

The Risk of Cardiovascular Disease in The Rejang Clan

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ABSTRACT

Abdominal obesity, hypertriglyceridemia, low HDL, hypertension and hyperglycemia indicate condition of metabolic syndrome. Metabolic abnormalities can increase cardiovascular disease risk [20]. The aim of study determine cardiovascular disease risk in the Rejang Clan. Research design used descriptive analytic with cross sectional in which independent variables (BMI, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol) and dependent variable (cardiovascular disease risk) were measured at the same time. Sample is the Rejang Clan, used purposive sampling with inclusion and exclusion criteria totaling 88 people. Data analysis used univariate and bivariate such as chi square, t independent and correlation test. Gender shows almost all of them are female, age describes most of them aged 45 years, education shows that most of them are highly educated, and occupations describe most of them not working. Mean of BMI is 26.17 kg/m², abdominal circumference is 87.95 cm, blood pressure is 123.89 mmHg, uric acid is 5.54 mg/dl, sugar is 131.98 mg/dl, and cholesterol is 192.35 mg/dl. There is different proportions on the characteristics of age (p value 0.006), while on the characteristics of gender (p value 0.835), education (p value 0.107) and occupation (p value 0.124) have no difference in proportion. Furthermore, there was no difference in BMI, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol based on cardiovascular disease risk (p value > 0.05). Rejang Clan do not have a risk of cardiovascular disease.



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1. INTRODUCTION

Abdominal obesity, hypertriglyceridemia, low high density lipoprotein (HDL) cholesterol, hypertension and hyperglycemia indicate the condition of the metabolic syndrome. So far, the factors that are considered to be the cause of the metabolic syndrome associated with obesity include diet, lack of exercise, metabolic disorders, neuroendocrine mechanisms, psychology, drugs, socioeconomic factors and lifestyle as well as genetic factors. Metabolic abnormalities in an individual can increase the risk of cardiovascular disease [20].

Obesity is a major component of the metabolic syndrome (MS), but the exact mechanism is not known with certainty. Obesity followed by increased fat metabolism will cause the production of reactive oxygen species (ROS) to increase, both in the circulation and in adipose cells. Increased ROS in adipose cells can cause the balance of oxidation-reduction (redox) reactions to be disturbed, so that antioxidant enzymes decrease in circulation. This situation is called oxidative stress. Conditions of increased oxidative stress cause adipose

tissue dysregulation and are the initial pathophysiology of MS, hypertension, and atherosclerosis [11].

Hypertension in the metabolic syndrome occurs through several factors, namely increased sympathetic nerve activity, increased activity of the renin-angiotensin system, and impaired vasodilation. The combination of hypertension and components of the metabolic syndrome will increase the incidence of target organ damage and the incidence of cardiovascular disease, as well as mortality [8].

Gout or gout is a metabolic disorder of the body characterized by increased levels of uric acid or hyperuricemia. Gout is a degenerative disease that occurs due to an increase in uric acid levels in the blood [4].

Diabetes mellitus and hyperlipidemia are also important risk factors for CHD in young adults. Both of these factors play an important role in the pathogenesis of CHD. The study found that a significant increase in triglycerides, LDL and a decrease in HDL was present in all young adult CHD patients and 15% to 20% were CHD patients with diabetes mellitus [23].

Adults are twice as likely to die and three times more likely to develop heart disease or stroke than people without the metabolic syndrome. In addition, people with the metabolic syndrome have a fivefold greater risk of developing type 2 diabetes. Cardio Vascular Disease (CVD) such as the metabolic syndrome is now considered a new force as a driving factor for the CVD epidemic. Metabolic syndrome is associated with a twofold increased risk for CVD, CVD mortality and stroke has been associated with a 1.5 times increased risk of all-cause mortality. The metabolic and clinical disturbances found in the metabolic syndrome present a greater risk of cardiovascular disease than the risk of other coronary heart disease alone. It is reasonable that various aspects of the metabolic syndrome play an important role in causing cardiovascular disorders [3].

About 20-25% of the world's adult population has the metabolic syndrome. The Third National Health and Nutrition Examination Survey (NHANES) states that the prevalence of metabolic syndrome at the age of more than 20 years is 24%, at the age of 50 years it is greater than 30% and at the age of 60 years and over it is 40%. The prevalence of metabolic syndrome in Asia is lower, at 5-16%. While the prevalence of metabolic syndrome in five areas in Jakarta is 28.4% and there is no significant difference in prevalence between men and women [14].

