THE RELATIONSHIP BETWEEN FAT INTAKE AND LDL CHOLESTEROL LEVELS IN OUTPATIENTS WITH CORONARY HEART DISEASE AT DR. PIRNGADI GENERAL HOSPITAL, MEDAN

Hubungan Asupan Lemak dengan Kadar Kolesterol LDL pada Pasien Rawat Jalan Penyakit Jantung Koroner di RSUD Dr. Pirngadi Medan

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ABSTRACT

Coronary heart disease (CHD) begins with blockage of blood vessels due to plaque buildup in the heart, which occurs when there is an excess of LDL cholesterol, causing damage to the blood vessels. Based on provincial data, the prevalence of heart disease in North Sumatra is 0.60% or around 48,469 cases. One of the causes of coronary heart disease is high fat intake and high LDL cholesterol levels. This study aims to identify the relationship between fat intake and LDL cholesterol levels in outpatients with coronary heart disease at the cardiology clinic of Dr. Pirngadi General Hospital in Medan. This is a quantitative study with a cross-sectional design and purposive sampling technique. The research sample consisted of all coronary heart disease patients who sought treatment at the cardiology clinic of Dr. Pirngadi General Hospital in Medan, totaling 50 respondents aged 25-85 years. The results showed that 58% of patients had a high fat intake (>25% of total energy requirements) and 68% had LDL cholesterol levels (≥130 mg/dL). The analysis results showed a relationship between fat intake and LDL cholesterol levels (ρ=0.022; r=0.324). There was a positive and significant but weak correlation between fat intake and LDL cholesterol levels in outpatients with coronary heart disease at Dr. Pirngadi General Hospital in Medan.

Keyword : coronary heart disease; fat intake; LDL cholesterol

ABSTRAK

Penyakit jantung koroner (PJK) dimulai dengan penyumbatan pembuluh darah akibat penumpukan plak pada jantung yang terjadi ketika jumlah kolesterol LDL berlebih. Berdasarkan data provinsi tahun 2023 prevalensi penyakit jantung di Sumatera Utara sebesar 0,60% atau sekitar 48.469 kasus. Salah satu penyebab terjadinya penyakit jantung koroner adalah asupan lemak dan kadar kolesterol LDL yang tinggi. Penelitian ini bertujuan untuk mengidentifikasi hubungan antara asupan lemak dengan kadar kolesterol LDL pada pasien rawat jalan penderita penyakit jantung koroner di poli jantung di RSUD Dr. Pirngadi Medan. Jenis penelitian adalah kuantitatif dengan desain *cross sectional*, dengan teknik *Purposive sampling*. Sampel penelitian ini adalah seluruh pasien penyakit jantung koroner yang berobat ke poli jantung RSUD Dr. Pirngadi Kota Medan sebanyak 50 responden dengan rentang usia 25-85 tahun. hasil penelitian menunjukkan pasien yang memiliki asupan lemak lebih (>25% dari kebutuhan energi total) sebesar 58% dan pasien yang memiliki kadar kolesterol LDL (≥130 mg/dL) sebesar 68%. Hasil analisis menunjukkan terdapat hubungan antara asupan lemak dengan kadar kolesterol

LDL (ρ=0,022; r=0,324). Terdapat hubungan yang positif dan signifikan yang berkorelasi lemah antara asupan lemak dengan kadar kolesterol LDL pada pasien rawat jalan penyakit jantung koroner di RSUD Dr. Pirngadi Medan.

Kata Kunci : asupan lemak; kolesterol LDL; penyakit jantung koroner

INTRODUCTION

Cardiovascular diseases fall under the category of non-communicable diseases (NCDs), which are chronic and develop due to genetic, physiological, environmental, and behavioral factors (Indonesian Ministry of Health, 2023). One such form is coronary heart disease (CHD), which occurs due to blood vessel blockage from the buildup of LDL cholesterol plaques, leading to atherosclerosis or hardening of the arteries (Wahidah & Harahap, 2021).

According to the World Health Organization (WHO, 2021), in 2019, there were 17 million premature deaths from NCDs, with 38% caused by cardiovascular diseases. CHD alone accounted for 13% of global deaths. Based on the 2023 Indonesian Health Survey, the prevalence of heart disease in Indonesia reached 0.85% (877,531 cases), and in North Sumatra, it was 0.60% (48,469 cases) (Indonesian Ministry of Health, 2023).

