DESCRIPTION OF LOW DENSITY LIPOPROTEIN (LDL) LEVELS AND FASTING COMPLIANCE IN OUTPATIENT CARDIAC PATIENTS AT RSU PRIMA MEDIKA DENPASAR IN THE MONTHS OF FEBRUARY TO MARCH 2025

GAMBARAN KADAR *LOW DENSITY LIPOPROTEIN* (LDL) DAN KEPATUHAN PUASA PADA PASIEN JANTUNG RAWAT JALAN DI RSU PRIMA MEDIKA DENPASAR PADA BULAN FEBRUARI SAMPAI MARET 2025

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Abstract

Cardiovascular disease remains the leading cause of death both globally and nationally, with Low-Density Lipoprotein (LDL) levels serving as a key biochemical indicator in its screening and management. The accuracy of LDL level testing greatly depends on adherence to a 10–12 hour fasting period prior to sample collection. This study aims to assess LDL levels and fasting compliance among outpatient cardiac patients at Prima Medika General Hospital, Denpasar. This descriptive cross-sectional study employed purposive sampling involving 35 outpatient cardiac patients between February and March 2025. Data were collected through interviews and laboratory analysis using the Furuno CA-270 instrument. Results showed that 71% of respondents had LDL levels >100 mg/dL, while the remaining 29% fell within the normal category (<100 mg/dL). Notably, all respondents (100%) adhered to the fasting requirement. These findings indicate that elevated LDL levels remain common among outpatient cardiac patients, particularly in males of productive age. The high rate of fasting compliance reflects the effectiveness of pre-analytical education provided. Therefore, this study recommends routine lipid screening and ongoing education to enhance the accuracy of laboratory diagnosis, optimize cardiac disease management, and prevent cardiovascular complications in accordance with global standards.

Keywords: Low-Density Lipoprotein, Fasting, Cardiac Patients

Abstrak

Penyakit jantung adalah penyebab utama kematian secara global dan nasional, dengan kadar Low Density Lipoprotein (LDL) sebagai indikator biokimia kunci dalam skrining dan penanganannya. Akurasi pemeriksaan kadar LDL sangat bergantung pada kepatuhan puasa 10–12 jam sebelum pengambilan sampel. Penelitian ini bertujuan untuk menilai kadar LDL dan tingkat kepatuhan puasa pada pasien jantung rawat jalan di RSU Prima Medika Denpasar. Studi deskriptif cross-sectional ini menggunakan teknik purposive sampling pada 35 pasien jantung rawat jalan yang dilakukan antara Februari dan Maret 2025. Pengumpulan data melalui wawancara dan analisis laboratorium menggunakan alat Furuno CA-270. Hasil menunjukkan 71% responden memiliki kadar LDL >100 mg/dL, sedangkan 29% sisanya berada dalam kategori normal (<100 mg/dL). Penting untuk dicatat, seluruh responden (100%) patuh terhadap anjuran puasa. Temuan ini mengindikasikan bahwa kadar LDL tinggi masih umum ditemukan pada pasien jantung rawat jalan, terutama pada laki-laki usia produktif. Kepatuhan puasa yang tinggi menunjukkan efektivitas edukasi pra-analitik yang telah diberikan. Oleh karena itu, penelitian ini merekomendasikan skrining lipid rutin dan edukasi berkelanjutan untuk meningkatkan akurasi diagnosis laboratorium, mengoptimalkan manajemen penyakit jantung, dan mencegah komplikasi kardiovaskular sesuai standar global.

