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# Lipid Profile Analysis of Coronary Heart Disease Patients in Gatot Soebroto Indonesia Army Central Hospital for January-June 2024 Period

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#### **ABSTRACT**

Coronary Heart Disease (CHD) remains a leading cause of death globally. The accumulation of plaque in the coronary arteries, frequently triggered by lipid deposition, is a primary contributor to CHD. Lipid profiles are crucial for assessing risk and monitoring treatment response in CHD patients. This study aimed to analyze the lipid profiles of patients diagnosed with CHD at the RSPAD Gatot Soebroto heart clinic. This was a quantitative descriptive observational study. The sample comprised 84 CHD patients whose diagnosis was confirmed through EKG, coronary CT scan, or angiography. Measured variables included total cholesterol, triglycerides, High Density Lipoprotein (HDL), and Low Density Lipoprotein (LDL). Results indicated that 38.6% of patients had one-vessel disease, and over half of the sample was under 60 years old. While a majority of patients had normal levels of triglycerides (64.3%), total cholesterol (64.3%), and HDL (53.6%), a substantial proportion (63.1%) exhibited abnormal LDL levels. This study demonstrates that, despite many CHD patients having normal lipid profiles, a significant proportion still presents with abnormal LDL levels. Further research is necessary to identify the factors contributing to abnormal lipid profiles in CHD patients and evaluate the efficacy of interventions to improve lipid profiles.

KEY-WORDS Coronary Heart Disease, Lipid Profile, LDL, HDL, Cholesterol

WORDS



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#### INTRODUCTION

Indonesia is the country with the fourth-largest population in the world. More than 270 million people live in Indonesia. In the world of health, Coronary Heart Disease (CHD) ranks second in the second leading cause of death in Indonesia. In 2019, there were 96 deaths due to CHD per 100,000 Indonesian population (World Health Organization, 2023). Coronary Heart Disease (CHD) is a condition where there is an imbalance between the supply and demand for oxygen in the heart muscle, which results in a decrease in oxygen levels in the heart. If the oxygen level in the heart decreases, there will be several signs of heart disease, such as chest pain

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or a sudden heart attack. This insufficiency often occurs when there is a buildup of plaque in the arteries, which are the places where oxygen-rich blood passes through (Lilly, 2015).

Many risk factors can contribute to the incidence of CHD, one of which is high cholesterol levels (hypercholesterolemia). It is estimated that half of the patients with Coronary Heart Disease (CHD) have a history of hypercholesterolemia. Cholesterol is a lipid that often plays a significant role in the cause of cardiovascular disease (Rämö et al., 2019). High lipid levels will trigger increased atherogenesis, inflammation, and thrombosis in the blood vessels. Atherogenesis is the process of formation of atherosclerotic plaques that cause Coronar Heart Disease (CHD) (Reyes-Soffer et al., 2022). The plaque that has formed on blood vessels is irreversible. Significant changes to a person's lifestyle are needed to restore blood vessels to their original state; current treatments only prevent complications and heal plaques that are identified late in the early stages of atherogenesis (Wilkins et al., 2019).

Lifelong treatment is very common for cardiovascular diseases. To prevent the development of related medical conditions, the average patient with Coronary Heart Disease (CHD) is advised to take two types of drugs, namely antiplatelets as a prevention of blood clots (thrombosis) and statins, which function to lower blood cholesterol and inhibit inflammation in blood vessels. Sometimes Beta-blockers are also taken to reduce the workload of the heart, especially in people suffering from high blood pressure or complications from CHD, namely heart failure. People with Coronary Heart Disease usually take several different medications over a long period (Rossello et al., 2015).

Nowadays, lipid profiles have been categorized into routine examinations that aim to assess the risk of cardiovascular events. In the lipid profile examination, the parameters that can be observed are in the form of total cholesterol levels, HDL cholesterol, LDL cholesterol, and triglycerides (Nigam, 2011). Lipid profile is a determinant of the prognosis and all causes of death from Coronary Heart Disease. In previous studies, it was stated that increased levels of high-density lipoprotein cholesterol (HDL-C) can reduce the risk of death from coronary heart disease (Zhao et al., 2021).

