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ANALYSIS OF CHOLESTEROL LEVELS AND DEGREE OF STENOSIS IN PATIENTS WITH CORONARY ARTERY DISEASE AT BW HEART HOSPITAL JAKARTA

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ABSTRACT

Introduction
Coronary Artery Disease (CAD) is the leading cause of death worldwide, with an estimated 17.9 million deaths in 2019 due to cardiovascular diseases (CVDs). One of the major types of CVDs is CAD. Dyslipidemia is one of the risk factors contributing to CAD. This study aims to analyze the relationship between cholesterol levels and the degree of stenosis in CAD patients at BW Heart Hospital.

Method
The research method used was descriptive correlational with a cross-sectional design. The target population consisted of 250 individuals, and a purposive sampling technique was used to recruit 84 respondents. Univariate and bivariate analyses were conducted, with the Chi-Square test applied at $\alpha = 5\%$.

Result
Results showed that 41 respondents (64.1%) had abnormal LDL cholesterol levels and severe stenosis. The Chi-Square analysis indicated a significant relationship between LDL levels and degree of stenosis with a P-value of 0.004 ($p < 0.05$), leading to the rejection of H0.

Conclusion
The study concludes that LDL cholesterol levels are significantly associated with the degree of stenosis in CAD patients. Education to control CAD risk factors—especially LDL levels—is recommended to prevent worsening stenosis.

INTRODUCTION

Each year, the American Heart Association (AHA) reports that cardiovascular diseases continue to impose major health and economic burdens worldwide (Tsao et al., 2023). Cardiovascular diseases (CVDs) refer to a group of disorders affecting the heart and blood vessels, including coronary artery disease, heart failure, stroke, cardiomyopathy, and deep vein thrombosis. Among these, coronary artery disease remains the leading cause of death, followed by stroke (Waldstein et al., 2022).

According to the World Health Organization (WHO, 2021), CVDs are the leading cause of death globally, accounting for approximately 17.9 million deaths (32% of all global deaths) in 2019, of which 85% resulted from heart attacks and strokes. Around 58% of CVD cases originate from Asia, with Southeast Asia contributing at least 3.9 million deaths annually. Indonesia ranks second in Southeast Asia for the highest CVD burden after Myanmar.

Coronary artery disease (CAD), also known as coronary heart disease, affects the coronary arteries responsible for supplying blood, oxygen, and nutrients to the myocardium. Partial or total obstruction of coronary arteries may result in ischemia and myocardial infarction, where prolonged ischemia leads to irreversible tissue damage (Ignatavicius et al., 2018).

CAD risk factors include modifiable and non-modifiable components. Non-modifiable factors include age, sex, and family history, while modifiable factors include dyslipidemia, hypertension, smoking, diabetes, obesity, and lifestyle (McCance & Huether, 2019). Atherosclerosis—plaque buildup within arterial walls—is one of the major contributors to CAD.

Nurses play an essential role in managing CAD, providing patient care, and delivering comprehensive information. A preliminary study conducted on August 8, 2024 at Binawaluya Heart Hospital showed that 7 out of 10 CAD patients who underwent MSCT Coronary had LDL levels >130 mg/dL, and 4 of them showed moderate-to-severe stenosis.

METHOD

This research method uses descriptive correlational analysis, analyzing the relationship between two variables to determine whether there is a relationship between the independent variable, cholesterol levels, and the dependent variable, the degree of stenosis, in CAD patients. Furthermore, this study employed a cross-sectional approach, where researchers observed the issues raised simultaneously, taking into account frequency and time.

The inclusion and exclusion criteria for this study were as follows: Inclusion criteria: patients diagnosed with CAD, CAD patients who underwent coronary MSCT, CAD patients who underwent cholesterol testing. Exclusion criteria: CAD patients who underwent coronary MSCT but only had HbA1c testing. The sample size for this study was 84 CAD patients who underwent coronary MSCT and underwent cholesterol testing, as registered in their medical records

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RESULTS

1. Univariate Analysis

a. LDL Cholesterol Levels

The following shows the frequency distribution of respondents' LDL levels:

Frequency distribution of respondents' LDL cholesterol levels

LDL Cholesterol Level	Frequency	Percentage
Normal	20	23.8%

LDL Cholesterol Level	Frequency	Percentage
Abnormal	64	76.2%
Total	84	100%

The LDL cholesterol levels in CAD patients at Binawaluya Heart Hospital show that the majority of CAD patients have abnormal LDL cholesterol levels with a total of 64 respondents (76.2%), while CAD patients with normal LDL levels are 20 respondents (23.8%).

b. Degree of Stenosis

The following shows the frequency distribution of respondents' degrees of stenosis:

Frequency distribution of respondents' degrees of stenosis

Degree of Stenosis	Frequency	Percentage
Mild	7	8.3%
Moderate	29	34.5%
Severe	48	57.1%
Total	84	100%

The degree of stenosis in CAD patients at Binawaluya Heart Hospital showed that most CAD patients had a severe degree of stenosis with a total of 48 respondents (57.1%).