Risk factors for CHD are divided into non-modifiable major factors (age, sex, genetics, family history)

and modifiable minor factors (unhealthy diet, smoking, stress, hypertension, obesity, and alcohol consumption) (Susanti et al., 2024; Wihastuti et al., 2016). Among these, high intake of fat and cholesterol is a primary cause of increased LDL cholesterol levels in the blood. Modern diets high in fat and cholesterol without regard to nutritional content contribute to an increased risk of CHD (Nofia & Anggraini, 2023).

Cholesterol is a natural fatty compound produced by the body and found in animal-based foods. Excess cholesterol forms lipoprotein particles for transport in the blood. The most harmful type of lipoprotein is Low-Density Lipoprotein (LDL) because it is atherogenic and directly linked to the development of atherosclerosis. A 1% increase in total cholesterol levels can raise the risk of CHD by up to 2% (Hasan et al., 2023).

Several studies indicate a strong relationship between fat intake and increased LDL cholesterol levels. For instance, Pratama & Safitri (2019) found a significant correlation between fat intake

and LDL cholesterol levels. Additionally, Froyen (2021) reported a strong correlation between dietary fat intake and elevated LDL levels in patients with coronary heart disease. However, some other studies have not found a significant relationship, highlighting the need for further research to clarify the association between the two.

Dr. Pirngadi Hospital Medan is a referral hospital in Medan City with comprehensive cardiac care facilities. Based on 2024 medical record data, there were 90 outpatient CHD patients aged 20–85 years. Given this context, this study aims to determine the relationship between fat intake and LDL cholesterol levels in outpatient coronary heart disease patients at the Cardiology Clinic of Dr. Pirngadi Hospital Medan.

METHODS

Design, Location, and Time

This study employed a quantitative analytical approach with a cross-sectional design to determine the relationship between fat intake and LDL cholesterol levels in patients with coronary heart disease. The research was conducted at the Cardiology Clinic of Dr. Pirngadi Hospital in Medan City from January to December 2024.

Population and Sampling Method

The population of this study consisted of all coronary heart disease patients receiving treatment at the Cardiology Clinic of Dr. Pirngadi Hospital, Medan City, totaling 90 patients. The sample was determined using purposive sampling, comprising 50 respondents, with an additional 10% included to anticipate dropouts. Research instruments included a respondent characteristics questionnaire, a Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) form, and secondary data on LDL cholesterol levels from hospital medical records.

Type and Method of Data Collection

Primary data were obtained through interviews using the SQ-FFQ questionnaire to measure fat intake, while secondary data were derived from medical records of LDL cholesterol levels over the past three months. The research procedure consisted of a preparation stage (research permit submission and instrument validation), an implementation stage (field data collection), and an analysis stage

(processing of interview and medical record data).

Data Analysis

Data analysis was performed using SPSS version 25 software, employing univariate and bivariate approaches. Univariate analysis was used to describe respondent characteristics, fat intake, and LDL cholesterol levels. Bivariate analysis was conducted using the Pearson correlation test to determine the relationship between fat intake and LDL cholesterol levels, with a significance level of $p < 0.05$.

RESULTS AND DISCUSSION

The study was conducted at the Dr. Pirngadi Regional General Hospital (RSUD) in Medan. There were 90 outpatient coronary heart disease patients at the cardiology clinic during the study period, with visit schedules from Monday to Saturday. The results showed that the majority of respondents were in the late elderly age group (56–100 years) at 70%, with males dominating at 56%. Most respondents had a high school education as their highest level (64%), were unemployed or homemakers (56%), and had an income below the Medan City Minimum Wage (UMK) for 2025 (56%). Furthermore, the majority of patients had a history of other diseases, primarily hypertension (62%).

Based on the research findings, 58% of patients had excessive fat intake, with an average consumption of 67.05 ± 28.14 grams per day. The highest contributing food sources of fat were chicken eggs, soybean tempeh, avocado, butter, and mackerel fish. Meanwhile, 68% of patients had high LDL cholesterol levels (≥ 130 mg/dL), with an average LDL level of 154.44 ± 39.25 mg/dL. Normality tests indicated the data were normally distributed, and linearity tests showed a significant linear relationship between fat intake and LDL cholesterol levels ($p=0.006$).