Previous research has also shown that preventable vascular risk factors, such as hypertension, obesity, dyslipidemia, and active tobacco use, cause the high rate of CHD and stroke in Indonesian society (Arsyad et al., 2022; Hartopo et al., 2023; Hussain et al., 2016; Maharani et al., 2019). It can be underlined that dyslipidemia is one of the impacts if a person's lipid profile is not controlled regularly. This shows that if a person regularly maintains his body fat intake, he will reduce the risk of developing coronary heart disease, but due to the lack of an overview of the lipid profile, this is difficult to do. Therefore, it is important to evaluate the influence of lipid profiles on cardiovascular diseases (Dong et al., 2021).

Coupled with the fact that the risk of recurrence in CHD patients in Indonesia is very high, out of 395 CHD patients at the Makassar Heart Center Hospital, 65% of participants are considered to be at very high risk (Arsyad et al., 2022). In addition, at the Harapan Kita Heart Center Hospital in Jakarta, 50% of the 82 patients who were controlled had dyslipidemia, and patients with dyslipidemia had a 4.8 times higher chance of developing coronary heart disease compared to patients who did not have dyslipidemia (Ariyanti & Besral, 2019). After the author conducted a

deeper search, there has indeed been research on lipid levels and cardiovascular disease in heart disease patients at Gatot Soebroto Hospital, but there has been no specific research on lipid profiles in coronary heart disease at Gatot Soebroto Hospital. Then, the complete infrastructure and the sufficiency of the target patients whose data will be taken are also reasons why the author wants to conduct research at the cardiac poly of Gatot Soebroto Hospital.

In Islam, health is a gift that must be cared for as well as possible. The same is true in keeping lipid profile levels in balance. Islam always emphasizes that, as Muslims, behaving excessively is highly discouraged in accordance with the Quran. Al-A'rāf [7]:31 means "... Indeed, Allah does not like those who exceed...". Therefore, the management of lipid profile balance in coronary heart disease does not only focus on medical aspects, but also on efforts to achieve a balance of life in accordance with Islamic values.

Based on these problems, the author discusses the analysis of lipid profiles in coronary heart disease patients at the Gatot Soebroto Hospital heart poly and its review according to Islamic views.

This study aims to find out the picture of lipid profiles in patients with coronary heart disease at the cardiac polyclinic of Gatot Soebroto Hospital. Identifying lipid profiles in coronary heart disease patients at the cardiac polyclinic of Gatot Soebroto Hospital. Knowing the concept of lipid profile balance in coronary heart disease patients from an Islamic view

The benefit is that it provides knowledge about lipid profile analysis in coronary heart disease. Information related to the results of lipid profile analysis on coronary heart disease at the cardiac polyclinic of Gatot Soebroto Hospital. Knowledge about lipid profiles in coronary heart disease.

#### **RESEARCH METHOD**

The type of research employed in this study is a quantitative descriptive design using an observational analytical method. Specifically, the study applies a cross-sectional approach with retrospective data collection, allowing researchers to analyze past events and identify patterns or associations among variables simultaneously. This design is suitable for evaluating the lipid profile characteristics of Coronary Heart Disease (CHD) patients and understanding the distribution of relevant clinical parameters within a defined period.

The population in this study includes all patients diagnosed with CHD, such as Coronary Artery Disease, Stable Angina, and Silent Myocardial Ischemia, who visited the cardiac polyclinic at Gatot Soebroto Hospital from January to June 2023. The sample encompasses the entire population, provided they meet the inclusion criteria, which require complete medical record data, including the patient's name, age, and full lipid profile results (total cholesterol, triglycerides, LDL, and HDL). Records missing any part of the lipid profile are excluded based on the \*\*exclusion criteria. The data type used is secondary data, sourced directly from patients' medical records, enabling the study to conclude without requiring direct patient interaction.