The Health Office of Rejang Lebong Regency noted that the highest disease was hypertension with the number of sufferers around 2,079 people (<https://harianrakyatbengkulu.com>). Likewise, from January to the end of September 2019, there were quite a number of people with diabetes mellitus (DM), namely from 22 health centers spread over 15 sub-districts, it was revealed that the number of DM sufferers was 194 people and 26 of them died (Harian Silampari, 2019). The survey conducted by the P2TM Dinkes RL team on 500 random samples also found patients with 42.3% hypercholesterolemia, 20.3% uric acid and a high BMI of 40.9% [2]. Likewise, the results of a preliminary survey conducted at the Curup Timur Health Center showed the number of people with hypertension was 1,059 people. Data shows that the high incidence of hypertension has the potential to increase the risk of cardiovascular disease, especially in the Rejang Tribe community. This study aims to determine the risk of cardiovascular disease in the Rejang Clan.

2. Methods

The research design used was descriptive analytic with a cross sectional approach because the independent variables (body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol) and the dependent variable (cardiovascular disease risk) were measured at the same time. Research is not

conducted on the entire object under study (population), but only takes part of the population (sample) [13].

This research was conducted in Rejang Lebong Regency. The research was conducted in April-October 2020. The population is the entire object of research or the object under study [13]. The population in this study was the Rejang Clan community in Rejang Regency totaling 88 people by purposive sampling using inclusion criteria such as: men and women, aged 26-65 years, Rejang Clan, willing to be respondents and able to communicate well, while the exclusion criteria is sick.

Research data includes sample characteristics, body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol and the incidence of cardiovascular disease. Characteristics of the sample including age, gender and disease history were collected through interviews using a questionnaire. Data on body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol were collected by direct examination using their respective tools, in the form of a tread scale, mikrotis, sphygmomanometer, easy touch uric acid blood, easy touch blood glucose and easy touch cholesterol.

Univariate analysis is an analysis conducted on each variable in the research results and describes the characteristics of each research variable. In general, this analysis only produces the distribution and percentage of each variable [13]. Variables that will be analyzed univariately in this study are sample characteristics, body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol and the incidence of cardiovascular disease. This data is presented in the form of tables and narratives. Furthermore, bivariate analysis such as chi square, t independent and correlation test are used to determine the difference in the proportion of individual characteristics and body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol based on cardiovascular disease risk in the Rejang Clan in Rejang Lebong Regency in 2020. Ethical clearance was carried out at the ethics review session at the Bengkulu Health Ministry Poltekkes.

3. Results

a. Description of Individual Characteristics of The Rejang Clan

Table 1 Description of Individual Characteristics of The Rejang Clan

Characteristics	f	%
Gender		
Woman	67	76,1
Man	21	23,9
Total	88	100
Age		
> 45 Year	36	40,91
≤ 45 Year	52	59,09
Total	88	100
Education		
Low	25	28,4
High	63	71,6
Total	88	100
Occupation		
Working	26	29,55
Not Working	62	70,45
Total	88	100

The distribution of respondents by gender shows that almost all of them are female, namely 67 people

(76.1%). As for the distribution of respondents based on age, most of them are 45 years old, namely 52 people (59.09%). The distribution of respondents based on education shows that most of them are highly educated, namely 63 people (71.6%). Furthermore, the distribution of respondents based on occupation describes most of them not working, namely 62 people (70.45%).

b. Description of Body Mass Index, Abdominal Circumference, Blood Pressure, Uric Acid Levels, Blood Sugar and Cholesterol in The Rejang Clan

Table 2 Description of Body Mass Index, Abdominal Circumference, Blood Pressure, Uric Acid Levels, Blood Sugar and Cholesterol in The Rejang Clan

Variable	Mean	SD	Min	Max
Weight (kg)	63,27	10,85	46	89
Height (cm)	155,56	6,92	141	174,1
Body Mass Index (kg/m ²)	26,17	4,34	16,59	40,18
Abdominal Circumference (cm)	87,95	11,16	67	118

Table 3 Description of Body Mass Index and Abdominal Circumference by Gender in The Rejang Clan

Variable	Woman				Man			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Weight (kg)	63,27	11,11	48	89	63,26	10,22	46	78
Height (cm)	154,19	5,82	141	169,5	159,89	8,42	144	174,1
Body Mass Index (kg/m ²)	26,64	4,62	17,75	40,18	24,68	2,93	16,59	29,22
Abdominal Circumference (cm)	88,51	11,08	67	118	86,17	11,48	68	103

The frequency distribution shows the average body mass index for all respondents is 26.17 kg/m², whereas when viewed by gender it is different. The mean of female respondents described a body mass index of 26.64 kg/m² while male respondents were 24.68 kg/m². The mean abdominal circumference for all respondents was 87.95 cm. However, when viewed further, the abdominal circumference of female respondents was 88.51 cm and male respondents were 86.17 cm.

