

DESCRIPTION OF THE LEVEL OF KNOWLEDGE AND BEHAVIOR OF DIABETES MELLITUS PREVENTION IN STUDENTS OF THE D-IV MEDICAL LABORATORY TECHNOLOGY STUDY PROGRAM, CLASS OF 2025.

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Abstract

Diabetes Mellitus is a chronic metabolic disease characterized by elevated blood glucose levels due to impaired insulin production or function. This study aimed to describe the level of knowledge about Diabetes Mellitus among students of the D-IV Medical Laboratory Technology Study Program, class of 2025. This descriptive study used a cross-sectional approach involving 34 respondents through questionnaire distribution. The results showed that 52.9% of respondents had good knowledge, 35.3% had sufficient knowledge, and 11.8% had poor knowledge. Students still showed limited understanding regarding diabetes complications and normal blood glucose levels. Overall, students demonstrated a fairly good level of knowledge about Diabetes Mellitus.

Keywords: *Diabetes Mellitus, knowledge level, students.*

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease characterized by elevated blood glucose levels due to impaired insulin production or ineffective use. This disease is a non-communicable disease and is one of the most serious health challenges worldwide, including in Indonesia (Suryati, 2021). According to data from the International Diabetes Federation (IDF), in 2021, approximately 537 million adults aged 20–79 years were living with diabetes worldwide, and this figure is predicted to continue to increase, reaching 700 million by 2045 (Patue et al., 2025). The IDF also estimates that the prevalence of diabetes increases with age, reaching 19.9%, or approximately 111.2 million people in the 65–79 age group (Pawelay et al., 2026).

Indonesia is among the 10 countries with the highest diabetes burden in the world. According to IDF data, the number of DM sufferers in Indonesia increased sharply from 10.7 million in 2019 to 19.47 million in 2021, placing Indonesia in fifth place globally with a prevalence of 10.6% (Patue et al., 2025). The 2018 Riskesdas report recorded an increase in DM prevalence to 10.9%, while the International Diabetes Federation in 2019 ranked Indonesia as the 6th country in the world with the number of DM sufferers reaching 10.3 million (Perkeni, 2021). In Central Sulawesi Province, Palu city ranks second with the number of type 2 DM sufferers reaching 27,005 people, caused by various modifiable and non-modifiable risk factors (Pawelay et al., 2026).

Type 2 diabetes mellitus is the most common type of diabetes, accounting for over 90% of all diabetes cases. This disease occurs due to impaired insulin secretion and/or insulin resistance in target organs, particularly the liver and muscles. Clinically, type 2 diabetes occurs when the body is unable to

produce enough insulin to compensate for increasing insulin resistance (Pawelay et al., 2026; Suryati, 2021). Young people and young adults, including college students, are increasingly vulnerable to type 2 diabetes. Lifestyle changes experienced by college students—such as irregular eating patterns, high consumption of carbohydrates and sugary drinks, low physical activity, and high academic pressure—contribute significantly to the increased risk of glucose metabolism disorders in this group (Budiman et al., 2021; Andriani & Handayani, 2022).

Blood sugar levels are the concentration of glucose in the blood, which is the primary energy source for all body cells and is tightly regulated through hormonal mechanisms, primarily by insulin and glucagon (Suryati, 2021). Blood glucose monitoring is one of the five pillars of diabetes management, which includes education, medical nutrition therapy, physical activity, drug therapy, and blood glucose monitoring (Perkeni, 2021). Blood glucose testing can be performed using several methods, including random blood glucose (FBS), fasting blood glucose (FBS), 2-hour postprandial blood glucose (2-hour postprandial blood glucose), and HbA1c. In the context of community-based research or field screening, the Point of Care Testing (POCT) method using a glucose oxidase-enzymatic glucometer is the most practical option because it provides rapid results without the need for complete laboratory facilities (Perkeni, 2021).