## RESULT AND DISCUSSION

## **Overview of Respondent Characteristics**

The respondents of this study are patients who have been diagnosed with coronary heart disease who carry out routine treatment at the cardiac poly of Gatot Soebroto Hospital from January to June 2023. The sample used in this study has been adjusted to the inclusion and exclusion criteria listed in the sampling method in CHAPTER III. The total sample of this study is 84 people. The characteristics evaluated in this study were gender and age range, description of fasting blood sugar profile (GDP), and type of CAD experienced by patients.

Table 1. Characteristics of gender, age, GDP, and CAD type.

Variable	Number (n)	Percentage (%)	
Gender			
Man	56	66,7%	
Woman	28	33,3%	
Age			
< 60 years	43	51,2%	
≥ 60 years	41	48,8%	
GDP			
Non Diabetes	38	45.2%	
Prediabetes	24	28.6%	
Diabetes	22	26.2%	
CAD Type			
1 Vessel Disease	32	38,6%	
2 Vessel Disease	19	22,9%	
3 Vessel Disease	32	38,6%	

GDP: Gula Darah Puasa, CAD: Coronary Artery Disease CAD Type: Number of Blood Vessels Undergoing Stenosis

In Table 1, it appears that most of the respondents in this study are male, namely 56 people or around 66.7%, and the rest are female. The age characteristics of the respondents were divided into 2, namely respondents who were classified as elderly ( $\geq$ 60 years old) and those under 60 years old. It seems that both groups have almost the same number of respondents. Most respondents had normal blood sugar ( $\geq$ 40%), while the rest were in the prediabetes and diabetes categories. These results require further confirmation regarding the history of diabetes medication consumed.

Based on Table 3, the distribution of CAD types among respondents shows a fairly balanced pattern. Three categories of CAD types are studied, namely 1 vessel disease, 2 vessel disease, and 3 vessel disease. The results showed that the highest and lowest percentages were owned by two categories, namely 1 vessel disease and 3 vessel disease, with a percentage of 38.6% for each category. Category 2 vessel disease has the lowest percentage of 22.9%. These findings indicate that a significant proportion of respondent's experience CAD with type 1 and 3 vessel disease.

## **Lipid Profile Overview**

Table 2 shows that the triglyceride profile, total cholesterol, and HDL levels show higher normal values compared to the abnormal condition.

Table 2. Overview of Respondents' Lipid Profiles

Variable	Number (n)	Percentage (%)	
Triglycerides			
Normal	54	64,3%	
Abnormal	30	35,7%	
<b>Total Cholesterol</b>			
Normal	54	64,3%	
Abnormal	30	35,7%	
HDL			
Normal	45	53,6%	
Abnormal	39	46,4%	
LDL			
Normal	31	36,9%	
Abnormal	53	63,1%	

HDL: High Density Lipoprotein, LDL: Low Density Lipoprotein.

Only LDL levels showed that respondents with high LDL levels were more than normal. These lipid profile analysis results refer to the latest laboratory values obtained by the research respondents. Before the examination, the patient fasted (drinking only water) for at least 8 hours to ensure that no fat consumption factors affected the patient's lipid results. The results of the lipid analysis were then divided into normal and abnormal categories, referring to the sequential abnormal cut off of Triglycerides >150mg/dL, Total Cholesterol >200mg/dL, LDL >120mg/dL, and HDL <70mg/dL.

## **Difference Test on Respondent Characteristics**

In this subchapter, an overview of the patient's lipid profile will be described based on the characteristics of the gender and age of the respondents. These results are expected to provide an overview of the differences between sex characteristics and the influence of age on the lipid profile values of respondents. The lipid profile results in this subchapter will be described in quantitative descriptive values.