Table 4 Description of Blood Pressure, Uric Acid Levels, Blood Sugar and Cholesterol in The Rejang Clan

Variable	Mean	SD	Min	Max
Blood Pressure (mmHg)	123,89	20,49	90	180
Uric Acid (g/dl)	5,54	1,74	3	13,6
Blood Sugar (g/dl)	131,98	74,36	67	506
Cholesterol (g/dl)	192,35	44,93	101	347

Table 5 Description of Blood Pressure, Uric Acid, Blood Sugar and Cholesterol by Gender in The Rejang Clan

Variable	Woman				Man			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Blood Pressure (mmHg)	122,56	18,60	90	175	128,14	25,70	95	180
Uric Acid (g/dl)	5,43	1,86	3	13,6	5,89	1,22	3,8	8,2

Blood Sugar (g/dl)	127,2	68,57	71	486	147,19	90,69	67	506
Cholesterol (g/dl)	191,6	44,45	101	347	194,48	47,49	109	292

Table 6 Description of Cardiovascular Disease Risk in The Rejang Clan

Variable	f	%
Cardiovascular Disease Risk		
Yes	5	5,68
No	83	94,32
Total	88	100

The frequency distribution shows the average blood pressure of all respondents is 123.89 mmHg, whereas different genders. Female respondents described the average blood pressure of 122.56 mmHg while male respondents were 128.14 mmHg. The average uric acid level in all respondents was 5.54 mg/dl. Further, the average uric acid in some female respondents was 5.43 mg/dl and male respondents was 5.89 mg/dl. Further, the maximum value of uric acid in female respondents was 13.6 mg/dl and male respondents was 8.2 mg/dl. The frequency distribution shows the average blood sugar level in all respondents is 131.98 mg/dl. While the mean of female respondents was 127.21 mg/dl and male respondents was 147.19 mg/dl. The average cholesterol level in all respondents was 192.35 mg/dl. Further, the average cholesterol in several respondents, both female and male, was 191.67 mg/dl and 194.48 mg/dl. The risk of cardiovascular disease shows that almost all respondents, namely 83 people (94.32%) do not have a history of the disease.

c. Differences in The Proportion of Individual Characteristics (Gender, Age, Education and Occupation) Based on Cardiovascular Disease Risk in The Rejang Clan

Table 7 Differences in The Proportion of Individual Characteristics (Gender, Age, Education and Occupation) Based on Cardiovascular Disease Risk in The Rejang Clan

Characteristics	Cardiovascular Disease Risk				p value
	Yes		No		
	n	%	n	%	
Gender					
Woman	4	5,97	63	94,03	0,835
Man	1	4,76	20	95,24	
Age					
> 45 Year	5	13,89	31	86,11	0,006
≤ 45 Year	0	0	52	100	
Education					
Low	3	12	22	88	0,107
High	2	3,17	61	96,83	
Occupation					
Working	3	11,54	23	88,46	0,124
Not Working	2	3,23	60	96,77	

Table 4.7 illustrates the difference in the proportions of age characteristics with p value < 0.05 (0.006), while gender characteristics with p value > 0.05 (0.835), education with p value (0.107) and occupation with p value > 0.05 (0.124) there is no difference in proportion.

d. Cardiovascular Disease Risk in The Rejang Clan

Table 8 Correlation of Body Mass Index, Abdominal Circumference, Blood Pressure, Uric Acid, Blood Sugar and Cholesterol in The Rejang Clan

Variable	p value
Body Mass Index (kg/m ²)	0,431
Abdominal Circumference (cm)	0,072
Blood Pressure (mmHg)	0,562
Uric Acid (g/dl)	0,925
Blood Sugar (g/dl)	0,095

Table 4.8 shows body mass index, abdominal circumference, blood pressure, uric acid, blood sugar have p value > 0.05. This illustrates that there are no correlation between these variables. Furthermore, the output illustrates that all correlation values between independent variables are > 0.8, meaning that all independent variables are not collinear, so the assumptions cannot be continued for discriminant analysis.

