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Differences in Blood Glucose Levels Before and After the Consumption of Sweet Tea in People in Marong Village

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ABSTRACT

Blood glucose is the body's main energy source and is greatly influenced by the consumption patterns of food and beverages, especially those containing sugar. Uncontrolled increases in blood glucose levels can lead to metabolic disorders such as Diabetes Mellitus. Consumption of sweetened tea containing added sugar can cause a rapid spike in blood glucose levels, especially when consumed regularly and in excessive amounts. The purpose of this study is to find out the difference in blood glucose levels before and after sweet tea consumption in the Marong Village community. This study uses a pre-experimental design with a one-group pretest-posttest approach. A total of 16 respondents were selected using the purposive sampling technique. Blood glucose levels were checked before and two hours after the consumption of sweet tea using the POCT (Point of Care Testing) tool. Data were analyzed using a statistical paired sample t-test. The results of the study showed obtained the average blood glucose level before the consumption of sweet tea was 88.3 mg/dL, and after consumption was 97.3 mg/dL, with an average difference of 8.3 mg/dL. The results of the paired sample t-test showed a significance value of 0.000 ($p < 0.05$), which means that there is a statistically significant difference. This study concludes that the consumption of sweet tea has a significant influence on increasing blood glucose levels.

INTRODUCTION

Glucose is the most important carbohydrate, most of which is absorbed into the bloodstream as glucose, while other sugars are converted into glucose in the liver. Glucose is the primary fuel source for body tissues and is essential for energy production. Blood glucose levels are closely associated with diabetes mellitus. A blood glucose level of ≥ 200 mg/dL, accompanied by symptoms such as polyuria, polydipsia, polyphagia, and unexplained weight loss, is sufficient to diagnose diabetes mellitus (Apriliani, 2023).

Diabetes mellitus has become one of the most pressing public health challenges globally, including in Indonesia, with prevalence rates continuing to rise each year. Data shows that in 2020, type 2 diabetes ranked fourth among the most common diseases, and just one year later, it had jumped to third place in 2021. According to the 2021 report by the International Diabetes Federation (IDF), approximately 537 million adults aged 20 –79 years (about 6,7% of the global population in that age group) have diabetes, a figure projected to rise sharply to 783 million cases by 2045. The rising burden of this disease not only contributes to high morbidity and mortality rates but also imposes significant economic

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pressures through long-term care costs, necessitating integrated prevention efforts including primary prevention, early detection, and comprehensive management to minimize complications and maintain the quality of life for those affected (Diabetes, 2021).

The main factor contributing to diabetes mellitus (DM) is closely related to uncontrolled eating habits, where excessive consumption of simple carbohydrates and sugary drinks increases the supply of glucose in the bloodstream beyond the body's regulatory capacity. This excess intake not only triggers spikes in blood glucose levels but also impacts the cells' sensitivity to insulin, thereby worsening long-term glycemic stability. Therefore, managing DM requires the implementation of a healthy lifestyle that includes balanced nutrition planning (considering the glycemic index, fiber intake, and portion control) as well as regular monitoring of blood sugar levels. These steps are crucial for aligning macronutrient consumption with the patient's metabolic needs and preventing chronic complications resulting from hyperglycemia (Hasim, 2022).

In recent decades, consumption of sweetened food and beverage products has seen a significant surge worldwide, with an average annual growth rate of 3–4% over the past ten years, according to Euromonitor International. This increase aligns with rising prevalence rates of obesity and non-communicable diseases, and is further reflected in the fact that approximately 75% of global processed foods and beverages contain added sugar. Meanwhile, sweetened beverages (including soda, fruit-flavored drinks, energy drinks, and ready-to-drink coffee and tea) account for more than 46% of total added sugar consumption. Various epidemiological data show a strong association between increased sugar intake in the form of food and beverages and an increased risk of overweight, obesity, and the development of type 2 diabetes (Christine Evelyn Sitorus, Nelly Mayulu, 2021).

Tea is one of the most popular refreshing beverages across various cultures, but excessive consumption, especially of sweetened varieties, can have detrimental metabolic effects. Adding 25–30 grams of sugar to each serving of tea has been shown to increase blood glucose levels by 25–30 mg/dL in individuals with normal metabolic function, thereby increasing the risk of developing obesity, diabetes, and cardiovascular disease. To minimize these potential health risks, it is recommended to limit the consumption of sweetened tea and consider using natural sweeteners or serving tea without added sugar. This strategy not only helps maintain glycemic stability but also supports a healthy lifestyle and the prevention of chronic diseases (Ribatul et al., 2023).

