

Profile of Cholesterol, Blood Pressure, and Nutritional Status Among Type 2 Diabetes Mellitus Patients at Sis Al Jufri Hospital, Palu City, 2024

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ARTICLE INFO	ABSTRACT
Article History: Received Accepted Published online	Background: Type. 2 Diabetes Mellitus is rapidly increasing in Indonesia, including Central Sulawesi, with a high prevalence and risk of complications such as high cholesterol, hypertension, and poor nutritional status. These three factors are interrelated and worsen the patient's condition.
Keywords: Diabetes Mellitus Type 2; Cholesterol; Blood Pressure; Nutritional Status.	Research Objective: This study aims to describe cholesterol, blood pressure and nutritional status in Type 2 DM patients at Sis Al Jufri Hospital, Palu City.
This is an open access article under the  CC-BY-SA license.	Research Methods: This study used a cross-sectional observational design with a total sampling of 37 newly diagnosed Type 2 DM patients at Sis Al Jufri Hospital, Palu City. Secondary data is taken from medical records, including cholesterol, blood pressure, and nutritional status. The analysis was carried out univariate using Jamovi, maintaining the confidentiality of the data and having received ethical permission.
	Conclusion: Research shows that the majority of type 2 DM patients at Sis Al Jufri Hospital in Palu city are women aged 45-60 years (51.4%). The dominant nutritional status was obesity 1 (43.3%), blood pressure was the majority of (43.2%). This profile is important for risk management of type 2 DM complications.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic condition characterized by insulin resistance, in which the body cannot use insulin effectively, or by insufficient insulin production. This condition leads to elevated levels of sugar (glucose) in the blood. Type 2 diabetes most commonly occurs in adults, although it can also develop in children and adolescents¹.

The World Health Organization (WHO) predicts an increase in the number of type 2 diabetes patients in Indonesia—from 8.4 million in 2000 to around 21.3 million by 2030. Approximately 537 million adults (aged 20–79 years) were living with diabetes in 2021, and more than 90% of these cases were type 2 diabetes².

The prevalence of diabetes in Indonesia has reached 1.7% across all age groups. Among these, type 2 diabetes is the most common, accounting for 50.2% of all diagnosed diabetes cases. Moreover, data from the Ministry of Health show that the prevalence of diabetes among individuals aged 15 years and older reached 11.7% in 2023, up from 10.9% in 2018³.

In Central Sulawesi, the prevalence of type 2 diabetes has shown a significant increase. As of early September 2022, 1,509 type 2 diabetes cases were detected from examinations involving 37,089 individuals. By March 2024, the total number of diabetes cases in Central Sulawesi had reached 16,456, including both

new and existing cases as well as deaths, distributed across 13 districts and cities ⁴.

The relationship between cholesterol, blood pressure, and nutritional status is crucial, as these three factors are interrelated and significantly contribute to the risk of complications. Patients with type 2 diabetes often experience elevated cholesterol levels, which increase the risk of cardiovascular diseases, particularly coronary heart disease. Hypertension, which frequently coexists with diabetes, is also a major risk factor for coronary heart disease and stroke.

Hypertension exacerbates vascular damage caused by hyperglycemia, thereby increasing the risk of complications in type 2 diabetes. Furthermore, an unbalanced nutritional status can worsen the condition of type 2 diabetes. Patients with poor nutritional status often exhibit poorer blood glucose control, while those who are overweight or obese tend to have higher insulin resistance ⁵.

Based on the above description, this study aims to examine cholesterol levels, blood pressure, and nutritional status among patients with type 2 diabetes mellitus at SIS Al Jufri Hospital, Palu City, during the period of January to December 2024. The results of this study are expected to provide valuable information for healthcare professionals in delivering optimal medical services to patients with type 2 diabetes mellitus.

MATERIAL AND METHOD

Research Design

This study used a descriptive quantitative design to describe the profile of cholesterol levels, blood pressure, and nutritional status among patients with type 2 diabetes mellitus.

Time and Place of Research

The research was conducted at Sis Al Jufri Hospital, Palu City, from January to December 2024. The data were obtained from the hospital's medical records during this period.

Population and Sample

The population of this study included all patients diagnosed with type 2 diabetes mellitus who were treated at Sis Al Jufri Hospital, Palu City,

during the study period. The sample consisted of patients who met the inclusion criteria, diagnosed with type 2 diabetes mellitus and had complete medical records containing data on cholesterol levels, blood pressure, and nutritional status, lastly agreed to participate in the study. Consecutive sampling technique was used, meaning all eligible patients meeting the inclusion criteria during the study period were included until the required sample size was reached.

Data Presentation

The data collected were processed and presented in tabular and narrative form to describe the distribution of cholesterol levels, blood pressure, and nutritional status among type 2 diabetes mellitus patients. Descriptive statistics, such as frequency and percentage, were used to present the findings.