Table 9 Body Mass Index, Abdominal Circumference, Blood Pressure, Uric Acid, Blood Sugar and Cholesterol Based on Cardiovascular Disease Risk in The Rejang Clan

Variable	Cardiovascular Disease Risk				p value
	Yes		No		
	Mean	SD	Mean	SD	
Body Mass Index (kg/m ²)	25,69	4,74	26,20	4,34	0,80
Abdominal Circumference (cm)	90,8	7,59	87,8	11,35	0,56
Blood Pressure (mmHg)	131,8	16,04	123,42	20,71	0,38
Uric Acid (g/dl)	5,36	1,36	5,55	1,76	0,81
Blood Sugar (g/dl)	109,2	21,68	133,34	76,23	0,48
Cholesterol (g/dl)	180	47,66	193,10	44,96	0,53

Table 4.9 shows no differences in body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol based on cardiovascular disease risk with p value > 0.05. However, the mean abdominal circumference, it showed a value of 90.8 cm and blood pressure of 131.8 mmHg in the group at risk of cardiovascular disease compared to the group not at risk of cardiovascular disease, which showed an average abdominal circumference of 87.8 cm and blood pressure. of 123.42 mmHg.

4. Discussion

4.1 Description of Individual Characteristics of Rejang Clan

The results showed that almost all of the respondents were female. Meanwhile, the distribution of respondents based on age describes most of them aged 45 years. The distribution of respondents based on education shows that most of them are highly educated. Furthermore, the distribution of respondents based on occupation describes most of them not working. Age is a very influential factor in the incidence of cardiovascular disease. In line with research conducted by [1], showed a relationship between age and the incidence of CHD. The close relationship between CHD and age is that with increasing age, the higher the risk of suffering from CHD.

4.2 Description of Body Mass Index, Abdominal Circumference, Blood Pressure, Uric Acid Levels, Blood Sugar and Cholesterol in The Rejang Clan

The frequency distribution shows that mean of body mass index in all respondents is in the light fat category, whereas when viewed by gender it is different. Female respondents described the body mass index as being in the light fat category, while the male respondents were in the normal category. The average abdominal

circumference of all respondents was within normal limits. However, when viewed further, the abdominal circumference of female respondents was above the normal value and male respondents were still within normal limits. Obesity, especially central obesity, is an important component of the metabolic syndrome and is significantly associated with cardiovascular disease in both men and women. Obese women are more prone to diabetes, which in turn increases their cardiovascular risk. A registry study showed that, although there was a reduction in the rate of myocardial infarction and death from CHD in men and women aged > 65 years, this was not seen in younger women. One hypothesis indicates that this is due to increased obesity in younger women. The main factor in the occurrence of metabolic syndrome is central obesity which is shown in the form of a large abdominal circumference. Large abdominal circumference is usually caused by a buildup of fatty tissue in the abdominal omentum. Fat tissue that accumulates can occur because there is an excess of calories resulting from a greater calorie input compared to burning calories. The body's caloric input is generally in the form of consumption of foods with high calories that come from carbohydrates and fats. Included in this calorie input are alcohol consumption, snacks or snacks, and calorie drinks [6].

The frequency distribution shows that blood pressure of all respondents is in the normal category, whereas when viewed from different genders. Female respondents described the average blood pressure as being in the normal category, while male respondents were approaching pre-hypertension conditions. However, in the two groups it was also found that some respondents were in a condition of hypertension. Men tend to be at risk of cardiovascular disease associated with unhealthy lifestyles such as smoking and alcohol consumption compared to women [10].

The female sex has a lower risk because of the hormone estrogen. Protection by this hormone lasts as long as women have not menopaused, and when women have menopause, the risk of cardiovascular disease will increase and be the same as men [7]. Menopause is a period of physiological cessation of menstruation which usually occurs at the age of 42 to 55 years [19]. Menopause affects the production of the hormone estrogen which functions to increase fat metabolism in the body. There are estrogen receptors (ERs) in the blood vessels that serves as an estrogen stimulation to prevent the accumulation of fat and injury to the smooth muscle cells of the blood vessels, so that women's blood vessels can be protected from atherosclerosis [16].

The average uric acid level in all respondents was within normal limits. If we look further, the mean uric acid in some female respondents is above the normal value and much higher than in male respondents. The relationship between uric acid and cardiovascular disease is actually still controversial and the truth is still being researched [9]. A study states that an increase in serum uric acid is positively correlated with mortality from cardiovascular disease in white and black men and women. Most of these deaths were caused by myocardial infarction exacerbated by high uric acid levels. Uric acid causes the accumulation of urate crystals around the previously formed atherosclerosis [14]. Serum uric acid is a strong predictor of mortality for cardiovascular disease in middle-aged men who are not affected by the metabolic syndrome or gout [12].

