

COMPARISON OF GLUCOSE LEVELS IN DIABETES MELLITUS PATIENTS BEFORE AND AFTER CONSUMING KERSEN LEAVES (*MUNTINGIA CALABURA*) AT BOROKO PUBLIC HEALTH CENTER

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ABSTRACT

Diabetes mellitus is a chronic metabolic disease characterized by increased blood glucose levels. Diabetes mellitus can be treated through medical or herbal means. One herbal plant that can lower blood glucose levels is the leaves of the cherry tree. This study aims to determine the difference in blood glucose levels before and after consuming a decoction of cherry leaves (*Muntingia calabura*) in patients with diabetes mellitus. This research uses a quantitative approach with a one-group pretest-posttest design. The sample consists of 30 people selected using purposive sampling technique. Blood glucose levels were measured using the POCT method before and after a 7-day intervention. The Shapiro-Wilk normality test showed that the data were not normally distributed, so the analysis was conducted using the Wilcoxon Sign-Rank test. The results show a decrease in blood glucose levels after the intervention, with a p-value < 0.05, indicating a significant difference between glucose levels before and after consuming cherry leaves. Conclusion: The infusion of cherry leaves has the potential to be an alternative for lowering blood glucose levels in patients with diabetes mellitus.

Keywords : Comparison of Glucose Levels, Diabetes Mellitus, and Cherry Leaves

INTRODUCTION

Diabetes mellitus is a significant global health issue. This disease, often known as diabetes or sugar disease, is characterized by the body's inability to regulate blood glucose levels. According to *the International Diabetes Federation* (IDF, 2019), more than One million deaths per year are caused by diabetes mellitus. Advances in science and technology, coupled with changes in social and economic lifestyles due to modernization, are factors driving the increase in the incidence of degenerative diseases, including diabetes mellitus, which has the potential to be fatal [1].

Diabetes mellitus cases have shown a consistent upward trend each year. According to estimates by *the World Health Organization* (WHO, 2019), the number of individuals suffering from this disease is projected to increase from 171 million in 2000 to approximately 366 million in 2030 [2].

Meanwhile, the latest report from *the International Diabetes Federation* (IDF, 2024) states that the global prevalence of diabetes mellitus has reached 11.1%. This figure indicates that approximately one in

nine adults aged 20 to 79 years is living with the disease. By 2024, the number of sufferers is estimated to reach 589 million and is likely to increase to 853 million by 2050 [3].

In North Sulawesi, specifically in North Bolaang Mongondow Regency, there has been a significant increase in diabetes mellitus cases. The number of sufferers increased from 244 people in 2019 to 941 in 2020, then 1,394 in 2021, and reached 1,690 in 2022. This trend shows an increase in cases from year to year. Distribution by gender shows that there are more female sufferers, namely 1,094 people compared to 300 men, according to data from the PPID of North Bolaang Mongondow Regency (2022). [4].

Based on existing data, the Boroko Community Health Center (Puskesmas) area was recorded as having the highest number of Diabetes Mellitus sufferers, with 296 people in 2022. In an effort to reduce the incidence of Diabetes Mellitus in Boroko Village, the Boroko Community Health Center implemented the Elderly Posyandu Program. This program is a form of health care for the elderly with the primary goal of improving their health. One of the health services provided is a blood glucose test to determine glucose levels in the body as an initial step in preventing Diabetes Mellitus. However, this program has not succeeded in significantly reducing the number of Diabetes Mellitus sufferers (PPID Kab. Bolmut, 2022).

Based on a study conducted by researchers, the number of sufferers actually increased to 463 in 2023. Although the number decreased to 416 in 2024, this figure

is still considered high. This indicates that diabetes mellitus in Boroko Village is not limited to the elderly but is also increasingly being found among young people, necessitating a more comprehensive approach to its management (Primary Data, 2025).

In addition to pharmacological and insulin therapy, diabetes mellitus can also be managed through traditional medicine. Cherry (*Muntingia calabura*) is one type of plant that has the potential to be used as a natural therapy.[1] The flavonoid content in cherry leaves is known to function in supporting the regeneration process and formation of pancreatic beta cells, while also stimulating insulin secretion. Furthermore, these compounds also have antioxidant activity that plays a crucial role in protecting cells from damage caused by an imbalance between free radicals and antioxidants, known as oxidative stress (Moonti et al. 2023). [5].