Table 3 Lipid Profile Test by Sex

	Ge			
<b>Lipid Profile</b>	Man	Mean Girls (± Ele-	P value	
	Mean (± SD)	mentary School)		
Triglycerides	$147,46 \ (\pm 71,63)$	148,04 $(\pm 79,20)$	0,974	
Total Cholesterol	180,82 (±37,41)	200,57 (±61,65)	0,128	
HDL	40,05 (±8,75)	48,36 (±13,72)	0,006*	
LDL	110,32 (±30,80)	121,89 (±54,94)	0,307	

<sup>\*</sup>P value is assessed by T-Test, P value < 0.05 shows a significant difference Mean in mg/dL

Table 3 shows no significant difference in triglyceride levels between the two sexes. In cholesterol levels, female respondents had a higher average, although the differential test did not show significant results. There was a significant difference in HDL levels; the results showed that female respondents had higher HDL levels. LDL levels in female respondents also showed slightly higher values, although the different tests did not show a significant difference.

**Table 4 Lipid Profile Test by Age** 

	Ag	Age		
Lipid Profile	<60 years Mean (± SD)	≥60 years Mean (±	P value	
	SD)			
Triglycerides	150,49 (±67,76)	144,68 (±80,31)	0,452	
Total Cholesterol	179,28 (±42,83)	195,93 $(\pm 50,99)$	0,168	
HDL	$40,84  (\pm 9,74)$	44,90 (±12,50)	0,165	
LDL	108,00 (±37,27)	120,66 (±43,14)	0,179	

<sup>\*</sup>The Mann-Whitney test assesses the P value, and a P value  $\leq 0.05$  shows a significant difference Mean in mg/dL

In the total cholesterol profile, HDL and LDL appeared to have higher average values in respondents who were in the age range of >60 years. Only triglyceride values tend to be lower in the elderly group. However, the results of the differential test showed no significant difference between the two groups.

Table 5 Lipid Profile Test Based on CAD Type

	CAD Type			
Lipid Profile	1 Vessel Disease Mean (± SD)	2 Vessel Disease Mean (± SD)	3 Vessel Disease Mean (± SD)	P value
Triglycerides	135,29 (±58,98)	165,47 (±92,21)	152,53 (±78,50)	0,674
Total Cholesterol	179,80 (±42,17)	192,80 (±44,56)	192,85 (±53,69)	0,696
HDL	42,23 (±12,29)	46,47 (±8,11)	41,82 (±11,39)	0,212
LDL	109,69 (±34,71)	113,93 (±32,59)	118,91 (±48,88)	0,951

<sup>\*</sup>The Kruskal-Wallis test assesses P value; P value < 0.05 shows a significant differ-

Mean in mg/dL

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Patients with type CAD 3 vessel disease have higher cholesterol and LDL levels and lower HDL levels. Meanwhile, respondents with 2 vessel diseases had the highest triglyceride levels. However, all differences did not appear significant based on the hypothesis test (P value >0.05).

**Table 6 Lipid Profile Test Based on Fasting Blood Sugar** 

	<b>Profile Diabetes</b>					
Lipid Profile	Non Diabetes Prediabetes Mean		Diabetes Mean (±		P value	
	Mean (± SD)	(± SD)		SD)		
Triglycerides	128,53 (±52,82)	168,04	$(\pm 69,44)$	158,45	$(\pm 100,2)$	0,105
Total Cholesterol	192,13 (±56,18)	185,00	$(\pm 41,56)$	181,86	$(\pm 36,97)$	0,692
HDL	45,76 (±13,22)	39,13	$(\pm 8,82)$	41,77	$(\pm 8,85)$	0,193
LDL	120,68 (±48,37)	108,71	$(\pm 36,96)$	108,91	$(\pm 26,92)$	0,348

<sup>\*</sup>The Kruskal-Wallis test assesses P value; P value < 0.05 shows a significant differ-

Mean in mg/dL

There is no typical picture of the patient's lipid profile pattern based on diabetic comorbid conditions. In the triglyceride profile, the highest average is in patients with prediabetes, while cholesterol levels are the highest in non-diabetic patients. In HDL levels, non-diabetic patients have the highest scores, and LDL

profiles are the lowest. The results of the statistical test showed that there was no significant difference between the groups.

