

## OVERVIEW OF BLOOD SUGAR LEVELS WHEN USING THE POINT OF CARE TESTING (POCT) METHOD

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### Abstract

Blood glucose level is an important indicator used to assess the body's metabolic condition and detect the risk of diabetes mellitus. University students are considered vulnerable to unhealthy lifestyle changes, including irregular eating patterns, lack of physical activity, academic stress, and insufficient sleep, which may affect blood glucose regulation. This study aimed to describe random blood glucose levels using the Point-Of-Care Testing (POCT) method among students of the Medical Laboratory Technology Study Program, Class of 2025, at Politeknik Cendrawasih Palu. This research employed a descriptive study with a cross-sectional approach. The sample consisted of 34 students who met the inclusion criteria. Blood glucose examination was performed using a POCT glucometer with capillary blood samples obtained from the fingertip. The results showed that all respondents had random blood glucose levels within the normal range, with values ranging from 89–161 mg/dL and an average level of 110.41 mg/dL. These findings indicate that the respondents generally had good glucose metabolism. The POCT method proved to be practical, rapid, and effective for early blood glucose screening and health monitoring among students.

**Keywords:** Random Blood Glucose, POCT, Students.

### INTRODUCTION

Blood glucose level is one of the important indicators used to assess the metabolic condition of the body. Glucose serves as the primary energy source for body cells, especially the brain, which requires a continuous supply of glucose to function properly. The balance of blood glucose levels is regulated by hormones such as insulin and glucagon produced by the pancreas. Disturbances in this regulatory mechanism may lead to abnormal blood glucose levels and increase the risk of metabolic disorders, including diabetes mellitus.

Diabetes mellitus has become a major global health problem due to its increasing prevalence every year. According to the International Diabetes Federation (IDF), Indonesia is among the countries with a high number of diabetes cases. Changes in lifestyle, such as excessive consumption of high-sugar foods and beverages, lack of physical activity, stress, and irregular sleep patterns, contribute significantly to the increase in blood glucose disorders, particularly among young adults and students.

University students are considered a vulnerable group because they often experience unhealthy lifestyle changes during academic life. Busy schedules, sedentary habits, irregular eating patterns, and academic stress may affect blood glucose regulation. Students of the Medical Laboratory Technology Study Program are expected not only to understand laboratory examinations theoretically but also to be aware of their own health conditions as future laboratory professionals.

Random blood glucose examination using the Point-Of-Care Testing (POCT) method is widely used because it is practical, fast, and easy to perform. This method uses capillary blood samples obtained from the fingertip and provides immediate results without requiring a complete laboratory setup. Therefore, POCT is suitable for health screening activities in educational institutions and community settings.

This study aims to describe the random blood glucose levels of Medical Laboratory Technology students, Class of 2025, using the POCT method. The results of this study are expected to provide baseline data regarding students' metabolic health conditions and increase awareness about the importance of maintaining a healthy lifestyle and conducting regular blood glucose examinations as an early prevention effort against diabetes mellitus.

In addition, early screening of blood glucose levels is important because metabolic disorders often develop gradually without obvious symptoms in the early stages. Many young adults are unaware that unhealthy lifestyle habits may increase their risk of developing diabetes mellitus in the future. Therefore, routine blood glucose examinations can help identify abnormal glucose conditions at an early stage and encourage individuals to adopt healthier lifestyles before more serious complications occur.

Furthermore, this study is expected to contribute to the development of scientific knowledge in the field of clinical chemistry and laboratory medicine, particularly regarding the application of the Point-Of-Care Testing (POCT) method in educational settings. The findings may also serve as reference data for future studies related to blood glucose levels, lifestyle factors, and metabolic health among university students. In addition, this research may increase students' awareness of the importance of maintaining healthy behaviors and monitoring their health conditions regularly as part of disease prevention efforts.