The Pearson correlation test results showed a p-value of 0.022 ($p<0.05$) and an r-value of 0.324, indicating a positive and significant relationship between fat intake and LDL cholesterol levels. This means that the higher a person's fat intake, the more likely their LDL cholesterol level will also increase. The cross-tabulation of fat intake with respondents' LDL cholesterol levels and the analysis results are presented as follows:

Table 1. Cross-Tabulation of Fat Intake with Respondents' LDL Cholesterol Levels

No.	Fat Intake Category (g/day)	LDL Cholesterol Level Category				Total		P Value	OR
		Normal (<130 mg/dL)		High (≥130 mg/dL)					
		N	%	n	%	n	%		
1.	Low	9	18	5	10	14	28	0,022	0,324
2.	High	4	8	25	50	29	58		
Total		16	32	34	68	50	100		

Table 2. Analysis Results of Fat Intake with LDL Cholesterol Levels

No.	Variabel	Sig. Value	Correlation (r)	α
1.	Fat Intake	0,022	0,324	0,05
2.	LDL Cholesterol Level			

Based on the results, it was found that 50% of patients had both excessive fat intake and high LDL cholesterol levels, while 8% had excessive fat intake but normal LDL levels. LDL levels in the blood are considered safe if below 130 mg/dL (Dianat & Zahraei, 2023). This result aligns with research by Dwi et al. (2021), which showed that saturated fat consumption is associated with increased LDL cholesterol levels in the elderly population. Kwon et al. (2020) also reported a significant relationship between fat intake and LDL cholesterol levels ($\rho = 0.001 < 0.05$), meaning that higher fat intake leads to higher LDL levels. Therefore, patients with coronary heart disease are advised to control their diet, particularly by limiting the consumption of high-fat foods.

The results indicate that most respondents consumed foods fried in palm oil, such as fried chicken, fried fish, tofu, tempeh, and various snacks. Additionally, cooking with coconut milk, as in rendang and gulai dishes, was very common. Environmental factors and the typical Sumatran culture, which favors coconut milk-based dishes, contribute to high fat intake. This aligns with research by Nasution et al. (2023), which showed that excessive fat intake occurs due to traditions of consuming high-fat foods like coconut milk and traditional Sumatran dishes rich in fat, such as rendang, Karo roasted pork (BPK), saksang, and gulai, as revealed in interviews. This is a major contributor to the risk of obesity and coronary heart disease.

The 8% of patients with excessive fat intake but normal LDL levels could occur if they consumed more monounsaturated fats (MUFA). MUFA typically comes from plant sources such as seeds, nuts, and olive oil. Based on research by Cao et al. (2022), MUFA does not increase LDL cholesterol levels and can even help lower them. This is supported by Pedersen et al. (2025), who state that MUFA consumption is preferable to saturated fats (SFA) as it can positively contribute to the lipid profile. This finding can be a recommendation for future research to analyze more deeply the intake of unsaturated fats consumed by patients with both normal and abnormal LDL levels to enrich the study results.

This study also found that 10% of patients had low fat intake but high LDL cholesterol levels. This phenomenon suggests that other factors can influence LDL levels, such as age, gender, occupation, education level, and the type of fat consumed (Suwarni et al., 2023). This is supported by interview results showing that patients frequently consumed fats from animal proteins like pork, chicken, beef, and least frequently, duck meat. Additionally, the researcher only calculated total fat intake, not saturated and unsaturated fat intake separately.

Excessively high fat intake, especially saturated and trans fats, contributes to the narrowing and blockage of coronary arteries. This disorder occurs when fatty substances accumulate beneath the endothelium layer, the innermost lining of the arterial wall. This process, known as atherosclerosis, can disrupt smooth blood flow to the heart. Saturated fat also has adverse health effects as it causes the liver to produce excessive cholesterol. This cholesterol, primarily low-density lipoprotein (LDL) cholesterol, can accumulate on arterial walls, thereby slowing blood flow and reducing oxygen supply to the heart muscle. The consequence of this process increases a person's risk of heart disease and other cardiovascular disorders, collectively known as cardiovascular disease (CVD) (Doloksaribu, 2016). Although the correlation in this study was weak, it indicates that LDL cholesterol levels are not solely influenced by fat intake but also by unhealthy lifestyle factors such as a high-fat diet, lack of physical activity, prolonged psychological stress, smoking habits, nutritional status, and age (Perki, 2022).

