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The effect of jackfruit consumption on blood glucose levels in the community using the POCT method

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Abstract

Background: Diabetes mellitus is a global health problem that continues to rise, with projections reaching 700 million cases by 2045. In Indonesia, this disease is the third leading cause of death. Diabetes mellitus is a metabolic disorder characterized by hyperglycemia due to insulin deficiency or dysfunction. DM is classified into type 1, type 2, other types, and gestational diabetes. Type 1 DM occurs due to autoimmune destruction of pancreatic beta cells, whereas type 2 DM arises from insulin resistance and decreased insulin production. Major risk factors include unhealthy diets, fast food consumption, physical inactivity, obesity, stress, age, and family history. Lifestyle changes have also contributed to the increased prevalence of DM, particularly due to sedentary behavior. Jackfruit, as a fruit with a medium-high glycemic index, has the potential to raise blood glucose levels. This study was conducted to assess the effect of jackfruit consumption on blood glucose using the POCT method as a rapid detection tool to reduce the risk of complications and death due to DM. *Objectives*: observing the increase in glucose levels before and after consuming jackfruit. *Materials and Methods*: The study was conducted through structured interviews and blood glucose measurements using POCT before and after jackfruit consumption with three portion categories. Data were recorded based on the number of fruits consumed. Data processing was carried out using Excel and SPSS, with normality tests performed to determine the use of either the Paired Sample T-Test or the Wilcoxon test, depending on the data distribution. *Results*: The study showed that jackfruit consumption caused a significant increase in blood glucose levels, with an average rise of 14 mg/dL after 2 hours. Analysis using POCT, normality tests, and the Wilcoxon test indicated a significant difference before and after consumption. The magnitude of the increase was influenced by the glycemic index, fruit ripeness, and the respondents' conditions. *Conclusions*: Based on the findings of this study, it can be concluded that the results showed a p-value of 0.00, indicating a statistically significant difference. This means that consuming jackfruit can increase blood glucose levels.

Keywords

Jackfruit; Blood Glucose; POCT; Glycemic Response; Food Compusumption

1. Introduction

Diabetes mellitus is a global health problem that requires serious attention. The number of cases continues to rise each year. It is projected that by 2045, the prevalence of diabetes will reach 9.9%, or approximately 700 million people worldwide. In Indonesia, diabetes ranks third as the leading cause of death. Diabetes mellitus (DM) is a clinical syndrome associated with metabolic disorders and is characterized by elevated glucose levels in the body. The diagnosis of DM is based on the characteristic symptoms experienced by the patient as well as blood glucose test results indicating an increase. (Putri Sagita, *et al.*, 2021). Diabetes mellitus involves absolute or relative insulin deficiency and impaired insulin function. Diabetes mellitus is classified into type 1 DM, type 2 DM, other types of DM, and gestational DM. (Decrolin Eva, 2019).

Type 1 diabetes is a condition that occurs due to autoimmune destruction of beta cells in the pancreatic islets, resulting in a drastic decrease in endogenous insulin production. This disease accounts for approximately 5–10% of total diabetes cases worldwide. Type 1 diabetes can appear in all age groups, but the first symptoms are usually observed during puberty or early adulthood. Individuals with type 1 diabetes are estimated to have a life expectancy of about one decade after disease onset, making the incidence in adults higher than in children. Currently, the prevalence is around 6 per 10,000 population, and over the past 50 years, this number has increased to approximately 15 per 10,000 population per year. Management of this disease involves insulin administration or glucose-lowering medications to maintain stable blood sugar levels. (Mobasseri M, *et. Al.*, 2020).

Type 2 diabetes mellitus is characterized by relative insulin deficiency caused by pancreatic cell dysfunction and insulin resistance. The risk factors are divided into two categories: modifiable and non-modifiable (Kadek R. Widiasari, et al., 2021). Type 2 diabetes mellitus is a chronic metabolic disorder marked by hyperglycemia due to impaired insulin sensitivity and insufficient insulin production by the pancreas. (Melytania *et al.*, 2023).

Diabetes mellitus is a group of diverse metabolic disorders characterized by elevated blood glucose levels (hyperglycemia). In individuals with diabetes, body cells may become unresponsive to insulin, or the pancreas may no longer be able to produce sufficient insulin. This condition leads to hyperglycemia, which in the short term can cause acute metabolic complications, and in the long term can result in various neuropathic

complications. (Ervina E. M, *et al.,* 2022).