Castor et al. (2025) analyzed the burden of type 2 diabetes and cardiovascular disease caused by sugary drinks in 184 countries and found that in 2020, consumption of sugary drinks was responsible for approximately 9,8% of new cases of type 2 diabetes worldwide (approximately 2,2 million cases). This figure highlights the significant public health impact of sweetened beverage consumption patterns (including sweetened tea). Such epidemiological findings reinforce the strong association between liquid sugar consumption and increased diabetes risk (Lara-Castor et al., 2025).

The hypothesis of this study is that there is a difference in blood glucose levels before and after consuming sweet tea among the people of Marong Village.

MATERIALS/METHOD

This study uses a pre-experimental design based on a one-group pretest-posttest approach to analyze the impact of sweet tea consumption on blood glucose levels (Jiwantoro YA et al., 2023). The research location was in Marong Village, East Praya Subdistrict, Central Lombok Regency. It was chosen due to the high prevalence of sweet tea consumption in the local community's social activities. The study was conducted over four months (January–April 2025), encompassing the recruitment of participants, data collection,

and analysis of results. The target population included all village residents who regularly consumed sweet tea as part of their daily lifestyle. Sample selection utilized purposive sampling with the following inclusion criteria: (1) being an adult (≥20 years old), (2) having no diagnosis or history of diabetes mellitus based on self-assessment or medical records, and (3) agreeing to participate through informed consent to ensure data validity and sample suitability for the research objectives. A Theory section (if necessarily added) should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. A Calculation section represents a practical development from a theoretical basis.

The number of respondents and samples in this study was determined using Federer's formula. There were 16 respondents, each of whom underwent two measurement sessions, one before and one after consuming sweet tea, bringing the total sample to 32.

In this study, the independent variable used was sweet tea of brand X, with each serving prepared by steeping one tea bag weighing 1.85 grams in 200 ml of warm water, then adding 5 grams of granulated sugar (equivalent to one teaspoon) until completely dissolved to ensure consistency in taste and glucose content. Meanwhile, the dependent variable observed was the change in blood glucose levels of the respondents, measured using a Point of Care Testing (POCT) glucometer at two different measurement times before and after consuming the sweet tea solution of brand X.

The study began with the recruitment and selection of participants who met the inclusion criteria, followed by the signing of the informed consent form. Subsequently, all respondents underwent a two-hour fasting period before baseline blood glucose level measurement (pretest) using the Point of Care Testing (POCT) method. After the initial data collection was completed, participants consumed one serving of sweet tea brand X, prepared according to standard protocol. The post-test blood glucose measurement was conducted exactly two hours after tea consumption, using capillary blood sampling with a sterile lancet via aseptic procedure, followed by immediate glucose reading using a glucometer.

All collected data were then processed using a stepwise statistical method. The first step involved a Shapiro-Wilk normality test to evaluate parametric assumptions. If the test results show a normal distribution pattern and meet the variance homogeneity requirement, the analysis continues with a paired sample t-test to measure the significance of the difference. However, if the conditions of normality or homogeneity are not met, the researcher will apply the Mann-Whitney non-parametric test as an alternative comparative analysis.

RESULTS

A total of 16 respondents were found to be in the sweet tea drinker category, with 13 female respondents and 3 male respondents.

Table 1. Gender Distribution of Respondents

No.	Sex	Total	Percentage
1.	Male	3	18,75 %
2.	Female	13	81,25 %
Total		16	100 %

Based on Table 1. Out of a total of 16 respondents included in the category of sweet tea drinkers, the majority were female as many as 13 people (81.25%), while male respondents amounted to 3 people (18.75%). This shows that the majority of respondents in this study are women.

Table 2. Blood Sugar Level Examination Results Before and After Consuming Sweet Tea

No.	Sample Code	Sex	Blood Glucose Levels Before Consuming Sweet Tea (mg/dL)	Blood Glucose Levels After Consuming Sweet Tea (mg/dL)	Difference (mg/dL)
1.	S1	Male	96	105	9
2.	S2	Female	100	110	10
3.	S3	Female	97	103	6
4.	S4	Female	89	93	4
5.	S5	Female	80	90	10
6.	S6	Female	80	88	8
7.	S7	Male	91	101	10
8.	S8	Female	80	89	9
9.	S9	Female	91	95	4
10.	S10	Female	90	105	15
11.	S11	Female	76	89	13
12.	S12	Female	84	101	17
13.	S13	Male	88	102	14
14.	S14	Female	87	91	4
15.	S15	Female	106	112	6
16.	S16	Female	78	83	5
Highest	-	-	106	112	17
Lowest	-	-	76	83	4
Average	-	-	88,3	97,3	8,3

Referring to Table 2. It is known that the average blood glucose level before consuming sweet tea was 88.3 mg/dL. After consumption, the average value increased to 97.3 mg/dL, indicating an average increase of 8.3 mg/dL. The highest post-consumption blood glucose level recorded was 112 mg/dL, observed in subject S15, while the lowest post-consumption level was 83 mg/dL, recorded in subject S16. The most significant increase in blood glucose levels occurred in subject S12, at 17 mg/dL. Conversely, the lowest increase of 4 mg/dL was observed in several subjects, namely S4, S9, and S14. This data reflects individual variation in blood glucose response to sweet tea consumption.