2. Bivariate Analysis

Analysis of the relationship between LDL cholesterol levels and the degree of stenosis in CAD patients at Binawaluya Heart Hospital

Crosstabulation of LDL levels and the degree of stenosis in CAD patients at Binawaluya Heart Hospital

LDL Level	Mild	Moderate	Severe	Total	P-value
Normal	5 (25%)	8 (40%)	7 (35%)	20	0.004
Abnormal	2 (3.1%)	21 (32.8%)	41 (64.1%)	64	
Total	7	29	48	84	

It is known that of the 84 respondents, 41 respondents (64.1%) were categorized as having abnormal LDL cholesterol levels with severe stenosis

DISCUSSION

Overview of LDL Cholesterol Levels in CAD Patients at Binawaluya Heart Hospital

A study of 84 respondents on LDL cholesterol levels in CAD patients at Binawaluya Heart Hospital showed that the majority of CAD patients had abnormal LDL cholesterol levels (64 respondents (76.2%), while 20 respondents (23.8%) had normal LDL cholesterol levels.

A study by Hafiza et al. (2024) showed that of 70 individuals diagnosed with CAD, the most common category for total cholesterol levels was high (41%). Meanwhile, of the 30 individuals not diagnosed with CAD, the most common category for total cholesterol levels was normal (20%). These findings also align with a 2019 study by Fika Minata on the relationship between hypertension and cholesterol levels with coronary heart disease (CHD) at Basemah Pagar Alam Regional Hospital. The study found that 11 respondents (40.7%) had cholesterol levels below 200 mg/dL, compared to 16 respondents (59.3%) who had cholesterol levels above 200 mg/dL.

Low-density lipoprotein cholesterol (LDL) is the strongest risk factor for CAD. LDL cholesterol levels are not always high in CAD patients. However, LDL cholesterol can be elevated if associated with other CAD risk factors such as diabetes and metabolic syndrome. Lipid abnormalities can cause inflammation, endothelial dysfunction, adipoxytokine abnormalities, and the development of coronary atherosclerosis (Martin Bødtker et al., 2023).

Therefore, this study found that 64 (76.2%) of the 84 respondents with CAD had abnormal LDL cholesterol levels. High LDL cholesterol levels increase the risk of CAD.

Overview of Stenosis Degrees in CAD Patients at Binawaluya Heart Hospital

A study of stenosis degrees in CAD patients at Binawaluya Heart Hospital, involving 84 respondents, showed that the majority of CAD patients had severe stenosis (48 respondents (57.1%), moderate stenosis (29 respondents (34.5%), and mild stenosis (7 respondents (8.3%).

The coronary arteries are the main blood vessels that supply blood and oxygen to the heart muscle. When the arteries become narrowed, this condition is called coronary artery disease or coronary artery stenosis. Stenosis in the arteries results from plaque buildup (atherosclerosis) that accumulates over many years. Symptoms include chest pain and shortness of breath. However, complete narrowing of the arteries can lead to a heart attack (Gopalan & Kirk, 2022).

This study found that 48 respondents (57.1%) had severe stenosis. This can be caused by several risk factors such as diabetes, dyslipidemia, smoking, hypertension, and lack of activity. Therefore, shortness of breath and chest pain are common patient complaints.

Analysis of the relationship between LDL cholesterol levels and the degree of stenosis in CAD patients at BW Heart Hospital

Based on the results of the study, LDL cholesterol levels and the degree of stenosis in CAD patients at BW Heart Hospital showed that of the 84 respondents, 5 respondents (25%) were categorized as having normal LDL cholesterol levels with mild stenosis, 8 respondents (40%) were categorized as having normal LDL cholesterol levels with moderate stenosis, 7 respondents (35%) were categorized as having normal LDL cholesterol levels with severe stenosis, 2 respondents (3.1%) were categorized as having abnormal LDL cholesterol levels with mild stenosis, 21 respondents (32.8%) were categorized as having abnormal LDL cholesterol levels with moderate stenosis, and 41 respondents (64.1%) were categorized as having abnormal LDL cholesterol levels with severe stenosis.

Based on research conducted by Adelin et al. (2022), the average LDL value of 52 respondents was 103.52 mg/dl, with the lowest level being 23 mg/dl and the highest being 252 mg/dl. This study found a strong correlation between Low Density Lipoprotein levels and the Gensini score. The Gensini score is an angiographic scoring system used to measure

the severity of coronary heart disease. This research also aligns with research conducted by Anggi Yulianti (2020) that found a relationship between LDL cholesterol and the degree of arterial stenosis in CHD patients. This is because LDL has atherogenic properties that cause coronary artery stenosis.

