Correlation between Dyslipidemia and the Significance of Coronary Lesions in the Minangkabau Ethnic Group with Coronary Heart Disease

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A B S T R A C T

The Minangkabau ethnic group is known to have a specific polymorphism gene that causes this group to be susceptible to coronary heart disease with complex coronary lesions. The Minangkabau people are known to often eat foods high in fat, such as rendang and others, many of them have dyslipidemia. Dyslipidemia is a disorder of lipid metabolism with increased levels of total cholesterol, low density lipoprotein (LDL), triglycerides, and decreased high density lipoprotein (HDL). This research aimed to find the correlation between dyslipidemia and the significance of coronary lesion in Minangkabau Ethnic group. This research took place from September to October 2018 at Minangkabau Mainland (Padang City). Total subjects who met the inclusion criteria were 109 subjects, and 25 subjects were excluded because of Old age, Diabetes Mellitus, Chronic heart failure, and lack of data. The significance of the coronary lesion was assessed based on the percentage of stenosis. The lesion is significant if the main vessel stenosis is 50%, or the osteal Left Anterior Descending (LAD) stenosis is >50%, or the mid-distal LAD stenosis is $\geq$ 70%, or stenosis in RCA $\geq$ 70%. Dyslipidemia conditions obtained from laboratory tests. Statistical test used is the chi square test. There were 60 patients with significant coronary lesions out of 109 study subjects and 49 subjects with insignificant lesions. The group with significant lesions was mainly male with a mean age of 53.0 ± 6.39 years. Of the 60 patients with significant coronary lesions, 30 were found to have dyslipidemia, and 14 of the subjects with insignificant lesions were found to be dyslipidemia. Thus, there was a significant relationship between dyslipidemia and the significance of coronary lesions with a P of 0.038.

Keywords: Dyslipidemia, Minangkabau ethnic, polymorphism gene, coronary lesions

1. Introduction

Coronary heart disease (CHD) is the most common type of heart disease with the most frequent clinical manifestations, and CHD is one of the highest cause of death worldwide. The World Health Organization (WHO) estimates that in 2015, heart and blood vessel diseases are the cause of 30% of all deaths, and in 2020 it is estimated that 7.8 million deaths out of 11.1 million deaths will be caused by CHD. In Indonesia, heart disease and blood vessels diseases are still the highest cause of death, which is about 9.2%, and CHD has the highest prevalence, namely 1.5%[1]. The P2Y12 gene polymorphism is a genetic variation in the P2Y12 receptor gene, which is involved in platelet aggregation and activation. One subset of the specific polymorphism called C34T, also known as the rs6809699 variant, has been studied extensively in Asian people, including Indonesian[1]. Specifically, This gene began to be researched in Minangkabau ethnics because of the high number of cardiovascular cases with extensive lesions and increased risk of bleeding in patients with this ethnic. This gene is suspected in causing the ethnics to be susceptible to coronary heart disease with complex coronary lesions, higher risk of recurrent cardiovascular events, such as stent thrombosis or myocardial infarction. The Minangkabau people are also known to often eat foods high in fat, such as rendang and others, many of them have dyslipidemia.

Figure1. Minangkabau Foods are famous for the high fat level content

Dyslipidemia is a disorder of lipid metabolism with increased levels of total cholesterol, low density lipoprotein (LDL), triglycerides, and decreased high density lipoprotein (HDL). This research aimed to find the correlation between dyslipidemia and the significance of coronary lesion in Minangkabau Ethnic group. This research took place from September to October 2018 at Minangkabau Mainland (Padang City). Total subjects who met the inclusion criteria were 109 subjects, and 25 subjects were excluded because of Old age, Diabetes Mellitus, Chronic heart failure, and lack of data. This research is an analytical observational study using a case control study design. Where the case group in the study was a sample group with significant coronary lesions while the control group was a sample group with non-significant coronary lesions

The significance of coronary lesions is assessed from the narrowing of the coronary arteries obtained during coronary angiography, to be exact the lessions significance is assessed from the percentage of coronary artery stenosis. The lesion was significant if the stenosis in the main blood vessel (Left Main) was 50%, or stenosis in the osteal/proximal Left Anterior Descending (LAD) > 50%, or stenosis in the mid-distal LAD ≥ 70%, stenosis in the LCx ≥ 70%, or stenosis in RCA ≥ 70%. Meanwhile, The non-significant lesion was when the stenosis in the main blood vessels (LM) was <50%, or stenosis in the osteal/proximal Left Anterior Descending (LAD) ≤ 50%, or stenosis in the mid-distal LAD < 70%, or stenosis in the LCx < 70%, or stenosis in the RCA < 70%.