Insulin is a hormone produced by the pancreas to help regulate blood sugar levels. This hormone is closely related to health issues that cause high blood sugar (hyperglycemia) and low blood sugar (hypoglycemia), both of which are associated with diabetes mellitus. (Freeman AM, 2023).

One of the risk factors for diabetes is lifestyle. Lifestyles associated with the occurrence of diabetes include high consumption of fast food, lack of physical activity, and stress. Other factors that can increase the risk of diabetes are heredity, age, and overweight. The impact of diabetes on health is not limited to blood sugar levels; in the long term, this disease can cause complications in vital organs, disability, and even death. The main cause of diabetes today is lifestyle changes resulting from improved economic conditions. Rapid economic development in Asian countries has driven changes in infrastructure, technology, and food supply, which in turn trigger excessive food consumption and sedentary behavior. Sedentary behavior refers to daily sitting or lying down, excluding sleep time. (Alya Azzahra Utomo, *et al*., 2020)

According to Anna Angraeni, *et al*., 2017 Jackfruit (*Artocarpus heterophyllus* Lamk) is a popular fruit in tropical regions, especially in Indonesia, and can be found throughout most areas, with significant economic value. Jackfruit belongs to the Moraceae family and is a large fruit with a strong fragrant aroma and sweet taste. Based on plant structure, jackfruit is a compound fruit, with 8–15% of its weight consisting of seeds. Each seed is enclosed in a white aril surrounding a thin brown endosperm, which is protected by the white cotyledon flesh. Jackfruit cotyledons are rich in starch and protein. In ripe fruits, jackfruit has a unique aroma and is commonly consumed as a dessert and as an ingredient in various Asian culinary preparations. (Mukprasirt et al., 2004 dalam Anna Angraeni, *et al*., 2017). Jackfruit has a medium to high glycemic index (GI), which means it can cause a significant rise in blood sugar levels after consumption, especially in individuals with diabetes or insulin resistance. Although jackfruit contains fiber and other beneficial nutrients, its natural carbohydrates still affect the blood glucose response.

Point-of-Care Testing (POCT) It is a medical diagnostic test method performed near the patient, often outside the traditional laboratory setting. This method is used because of its convenience and rapid results, allowing healthcare providers to make immediate

decisions. POCT is widely applied in various clinical settings, including emergency rooms, intensive care units, and even home care (Shaw, Julie L.V.2021)

Based on the background above, this study was conducted to examine the effect of jackfruit consumption on the increase in blood glucose levels in the community using the POCT method for rapid blood sugar testing. The study aims to reduce diabetes-related mortality by identifying causal factors that can be modified or improved.

2. Materials and Methods

2.1. Types of Research

This study used an analytical observational research method with a purposive sampling design, conducted in May 2024 in Cilame Village, Rt 02/Rw 10, West Java Province. The study population included all residents, with a sample size of 88. This number was determined from the total population of Rt 02/Rw 10, which is 115 individuals aged 18–50 years. The samples used as research subjects were capillary blood, which facilitated testing before and after treatment, including measuring blood glucose levels before jackfruit consumption and 2 hours after jackfruit consumption. In this study, the dependent variable was blood glucose levels, and the independent variable was jackfruit. Inclusion criteria for this study were: (1) not suffering from type 1 or type 2 diabetes mellitus, (2) not suffering from chronic diseases such as kidney disease, hypertension, etc., (3) not currently taking medications such as diuretics or insulin, and (4) being healthy residents aged 18–50 years.

2.2. Research Methods

The sampling technique influences the samples that will be used. Sampling was conducted through structured interviews, involving a question-and-answer process with the residents. Before being given, the jackfruit was first tested using a POCT device, and blood glucose was rechecked 2 hours after consuming the jackfruit. After the blood glucose measurements, the results were recorded according to the amount of jackfruit consumed. The jackfruit given to residents was divided into three categories: the first category consumed 1 fruit, the second category consumed 2 fruits, and the third category consumed 3 fruits. Data processing in this study was carried out using Excel and then continued with SPSS. The tests performed included a normality test: if the significance value (sig) > 0.05,

the sample is normally distributed and the Paired Sample T-Test can be used; if sig < 0.05, the Wilcoxon test is applied..

3. Results and Discussion

3.1. Results

In the study on the effect of jackfruit consumption on the increase in blood glucose levels using the POCT method, conducted in May 2024 in Cilame Village, Rt 02, a total of 88 samples were obtained from the residents of Cilame Village, Rt 02. The respondents met the age criteria of 18 to 50 years. The samples used as research subjects were capillary blood, which was tested using POCT and then analyzed and processed.