### LITERATURE REVIEW

Blood glucose is the amount of glucose present in the bloodstream and serves as the main source of energy for body cells. Glucose is obtained from carbohydrate metabolism and distributed throughout the body through the circulatory system. The body maintains blood glucose levels within a normal range through a regulatory mechanism involving insulin and glucagon hormones produced by the pancreas. Insulin functions to decrease blood glucose levels by facilitating glucose uptake into cells, while glucagon increases blood glucose levels when the body requires additional energy. The balance between these hormones is essential for maintaining metabolic homeostasis.

Abnormal blood glucose regulation may lead to hyperglycemia or hypoglycemia. Hyperglycemia occurs when blood glucose levels rise above normal limits and is commonly associated with diabetes mellitus. On the other hand, hypoglycemia occurs when blood glucose levels drop below normal and may cause symptoms such as weakness, dizziness, and loss of consciousness. Continuous disturbances in blood glucose regulation can negatively affect body organs and increase the risk of serious complications, including cardiovascular disease, kidney failure, nerve damage, and visual impairment.

Diabetes mellitus is one of the most common metabolic disorders worldwide and has become a major public health concern. According to the International Diabetes Federation (IDF), the prevalence of diabetes continues to increase globally, including in developing countries such as Indonesia. Diabetes mellitus is generally classified into type 1 diabetes, type 2 diabetes, and gestational diabetes. Type 2 diabetes is the most common form and is strongly associated with unhealthy lifestyle factors such as obesity, poor dietary habits, lack of physical activity, smoking, stress, and insufficient sleep. Early prevention and detection are therefore essential to reduce the burden of the disease.

Young adults, including university students, are increasingly exposed to unhealthy lifestyle habits that may influence blood glucose metabolism. Academic stress, irregular eating patterns, frequent consumption of fast food and sugary beverages, lack of exercise, and sedentary lifestyles are common among students. These behaviors may increase the risk of elevated blood glucose levels and metabolic disorders in the future. Although students in health-related programs generally possess knowledge about healthy living, several studies indicate that knowledge alone does not always lead to healthy behavior practices.

Previous studies have investigated blood glucose levels among different populations. Kalangi (2020) reported that obesity among adolescents was associated with higher blood glucose levels and increased metabolic risk. Juliantari Putri (2024) found that most respondents in her study had random blood glucose levels within the normal range, although several individuals showed values close to hyperglycemic conditions. Similarly, Rahayu et al. (2024) explained that psychological stress among adolescents and students may affect cortisol hormone secretion, which in turn can increase blood glucose levels through gluconeogenesis mechanisms.

Research conducted by Restika et al. (2025) also emphasized that unhealthy lifestyle patterns among adolescents contribute significantly to the increasing trend of type 2 diabetes mellitus in younger populations. Their study highlighted that sedentary behavior, low physical activity, and excessive consumption of sweetened beverages are among the major risk factors affecting glucose metabolism. These findings indicate that preventive measures and routine health screenings are important even among younger age groups.

Blood glucose examination is commonly performed using several laboratory methods, including fasting blood glucose tests, postprandial blood glucose tests, HbA1c examinations, and random blood glucose tests. Among these methods, random blood glucose examination using the Point-Of-Care Testing (POCT) method is widely used because it is practical, simple, and provides rapid results. POCT utilizes capillary blood obtained from the fingertip and does not require sophisticated laboratory equipment. This method is especially useful for screening activities, field research, and community health services.

The Point-Of-Care Testing (POCT) method works using enzymatic principles, commonly glucose oxidase-based reactions, to measure blood glucose concentration. Several previous studies have shown that POCT provides reliable results for screening purposes and is highly efficient in situations requiring immediate examination results. However, certain factors such as environmental temperature, hematocrit levels, device calibration, and improper handling of test strips may influence measurement accuracy. Therefore, proper procedures and quality control are necessary to ensure reliable examination outcomes.

Medical Laboratory Technology students are future health professionals who will be directly involved in laboratory diagnostic services. Consequently, they are expected not only to understand laboratory procedures theoretically but also to apply healthy lifestyles and monitor their own health conditions. Awareness of personal health status is important because health professionals should serve as role models for the community regarding disease prevention and healthy living practices.