The use of cherry leaves as an alternative therapy for diabetes mellitus is closely related to its primary goal, which is to stabilize blood glucose levels. Glucose itself is an essential energy source, especially for the brain and muscles, so its balance is crucial for maintaining normal physiological function. The mechanism for regulating blood sugar levels is primarily controlled by the hormone insulin produced by the pancreas (Davies et al., 2022). Some commonly used methods for examining glucose levels include Fasting Blood Glucose (FBS), Random Blood Glucose (RSG), Oral Glucose Tolerance Test (OGTT), 2-Hour

Postprandial Blood Glucose (2-Hour PPG), and HbA1C. [6]

In blood glucose testing practice, various methods are commonly used, including enzymatic, electrochemical, and *Point of Care Testing* (POCT). The enzymatic method is generally used in laboratories due to its high accuracy, although it requires special equipment and longer analysis times. The electrochemical method works by utilizing glucose's ability as a reducing agent for an indicator, which will experience a color change during the reduction process. However, this technique has limitations, as the presence of other compounds in the blood can also act as reducing agents for the indicator, thus reducing the level of measurement specificity (Fahmi et al., 2020). Meanwhile, the *Point of Care Testing* (POCT) method is often used because it provides rapid results and can be performed outside the laboratory. [7]

Given the above background description regarding the increasing number of cases of Diabetes Mellitus (DM) every year, efforts are needed to prevent the increase in diabetes mellitus by consuming boiled cherry leaves (*Muntingia calabura*). Therefore, this study is formulated under the title : "*Comparison of Glucose Levels in Diabetes Mellitus (DM) Patients Before and After Consuming Cherry Leaves (Muntingia calabura)* " At Boroko Health Center".

RESEARCH METHODOLOGY

Study is quantitative with design A *one-group pre-posttest* study using a longitudinal approach , namely repeated

observations of the same research object over a certain period of time. The study was conducted in June 2025. The research location was Boroko Community Health Center, Kaidipang District.

In the research this , as many as 30 samples individuals suffering from diabetes mellitus The sample selection was conducted by considering the inclusion and exclusion criteria determined by the researcher. The data analysis in this study was univariate analysis, covering respondent characteristics such as age, gender, and glucose level test results. The bivariate analysis used a *paired sample t-test*. for data with normal distribution and *Wilcoxon signed-rank* for data with distribution abnormal .

RESEARCH RESULT

Based on research conducted at the Boroko Community Health Center laboratory unit in North Bolaang Mongondow Regency, a total of 30 samples were obtained using a *purposive sampling technique* . After obtaining the results, the next step was to analyze the research data into univariate and bivariate analyses .

1. Univariate Analysis

The type of univariate analysis used is descriptive analysis to describe each research variable, in this case what the researcher describes or presents are: respondent identity in the form of gender and age, as well as the results of blood glucose level examinations before and after consuming the cherry leaf concoction.

Table 1. Distribution of Respondents by Gender

Jenis Kelamin	Frekuensi	Persentase (%)
Laki-laki	11	36.7
Perempuan	19	63.3
Jumlah	30	100

(Source: Primary Research Data, 2025).

Table 1 above shows that of the 30 respondents involved in this study, the majority were women, 19 of whom participated, or 63.3%. Meanwhile, 11 men, or approximately 36.7% of the total participants, were men.

Table 2. Distribution of Respondents by Age

Usia	Frekuensi	Persentase (%)
25-34 tahun	4	13.3
35-44 tahun	7	23.3
45-54 tahun	4	13.3
55-64 tahun	9	30.0
≥ 65 tahun	6	20.0
Total	30	100

(Source: Primary Research Data, 2025).

Table 2 above shows the distribution of respondents' age groups. This age division refers to the age grouping according to the Central Statistics Agency (2021). Based on this age group division and as shown in the table, it was obtained that of the 30 respondents in this study, the majority of respondents were in the 55–64 age range, amounting to 9 people, equivalent to 30%. The 35–44 age group was next with 7 people (23.3%). Respondents aged 65 years and above (≥ 65 years) numbered 6 people (20%). Meanwhile, each age group of 25–34 years and 45–54 years consisted of 4 people, equivalent to 13.3% of the total respondents.

Table 3. Results of Blood Glucose Level Examination of Respondents Before and After Consuming Cherry Leaf Concoction

	Hasil Pemeriksaan Kadar Glukosa Darah			
	Sebelum Konsumsi Daun Kersen		Sesudah Konsumsi Daun Kersen	
	N	%	N	%
Normal	0	0	23	76.7
Abnormal (Tinggi)	30	100	7	23.3
Total	30	100	30	100

(Source: Primary Research Data, 2025).

Based on Table 3 above, the results show that before consuming the cherry leaf concoction, all respondents' blood glucose levels (100%) were within the abnormal (high) range. However, after consuming the cherry leaf concoction for 7 consecutive days, 23 respondents (76.7%) had normal blood glucose levels, while 7 respondents (23.3%) had high (abnormal) blood glucose levels.