The frequency distribution shows that the average blood sugar level in all respondents is in the normal category. However, it was also found that some respondents in both groups were in a state of hyperglycemia. Uncontrolled diabetes with high glucose levels in the blood tends to raise cholesterol and triglyceride levels. The increased risk of diabetes is due to lipid disorders. The mechanism is not clear, but there is an increase in type IV hyperlipidemia and hypertriglyceridemia, abnormal platelet formation and DM accompanied by obesity and hypertension. There may also be many other factors influencing it [21], [18].

While the average cholesterol levels in all respondents were within normal limits. Further, the average cholesterol in several respondents both in women and men approached the condition of hypercholesterolemia.

High cholesterol levels can settle in the arteries causing narrowing and hardening known as atherosclerosis or plaque. As a result of the increased workload of the heart and hypertrophy, the heart's need for blood (oxygen) increases and causes CHD [21], [5]. Meanwhile, the risk of cardiovascular disease shows that almost all respondents, namely 83 (94.32%) do not have a history of the disease.

4.3 Differences in The Proportion of Individual Characteristics (Gender, Age, Education and Occupation) Based on Cardiovascular Disease Risk in The Rejang Clan

The results of the study illustrate that there are differences in the proportions on the characteristics of age, while on the characteristics of sex, education and work there is no difference in the proportions. Furthermore, based on age characteristics, the risk of cardiovascular disease was highest at age > 45 years and none at risk at age 45 years. Susceptibility to cardiovascular disease increases with age. The incidence of CHD increases fivefold at the age of 40-60 years. Physiologically, increasing age will cause physiological changes in the heart, including the heart muscle will become stiffer, the heart wall will thicken and the structure of the blood vessels will change which causes the blood vessels to be less elastic and increase systolic pressure [15]. Increasing age is also associated with other risk factors such as hypertension. According to an observational study, people over the age of 30 have higher systolic and diastolic pressures than their younger counterparts. This can increase the risk of cardiovascular disease [22].

4.4 Cardiovascular Disease Risk in The Rejang Clan

The results showed that there was no difference in body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol based on the risk of cardiovascular disease. The discrepancy between the results of the study with several theories could occur due to several reasons such as only one measurement and the presence of external variables that affect the lipid profile that are not controlled such as food consumption, cigarettes, glycemic control, and obesity as well as external variables that affect uric acid such as consumption food and drink, and blood pressure-lowering drugs. However, when viewed from the mean abdominal circumference and blood pressure in the group at risk of cardiovascular disease, it showed a higher value than the group without risk of cardiovascular disease.

In line with research conducted by [7], shows that respondents who are obese or obese have a risk of 3,753 times suffering from coronary heart disease compared to respondents who are not obese. Obesity is an important key to an increase in the incidence of CHD. Obesity is a condition that burdens the cardiovascular system. Most obese people have more visceral fat (intra-abdominal fat) than peripheral fat. With the increase in the amount of visceral fat in the body, the heart will work harder so that the risk of CHD will be greater [17].

Obesity is not an independent risk factor for cardiovascular disease, because it is usually accompanied by other important risk factors. The increase in body mass index is closely related to hypertension. About 20-33% of patients with hypertension are overweight and the risk of developing hypertension in obese people is 5 times greater than normal weight. Based on research conducted by Khusna (2016), that BMI has a positive correlation with high triglycerides, as it is known that triglycerides are the cause of atherosclerosis.

5. Conclusion

Gender shows that almost all of them are female, namely 67 people (76.1%), age describes most of them aged 45 years, namely 52 people (59.09%), education shows that most of them are highly educated, namely 63 people (71.6%) and occupations describe most of them not working, namely 62 people (70.45%). The average body mass index is 26.17 kg/m², the average abdominal circumference is 87.95 cm. The average blood pressure is 123.89 mmHg, the average uric acid level in all respondents is 5.54 mg/dl. The average blood

sugar level was 131.98 mg/dl, the average cholesterol level was 192.35 mg/dl and the risk of cardiovascular disease showed that almost all of the respondents, namely 83 (94.32%) had no history of the disease. There is a difference in the proportion of age characteristics with p value < 0.05 (0.006), while on gender characteristics with p value > 0.05 (0.835), education with p value (0.107) and occupation with p value > 0.05 (0.124) there is no difference in proportion. There was no difference in body mass index, abdominal circumference, blood pressure, uric acid, blood sugar, cholesterol based on the risk of cardiovascular disease with p value > 0.05 . The Rejang Clan do not have a risk of cardiovascular disease.

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