Knowledge is a crucial factor in controlling blood sugar levels in people with diabetes. Research shows that 68.8% of people with low knowledge have poor blood sugar control practices (Andriani & Handayani, 2022). Conversely, patients with good knowledge tend to have better control over their blood sugar levels because they know the right diet, regular meal schedules, and types of foods permitted according to the 3J principle (amount, schedule, type) (Andriani & Handayani, 2022; Budiman et al., 2021). Research conducted by Budiman et al. (2021) also found a significant relationship between knowledge levels and fasting blood glucose levels in patients with type 2 diabetes, with a p value of 0.005 ($\alpha < 0.05$), which means that the lower the patient's knowledge, the higher their blood sugar levels.

Increasing knowledge through health education has proven effective in helping people with diabetes control their blood sugar levels. Providing education using appropriate media, such as leaflets, videos, and local culture-based media, can significantly improve patient understanding (Patue et al., 2025). In addition to education, other non-pharmacological interventions, such as the administration of boiled cherry leaves (*Muntingia calabura* L.), which contain the flavonoid quercetin, have also been shown to help lower blood glucose levels in patients with type 2 diabetes (Pawelay et al., 2026). These interventions further reinforce the importance of a comprehensive promotive and preventive approach, not solely focused on pharmacological therapy.

Students in the Medical Laboratory Technology (TLM) study program represent a unique group within the context of this research. While they possess basic knowledge of clinical laboratory testing, they also face academic pressures, dietary changes, and lifestyles that can lead to metabolic disorders. This condition makes TLM students a suitable group for early blood sugar screening (Budiman et al., 2021; Andriani & Handayani, 2022). Based on the description above, this study aims to describe the blood sugar analysis of Medical Laboratory Technology students, class of 2025, as an early detection measure for the risk of glucose metabolism disorders in this young age group, which has so far received less special attention in health screening programs.

LITERATURE REVIEW

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by elevated blood glucose levels due to impaired insulin secretion, insulin action, or both. This disease has become a global health problem due to its increasing prevalence each year. The increase in DM cases is also accompanied by a rise in complications, which can reduce patients' quality of life if not properly managed. Controlling blood glucose levels is crucial for preventing complications in people with diabetes mellitus (Auliyah et al., 2025; Dafriani & Dewi, 2019).

Blood glucose levels are influenced by various factors, both endogenous and exogenous. Endogenous factors include the hormones insulin, glucagon, and cortisol, as well as receptor systems in the muscles and liver. Exogenous factors include diet, physical activity, and lifestyle. Blood glucose testing

is used as an important indicator of the body's metabolic state and helps confirm the diagnosis of diabetes mellitus and monitor the effectiveness of therapy. Blood glucose testing can be performed through random blood glucose, fasting blood glucose, two-hour postprandial glucose, or an oral glucose tolerance test (Alydrus & Fauzan, 2022).

In the management of diabetes mellitus, patient knowledge plays a crucial role because it can influence behavior in controlling blood sugar levels. Good knowledge enables patients to understand their disease, including diet management, medication use, physical activity, and efforts to prevent complications. In health behavior theory, increased knowledge can influence a person's attitude, resulting in better health behaviors (Dafriani & Dewi, 2019).

Research conducted by Kunaryanti *et al.* showed a significant relationship between knowledge levels about diabetes mellitus and blood sugar control behaviors in outpatients with a p-value of 0.000. The results showed that patients with good knowledge tended to demonstrate better blood sugar control behaviors than those with low knowledge. The strength of this study lies in the use of statistical correlation analysis, but it did not directly assess the relationship with patient blood glucose levels (Kunaryanti *et al.*, 2018).

Another study conducted by Budiman *et al.* showed a relationship between knowledge levels and blood glucose levels in patients with type 2 diabetes mellitus with a p-value of 0.005. The study found that good knowledge was associated with better controlled blood glucose levels. Furthermore, the study found that energy and carbohydrate consumption levels showed no significant relationship to blood glucose levels. The strength of this study is that it examined several factors that influence blood glucose levels. However, the relatively small sample size limits the generalizability of the results (Budiman *et al.*, 2021).