RESULTS AND DISCUSSIONS

Table 1. Demographic Characteristics Based on Gender and Age of Type 2 Diabetes Mellitus Patients at Sis Al Jufri Hospital, Palu city

Gender	Amount	%
Male	12	32.4
Female	25	67.6
Total	37	100

Age	Amount	%
<45 years	11	29.7
45-60 years	19	51.4
>60 years	7	18.9
Total	37	100

Based on Table 1, the frequency distribution of type 2 diabetes mellitus patients at SIS Al Jufri Hospital, Palu City, according to gender, shows that there were 12 male patients (32.4%) and 25 female patients (67.6%). This indicates a higher proportion of female patients compared to males, which is consistent with a

study conducted at DKT Lahat Hospital, South Sumatra (2019) that reported a higher prevalence of type 2 diabetes among females ⁶.

This finding highlights the importance of considering gender factors in the management and further research of type 2 diabetes mellitus, as differences in biological and lifestyle characteristics between males and females may influence treatment approaches and prevention strategies.

Similarly, a study on the prevalence of type 2 diabetes mellitus during the COVID-19 pandemic in Manado City showed that female patients outnumbered male patients, with 121 females (56.0%) and 95 males (44.0%) (Anisa A. et al., 2022)(7). This finding is further supported by a study on the profile of hospitalized type 2 diabetes mellitus patients, which found that the majority were female, accounting for 51.77% ⁸.

The frequency distribution by age showed 11 patients (29.7%) aged <45 years, 19 patients (51.4%) aged 45–60 years, and 7 patients (18.9%) aged >60 years. These findings align with research by the Indonesian Ministry of Health (Kemenkes), which reported that the majority of diabetes patients were within the 45–60-year age range, with 56.7% of cases identified in this group. This may reflect the higher prevalence of chronic diseases and health conditions among individuals in this age range. Previous studies have shown that the risk of various chronic diseases increases with age, particularly among individuals over 45 years ⁹.

The difference may be attributed to several factors, such as hormonal differences, lifestyle variations, or levels of health awareness between males and females. Women tend to visit healthcare facilities more frequently, leading to higher detection rates of type 2 diabetes mellitus. Moreover, biological factors, including hormonal changes due to menopause, may contribute to the increased risk of developing type 2 diabetes among women.

The consistency of findings from the two aforementioned locations indicates that gender is one of the key factors influencing the prevalence of type 2 diabetes mellitus. This should be taken into account in disease prevention and management efforts, such as health education programs tailored by gender groups to reduce the risks and impact of this condition.

Data based on age also indicate that type 2 diabetes is more common among older age groups, primarily due to risk factors such as declining pancreatic function and unhealthy lifestyles ¹⁰.

This finding aligns with recent research by Dansinger (2024), published in WebMD, which reported that the diagnosis of type 2 diabetes increases significantly in middle age, with approximately 14% of Americans aged 45–64 years diagnosed with diabetes. This age group often represents a critical point in disease onset due to the combination of genetic factors, lifestyle habits, and obesity ¹¹.

Table 2. Body Mass Index (BMI) Distribution of Type 2 Diabetes Mellitus Patients at Sis Al Jufri Hospital, Palu City

Category (BMI)	Amount	%
Underweight	0	0
Normal Weight	3	8.1
Overweight	5	13.5
Obesity I	16	43.3
Obesity II	13	35.1
Total	37	100

Based on Table 2, the frequency distribution of the medical record characteristics of type 2 diabetes mellitus (DM) patients at SIS Al Jufri Hospital, Palu, according to Body Mass Index (BMI), shows that no patients were underweight (0%), 3 patients (8.1%) had a normal weight, 5 patients (13.5%) were overweight, 16 patients (43.3%) were classified as obesity I, and 13 patients (35.1%) as obesity II.

These findings are consistent with research conducted at Proklamasi Clinic, Depok (2019), which identified obesity as a major risk factor for the development of type 2 diabetes mellitus ¹².

The significant proportion of patients in the obesity I category (43.3%) indicates that most type 2 diabetes patients at this hospital are obese. This finding supports numerous studies identifying obesity as a leading factor contributing to the onset of type 2 diabetes. Obesity affects insulin sensitivity and glucose

metabolism, which in turn increases the risk of developing diabetes.

This condition also reflects a global trend in which the rising prevalence of obesity is closely linked to increasing diabetes rates. The absence of underweight patients suggests that malnutrition is not a primary factor among this patient population.

The importance of managing nutritional status and body weight in patients with type 2 diabetes is therefore evident. Proper obesity management can serve as an effective preventive measure to reduce diabetes complications and improve patients' quality of life. Hence, health education programs promoting balanced diets and regular physical activity should be strengthened to help patients achieve and maintain a healthy weight.

Obesity, as measured by Body Mass Index (BMI), contributes significantly to insulin resistance, which is a hallmark of type 2 diabetes. A study by Widodo et al. (2020) found that obese patients were 20 times more likely to develop metabolic syndrome compared to non-obese individuals. This suggests that weight gain and fat accumulation can worsen the metabolic conditions of diabetic patients ¹³.