CONCLUSION

There is a statistically significant positive relationship between fat intake and LDL cholesterol levels. The majority of respondents were found to have excessive fat intake (>25% of total energy needs) and high LDL cholesterol levels (≥130 mg/dL). Statistical analysis using the Pearson correlation test yielded a p-value of 0.022 (p<0.05) with a correlation coefficient (r) of 0.324, indicating a weak positive correlation.

BIBLIOGRAPHY

Cao, X., Xia, J., Zhou, Y., Wang, Y., Xia, H., Wang, S., Liao, W., & Sun, G. (2022). The Effect of MUFA-Rich Food on Lipid Profile: A Meta-Analysis of Randomized and Controlled-Feeding Trials. *Foods*, *11*(13).

Dianat, I., & Zahraei, S. A. H. (2023). The Relationship between LDL Cholesterol Level and Cardiovascular Disease Risk: A Case-Study-Based Cognitive Study. *Mathews Journal of Case Reports*, *8*(7), 1–2.

Doloksaribu, B. (2016). Ilmu Gizi Teori dan Aplikasi: Lemak. *Jakarta: Buku Kedokteran EGC: EGC*.

Dwi, F., Melati, P., & Widiany, F. L. (2021). Asupan Lemak Jenuh dengan Kadar Lipoprotein pada Kelompok Lanjut Usia Kolesterol. *Jurnal Nutrisia*, *23*(1), 44–51.

Hasan, M. Z., Hashem, S., Ahmed, M., Haque, M. M., Jahan, J., Kabir, M. K., Hosen, M. I., & Shadly, T. A. (2023). Any Target Value of LDL-cholesterol before Elective PCI? A study at NICVD on Association of LDL-Cholesterol levels with Myocardial Injury during Elective PCI. *Bangladesh Heart Journal*, *38*(1), 70–80.

Kemenkes. (2023). Survei Kesehatan Indonesia Dalam Angka. In *Kota Kediri Dalam Angka*.

Kemenkes RI. (2018). Hasil Riset Kesehatan Dasar Tahun 2018. *Kementrian Kesehatan RI*, *53*(9), 1689–1699.

Kwon, Y. J., Lee, H. S., Chang, H. J., Koh, S. B., & Lee, J. W. (2020). Association of dietary lipid intake with low-density lipoprotein cholesterol levels: analysis of two independent population-based studies. *European Journal of Nutrition*, *59*(6), 2557–2567.

Nofia. V R, Anggraini S S, & Y. R. N. (2023). *Gaya Hidup Penyakit Jantung Koroner*. Deepublish Digital.

Nasution, S. Z., Amal, M. R. H., & Matondang, I. M. N. (2023). The Relationship Between Eating Behavior and Diseases Experienced by Malay Families in Medan. *Journal of Bionursing*, *5*(2), 183–190.

Perki. (2022). *Panduan Tatalaksana Dislipidemia 2022*. Perhimpunan Dokter Spesialis Kardiovaskular Indonesia.

Pratama, A. C., & Safitri, D. E. (2019).

Asupan Buah dan Sayur, Asupan Lemak, Aktivitas Fisik Berhubungan dengan Rasio Ldl/Hdl Orang Dewasa. *ARGIPA (Arsip Gizi Dan Pangan)*, *4*(1), 11–18.

Susanti, N., Zahara, A., & Fadillah Darus, N. (2024). Faktor Risiko yang Berhubungan dengan Penyakit Jantung Koroner : Literatur Review. *Jurnal Kesehatan Tambusai*, *5*(2), 4217–4222.

Suwarni, Wiralis, & Anggar Sari, G. P. G. (2023). Association between fat and fiber intake and cholesterol levels in patients with coronary heart disease: A cross- sectional study in Southeast Sulawesi, Indonesia. *Public Health of Indonesia*, *9*(1), 42–46.

Wahidah, W., & Harahap, R. A. (2021). [PJK)] : PJK (Penyakit Jantung Koroner) VS SKA (Sindrome Kororner Akut) Prespektif Epidemiologi. *Afiasi : Jurnal Kesehatan Masyarakat*, *6*(1), 54–65.

WHO. (2021). [Internet]. Avalible at: https://www.who.int/news-room/fact sheets/detail/the-top-10-causes-of-death.