2. Bivariate Analysis

In this study, a bivariate analysis was conducted to assess differences in blood glucose levels in diabetes mellitus patients before and after consuming cherry leaves in the Boroko Community Health Center (Puskesmas Boroko) area. The analysis was conducted using SPSS version 26.0 software. The analysis process began with a normality test on the research data to determine whether the data distribution followed a normal pattern. Based on the results of this normality test, researchers can decide whether the difference test in the bivariate analysis will be conducted using a parametric or non-parametric approach.

a. Normality Test

Table 4. Blood Glucose Level Normality Test Before and After Consuming Cherry Leaf Concoction

Kadar Glukosa Darah	Test of Normality			
	Intervensi	Shapiro Wilk		
		Statistic	N	Sig.
	Sebelum Konsumsi Ramuan Daun Kersen	.501	30	.000
	Sesudah Konsumsi Ramuan Daun Kersen	.571	30	.000

(Source: Primary Research Data, 2025).

Table 4 shows that the *asymptotic significance* value for the variable “before consuming the cherry leaf concoction” is 0.000, which is smaller than the value of $\alpha = 0.05$, or $0.000 < 0.05$. Likewise, for the variable “after consuming the cherry leaf concoction”, the *asymptotic significance* value is 0.000, which is smaller than the value of $\alpha = 0.05$, or $0.000 < 0.05$.

Taking these results into account and referring to the decision-making criteria applicable in the *Shapiro-Wilk test*, it can be concluded that both data sets—both before and after the intervention—do not exhibit a normal distribution pattern. Consequently, parametric methods such as the *paired sample t-test* cannot be applied for bivariate analysis. As an alternative, the analysis was continued using a *non-parametric method*, namely the *Wilcoxon Signed-Rank Test*, designed to test for statistically significant differences between two sets of data that are related to each other but do not follow a normal distribution.

b. Non-parametric Test (*Wilcoxon Signed-Rank*)

Non-parametric tests are intended to process data that is not normally distributed

in the normality test, the *Wilcoxon Signed-Rank test* is used. For process this data For measure significance difference between two paired data groups with ordinal scale for distributed data abnormal (Setyawan, 2022). [8]

Table 5. Comparison of Hemoglobin Levels of the Paired t Test with Manual Homogenization and Blood Roller Mixer

Sesudah Konsumsi Ramuan Daun Kersen - Sebelum Konsumsi Ramuan Daun Kersen Signifikan (2-Tailed)		Taraf Signifikansi	Keterangan
Z	-4.783 ^b	0,05	Terdapat perbedaan yang signifikan
Asymp. Sig. (2-tailed)	.000		

(Source: Primary Research Data, 2025).

In table 5, the significance value (*sig.*) (*2-Tailed*) is 0.000, which is smaller than the α value ($\alpha = 0.05$), or $0.000 < 0.05$. So, referring to the conclusion of the *Wilcoxon Signed-Rank test* based on the results of the analysis, it can be concluded that blood glucose levels experienced significant changes after consuming the cherry leaf concoction compared to the conditions before consumption. Thus, the alternative hypothesis (H_a) is accepted, while the null hypothesis (H_0) is rejected.

DISCUSSION OF RESEARCH RESULTS

This research was conducted in the Boroko Community Health Center (Puskesmas) working area in Kaidipang District, North Bolaang Mongondow Regency, focusing on blood glucose levels measured in the community health center's laboratory. The study lasted for 13 days, from June 18 to June 30, 2025.

The first step taken by the researchers was to identify and register patients diagnosed with diabetes mellitus in the Boroko Community Health Center area. After potential respondents were identified, the researchers explained the purpose and procedures of the study and distributed *informed consent forms* and questionnaires. Individuals who agreed to participate were asked to sign the informed consent form and complete the questionnaire as proof of their official consent.

The next step is an initial blood glucose test. A capillary blood sample is taken and tested using an Autocheck *Point of Care Testing* (POCT) device. The researchers then record the results on a specially prepared form.

After the initial examination, researchers administered an intervention in the form of a cherry leaf decoction to all respondents. The decoction consisted of 100 grams of fresh cherry leaves (approximately 10 leaves), thoroughly cleaned, then boiled in 400 ml of water until it reached boiling point and the volume reduced to approximately 100 ml. After letting it steep for two minutes, the decoction was consumed once daily for seven consecutive days.

During the intervention period, researchers also recorded daily food records for each respondent to monitor their food intake. This step was taken to minimize potential bias that could influence the study results.

All measurement results, both before and after the intervention, have been collected and presented systematically in Table 4.1 in the previous section.

a. Blood Glucose Levels Before Giving Cherry Leaf Decoction

The data shown in Table 3 indicates that all respondents (100%) had blood glucose levels above normal before the

intervention. Therefore, it can be concluded that all study participants experienced hyperglycemia before consuming the cherry leaf decoction. None of the study subjects were in the normoglycemic or prediabetic categories.