Kata Kunci: Low Density Lipoprotein, Puasa, Pasien jantung

1. INTRODUCTION

Cardiovascular disease remains a major public health problem, both at the global and national levels. According to the World Health Organisation (WHO), the disease accounts for approximately 32% of all global deaths each year, with more than three-quarters of deaths occurring in lower-middle-income countries, including Indonesia (Aswara et al., 2022). Indonesian basic health research data shows an increasing trend in the prevalence of heart disease in the last two decades, along with the sedentary lifestyle of modern society, consumption of foods high in saturated fat, stress, and exposure to cigarette smoke (Naomi et al., 2021). One of the key biochemical indicators in the screening and management of heart disease is blood cholesterol levels, especially the Low-Density Lipoprotein (LDL) fraction, which is known as bad cholesterol (Salman & Norhasanah, 2018). LDL is the most abundant type of lipoprotein carrying cholesterol in the body. In excessive amounts, LDL can cause cholesterol accumulation in arterial walls, forming atherosclerotic plaques that narrow the lumen of blood vessels and obstruct blood flow to vital tissues such as the brain and heart (Krismaya, 2021) This condition is known as atherosclerosis and forms the pathophysiological basis of various cardiovascular diseases like angina pectoris, acute myocardial infarction, and ischemic stroke (Anies, 2017).

Djasang (2019) stated that laboratory testing of LDL levels serves as an important diagnostic tool. However, the results of laboratory tests can be significantly influenced by pre-analytical factors, particularly the condition of the patient prior to blood sample collection. One standard procedure before conducting a lipid profile test, including LDL, is the recommendation to fast for 10–12 hours. This aims to eliminate the influence of food intake on the test results, as blood lipid levels are highly sensitive to dietary intake (Muhtaromin, 2021). Patient noncompliance with fasting recommendations can cause fluctuations in LDL levels that do not accurately reflect the actual physiological condition, thereby potentially leading to incorrect diagnoses and inappropriate clinical decisions. Outpatients represent a rather unique group of patients, as they come to healthcare facilities independently and return home on the same day. Outpatient services are heavily relied upon by the public due to their efficiency and the fact that they do not require hospitalization (Winpenny et al., 2016). However, in the

context of laboratory testing, outpatients are at a higher risk of not adhering properly to pre-analytical procedures due to time constraints, limited understanding, and a lack of education from medical personnel (Abdillah, 2021). Several previous studies have shown that elevated LDL levels are often associated with high-fat diets and a lack of physical activity (Fahreza et al., 2020). Meanwhile, research by Isman et al (2024) demonstrated that LDL levels are significantly influenced by fasting status, and result variability can increase markedly if patients do not fast according to the procedure. However, studies that specifically evaluate patient compliance with fasting in the context of LDL testing, particularly among cardiac outpatients, remain very limited.

This study aims to determine the profile of Low-Density Lipoprotein (LDL) levels and fasting compliance among cardiac outpatients at Prima Medika General Hospital Denpasar from February to March 2025. Through this research, it is expected to provide a scientific contribution to the improvement of pre-analytical protocols and to enhance the awareness of both patients and medical personnel regarding the importance of proper preparation before laboratory testing.

2. RESEARCH METHOD

This study is a descriptive cross-sectional study aimed at providing an overview of Low-Density Lipoprotein (LDL) levels and compliance with fasting recommendations among outpatients with heart disease. The study was conducted at the Clinical Pathology Laboratory of Prima Medika General Hospital in Denpasar from February to March 2025. The study sample was selected using purposive sampling from a population of 60 outpatients with heart disease who underwent LDL testing during the study period. A total of 35 patients were included in the sample, with inclusion criteria including outpatients with heart disease who underwent LDL testing at the study site and were willing to sign an informed consent form. Exclusion criteria included patients with a history of other diseases that could affect LDL levels or who were unwilling to participate in the study. Data collection was conducted through structured interviews to assess fasting compliance (fasting for 10–12 hours before the test) and LDL level laboratory tests using the Furuno CA-270 device with the direct assay method. To ensure data validity, the interview instrument was tested through a limited trial on similar patients to ensure the clarity of the questions. The reliability of the instrument was tested using the test-retest method. Additionally, the interview procedure was conducted by healthcare personnel who had been trained to minimise information bias. All collected data were analysed descriptively, presented in frequency distribution tables, and reported as percentages and mean values. LDL levels were categorised into two groups: normal (≤100 mg/dL) and high (>100 mg/dL). This study obtained ethical approval from the Health Research Ethics Committee of STIKES Wira Medika Bali with Number: 417/E1.STIKESWIKA/EC/III/2025. All research procedures were conducted in accordance with ethical principles, including obtaining informed consent from all respondents.