LDL is produced in the liver and released into the blood. Its production may increase due to a diet high in saturated fat and sugar. As LDL circulates in the blood, it freely enters the intima. Once inside the tissue, LDL can become oxidized. Oxidized LDL can cause plaque in the blood vessels which causes stenosis in the blood vessels (Gopalan & Kirk, 2022)

Thus, based on the results of this study, it was found that out of 84 respondents, 41 (64.1%) had abnormal LDL with severe stenosis. This is because high LDL in the blood can accumulate in blood vessels. This accumulation of LDL can cause plaque, which leads to stenosis in the blood vessels.

However, this study found that 7 respondents had normal LDL but had severe stenosis. This is a rare case, as mentioned in the study by Mottola et al. (2023). This study stated that even if LDL is normal, uncontrolled risk factors can lead to coronary artery stenosis. These risk factors include diabetes, smoking, hypertension, or genetics. Of these 7 respondents, 2 had diabetes, 4 had hypertension, and 5 had a history of smoking. A factor that could not be assessed in this study was family history.

CONCLUSIONS

Based on the results of the data analysis in this study, several conclusions can be drawn, as follows: This study, describing LDL cholesterol levels in CAD patients at BW Heart Hospital, shows that the majority of CAD patients have abnormal LDL cholesterol levels (64 respondents (76.2%), while 20 CAD patients (23.8%) have normal LDL cholesterol levels. The description of the degree of stenosis in CAD patients at Binawaluya Heart Hospital shows that the majority of CAD patients have severe stenosis (48 respondents (57.1%), moderate stenosis (29 respondents (34.5%), mild stenosis (7 respondents (8.3%), minimal stenosis (0 respondents), and obstructed stenosis (0 respondents). The results of the bivariate analysis indicate a relationship between LDL cholesterol levels and the degree of stenosis in CAD patients, with a P-value of 0.004, indicating a fairly strong correlation.

BIBLIOGRAPHY

Adelin, P., Putra, A. E., Pa, T. P., Triyana, R., & Puspita, D. (2022). Hubungan Kadar Low Density Lipoprotein dengan Derajat Stenosis Arteri Pasien Penyakit Jantung Koroner RSUP M Djamil Padang Tahun 2021 – 2022. 759, 167–172.

American Heart Association. (2022). Cholesterol What is cholesterol ?

Gopalan, C., & Kirk, E. (2022). Biology Of Cardiovascular and Metabolic Disease. Academic Press.

Hafiza, R., Candra, A., & Lidiawati, M. (2024). HUBUNGAN HIPERTENSI, KADAR KOLESTEROL TOTAL, DAN KADAR LDL TERHADAP PENYAKIT JANTUNG KORONER DI POLI JANTUNG RUMAH SAKIT

PERTAMEDIKA UMMI ROSNATI KOTA BANDA ACEH. 11(10), 1963–1971.

Ignatavicius, D. D., Workman, M. L., Rebar, C. R., & Heimgartner, N. M. (2018). Medical-Surgical Nursing CONCEPTS FOR INTERPROFESSIONAL (9th ed.). Elsevier.

Martin Bødtker, M., Dzaye, O., Hans Erik, B., & Jesper Møller, J. (2023). Low-Density Lipoprotein Cholesterol Is Predominantly Associated With Atherosclerotic Cardiovascular Disease Events in Patients With Evidence of Coronary Atherosclerosis : The. Circulation, 1053–1063.https://doi.org/10.1161/CIRCULATIONAHA.122.061010

McCance, K. L., & Huether, S. E. (2019). Pathophysiology: the biologic basis for disease in adults and children (8th ed.). Elsevier.

Mottola, G., Welty, F. K., & Mojibian, H. R. (2023). Case report: Coronary atherosclerosis in a patient with long-standing very low LDL-C without lipid-lowering therapy. Frontiers in Cardiovascular Medicine, 10(September), https://doi.org/10.3389/fcvm.2023.1272944

Tsao, C. W., Aday, A. W., Almarzooq, Z. I., Anderson, C. A. M., Arora, P., Avery, C. L., Baker-Smith, C. M., Beaton, A. Z., Boehme, A. K., Buxton, A. E., Commodore-Mensah, Y., Elkind, M. S. V., Evenson, K. R., Eze-Nliam, C., Fugar, S., Generoso, G., Heard, D. G., Hiremath, S., Ho, J. E., … Martin, S. S. (2023). Heart Disease and Stroke Statistics - 2023 Update: A Report from the American Heart Association. In Circulation (Vol. 147, Issue 8). https://doi.org/10.1161/CIR.0000000000001123

Waldstein, S. R., Kop, W. J., Suarez, E. C., Lovallo, W. R., & Katzel, L. I. (2022). Handbook of Cardiovascular Behavioral Medicine. In Handbook of Cardiovascular Behavioral Medicine. Springer Nature Switzerland. https://doi.org/10.1007/978-0-387-85960-6

WHO. (2021). Cardiovascular diseases (CVDs). World Health Organization. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)