Despite the growing number of studies related to blood glucose examinations, research specifically focusing on Medical Laboratory Technology students remains limited. Most previous studies have focused on patients in healthcare facilities or general community populations rather than students in health vocational institutions. Furthermore, there is still limited baseline data regarding the metabolic health status of first-year Medical Laboratory Technology students, particularly in vocational higher education institutions in Indonesia.

Based on these considerations, this study was conducted to describe the random blood glucose levels of Medical Laboratory Technology students, Class of 2025, using the Point-Of-Care Testing (POCT) method. This research is expected to provide baseline information regarding students' metabolic health conditions and contribute to the development of preventive health programs in educational settings. In addition, the findings may increase awareness among students about the importance of maintaining healthy lifestyles, conducting routine blood glucose examinations, and preventing metabolic disorders from an early age.

## **METHOD**

This study employed a descriptive cross-sectional approach. The aim of this descriptive study was to provide an overview of random blood sugar levels among students in the Medical Laboratory Technology Study Program, Class of 2025, using the Point-Of-Care Testing (POCT) method. The cross-sectional approach involved data collection at a specific point in time to accurately describe the respondents' condition during the study.

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The study was conducted at the Hematology Laboratory of Cendrawasih Polytechnic, Palu, on April 30, 2026. The population was all students in the Medical Laboratory Technology Study Program, Class of 2025. The sample was drawn from students who agreed to participate and met the inclusion and exclusion criteria determined by the researcher.

The research instruments used included an informed consent form, a respondent identity questionnaire, stationery, and blood sugar testing equipment, including a POCT glucometer, glucose strips, sterile lancets, 70% alcohol swabs, dry cotton wool, and medical gloves. The examination used capillary blood samples from the respondents' fingertips.

The research procedure consisted of pre-analytical, analytical, and post-analytical stages. In the pre-analytical phase, the researcher explained the research objectives and obtained respondents' consent through an informed consent form. The analytical phase involved drawing capillary blood using a sterile lancet and measuring blood sugar levels using a POCT glucometer. The results were then recorded and analyzed descriptively in the form of a frequency distribution table to determine the students' blood sugar levels throughout their studies.

## RESULTS AND DISCUSSION

This study was conducted to determine the description of random blood glucose levels using the Point-Of-Care Testing (POCT) method among students of the Medical Laboratory Technology Study Program, Class of 2025. The examination was carried out on 34 respondents using capillary blood samples obtained from the fingertip and analyzed with a glucometer. The POCT method was selected because it is practical, rapid, and suitable for screening activities in educational environments.

Based on the examination results, all respondents had random blood glucose levels within the normal category. The blood glucose values ranged from 89 mg/dL to 161 mg/dL, with an average value of 110.41 mg/dL. These results indicate that the respondents generally had stable glucose metabolism and good insulin regulation mechanisms.

**Table 1. Results of Random Blood Glucose Examination**

No	Gender	Number Of Respondents	Normal Category	Blood Glucose Category
1	Famale	26	26	Normal
2	Male	8	8	Normal
	Total	34	34	Normal

The results demonstrated that no respondents experienced hypoglycemia or hyperglycemia during the examination. Most respondents had blood glucose levels within the range of 90–120 mg/dL, which is still considered normal for random blood glucose measurements. This finding suggests that the majority of respondents maintained balanced glucose homeostasis.

The normal blood glucose levels found in this study may be influenced by the relatively young age of the respondents. Most participants were between 18 and 23 years old, an age range in which pancreatic function and insulin sensitivity are generally still optimal. At this stage of life, the body can efficiently regulate glucose metabolism and maintain stable blood glucose concentrations.

Another factor that may contribute to normal blood glucose levels is physical activity. Daily activities performed by students can increase glucose utilization by muscle cells and improve insulin sensitivity. Adequate physical activity helps prevent excessive accumulation of glucose in the bloodstream and supports overall metabolic balance.