3. RESULTS AND DISCUSSION

In this study, the characteristics of the research subjects by sex and age are presented in the following tables:

Table 1. Sex-Based Characteristics of Respondents

No	Sex	Frequency (n)	Percentage
1	Female	14	40%
2	Male	21	60%
	Total	35	100%

Table 2. Age Group-Based Characteristics of

No	Age Group	Frequency (n)	Percentage
1	Pre-Elderly (46–65 years)	22	63%
2	Elderly (>65 years)	13	37%
	Total	35	100%

Based on Tables 1 and 2, it was observed that out of the 35 total respondents in this study, the majority were male, accounting for 21 individuals (60%), while female respondents comprised 14 individuals (40%). This indicates that male patients predominantly underwent Low-Density Lipoprotein (LDL) level examinations for cardiac disease at RSU Prima Medika Denpasar during the February to March 2025 period. This finding aligns with various previous studies demonstrating that males have a higher risk of developing dyslipidemia and cardiovascular disease compared to females, especially before menopause, due to the protective hormonal effects of estrogen in women (Regitz-Zagrosek et al., 2016) Regarding age distribution, the pre-elderly age group (46–65 years) constituted the largest cohort undergoing LDL examinations, totaling 22 individuals (63%). The elderly group (>65 years) comprised 13 individuals (37%). The youngest participant in this study was 48 years old, and the oldest was 74 years old. This finding suggests that individuals in their productive to older adult years are the most frequent recipients of LDL level examinations, likely due to an increased risk of metabolic issues, unhealthy lifestyles, and the onset of physiological decline within this age range. This distribution underscores the importance of early detection of lipid profile abnormalities in these age groups to prevent more severe cardiovascular complications.

Table 3. Distribution of Low-Density Lipoprotein (LDL) Test Results

No	Low-Density Lipoprotein (LDL)	Frequency (n)	Percentage
1	Normal (<100 mg/dL)	10	29%
2	High (>100 mg/dL)	25	71%
	Total	35	100%

Based on Table 3, the Low-Density Lipoprotein (LDL) level distribution among 35 outpatient cardiac patients at Prima Medika General Hospital Denpasar reveals that the majority of respondents had elevated LDL levels. Specifically, 25 individuals (71%) recorded LDL levels >100 mg/dL, categorized as high, while 10 individuals (29%) had LDL levels

<100 mg/dL, falling within the normal range. The high proportion of patients with LDL levels above the normal range signifies a significant risk for cardiovascular disease progression within this population. LDL is the primary lipoprotein involved in cholesterol transport to peripheral tissues, and clinically, high levels are proven to contribute to the atherosclerosis process. Therefore, these results underscore the critical importance of routine LDL monitoring in cardiac patients, especially outpatients, to support optimal disease prevention and management.

Table 4. Fasting Compliance for Low-Density Lipoprotein (LDL) Testing

No	Fasting Compliance	Frequency (n)	Percentage
1	Compliant (Fasted 10–12 hours)	35	100%
2	Non-compliant (Fasted <10 hours or >12 hours)	0	0%
	Total	35	100%

Based on Table 4, all respondents adhered to the recommended fasting period (10–12 hours), indicating high compliance with pre-analytical procedures and underscoring the importance of patient education in supporting the quality of laboratory examinations. This demonstrates effective implementation of pre-analytical protocols and patient education. The study results show that most outpatient cardiac patients at RSU Prima Medika Denpasar had Low-Density Lipoprotein (LDL) levels above the normal range (>100 mg/dL). This finding reinforces Feerence et al. (2017)'s statement that LDL is a primary risk factor for atherosclerosis and coronary heart disease.

