt	1,094 x (0)	

From the results of bi-variate and multivariate analysis tests that produce logistic regression equations, the probability of suffering from hypertension in subjects aged 50 years, not working, consuming alcohol, and consuming a lot of salt is 97%. While the lowest probability (2.6%) if the individual does not have these four risk factors.

Discussions

Primary hypertension can occur at a young age (25-45 years) and 20% of people under 20 years and over 50 years. This happens because the productive age population does not pay much attention to the behavior of food patterns/types and physical activity. It was also found that there was an increase in the prevalence of hypertension in the older population (>40 years). This occurs biologically because arterial pressure increases with age, the incidence of aortic regurgitation and degenerative processes. Age has a relationship with hypertension in this study both in bivariate and multivariate tests (p = 0.000; 95% CI 4.672-32.889) because every increase in age, organs such as the heart, blood vessels, kidneys and endocrine system will experience changes due to degenerative processes. Subjects aged 50 years had 12.4 times the risk of developing hypertension compared to subjects aged <50 years (Jerez Tirado & Porras Ramírez, 2021; Rondón Carrasco et al., 2020; Sukmawati E et al., 2018; World Health Organization, 2020).

Data from WHO notes that there is a relationship between gender and hypertension, where 1 in 5 women worldwide suffer from hypertension. This is greater than men where there are 1 in 4 men who suffer from hypertension worldwide. Data from Riskesdas in 2018 showed that there was a higher proportion of female hypertension (36.85%) than men (28.8%). Research conducted by Anggara FHD and Prayitno N, showed 75 respondents who had been included in the study, there were women who suffered from hypertension (36.8%) more than men (24.3%). In this study there was a higher frequency of hypertension sufferers in women than men. In contrast to previous studies, in this multivariate test, the gender variable did not have a relationship with the incidence of hypertension, however, the bivariate test was associated with the incidence of hypertension (Navarrete-Mejía et al., 2021; Santamaría et al., 2018).

Lifestyle or parenting can be reflected from the level of education received by each individual and

The environment, with a result that at a low level of education they tend to suffer from hypertension and even complications can occur due to the possibility of not knowing how to prevent and control hypertension (Sukmawati, 2017). In this study, the bivariate test found that the level of education was related to the incidence of hypertension, however, in the multivariate test it was the opposite. The data and information center of Ministry of Health of Republic of Indonesia in 2019 stated that groups of people who have jobs have a low proportion of hypertension compared to groups of people who do not have jobs. This is supported by research conducted by Anggara FHD and Prayitno N, there is a significant relationship between individual work status and the incidence of hypertension (p-value = 0.000). In the bi-variate and multivariate tests of this study, the occupation variable had a significant relationship with the incidence of hypertension (p=0.003; 95%CI 1.661-10.871). Subjects who do not have a job have a risk of hypertension by 4.2 times compared to subjects who work (Kementerian Kesehatan RI., 2020; Navarrete-Mejía et al., 2021; Santamaría et al., 2018).

Obesity is a risk factor for hypertension where there is accumulation of fat in the body due to an imbalance in energy intake (energy intake) and energy used (energy expenditure) for a long time. Based on data from Riskesdas in 2017, obese people showed an increase in prevalence in the population aged >18 years from 11.7% in 2010 to 15.4% in 2013. The survey and analysis conducted by Riskesdas found that environmental factors played a major role, such as eating behavior and types of food play an important role (Lubbers et al., 2018; Mills et al., 2020).

Obesity is often associated with the incidence of hypertension. It is estimated that 60% of the total hypertensive patients are overweight >20%. Jullaman's research states that people who have a BMI in the obese category have a 1.64 times risk of suffering from hypertension grade 1 compared to normal BMI. This study is in accordance with Framingham's research which shows that people who are obese will have a 10 times greater chance of hypertension. Research by Sari states that people with central obesity have a risk of 1.6 times suffering from hypertension grade 1 compared to people who are not centrally obese. The obesity variable in this study had a relationship with the incidence of hypertension in the bivariate test, however, in the multivariate test the opposite was true (Kompaniyets et al., 2021; Seravalle & Grassi, 2017).