#### **Discussion**

The research respondents were patients who carried out routine control at the cardiac polyclinic of Gatot Soebroto Hospital and had received therapy and control for several comorbidities, such as dyslipidemia. The patient has been diagnosed with coronary heart disease before through cardiac catheterization. This study provides an overview of the patient's lipid profile and its association with characteristics such as age and sex, and comorbidities of diabetes and CAD type (based on the number of blood vessels involved). The discussion will try to relate the results of this study to previous research and examine theoretical studies related to these results.

In the results of this study, more than 50% of respondents were male. The lipid profile test results by sex showed that only HDL levels appeared to differ significantly between male and female respondents. Previous research by Gupta et al. (2016) showed similar results, where women had a higher average HDL level, which was 64.4 mg/dL, compared to men who only had 54.9 mg/dL, with a p-value < 0.05. These results align with studies conducted, which also found significant differences in HDL levels between women and men. This difference can be explained by biological and hormonal factors, where estrogen in women plays a role in increasing HDL levels, and lifestyles that tend to differ between the two sexes. This shows the importance of considering gender differences in studies regarding lipid profiles and heart health (Gupta et al., 2016). Levels of other lipid profiles, such as triglycerides, total cholesterol, and LDL, did not appear to have significant differences between men and women. The results of this study align with Ambrož et al.'s research in 2021, which stated that sex, although affecting several variables, was not a dominant factor related to differences in lipid levels. Other factors affecting lipid levels, such as statin consumption, age, and hormonal status, become more relevant. Our study did not examine statin use in detail, but it did show that LDL, triglycerides, and total cholesterol levels were slightly higher in women than in men. This is in line with findings from other studies showing differences in LDL levels in women and men, especially after the age of 50 to 55 years, which coincides with menopause (Ryczkowska et al., 2023). Previous studies involving type 2 diabetes (T2D) patients also reported differences in LDL levels between men and women after age 45, although they did not differentiate based on statin use. Even in female patients with type 2 diabetes who take statins, LDL levels remain higher than in men after menopause, which could be due to less intensive treatment in women. Explanations from related studies suggest that the difference in LDL levels between men and women is most likely a postmenopausal phenomenon.

Our research shows that fat levels have different average values between the age range of the elderly and before the age of the elderly. However, the difference does not appear significant. This result differs from previous research by Al-Maqati et al. (2022) in Saudi Arabia, which found significant differences in fat levels in each age range. This difference may be because in our study, all patients were undergoing lipid-lowering therapy, which can affect overall fat level outcomes. Thus, differences in methods and patient conditions may explain the variation in results between the two studies (Al-Maqati et al., 2022). As we age, changes in lipid

metabolism pathways contribute to increased body fat levels in elderly individuals. One of the mechanisms is an increase in the synthesis of lipids, specifically triglycerides, which occurs in the liver and adipose tissue. The activity of the lipogenic enzyme increases, which promotes fat storage more than its utilization. In addition, the ability to oxidize fatty acids for energy decreases with aging, which is caused by decreased mitochondrial function and changes in the expression of oxidative phosphorylation-related genes. In advanced age, adipocyte function is also impaired, with decreased sensitivity to hormones such as insulin and catecholamines that regulate lipolysis. As a result, fat mobilization from adipose tissue decreases, while body fat accumulation increases. Statins, a drug commonly used to lower cholesterol levels, can partially improve this condition by inhibiting cholesterol synthesis in the liver. This reduces the accumulation of LDL (low-density lipoprotein) lipoproteins in the blood. In addition, statins can also increase the body's capacity to oxidize fatty acids, although the effects focus more on regulating cholesterol levels and reducing vascular inflammation.

