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RELATIONSHIP BETWEEN BODY MASS INDEX AND LIPID PROFILE IN PATIENTS AT IBNU SINA HOSPITAL MAKASSAR.

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Abstrak

Background: Body Mass Index (BMI) is commonly used as an indicator of nutritional status to assess the risk of metabolic and cardiovascular diseases. Abnormal lipid profiles, including elevated total cholesterol, LDL, triglycerides, and reduced HDL levels, are known contributors to cardiovascular disease. However, the association between BMI and lipid profile may vary across populations. **Objective**: This study aimed to determine the relationship between Body Mass Index and lipid profile among patients at Ibnu Sina Hospital, Makassar, in 2024. **Methods:** This study employed an observational analytic design with a cross-sectional approach. Data were obtained from medical records of adult patients who underwent BMI and lipid profile examinations in 2024. A total of 83 patients were included using total sampling. The association between BMI and lipid profile was analyzed using the Chi-square test with a significance level of 0.05. **Results**: Most respondents had a normal BMI. The majority of patients showed normal total cholesterol and triglyceride levels, while low HDL and high LDL levels were still frequently observed. Chi-square analysis showed no significant association between BMI and total cholesterol (p=0.173), HDL (p=0.417), LDL (p=0.769), or triglycerides (p=0.677). **Conclusion:** There was no significant relationship between Body Mass Index and lipid profile among patients at Ibnu Sina Hospital, Makassar. Other factors beyond BMI may influence lipid profile abnormalities.

Keywords: *body mass index; lipid profile; dyslipidemia*

BACKGROUNDS

Body Mass Index (BMI) is a widely used anthropometric indicator to assess nutritional status and classify body weight into underweight, normal, overweight, and obese categories[1]. BMI is commonly applied in both clinical practice and epidemiological studies due to its simplicity and strong association with metabolic and cardiovascular risk factors. Excess body fat, particularly in overweight and obese individuals, has been recognized as a major contributor to the development of non-communicable diseases, including type 2 diabetes mellitus, dyslipidemia, and cardiovascular disease [2].

Dyslipidemia is characterized by abnormalities in lipid metabolism, including elevated total cholesterol, low-density lipoprotein (LDL), and triglycerides, as well as reduced high-density lipoprotein (HDL). These lipid abnormalities play a crucial role in the pathogenesis of atherosclerosis, which underlies coronary heart disease and other cardiovascular events.

Elevated LDL and triglyceride levels contribute to lipid accumulation in arterial walls, while HDL exerts a protective effect by facilitating reverse cholesterol transport. Consequently, lipid profile assessment is an essential component in cardiovascular risk stratification and prevention strategies[3].

Several studies have demonstrated that increased BMI is associated with unfavorable lipid profiles, particularly higher levels of LDL and triglycerides and lower levels of HDL[4]. The underlying mechanisms include insulin resistance, increased hepatic production of very-low-density lipoprotein (VLDL), altered lipoprotein lipase activity,[5] and chronic low-grade inflammation associated with excess adipose tissue. However, the relationship between BMI and lipid profile is not always consistent[6]. Individuals with normal BMI may still exhibit dyslipidemia due to factors such as dietary habits, physical inactivity, genetic predisposition, hormonal imbalance, and metabolic dysfunction. This condition is often described as metabolically unhealthy normal weight[7].

In Indonesia, the prevalence of overweight, obesity, and dyslipidemia continues to increase, contributing significantly to the burden of cardiovascular disease. Hospital-based data provide valuable insights into the metabolic characteristics of patients seeking medical care, particularly in urban settings. Ibnu Sina Hospital in Makassar serves a diverse adult population and represents an important clinical setting to explore the association between BMI and lipid profile in real-world conditions[8].

Despite the extensive use of BMI as a screening tool, evidence regarding its relationship with lipid profile remains heterogeneous, especially across different populations and healthcare settings. Understanding this relationship is essential to determine whether BMI alone is sufficient to identify individuals at risk of dyslipidemia or whether additional metabolic assessments are required[9]. Therefore, this study aimed to analyze the relationship between Body Mass Index and lipid profile, including total cholesterol, LDL, HDL, and triglycerides, among adult patients at Ibnu Sina Hospital Makassar in 2024. The findings of this study are expected to contribute to clinical decision-making and preventive strategies for cardiovascular risk management.