Although various studies have shown a relationship between knowledge levels and health behaviors and complication prevention, there are still some differences in research focus and limitations in previous research. Some studies only assess health behaviors and complication prevention, while others emphasize increasing knowledge through specific educational media (Kunaryanti *et al.*, 2018; Auliyah *et al.*, 2025).

Based on this literature review, there is still a research gap regarding the relationship between knowledge levels of diabetes mellitus patients and blood glucose test results as an indicator of disease control. Therefore, this study was conducted to provide information on the relationship between patient knowledge levels and blood glucose control, thus providing a basis for developing educational programs and improving health services for diabetes mellitus patients (Budiman *et al.*, 2021).

METHOD

This study employed an observational analytical design with a cross-sectional approach. The aim was to determine the relationship between the knowledge level of diabetes mellitus patients and blood glucose test results. A cross-sectional approach was used because data collection for the independent and dependent variables was conducted simultaneously, allowing for direct analysis of the relationship between the variables.

The study population was all diabetes mellitus patients undergoing tests at the Hematology Laboratory on Thursday, April 30, 2026. Accidental sampling was used, with respondents meeting the inclusion criteria and being present during the study. Inclusion criteria included diabetes mellitus patients who were willing to participate, able to communicate effectively, and signed an informed consent form. Exclusion criteria included patients who did not complete the questionnaire or experienced conditions that prevented the interview process.

Materials and equipment used in the study included a diabetes mellitus knowledge questionnaire, a point-of-care blood glucose testing (POCT) device, glucose strips, lancets, alcohol swabs, dry cotton wool, gloves, and a research observation sheet.

The research phase began with an explanation of the study's purpose and the examination procedures to respondents. Respondents who met the criteria were given an informed consent form and then asked to complete a questionnaire to determine their knowledge of diabetes mellitus. After completing the questionnaire, blood glucose levels were measured using the Point of Care Testing (POCT) method. Capillary blood samples were obtained by pricking the fingertip with a sterile lancet and placed on a glucose strip installed in the POCT device.

The research process began with the identification of respondents who met the inclusion criteria. Respondents who agreed to participate were then given an explanation of the research objectives, benefits, and

procedures, followed by completing an informed consent form. After respondents agreed, a questionnaire was completed to measure their level of knowledge about Diabetes Mellitus. The next stage was blood glucose level examination using the Point of Care Testing (POCT) method by taking capillary blood samples from the respondents' fingertips. All data from the questionnaire and blood glucose examination were then collected and recorded on the research observation sheet. The data obtained were then processed and analyzed to determine the relationship between knowledge level and blood glucose level examination results.

The data collected consisted of primary data in the form of respondent characteristics, knowledge scores, and blood glucose test results. Data collection techniques included direct observation, interviews using questionnaires, and laboratory testing using POCT.

Table 1. Variables Of Study

Variable	Category	Measurement Scale
Knowledge level	Yes, No, Sometimes	Ordinal
Blood glucose level	Normal, High	Nominal
Age	Years	Ratio
Gender	Male, Female	Nominal

RESULTS AND DISCUSSION

The study, entitled "Overview of the Level of Knowledge of Diabetes Mellitus among Students of the Diploma IV Medical Laboratory Technology Study Program, Class of 2025," was conducted on 34 students of the Diploma IV Medical Laboratory Technology Study Program, Class of 2025. This study aimed to determine the students' level of knowledge regarding Diabetes Mellitus. Data collection was conducted using a questionnaire containing questions regarding the definition, causes, symptoms, prevention, complications, and management of Diabetes Mellitus.

1. Respondent Characteristics

Table 2. Distribution of Respondents by Gender

Gender	Frequency (n)	Percentage (%)
Man	10	29.4%
Woman	24	70.6%
Total	34	100%

Based on the table above, the majority of respondents were female, 24 people (70.6%), while 10 people were male (29.4%). This shows that students in the D-IV Technology Study Program The Medical Laboratory class of 2025 is predominantly female.