In this study, the lipid profile between each type of CAD (referring to the number of blood vessels involved) did not have a distinctive pattern. There was no apparent presence of one type of CAD with a prominent abnormal lipid profile. The statistical test results showed a P value of >0.05, meaning that the lipid profile was not significantly correlated with the CAD type in the respondents of this study. A study conducted by Du et al. in 2016 in China showed that lipid profiles were significantly correlated with an increased risk of CAD. However, not all lipid profiles are predictors of CAD severity. This result aligns with a 2016 study that assessed the predictive ability of lipid profile severity and some lipoproteins. The results of the study showed that lipid profiles such as HDL, LDL, triglycerides, and total cholesterol did not significantly correlate with CAD severity. According to a study by Yu et al. (2019), the correlation between lipid profiles such as LDL and HDL to the involvement of more than 1 coronary artery (multivessel disease) also shows a similar thing, it was found that LDL and HDL do not significantly correlate with the occurrence of multivessel disease. In addition, variables such as lipoprotein A are significantly correlated with multivessel disease with an Odds Ratio (OR) of 1.41 (Yu et al., 2019).

The Nature et al. 2021 study in Bangladesh showed higher numbers on some lipid profile indicators when compared to the results of this study, where almost all indicators, except LDL, mainly showed normal values. This result is in line with a previous study in Ternate by Mala et al. (2019) where in the study > 50% of respondents also got normal values in patients with a history of coronary heart disease. However, the assessment needs to get results through causal studies if you want to assess further the correlation between lipid levels and the incidence of CHD. Keep in mind that the similarity between this study and the previous study is that both studies have samples that have been diagnosed with CHD and are in the period of consuming lipid-lowering therapy (Mala et al., 2019). At least in 2021, data from Perkumpulan Endokrinologi Indonesia. (2021) similar results were found in the general population throughout Indonesia, where >60% of the people sampled in the survey showed normal fat levels. These results provide a population picture in this study that is almost similar to the description of dyslipidemia in a vast population, both CHD and non-CHD (Perkumpulan Endokrinologi Indonesia., 2021).

High lipid levels in patients with coronary heart disease (CHD) have been shown to increase the risk of death and pain significantly. The study showed that patients with uncontrolled lipid levels had a hazard ratio of 1.74 with a 95% confidence interval between 1.48 and 2.04. This showed that patients with abnormal lipid levels were nearly 1.74 times more likely to experience death or serious cardiovascular events than those with normal lipid levels. These findings emphasize the importance of lipid level management as the primary strategy in preventing further complications and improving the prognosis in CHD patients (Kalim & Kaligis, 2001).

The main limitation in this study was the absence of control over the use of statins in patients, which could affect outcomes because these variables were not standardized between groups. Therefore, the possibility of confounding variables affecting the patient's lipid profile must be considered. In addition, other important variables, such as weight and duration of drug consumption, were also not analyzed in this study, which could contribute to a more holistic understanding of the influence of these factors on lipid levels and the incidence of coronary heart disease (CAD). This study also provides a new understanding of the success of CAD therapy, especially in reducing risk by improving lipid profiles, where some patients still have not reached the optimal stage. Therefore, future studies are expected to involve these additional factors and use regression analysis to determine a more comprehensive predictor model. A more in-depth analysis of the lipoprotein profile is also needed, given the importance of lipoproteins in CAD development, to provide a clearer picture of the factors influencing the incidence of CAD in this population.

#### **CONCLUSION**

Based on the previous results, several conclusions can be drawn: Triglyceride and total cholesterol levels are normal for CHD patients at Gatot Soebroto Hospital. HDL levels varied, with most respondents having low HDL levels in CHD patients at Gatot Soebroto Hospital. Most LDL levels are abnormal in CHD patients at Gatot Soebroto Hospital. Sex correlated with HDL levels, with male respondents having lower HDL levels. Other lipid profiles are not related to sex. Age was not correlated with the lipid profile of CHD patients at Gatot Soebroto Hospital. An Islamic review of the concept of lipid profile balance in coronary heart disease patients shows that Islam strongly encourages its people not to overdo it in consuming food. This aims to prevent lipid metabolism disorders and protect oneself from the risk factor for Coronary Heart Disease, namely dyslipidemia, which abnormal lipid profile laboratory results can show. As Allah says in QS. Al-A'rāf [7]:31 "O son of Adam, wear your beautiful clothes in every mosque, eat and drink, and do not overdo it. Indeed, Allah does not like those who are excessive."

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