CONTENT

METHODS

Study Design and Setting

This study employed an observational analytic design with a cross-sectional approach. The study was conducted at Ibnu Sina Hospital, Makassar, South Sulawesi, Indonesia. Data collection was carried out using medical records of patients who underwent clinical and laboratory examinations during the year 2024.

Study Population and Sample

The study population consisted of all adult patients who visited Ibnu Sina Hospital and had complete data on anthropometric measurements and lipid profile examinations in 2024. The sampling technique used was total sampling. A total of 83 patients met the inclusion criteria and were included in the analysis.

Inclusion and Exclusion Criteria

The inclusion criteria were adult patients aged ≥18 years who had complete medical record data, including body weight, height, and lipid profile parameters (total cholesterol, LDL, HDL, and triglycerides), and who underwent examinations at Ibnu Sina Hospital between January and December 2024.

Patients were excluded if their medical records were incomplete, if they had chronic conditions that could significantly affect lipid metabolism (such as advanced chronic kidney disease, liver cirrhosis, or thyroid disorders), or

if they were receiving lipid-lowering therapy at the time of examination.

Variables and Measurements

The independent variable in this study was Body Mass Index (BMI), calculated as body weight in kilograms divided by height in meters squared (kg/m²). BMI was categorized into underweight, normal weight, overweight, and obesity according to established cut-off values for adult populations. The dependent variables were lipid profile parameters, including total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides[10]. Lipid profile measurements were obtained from laboratory examination results recorded in the medical records and expressed in mg/dL. Laboratory analyses were performed using an automated clinical chemistry analyzer.

Data Collection

Data were collected retrospectively from patients' medical records using a structured data extraction form. The extracted data included demographic characteristics, anthropometric measurements, and lipid profile results. All collected data were anonymized to ensure patient confidentiality.

Statistical Analysis

Data analysis was performed using statistical software. Descriptive statistics were used to summarize patient characteristics and lipid profile distributions. The association between BMI categories and lipid profile parameters was analyzed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

This study utilized secondary data obtained from medical records and received ethical approval from the Health Research Ethics Committee. Patient identities were not disclosed, and all data were treated confidentially in accordance with ethical principles for medical research.

RESULT

Table 1. Characteristics of Respondents

Characteristics	n	%
Ages		
21-30	1	1,2
31-40	9	10,8
41-50	17	20,5
51-60	21	25,3
61-70	25	30,1
71-80	10	12,0
Body Mass Index (kg/m²)		
Underweight	6	7,2
Normal Weight	38	45,8
Overweight	23	27,7
Obese	16	19,3
CholesterolTotal		
Normal	49	59,0
Borderline High	17	20,5
High	17	20,5
HDL		
Low	49	59,0

High	34	41,0
LDL		
Optimal	24	28,9
Near	23	27,7
Borderline High	14	16,9
High	13	15,7
Very High	9	10,8
Trigliserida		
Normal	70	84,3
Borderline High	7	8,4
High	5	6,0
Very High	1	1,2
Total	**83**	**100**

Soure, secondary data 2025

Table 2. Relationship between Body Mass Index and Total Cholesterol among Patients at Ibnu Sina Hospital, Makassar

BMI	Cholesterol Total								*P-value*
	Normal		Borderline High		High		Total		
	n	%	n	%	n	%	n	%	
Underweight	5	10,2	0	0,0	1	5,9	6	7,2	0,173
Normal	23	46,9	5	29,4	10	58,8	8	45,8	
Overweight	14	28,6	5	29,4	4	23,5	23	27,7	
Obese	7	14,3	7	41,2	2	11,8	16	19,3	
Total	**49**	**100**	**17**	**100**	**17**	**100**	**83**	**100**	

Soure, secondary data 2025

Table 3. Relationship between Body Mass Index and HDL among Patients at Ibnu Sina Hospital, Makassar

BMI	HDL						*P-value*
	Low		High		Total		
	n	%	n	%	n	%	
Underweight	3	6,1	3	8,8	6	7,2	0,417
Normal	23	49	15	41	38	45,8	
Overweight	16	32,7	7	20,6	23	27,7	
Obese	7	14,3	9	26,5	16	19,3	
Total	49	100	34	100	83	100	

Soure, secondary data 2025

Table 4. Relationship between Body Mass Index and LDL among Patients at Ibnu Sina Hospital, Makassar