These findings support Decroli's (2019) statement, which states that a person can be diagnosed with diabetes mellitus if their random blood sugar level exceeds 200 mg/dL. Diabetes mellitus is a complex metabolic condition characterized by high blood glucose concentrations, or hyperglycemia. Under physiological conditions, glucose from consumed food circulates in the bloodstream, and the balance of glucose levels is controlled by insulin, a hormone produced by the pancreas. This hormone plays a crucial role in controlling how the body stores and utilizes glucose. [9]

b. Blood Glucose Levels After Consuming Cherry Leaf Decoction

Based on the information presented in Table 3, it can be identified that of the total of 30 respondents, 23 individuals or 76.7% had blood glucose levels that were within normal limits, while 7 other people (23.3%) still showed levels that were classified as high or abnormal.

From these results, it can be concluded that although most respondents still showed higher-than-normal glucose levels, there was a significant decrease compared to pre-intervention levels. This indicates a positive effect of consuming the cherry leaf decoction on lowering blood glucose levels.

This conclusion is in accordance with the statement put forward by Pittara (2022),

who stated that random blood glucose levels (GDS) are considered within normal limits if the value is less than 200 mg/dL, a reference also used in this study. [10]

The decrease in blood glucose levels after consuming cherry leaves is also in line with the opinion of Moonti et al. (2023), who explained that the management of diabetes mellitus is not only limited to the administration of pharmacological drugs or insulin therapy, but can also be done through the use of traditional medicine. One plant with this therapeutic potential is cherry leaves (*Muntingia calabura*). These leaves contain flavonoids, active compounds known to stimulate the regeneration of pancreatic beta cells and increase insulin secretion, as well as acting as antioxidants that can ward off oxidative stress, a condition that occurs due to an imbalance between free radicals and the body's antioxidant defense system.

c. Comparison of Respondents' Blood Glucose Levels Before and After Consuming Cherry Leaf Concoction

The results of the non-parametric analysis using the Wilcoxon Signed Ranks Test, as listed in Table 4.6, show a significance value (2-tailed) of 0.000, which is below the specified significance limit ($\alpha = 0.05$). Thus, because $p < 0.05$, it can be concluded that there is a statistically significant difference between blood glucose levels before and after administration of the cherry leaf concoction. This indicates that the alternative hypothesis (H_a) is accepted, while the null hypothesis (H_0) is rejected.

The analysis of average blood glucose levels showed a significant decrease of 41

mg/dL, from a baseline of 236 mg/dL before administering the cherry leaf concoction to 195 mg/dL after the intervention. This finding indicates that consuming the cherry leaf concoction has a positive effect on lowering blood glucose levels in diabetes mellitus patients participating in the study, particularly in the Boroko Community Health Center area.

This conclusion is supported by the theory presented by Rosida (2018) in Kusumaningrum (2020), which states that the cherry plant (*Muntingia calabura*), besides being easily found in tropical areas, also has pharmacological properties through the content of active compounds such as saponins, tannins, and flavonoids. These three compounds act as antioxidants and have the ability to stimulate the secretion of the hormone insulin, which is important in regulating glucose metabolism. In addition to controlling blood sugar levels, cherry leaves are also known to have benefits as an antihypertensive, anticholesterol, anti-inflammatory, antiseptic, and antitumor. [11]

A similar statement was made by Zahroh in Rambe (2021), who explained that boiled cherry leaves contain saponins and flavonoids, which function to suppress glucose absorption in the digestive tract, thereby minimizing carbohydrate intake into the blood. This effect is likely the main factor in the decrease in blood glucose levels in 23 (76.7%) respondents after seven days of consuming the cherry leaf concoction. [12]

The findings of this study support the results previously reported by Kusumaningrum (2020). Based on an

independent t-test analysis of 36 participants, a p-value of 0.006 ($p \leq 0.05$) was obtained. This figure indicates that consuming boiled kerson leaves significantly reduces fasting blood sugar levels in patients with diabetes mellitus. [13]

CONCLUSION

1. Before consuming the cherry leaf concoction, all respondents suffering from diabetes mellitus in the Boroko Community Health Center work area (100%) had blood glucose levels that exceeded normal limits, with an average value reaching 236 mg/dl.
2. After consuming the cherry leaf concoction, changes were seen in the blood glucose levels of respondents with diabetes mellitus in the Boroko Community Health Center work area, where 23 respondents (76.7%) had glucose levels in the normal range, while 7 respondents (23.3%) were still at high (abnormal) levels, with an average glucose level of 195 mg/dl.
3. Statistical analysis showed a significant difference between the average blood glucose levels before and after consuming the cherry leaf concoction. This is indicated by a two-tailed significance value of 0.000, which is smaller than $\alpha = 0.05$ ($0.000 < 0.05$). Thus, the alternative hypothesis (H_a) is accepted, while the null hypothesis (H_0) is rejected.

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