Furthermore, another study showed that the proportion of patients with normal BMI was relatively low—only 30%, indicating a broader public health issue related to dietary habits and lifestyle. Research conducted in Surabaya by Supriyanto (2021) reported that only 44% of type 2 diabetes patients had normal BMI, while the rest were overweight or obese. This highlights the urgent need for public health interventions to address obesity as a major diabetes risk factor ¹⁴.

Table 3. Demographic Characteristics Based on Blood Pressure of Type 2 Diabetes Mellitus Patients at Sis Al Jufri Hospital, Palu City

Blood Pressure Category	Amount	%
Normal	12	32.4
Pre-hypertension	3	8.2
Hypertension Grade 1	7	18.9

Hypertension Grade 2	15	40.5
Total	37	100

Based on Table 3, the frequency distribution according to blood pressure shows that 12 patients (32.4%) had normal blood pressure, 3 patients (8.2%) were in the pre-hypertension category, 7 patients (18.9%) were classified as hypertension grade 1, and 15 patients (40.5%) as hypertension grade 2.

These results indicate that although some patients had normal blood pressure, more than half (67.6%) experienced blood pressure-related issues, including pre-hypertension and hypertension. Notably, the high proportion of grade 2 hypertension (40.5%) is concerning and warrants serious attention.

Hypertension is one of the major risk factors for complications in diabetes patients, including cardiovascular disease and stroke. Therefore, it is crucial for hypertensive patients to receive proper management to control their blood pressure. This may involve lifestyle modifications, such as adopting a healthy diet, increasing physical activity, and using antihypertensive medications when necessary.

Overall, while a few patients maintained normal blood pressure, the high prevalence of hypertension among type 2 diabetes patients highlights the need for more intensive monitoring and intervention programs. Education on blood pressure management and the importance of routine check-ups should be an integral part of diabetes care at this hospital.

These findings are consistent with research by Nasruddin et al. 2022, who also found that type 2 diabetes patients with blood pressure above 140/90 mmHg were at higher risk of developing complications, including diabetic ulcers. This emphasizes the importance of blood pressure control as a key aspect of diabetes management ¹⁵.

Furthermore, a study by Amelda et al. (2022) confirmed that grade 1 hypertension is a common condition among type 2 diabetes patients, with a significant proportion experiencing hypertension. The study also revealed that good blood glucose control can

help reduce the risk of hypertension in diabetic patients ¹⁶.

Table 4. Demographic Characteristics Based on Total Cholesterol Levels of Type 2 Diabetes Mellitus Patients at Sis Al Jufri Hospital, Palu City

Cholesterol Level	Amount	%
Optimal	16	43.2
Borderline	8	21.6
High	13	35.2
Total	37	100

Based on Table 4, the frequency distribution according to total cholesterol levels shows that 16 patients (43.2%) had optimal total cholesterol, 8 patients (21.6%) were in the borderline category, and 13 patients (35.2%) had high total cholesterol.

These results indicate that nearly half of the patients had optimal total cholesterol levels — a positive finding, since maintaining normal or optimal cholesterol can help reduce the risk of cardiovascular diseases, which are common complications among diabetes patients. However, it is noteworthy that 56.8% of type 2 diabetes patients had borderline or high total cholesterol levels, suggesting potential health risks that require attention.

The proportions of patients with borderline (21.6%) and high cholesterol (35.2%) highlight the need for enhanced health management among these individuals. Elevated cholesterol contributes to plaque formation in arteries, thereby increasing the risk of heart disease and stroke. Therefore, it is essential for patients with high cholesterol to receive appropriate interventions such as dietary modifications, increased physical activity, and, when necessary, the use of cholesterol-lowering medications.

These findings differ from research conducted at Purwokerto Selatan Health Center, which reported a significant correlation between blood glucose levels and total cholesterol among type 2 diabetes patients. Another study found that high cholesterol levels (>200 mg/dL) can increase the risk of developing type 2 diabetes ¹⁷.

CONCLUSION

The demographic characteristics of type 2 diabetes mellitus (DM) patients at SIS Al Jufri Hospital, Palu City showed that the majority were female, and the most common age group was 45–60 years, comprising 19 patients (51.4%).

Based on nutritional status (BMI), the majority of patients were classified as Obesity I, with 16 patients (43.3%).

Based on blood pressure, most patients were in the Hypertension Grade 2 category, with 15 patients (40.5%).

Meanwhile, based on total cholesterol levels, the majority of patients were in the optimal category, accounting for 16 patients (43.2%).

Overall, these findings indicate that middle-aged female patients with obesity and hypertension make up the dominant demographic among type 2 diabetes mellitus patients at SIS Al Jufri Hospital, emphasizing the need for integrated management strategies focusing on weight control, blood pressure regulation, and cholesterol monitoring to improve patient outcomes.

AUTHOR CONTRIBUTIONS

Conceptualization, F.A, M.R.D.L.R, A.M.; Methodology, F.A.; Validation, M.R.D.L.R, A.M.; Formal Analysis, F.A.; Investigation, F.A., Resources, F.A.; Data Curation, F.A.; Writing-Original Draft Preparation, F.A., M.R.D.L.R., and A.M.; Visualization, F.A. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declares that there is no conflict of interest.

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