BMI	LDL									
	Optimal		Near		Bord. High		High		V. High	
	n	%	n	%	n	%	n	%	n	%
Underweight	1	4,2	3	3,0	1	7,1	0	0,0	1	11,1
Normal	2	50,0	9	39,1	6	42,9	5	38,5	6	66,7
Overweight	5	20,8	8	34,8	5	35,7	4	30,8	1	11,1
Obese	6	25,0	3	13,0	2	14,3	4	30,8	1	11,1
Total	24	100	3	100	14	100	13	100	9	100

Soure, secondary data 2025

Tabel 5. Relationship between Body Mass Index and Triglycerides among Patients at Ibnu Sina Hospital, Makassar

BMI	Trigleserida				
	Normal	Borderline High	High	Very High	Total

	n	%	n	%	n	%	n	%	n	%
Underweight	5	7,1	0	0,0	1	20,0	0	0,0	6	7,2
Normal	32	45,7	3	42,9	2	40,0	1	100	38	45,8
Overweight	20	28,6	1	14,3	2	40,0	0	0,0	23	27,7
Obese	13	18,6	3	42,9	0	0,0	0	0,0	16	19,3
Total	70	100	7	100	5	100	1	100	83	100

Soure, secondary data 2025

DISCUSSION

This study demonstrated that there was no statistically significant association between Body Mass Index (BMI) and lipid profile parameters, including total cholesterol, HDL, LDL, and triglycerides, among patients at Ibnu Sina Hospital Makassar in 2024. Although the Chi-square analysis showed non-significant results for all lipid components, the distribution of lipid abnormalities across BMI categories reveals clinically important patterns that deserve careful interpretation[11].

Most participants in this study were elderly, particularly in the 61–70-year age group, and the majority were female. This demographic profile is consistent with previous reports indicating that aging is associated with physiological changes, reduced physical activity, and altered lipid metabolism, all of which contribute to increased cardiovascular risk[12]. Furthermore, sex-related differences in body fat distribution and hormonal regulation are known to influence lipid metabolism and cardiovascular vulnerability[13]

Although the statistical analysis did not demonstrate a significant relationship between BMI and total cholesterol, patients with overweight and obesity tended to show higher proportions of borderline and high cholesterol levels[14]. However, elevated cholesterol was also observed among individuals with normal BMI. This phenomenon reflects the complex interaction between body composition and metabolic regulation, in which dietary intake, genetic predisposition, physical inactivity, smoking behavior,[15] and psychosocial stress strongly influence serum cholesterol concentrations[16]. The presence of metabolically obese normal-weight individuals has been described previously, indicating that unfavorable lipid profiles may occur even in the absence of elevated BMI[17].

Low HDL levels were prevalent across nearly all BMI categories in this study, including those with normal BMI. HDL concentration is highly sensitive to lifestyle factors, particularly physical activity and dietary composition, and is adversely affected by smoking and diets rich in trans-fatty acid[18] Similarly, elevated LDL levels were detected not only among obese participants but also among those with normal and overweight BMI. LDL metabolism is closely related to hepatic lipid synthesis, insulin resistance, and dietary saturated fat intake, processes that may develop independently of overall body weight [17].

Triglyceride levels exhibited a comparable pattern. Although most participants with normal BMI had normal triglyceride levels, higher concentrations were more frequent among overweight and obese individuals[19]. Hypertriglyceridemia is commonly associated with excessive carbohydrate consumption, insulin resistance, and increased hepatic production of very low-density lipoproteins,

mechanisms that often precede substantial weight gain[20].

Taken together, these findings emphasize that the relationship between BMI and lipid metabolism is multifactorial and cannot be fully captured by body weight alone. While BMI remains a valuable screening tool, it should not be used in isolation to assess metabolic and cardiovascular risk. Routine lipid profile evaluation for all adult patients is therefore essential, regardless of BMI category, to enable early detection of dyslipidemia and implementation of appropriate lifestyle interventions, including dietary modification, increased physical activity, weight management, and smoking cessation[21].

CONCLUSION

This study concludes that there was no statistically significant association between Body Mass Index and lipid profile parameters, including total cholesterol, HDL, LDL, and triglycerides, among patients at Ibnu Sina Hospital Makassar in 2024. Although most participants exhibited normal BMI and normal levels of total cholesterol and triglycerides, a substantial proportion of patients presented with low HDL and elevated LDL levels across all BMI categories. These findings indicate that Body Mass Index alone is insufficient as a sole indicator of metabolic and cardiovascular risk. Comprehensive assessment of lipid profile and implementation of routine screening, along with lifestyle modification strategies, remain essential for early prevention of cardiovascular disease and long-term metabolic health.

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