Discussion

LDL possesses atherogenic properties, meaning it can bind to arterial walls and form plaque, ultimately leading to blood flow obstruction (Guyton & Hall, 2017) . This finding is consistent with research by Aswara et al. (2022), which reported significantly higher LDL levels in patients with coronary heart disease compared to non-cardiac groups. Similar studies by Zhang et al (2020) also indicate that elevated LDL levels are frequently observed in productive-aged males, aligning with the characteristics of respondents in this study. The increase in LDL levels is generally closely associated with a diet high in saturated fats, smoking habits, and lack of physical activity, all of which are modifiable risk factors.

Regarding fasting compliance prior to testing, all respondents in this study adhered to the 10–12-hour fasting protocol according to pre-analytical procedures. This aligns with the findings of Djasang (2019) who states that pre-lipid testing fasting is necessary to ensure accurate results, particularly for indirect calculation methods, research by Isman et al (2024) demonstrates that patient education plays a crucial role in improving compliance with pre-laboratory instructions, and such compliance correlates with enhanced diagnostic quality. Although fasted sampling remains standard practice, emerging literature explores non-fasting LDL testing. A meta-analysis by Sindhu & Naugler (2012) revealed that the mean difference in LDL levels between fasting and non-fasting states is approximately 4 mg/dL, which is not clinically significant. This is reinforced by Lin et al. (2021), whose study found that patients with fasting LDL levels <1.4 mmol/L (54 mg/dL) did not exhibit clinically relevant postprandial LDL fluctuations, suggesting non-fasting measurements may be appropriate in specific contexts.

Nevertheless, for cardiac patients, fasting protocols remain recommended to maintain laboratory data consistency and diagnostic accuracy.

Some research findings also indicate the benefits of intermittent fasting approaches for reducing LDL levels. Anton et al (2018) reported that intermittent fasting methods could decrease LDL levels by up to 25% in obese individuals, as well as increase LDL particle size to be less atherogenic. Meanwhile, a systematic review by Welton (2020) stated that intermittent fasting positively impacts lipid profiles and blood pressure. However, these findings are not entirely consistent. A study by oleh Harris (2024) showed that time-restricted feeding (8 hours per day) was associated with a 91% increased risk of cardiovascular mortality, particularly in individuals with a history of heart disease. This suggests that the benefits of fasting, both for examination purposes and as a lifestyle therapy, must be evaluated individually and tailored to the patient's clinical condition. This, this study supports the view that high LDL levels are a crucial indicator of cardiovascular risk in cardiac patients, and that adherence to pre-analytical procedures like fasting is essential to ensure the accuracy of laboratory results. While some studies suggest flexibility in fasting conditions or intermittent fasting approaches as therapy, these require further evaluation and cannot be generalized to all clinical populations. This study has several limitations, including a small sample size and a single location, which limits the generalisability of the results. The use of purposive sampling techniques also has the potential to introduce selection bias. In addition, other factors that may affect LDL levels, such as diet, medication, and physical activity, were not analysed. In future studies, it is recommended to conduct multicenter studies with larger samples and longitudinal designs. It is also hoped that additional variables such as body mass index, dietary patterns, and health education will be examined to provide a more comprehensive picture of LDL control and fasting compliance in outpatients with cardiovascular disease.

4. CONCLUSION

Based on the research findings, it can be concluded that the majority of cardiac outpatients at Prima Medika General Hospital Denpasar have high LDL levels (>100 mg/dL), indicating a significant cardiovascular risk. The respondents were predominantly male in the pre-elderly age group (46–65 years), a population vulnerable to metabolic disorders. All respondents fasted as recommended (10–12 hours), reflecting a high level of compliance with pre-analytical procedures and the effectiveness of patient education. These findings support previous literature, although differences observed in the elderly group highlight the need for a multifactorial approach to risk assessment. As a practical recommendation, updating standard operating procedures (SOPs) and conducting regular staff training are advised to improve service quality and patient compliance.

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