Tabel 1. descriptive results of glucose examination data

Category	Mean	SD
Blood glucose level before	111 g/dL	25
Blood glucose level after	125 G/dL	22

Based on Table 1, the results showed a mean blood glucose level before consumption of 111 mg/dL with an SD of 25, and a mean blood glucose level after consumption of 125 mg/dL with an SD of 22.

Tabel 2. Normality test results

Category	N	Sig. (2-tailed)
Blood glucose level before	88	0,00
Blood glucose level after	88	0,00

Based on Table 2, the normality test using the Kolmogorov-Smirnov test showed a significance value of 0.00, which is < 0.05, indicating that the data are not normally distributed.

Tabel 3 Wilcoxon Test Results

Category	Z	Sig. (2-tailed)
Blood glucose level before	88	0,00
Blood glucose level after	88	0,00

Based on Table 3, the results showed a significance value of 0.00, indicating a significant difference between the variables before and after consuming jackfruit.

3.2. Discussion

His study used a sample of 88 respondents, with data processed and analyzed using SPSS, applying a significance level of 0.05, indicating a 5% level of precision. Table 1 illustrates the effect of jackfruit consumption on the increase in blood glucose levels using the POCT method, showing differences between before and after consuming jackfruit. Based on blood glucose measurements, the descriptive data were as follows: Mean blood glucose level before consumption: 111 mg/dL, mean blood glucose level after consumption: 125 mg/dL, indicating an average increase in blood glucose levels in the group. The standard deviation (SD) indicates the extent of variation or dispersion of blood glucose values from the mean. A larger SD reflects greater variability among individuals in the population.

Table 2 shows the results of the normality test, where samples are considered acceptable if the significance level > 0.05. Based on the obtained data, the normality test showed a significance value of 0.00. Since P < 0.05, there is a statistically significant difference in blood glucose levels before and after jackfruit consumption using POCT.

Table 3 presents the Wilcoxon test results, which were applied because the data were not normally distributed. The results showed a significance value of 0.00, indicating a significant difference in blood glucose levels before and after consuming jackfruit.

This study demonstrates a significant increase in blood glucose levels after jackfruit consumption. The average increase in blood glucose was recorded at 14 mg/dL, 2 hours post-consumption. These results are consistent with the hypothesis that consuming fruits with a medium to high glycemic index can acutely affect blood glucose levels. Furthermore, statistical analysis showed that the difference in blood glucose levels before and after jackfruit consumption was significant, with $p < 0.05$, indicating that jackfruit consumption is directly associated with increased blood glucose levels in the subjects studied.

The study found that jackfruit consumption can contribute to increased blood glucose levels, especially when consumed in large quantities. Therefore, although jackfruit may

provide certain health benefits, excessive consumption by individuals with diabetes or blood sugar control issues may lead to elevated blood glucose levels, even if not always significant. However, some studies report that jackfruit consumption does not increase blood glucose levels. This aligns with Ranasinghe et al., 2025, which found that free sugars and rapidly available carbohydrates increase as jackfruit ripens, with ripe fruit containing much higher amounts of carbohydrates and total sugars compared to unripe fruit, thus having a greater potential to raise blood glucose. Similarly, Hettiaratchi UP et al., 2011 reported that the glycemic index (GI) and glycemic load (GL) of jackfruit vary; one meal study showed a GI ≈ 75 (high category) for a serving of jackfruit — meaning that certain portions can trigger postprandial blood glucose spikes.

Conversely, Brittany Barry found that jackfruit has a relatively low glycemic index, approximately 40–60, suggesting that the fruit does not cause drastic spikes in blood glucose levels. Some sources also note that jackfruit is rich in fiber, which helps slow digestion and glucose absorption into the bloodstream, reducing the risk of sudden glucose spikes. Therefore, consuming jackfruit in reasonable amounts is considered safe even for individuals with diabetes, as it helps maintain stable blood glucose levels.

Jackfruit increases blood glucose levels, and the glucose response is influenced by two factors: the physiological condition of the respondent and the foods consumed. In this study, respondents met the inclusive and exclusive criteria. They had no history of diabetes mellitus, and the age range of 18–50 years was chosen to observe differences in blood glucose increases.

4. Conclusions

Based on the findings of this study, it can be concluded that the results showed a p-value of 0.00, indicating a statistically significant difference. This means that consuming jackfruit can increase blood glucose levels.

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