Tabel 3. Normality Test Results

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,148	16	,200	,959	16	,638
Posttest	,165	16	,200	,947	16	,445

Based on the Shapiro-Wilk test results, a significance value of 0.638 was obtained for the data before sweet tea consumption, and 0.445 for the data after sweet tea consumption. Since both significance values are greater than 0.05 (sig. > 0.05), H_0 is accepted, meaning that the data in this study is normally distributed. Therefore, the analysis was continued with a parametric statistical test, the Paired sample t-test.

Table 4. Paired Sample t-test results

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair	Pretest - Posttest	-9,00000	4,11501	1,02875	-11,19274	-6,80726	-8,748	15	,000

The results of the paired sample t-test show that the difference between the pre- and post-test means is -9,000, with a t-value of -8,748 and a significance level (Sig 2-tailed) of 0,000 ($p < 0,05$). The 95% confidence interval for the difference in values is between -11,192 and -6,807, which does not cross zero, so it can be concluded that the difference is statistically significant.

Based on the paired sample t-test results in Table 4, a Sig. 2-tailed (p-value) of 0,000 was obtained, which is less than 0,05 ($p < 0,05$). Therefore, the decision regarding the significance value (Sig. 2-tailed) is to accept H_1. This means there is a significant difference in blood glucose levels before and after consuming sweet tea, indicating that administering sweet tea to respondents can increase blood glucose levels.

DISCUSSION

Based on the results of examinations conducted on 16 respondents, it was found that the average blood glucose level before consuming sweet tea was 88,3 mg/dL. In contrast, after consuming sweet tea it increased to 97,3 mg/dL. The average increase in blood glucose levels was 8,3 mg/dL. These data show that there was an increase in blood glucose levels after consuming sweet tea.

Drinks such as sweet tea are rich in sucrose (granulated sugar). Once it enters the body, sucrose is broken down by special enzymes (such as sucrase) in the small intestine into glucose and fructose. Glucose is then absorbed into the bloodstream, significantly raising blood sugar levels. This triggers the pancreas to release insulin, the key hormone that instructs body cells to absorb glucose as an energy source or store it. The peak blood sugar level typically occurs about one hour after consumption and returns to stable levels within 2–3 hours due to the effective action of insulin (Suputra, 2021).

The rate of glucose absorption is greatly influenced by the rate of gastric emptying. Rapid gastric emptying causes a sudden surge of glucose into the bloodstream, while slow gastric emptying acts as a defense mechanism that slows absorption and mitigates blood sugar spikes. Regular consumption of high-sugar beverages can overwhelm the system. This triggers insulin resistance, where cells become less responsive, forcing the pancreas to work harder to produce more insulin. This continuous excessive workload has the potential to weaken pancreatic function and is a major risk factor for the development of type 2 diabetes (Jalleh et al., 2022).

The results of the Paired Sample t-Test showed a sig. 2-tailed value of 0,000 ($p < 0,05$), which means that there is a statistically significant difference between blood glucose levels before and after consuming sweet tea. Thus, the hypothesis proposed in this study is

accepted, namely that there is a difference in blood glucose levels before and after consuming sweet tea among the community in Marong Village.

The results of this study are in line with previous research conducted by Situmorang et al. (2023), which examined the comparison of blood sugar levels before and after the administration of white sugar, palm sugar, and honey to students at STIKes Santa Elisabeth Medan. The results of this study showed that there was an increase in blood sugar levels after the administration of white sugar, palm sugar, and honey (Situmorang et al., 2023).

Then, research conducted by Febriyanti et al. (2022) examined the comparison of blood glucose levels before and after drinking tea. The results of this study revealed that there was a difference in fasting blood glucose levels after consuming tea (Wahyuning Febriyanti, Apriani, 2022).

CONCLUSIONS

Based on the research results, it was concluded that the average blood glucose level before consuming sweet tea was 88.3 mg/dL, while after consumption it became 97.3 mg/dL. There was an average increase of 8.3 mg/dL. The results of the Paired Sample t-test showed a significant difference between blood glucose levels before and after consumption of sweet tea ($p = 0.000$; $p < 0.05$).

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