Cigarette consumption behavior is a big problem in terms of health. According to WHO in 2011, Indonesia was in the 5th position with the highest number of smokers in the world in 2007. The relationship between hypertension and smoking is very influential because chemicals such as nicotine can stimulate the sympathetic nerves by increasing catecholamine hormones (Epinephrine, Nor-epinephrine and Dopamine), carbon monoxide binds to hemoglobin more strongly than oxygen. In this study, there was no relationship between bi-variate and multivariate tests between cigarette consumption and the incidence of hypertension (World Health Organisation, 2016).

Physical activity greatly affects blood pressure stability through cardiac performance and vascular elasticity. Lack of activity is associated with the incidence of obesity and hypertension. Lack of physical activity will reduce energy use (Energy Expenditure) resulting in an imbalance in fat regulation in the body. Lack of physical activity tends to experience a higher heart rate. This causes the heart muscle to work harder with each contraction. The harder the heart muscle contracts, the greater the blood pressure exerts on the arterial walls, resulting in an increase in peripheral resistance which causes an increase in blood pressure. In this study, bivariate and multivariate tests did not show a significant relationship (Kompaniyets et al., 2021; Litwin & Kułaga, 2021).

Excessive alcohol consumption with a frequency of 3 times per day has a clear meaning. Alcohol has the same effect as carbon dioxide which can increase the acidity in blood plasma (acidic pH), so that the blood becomes thick and forces the heart to pump faster. Alcohol consumption in the long term will affect the increase in glucocorticoid and mineralocorticoid hormone levels in blood plasma so that the activity of the renin-angiotensin-aldosterone system (RAAS) also increases and causes hypertension (Mills et al., 2020). The release of this mineralocorticoid hormone will cause water re-absorption which causes fluid retention to hypertension. Alcohol consumption variable had a significant relationship with the incidence of hypertension in bi-variate and multivariate tests (p=0.036; 95%CI 1.154-66.483). Subjects who consume alcohol have a risk of developing hypertension by 8.7 times compared to subjects who do not consume alcohol (Husain et al., 2014; Puddey et al., 2019)vv.

Sodium consumption is associated with the occurrence of hypertension about 50-70%. In the nephrons, the kidneys will undergo a process of filtration in the glomerulus, re-absorption and augmentation of the proximal convoluted tubule, loop of Henle, distal convoluted tubule, and collecting tubule where in this process high sodium consumption will also absorb high water because of the nature of sodium which attracts water. High sodium consumption will increase urinary calcium excretion, parathyroid hormone, and 1,25 dihydroxy vitamin D. However, on the contrary, high potassium, calcium and magnesium consumption can reduce the incidence of hypertension. 27,29 This study included independent variables such as salt consumption and consumption fruit and vegetables. The results of the bivariate and multivariate analysis of the salt consumption variable had a significant relationship with the incidence of hypertension (p=0.012; 95%CI 1.273-7.005) but the fruit and vegetable consumption variable had the opposite result. This is probably because the population in the working area of Batu Ampar Public Health Center consumes fruits and vegetables that do not vary due to the unavailability of these fruits and vegetables. Subjects who consume a lot of salt have a risk of hypertension 3 times compared to subjects who consume little salt (Navarrete-Mejía et al., 2021; Sylvestris, 2017; Yenni Ariestanti, Yeny Sulistyowati, 2019).

CONCLUSION

The risk factors for hypertension in the population in the working area of the Batu Ampar Health Center are age, occupation, alcohol consumption, and salt consumption. In multivariate analysis, it was found that the probability of suffering from hypertension in subjects aged 50 years, unemployed, consuming alcohol, and consuming a lot of salt was 97%, as well as the probability of suffering from hypertension in subjects aged <50 years, working, not consuming alcohol and little salt consumption is 2.6%. The higher the subject has risk factors associated with the incidence of hypertension, the higher the probability of hypertension.

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