Dietary habits also play an important role in maintaining blood glucose levels. Students who consume balanced meals with appropriate carbohydrate intake may have better glucose regulation compared to those who frequently consume high-sugar foods and beverages. Although this study did not specifically analyze dietary intake statistically, healthy eating patterns may contribute to the normal blood glucose results observed among respondents.

Academic stress is another factor that may influence blood glucose levels among university students. Stress can stimulate cortisol hormone secretion, which may increase blood glucose concentrations through gluconeogenesis mechanisms. However, despite potential academic pressure, all respondents in this study still demonstrated normal blood glucose levels, indicating that their metabolic conditions remained stable during the examination period.

Sleep patterns may also affect glucose metabolism. Insufficient sleep and irregular sleeping habits can reduce insulin sensitivity and increase the risk of metabolic disorders. University students often experience irregular sleep schedules due to assignments, examinations, and social activities. Nevertheless, the respondents in this study

maintained blood glucose levels within normal limits, suggesting that sleep-related metabolic disturbances may not yet have significantly affected this population.

The findings of this study are consistent with previous studies conducted among young adults and university students. Juliantari Putri (2024) reported that most respondents in her study also had normal random blood glucose levels. Similarly, Kalangi (2020) explained that younger populations generally have better metabolic regulation compared to older age groups.

Research conducted by Restika et al. (2025) emphasized that unhealthy lifestyle behaviors among adolescents and young adults could increase the risk of type 2 diabetes mellitus. Sedentary lifestyles, obesity, and excessive sugar consumption were identified as important contributing factors. Therefore, maintaining healthy habits remains essential even when blood glucose levels are currently normal.

The use of the Point-Of-Care Testing (POCT) method in this study provided several advantages. The method allowed rapid examination, required only a small amount of capillary blood, and did not require complicated laboratory equipment. POCT is therefore highly suitable for screening activities in educational institutions and community-based health programs.

In addition to its practicality, the POCT method is also beneficial because examination results can be obtained immediately. Rapid results enable respondents to receive direct information regarding their blood glucose conditions. This feature is particularly useful for early detection and preventive health programs targeting large populations.

Although all respondents had normal blood glucose levels, preventive measures should still be encouraged. Students should maintain healthy lifestyles by engaging in regular physical activity, consuming balanced diets, reducing sugary food intake, managing stress effectively, and maintaining adequate sleep duration. These preventive strategies are important to reduce the future risk of metabolic disorders and diabetes mellitus.

The findings of this study may serve as baseline data regarding the metabolic health conditions of Medical Laboratory Technology students, Class of 2025. This information can be useful for future health monitoring programs and educational interventions related to healthy lifestyles and metabolic disease prevention among university students.

This study also contributes to scientific knowledge regarding the application of the Point-Of-Care Testing (POCT) method in blood glucose examinations. The results support the use of POCT as a practical and effective screening tool for detecting blood glucose abnormalities in educational and community settings.

Overall, the results of this study indicate that students of the Medical Laboratory Technology Study Program, Class of 2025, had random blood glucose levels within normal limits. These findings suggest that the respondents generally maintained good glucose metabolism and stable metabolic health conditions at the time of examination.

## CONCLUSION

Based on the results of the study, all students of the Medical Laboratory Technology Study Program, Class of 2025, who were examined using the Point-Of-Care Testing (POCT) method had random blood glucose levels within the normal category. The average blood glucose level obtained was 110.41 mg/dL, with values ranging from 89–161 mg/dL.

These findings indicate that the respondents generally had good glucose metabolism and normal blood sugar regulation. The Point-Of-Care Testing (POCT) method was proven to be practical, fast, and effective for the initial screening of blood glucose levels. Therefore, maintaining a healthy lifestyle and conducting regular blood glucose examinations are important to prevent metabolic disorders and diabetes mellitus in the future.

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