2. Level Of Knowledge Students About Diabetes Mellitus

Knowledge level categories:

- Good = 76-100%
- Enough = 56-75%
- Less = <56%

Table 3. Distribution of Students' Knowledge Levels About Diabetes Mellitus

Knowledge Level	Frequency (f)	Percentage (%)
Good	20	58,8%
Enough	10	29,4%
Not enough	4	11,8%
Total	34	100%

Level Diagram Student Knowledge :

Good : ██████████ 52,9%
 Enough : ████████ 35,3%
 Not Enough : █████ 11,8%

3. Analysis of Respondents' Answers Based on Knowledge Indicators

Table 4. Distribution of Respondents' Correct Answers Based on Indicators

No	Question Indicator	Correct Answer
1.	Understanding Diabetes Mellitus	33
2.	Risk factors for Diabetes Mellitus	27
3.	The main symptoms of Diabetes Mellitus	30
4.	Complications of Diabetes Mellitus	22
5.	Check blood sugar	25
6.	Normal blood sugar levels	19
7.	Prevention of Diabetes Mellitus	31
8.	Effects of diet on diabetes	29
9.	The effect of exercise on DM	30
10.	Management of Diabetes Mellitus	24

Discussion Based on the results of a study of 34 students in the Diploma IV Medical Laboratory Technology study program, the class of 2025, the majority of respondents (18 students) had a good level of knowledge, with 52.9% of them. However, 12 students (35.3%) still had a fair level of knowledge, and 4 students (11.8%) had a poor level of knowledge.

These results indicate that most students have a fairly good understanding of Diabetes Mellitus, particularly regarding the definition of the disease, common symptoms, prevention, and the importance of a healthy lifestyle. This high level of knowledge is likely influenced by the respondents' educational background in the health sector, which resulted in more frequent exposure to medical information during the learning process.

However, the results also indicate that several aspects of knowledge remain low. For the knowledge indicator regarding normal blood sugar levels, only 55.9% of the respondents received correct answers. Furthermore, knowledge regarding the complications of Diabetes Mellitus was also relatively low, with 64.7% of the respondents receiving correct answers.

This indicates that students still lack an understanding of the clinical aspects and laboratory interpretation related to Diabetes Mellitus. As Medical Laboratory Technology students, understanding laboratory test reference values and disease complications is crucial because they directly relate to the diagnostic testing process in the laboratory.

The respondents' low understanding of Diabetes Mellitus complications may be due to a lack of in-depth understanding of the long-term impacts of the disease, such as diabetic nephropathy, diabetic neuropathy, diabetic retinopathy, and cardiovascular disease. Furthermore, students likely prefer general theory over in-depth clinical interpretation.

This study also shows that good knowledge does not necessarily reflect comprehensive understanding. Although the majority of respondents understood the definition and prevention of Diabetes Mellitus, some still struggled to answer specific and applicable questions, particularly regarding normal blood sugar levels and disease complications.

If this condition is not addressed, it can impact students' readiness to understand laboratory tests related to Diabetes Mellitus when entering clinical practice or the workplace. Therefore, more in-depth education regarding the interpretation of Diabetes Mellitus laboratory test results is needed through practicums, seminars, and case-based learning.

The results of this study are in line with previous research which stated that health students tend to have a good level of knowledge regarding metabolic diseases, but still have weaknesses in the aspects of clinical interpretation and practical application in the laboratory field.

CONCLUSION

Based on the results of the study on the level of knowledge regarding Diabetes Mellitus among 34 students of the D-IV Medical Laboratory Technology Study Program, class of 2025, it can be concluded that most respondents had a good level of knowledge about Diabetes Mellitus, with a percentage of 52.9%. Meanwhile, 35.3% of respondents had sufficient knowledge and 11.8% had poor knowledge. Students showed better understanding of the definition, symptoms, causes, and prevention of Diabetes Mellitus, while knowledge regarding complications, laboratory interpretation, and normal blood glucose levels was still limited.

ARTICLE TITLE

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These findings indicate that students generally have adequate theoretical knowledge due to their educational background in the health field. However, some respondents still experienced difficulties in understanding more specific clinical aspects related to Diabetes Mellitus.

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