Dyslipidemia conditions obtained from laboratory tests. Dyslipidemia is defined as a situation where the results of measuring cholesterol levels serum meet one or more of the following criteria; Total cholesterol level > 200 mg/dl, LDL cholesterol level > 100 mg/dl, HDL cholesterol level < 40 mg/dl and triglyceride level ≥ 150 mg/dl and/or receiving anti-dyslipidemia therapy. Statistical test used for this study was the chi square test. Data analysis was carried out through univariate and bivariate analysis. Univariate analysis was carried out on each variable from the research results. Data was displayed in the form of a frequency distribution table. The data that will be explained in this research is the frequency distribution of respondents' characteristics. On the other hand, bivariate analysis was carried out to see the relationship between two variables, namely the independent variable and the dependent variable. The conclusion from the test results was that if the p value is ≤ 0.05 then Ho is rejected, meaning there was a significant relationship between the independent variable and the dependent variable.

2. Results and Discussion

The results obtained are as discussed below;

2.1 Characteristics of subjects

There were 60 patients with significant coronary lesions out of 109 study subjects. On the other hand, there were 49 subjects with insignificant coronary lesions. The group with significant lesions were mainly male (P value 0,057) with a mean age of 53.0 ± 6.39 years (P value 0,000).

Table 1. Characteristics of subjects

Variable	Coronary Lesions		P-value
	Significant (n=60)	Non-Significant (n=49)	
Age (years)	53,0±6,39	50,98±8,84	0,057
Gender			
Male	51 (85,0)	26 (53,1)	0,000
Female	9 (15,0)	23 (46,9)	

The results of the analysis on coronary heart disease patients showed that the group with significant lesions was more men, while the group with non-significant lesions was more women. This is in line with a population study conducted by Cheng, that men with typical angina had a greater risk of suffering from coronary heart disease with more severe lesions than women (19% compared to 11% with p<0.001)[2]. In the study population involving 14,786 male and female subjects in Finland, it was also found that men had a 3 times greater risk of suffering from CHD than women, with a 5 times greater risk of mortality. The greater number of men suffering from CHD is related to unhealthy behaviors, such as smoking, alcohol consumption, and exposure to physical stressors. Meanwhile, the cardio-protective effect of estrogen plays an important role in the low number of female subjects suffering from CHD[3].

The average age of the subjects in this study was not statistically significant in both groups. These results are in accordance with Akyüz's research which stated that there was no significant difference in the age of patients with CHD and controls. Age is a cardiovascular risk factor that cannot be modified. This is related to the aging process which causes a decrease in body organ function and the incidence of cardiovascular disease significantly increases at ages over 55 years[4]. Meanwhile, in this study the subjects were on average under 55 years old, so the effect of age was not significant on the significance of coronary lesions.

2.2 Correlation between dyslipidemia and the significance of coronary lesions

Among the 60 patients with significant coronary lesions, 30 were found to have dyslipidemia, and 14 of the subjects with insignificant lesions were found to be dyslipidemia. Thus, there was a significant relationship between dyslipidemia and the significance of coronary lesions with a P value of 0,038.

Table 2. Correlation between dyslipidemia and the significance of coronary lesions

Variable	Coronary Lesions		P-value
	Significant (n=60)	Non-Significant (n=49)	
Dyslipidemia	30 (50,0)	14 (28,6)	0,038

Coronary artery disease (CAD) development, especially related to the severity of the stenosis, has been linked causally to genetically determined and metabolically produced changes in lipid metabolism, as seen in various kinds of dyslipidemia. Plasma lipids are transported to tissues in the form of lipoproteins[5]. The components of lipoproteins are cholesterol esters, free cholesterol, triglycerides, phospholipids and a protein called apolipoprotein. There are 6 main lipoproteins in plasma, namely chylomicrons, very low-density lipoprotein (VLDL), intermediate-density lipoprotein (IDL), LDL, HDL, and Lp(a). The conventional model of atherosclerosis (cholesterol hypothesis) predicts that cholesterol is the sole determinant of atherosclerosis[6].

Objective laboratory measurements of lipids and lipoproteins are used to estimate the risk of cardiovascular diseases and to guide the treatment of dyslipidemia. In clinical practice, the concentration of plasma lipoprotein particles is not measured directly but is estimated from the cholesterol concentration. Total cholesterol is distributed mainly in three major lipoproteins, namely VLDL, LDL and HDL[7].

Accurate functional assessment of lesion severity is critical for clinical decision making in patients with intermediate coronary stenosis. The presence or absence of dyslipidemia apparently has a clear correlation with whether or not the coronary lesions are significant in patients with coronary heart disease. The significance of the severity of these lesions indicates that dyslipidemia is one of the main predictor factors for the prognosis of coronary heart disease[8]. Dyslipidemia therapy with regular monitoring is important to reduce the level of morbidity and mortality in patients with coronary heart disease. Especially in the Minangkabau ethnic group with a high fat diet and a high incidence of dyslipidemia. The Minangkabau ethnic group also has a specific gene polymorphism that makes it easier for lipoproteins to form atherosclerotic plaques and also more easily rupture which can cause coronary heart disease[9].

3. Conclusion

From the study, we can conclude that there was a significant correlation between dyslipidemia and the significance of coronary lesions in Minangkabau Ethnicity. Dyslipidemia, apart from being a risk factor for coronary heart disease, can also be a prognostic factor for the severity of coronary heart disease to determine morbidity and mortality.

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